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EDITORIAL

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Urban Borderlands: Difference, Inequality, and Spatio-Temporal In-Betweenness in Cities

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Abstract

The concept of urban borderlands helps us to understand how divisions take *place* in the city. Urban borderlands expand territorially beyond the mere linear border, drawing together what exists in or across both sides of the divide. In that they are not merely physical, but of course always socially, culturally, and experientially densely charged, the notion of the urban borderland offers itself as a useful analytic in the study of urban conditions that are marked by contiguity and coexistence. Contributions in this issue explore the potential of urban borderline studies across global cities, spanning various scales and employing theoretical frameworks such as borderlands, liminality, and multiple identities. This issue emphasizes the importance of considering bordering processes in urban planning and design and shows that urban borderlands are sites of contestation, negotiation, and coexistence, offering valuable lessons for the future of urban research and practice.

Keywords

assemblages; borders; boundaries; categorization; coexistence; identity; liminality; practices; separation; urban borderlands

In this issue of *Urban Planning*, we ask how divisions take *place* in the city: How do they show up as physical, territorial expressions of the process of separating from one another? How do they organise what is—or ought to be—different across the various categories and hierarchies we create in our attempts to delineate and organise various aspects of urban life? Although we are often intuitively drawn to the spaces that make difference felt, palpable, present, it requires precision to identify what exactly it is that is being separated, and to then understand how and why such separation is intended and takes place. It becomes evident that,

oftentimes, the borders and boundaries discussed in urban scholarship are not rigid demarcations but rather expansive territories, spaces that condense complex processes of inter- and transaction.

In the city, borders and boundaries can be thought conceptually as border*lands* in that they expand territorially beyond the mere line of division to draw in and together that which exists on either or crosses across both sides of the border. Because "that which" can be different depending on context—a spatial type, maybe, or a marker of social identity—and because it is also constantly changing (no building lasts forever and no identity is fixed, after all), the notion of the borderland offers itself as a useful analytic in the study of urban conditions that are marked by contiguity and coexistence. In that they are not merely physical, but of course always socially, culturally, and experientially densely charged, borderlands are "thick space." They take place, quite literally, in-between different entities, fragments of the city, between the city and its hinterland, between regions and nations. Borderlands make space for synapse, transactions, and transmissions.

Borders and boundaries are at the heart of urban planning; they are the instruments of planners and designers seeking to device functional or otherwise defined zones in the city and the possible relations that such zones may establish or maintain with each other and through their inhabitants. Morales (2024, p. 2) juxtaposes segregation (signalling the division of social classes without the use of physical elements) with fragmentation (which is inherently looking into "the connections between planning policies and physical barriers, financial decisions, social practices, aspirations, legislation, and infrastructure"). Where municipalities fail to deliver called-for services, and cities lack instruments for habitability and inclusion, the gap between socio-economic classes tends to increase, she argues, giving rise to the physical expression of social divisions in the form of gated communities. Where such divisions are less starkly evident in the morphology of the city, people tend to generate their own definitions of borders through their "embodied experience with urban environments," as Barthel and Scott (2024, p. 11) argue. In this sense, borders—routinised and familiarised through everyday practices—play an essential role in forging individual and group identities through the provision of a sense of security, orientation, and belonging for those within such zones, defined by borders and their sociomaterial entanglement with neighbourhoods. Such a conceptualisation opens ways to think borders (as the entities that define and hold particular identities) as constantly negotiated in response to external and internal unsettling.

At the scale of the urban, borderlands take place in the everyday and through a multitude of practices that work, over time, to smudge—or harden—concrete lines of division. Eidenskog and Glad (2024, p. 2) highlight the importance of considering bordering processes in urban planning because "the built environment frames our everyday lives"—it can influence if we practice bordering as separation or bordering as coexistence, the fundamental qualities of any border. Rather than merely as social constructs, borders are here interpreted as both physical and "enactments in practice" (p. 2). Jatkar (2024, p. 15) examines changing socio-material borderland assemblages in the form of walls that can be dismantled to become temporal or "spaces between the city and nature that provide room for socio-religiosity."

In Tsavdaroglou et al. (2024), urban borderlands are the spaces within which the "commoning" practices of migrants are enabled as a result of their political and practical abandonment. They demonstrate how such spaces serve as the points of arrival and departure in Thessaloniki. In a similar vein, Agundez (2024) presents abandonment as tied to the production of a particular kind of built environment and architecture, which she interprets as a form of resistance to colonial urban policies and the continued categorisation of citizens in Spain's exclave, Ceuta.

Examining the flyovers of Karachi as "material forms [and] attendant gaps" (Haque, 2024, p. 2) that are transient, contested, and constantly remade, Haque studies their role in the construction and experience of difference through the imagination of the other and its everyday practices. Attending to what she calls "life in the interstices" through a careful ethnography of everyday practices (here, of driving, walking, working, and inhabitation), Haque finds that borders as objects reconfigure the elements of such practices—they change how often, when, why, and how they occur. Objects as borders do not, however, take on the same roles for everyone. It matters how such objects are identified, and by whom. Jatkar (2024) examines material assemblages at urban borderlands to find subaltern agency within colonial modernity. He finds that material assemblages can produce bordering effects along the lines of formal–informal, private–public, vehicular–pedestrian, but reads borderland processes as the undoing of modern binaries in that "subaltern agencies"—rather than simply rejecting such binaries—inhabit and transform them from within. He powerfully formulates the potential of the borderland analytic: "Learning from subaltern practices at urban borderlands would help dislodge urban theory and practice from its colonial modernist tendencies and generate a decolonial planning practice that supports a more liveable and open city" (Jatkar, 2024, p. 16).

Not all contributions to this issue choose to work with the borderland analytic. Authors engage related framings to examine ordering, categorisation, and separation as well as their inversion empirically, but also in terms of knowledge production practices. Importantly, Borofsky et al. (2024) identify that research itself is bordered, for instance in that it tends to apply certain methods and approaches in some (formal), but not in other (informal) urban areas. They call for the increased integration of methods and knowledge to inform policy making and planning. In their contribution, Valencio et al. (2024) examine economic dynamics, infrastructure development, and susceptibility to hazards in Brazil's state of Minas Gerais. Their analysis across multiple dimensions—from legal over administrative to political and economic—reveals borders and boundaries as well as the potential for new scalar categories, reminding us of the relevance and socially constructed nature of scale.

Mady (2024, p. 3) invokes the notion of liminal space, building on the definition of liminality as "the condition of in-betweenness" that "suggests a dynamic border position, without being on either side of it." In her contribution, she shows how urban actors respond to Beirut River's prolonged liminality by attempting to "re-stitch" (Mady, 2024, p. 15) the river's banks. In a different interpretation of liminality, Imai and Woite (2024, p. 2) use the notion to examine "transitional or in-between spaces where the everyday boundaries and structures of society are temporarily suspended or dissolved." Complicating notions of typology, they show how borders between subcultures and their specialised interests, varying age cohorts, and cultural preferences are temporarily dissolved within the liminal spaces of Tokyo's gaming arcades. They demonstrate how such spaces defy categorisation into a singular type.

In the contributions to this issue, we encounter cats (Eidenskog & Glad, 2024), pigeons (Haque, 2024), and other non-/more-than/other-than-humans as they enter borderland geographies, signalling a shift toward the recognition that our *Mitwelt* (shared world) is more than our *Umwelt* (surroundings; Gesa & Millay, 2010; Steiner, 2014); that we are part of a world that we undeniably share with others. How we delineate boundaries, how we plan and design them, and how much of the *mit* (with) rather than the *um* (around) this can include (without causing harm to the living organisms involved, now or in the future) appears a promising direction for future research on urban borderlands.

Urban borderlands hold lessons for the project of coexistence, a project more important than ever as we look in the face of the crises of war and environmental collapse that are likely to continue to unsettle accustomed order. They offer the advantage of being located at a scale small enough to allow for the analysis of human coexistence through bordering as social practice (Iossifova, 2020) and big enough to enable the study of the more abstract processes of urban transitions and transformations. The scale of urban borderlands combines the palpable of the on-the-ground with the abstract of the theoretical social. It allows us to be precise without losing sight of the big picture. The contributions to this issue look at urban borderlands as thick spaces to find what is hidden from view, what may not fit on one side of the border or the other, what may not conform with agreed systems of order, spatially or otherwise, permanently or temporarily. In so doing, they uncover all kinds of orders, of categories, of things, and of practices that urban planning may choose to name, to do away with, or to protect and nurture.

Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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Subaltern Politics at Urban Borderlands

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Abstract

Cities around the world are developed through modern/colonial boundaries between the formal/informal, private/public, vehicular/pedestrian, secular/religious, human/nonhuman, or new/old. Postcolonial and decolonial theorists have demonstrated how borders have served the colonial control of the city through the state apparatus, where differences have reinforced inequalities rather than engendering an open city. While politics between the two sides of the border is often explored, this article draws attention to the rather underacknowledged role of material assemblages at urban borderlands in making room for subaltern agencies to come into being. To do so, I first demonstrate the bordering effects of modern planning practices through an example of real-estate advertisements. Later, I focus on four urban borderlands, namely walls, *mandals* (socio-religious organisations), hillslopes and rivulet banks, and alleyways. Through ethnographic research on two slum rehabilitation projects in Pune, India, I show that the spatiality and temporality produced by these borderlands transcend modern boundaries while making room for subaltern agencies. Walls are used for bending the fixed spatiality of modern apartment buildings; *mandals* engender a spatiotemporal structure that straddles the religious/secular boundary; hillslopes and rivulet banks support the permanent temporariness of the self-built neighbourhoods; and alleyways allow the public and the private to flow into one another. Here, subaltern agencies effectively transgress modern borders, not by rejecting them but by inhabiting them to make an alternative and open city possible. In effect, this article argues that urban borderlands make visible subaltern agencies that have the potential to dislodge urban theory and practice from their colonial modernist legacy.

Keywords

India; modern boundaries; modern planning; postcolonial urbanism; Pune; subaltern agencies; urban borderlands

1. Introduction

Like in many other cities in India and around the world, real-estate advertisements depicting a vision of a world-class living mark Pune's urban landscape. These real-estate advertisements are intended to allure the growing upper middle-class population of Pune into purchasing private ownership apartments in gated communities with amenities such as gardens, playgrounds, gymnasiums, and swimming pools. In a city with over 40% of the population living in self-built settlements, such real-estate advertisements unabashedly portray a desire for global competition and "conspicuous consumption of suburban space" (Chattopadhyay, 2012, pp. 1–3). Such symbolic representation of a global lifestyle that many in the city cannot afford also highlights the social and economic inequalities through their very materiality. These real-estate advertisements are often placed at the boundaries between the private/public, the vehicular/pedestrian, and the rich/poor. By their very placement at the borders, such real-estate advertisements manifest the "othering" that boundaries provoke. As such, a seemingly inconsequential material artefact such as the real-estate advertisement has the potential to—and often does—reinforce socio-economic inequalities by re-producing borders between spaces, times, and peoples.

As I walked towards a self-built neighbourhood for my ethnographic fieldwork of urban redevelopment projects in Pune, I noticed two very distinct real-estate advertisements at the border between the neighbourhood and one of the main vehicular roads in Pune. One advertisement was hung on a rentable hoarding managed by the Pune Municipality's Skysign and License Department. This hoarding was placed high, made up of a steel frame, and had LED lights to illuminate the advertisement at night. Moreover, this advertisement was directed towards the vehicular road, displayed one- and two-bedroom–hall–kitchen (BHK) apartments costing ₹2.6 million (around £24,500) and ₹3.4 million (around £32,000) respectively, and was written in English. The second advertisement was put up on a makeshift bamboo structure tied with a rope just below the taller billboard. This second advertisement was oriented towards the self-built neighbourhood with its back towards the vehicular road. It advertised one-BHK apartments costing ₹1.7 million (around £16,000) and was written in the local language of the region, Marathi. The materiality of these two real-estate advertisements positioned precisely at the border between the self-built neighbourhood and one of Pune's main vehicular roads makes visible the existing socio-economic inequalities while cementing them further.

Real-estate advertisements are often guided by the profit-maximising logics of attracting appropriate clientele for quick and maximum sale. The materiality of the real-estate advertisements also depends on the capital assets of the real-estate developers paying for the advertisements. Such profit-maximising logics can produce material artefacts that create bordering/othering effects (e.g., Ramírez, 2020). In the example highlighted above, though the English advertisement is positioned in a way that everyone can read it, most of the non-English speaking populations in the self-built neighbourhood cannot in fact read the English advertisement, thereby being precluded from considering buying two- and three-BHK apartments. Moreover, the Marathi advertisement was conspicuously oriented towards the self-built settlement. The British colonial past has indeed produced a culture in India where the English language continues to be symbolically associated with "elite-ness" (Chandra, 2012). Thus, notwithstanding the intentionality behind the placements of the advertisements, the two advertisements together generate an "othering" effect on the residents of self-built neighbourhoods through the material and symbolic reminder that they are Marathi-speaking and that they are poor. As the residents of self-built neighbourhoods walk in and out of

their neighbourhood, they are reminded of the stark inequalities between "them" and "others" who know English and can afford two- and three-BHK apartments. Therefore, borders and boundaries make visible differences and inequalities that exist and are reproduced in cities through governing regimes along multiple axes of power (Daher, 2018; Iossifova, 2013; Roßmeier & Weber, 2021).

Borders and boundaries have been explored in urban planning studies at multiple scales and for various purposes. Borders have been particularly central in urban and planning studies for "understanding the structure of the city" (Jirón, 2019, p. 2). Borders have helped explore urban growth (Boussauw et al., 2013), urban–rural divides and flows (Hidle et al., 2009; Zeuthen, 2012), and urbanisation of refuge (Porter et al., 2019). Here, borders represent the city's territorial limits of jurisdictional power (Newman, 2017; Van Houtum & Van Naerssen, 2002). Alternatively, intra-city boundaries between neighbourhoods and administrative units have been explored to demonstrate fragmentation and segregation (Breitung, 2011), urban politics (Bhide, 2020), or colonial control of space (Legg, 2007). Here, boundaries tend to appear more flexible and malleable than borders. Moreover, boundaries at a neighbourhood scale rely on Lynch's (1960) emphasis on "lineal elements [within cities] that act as boundaries between two phases" (Jirón, 2019, p. 2), such as walls, railway crossings, fences, or pathways. Boundaries here tend to be conceptualised as territorial divisions between socio-cultural practices and functionalities within a city. More recently, another strand of literature in urban studies has focused on socio-cultural and political practices in urban *borderlands*. Borderlands are conceptualised as "areas straddling both sides of the boundary" or the border (Newman, 2017, p. 1). A borderland is a zone near a political border, a zone where jurisdictional norms of either side of the border do not strictly apply. Within urban studies, urban borderlands have been treated as "celebrated spaces in-between the different…that allow for the emergence of alternatives" (Iossifova, 2015, p. 104). Urban borderlands are shown to act as "spaces of exception in the city" (Boano & Martén, 2013) and "heterotopias" (Suau, 2014) that help transgress the hegemonic structures of power. Applying border theorising to the scale of urban neighbourhoods also demonstrates the hybrid and shifting boundaries between ordering and othering processes, such as in inner-city restructuring processes (Roßmeier & Weber, 2021). In effect, the notion of borderland "assumes the existence, and impact, of a border on the human landscape" (Newman, 2003, p. 19) and explores the lived experiences of those inhabiting the spaces around the border.

In this article, I take the literature on "urban borderlands" forward by focusing on how subaltern agency disobeys modern/colonial border-making practices through the *material assemblages at urban borderlands*. I demonstrate through this article that people residing in the self-built settlements are not mere subjects of bordering practices of modern/colonial regimes manifested through *material assemblages* such as the real-estate advertisements I described above. Instead, people residing in the self-built settlements also exercise their political agency to thwart the bordering effects that certain material assemblages reproduce in cities. To explore subaltern agency that disobeys modern/colonial border-making practices, I link literature on urban borderlands to decolonial theory's emphasis on border-thinking (Anzaldúa, 1987; Lugones, 2010; Mignolo, 2011, 2012). Decolonial theory makes visible border-making practices within colonial modernity along multiple binary divisions. Within urban studies, binary divisions have been shown to guide modern planning practices in cities around the world at least since the 1960s (Sibley, 2001). Some of the modern urban binaries I explore in this article include formal/informal, private/public, vehicular/pedestrian, secular/religious, human/nonhuman, and new/old. Binaries are not just any dichotomy but are necessarily hierarchical privileging one side of the dichotomy over another. In colonial modernity, the first side of these

binaries is privileged over the latter, thereby marginalising the latter side of the binary. Margins within colonial modernity are therefore "*the other*, they are not *the in-between*" (Iossifova, 2013, p. 1). That is, the latter side of the binary is included within colonial modernity, albeit with a subsidiary position. Alternatively, decolonial theory's focus on "borderlands" as *the in-between spaces* helps explore what remains invisible and unrecognisable to the modern order of things. To elaborate on how and why such exploration of subalternity through urban borderlands can be mobilised in the context of Pune, I briefly summarise the debates around subalternity and borderlands in postcolonial/decolonial literature in the following section.

2. Subaltern Politics at Urban Borderlands

Intellectual interest in subalternity is shared among the postcolonial, decolonial, and subaltern studies (Grosfoguel, 2011; Guha, 1982, 2001; Mignolo, 2012; Spivak, 1988). Subaltern and postcolonial theory are quite directly relevant to India given their early developments from within South Asian scholarship. Here, drawing on Gramscian theory of the subaltern—who "by definition…are not united and cannot unite until they are able to become a 'state' " (Hoare & Nowell Smith, 1971, p. 202)—early subaltern studies focused on the peasant populations in South Asia (see Guha, 1982). However, Spivak's (1988) critical interventionist essay "Can the Subaltern Speak?" effectively brought the concept of the subaltern from "an empirical (normative) subject/object to an analytical (conceptual) domain" (Jazeel & Legg, 2019, p. 17). In other words, Spivak's (1988) essay challenged such critical intellectual knowledge production that unproblematically assumes to have understood the "subaltern" perspectives. This analytical concept of "subalternity is where social lines of mobility, being elsewhere, do not permit the formation of a recognisable basis of action" (Spivak, 2005, p. 475). That is, when political agency cannot be mobilised through formal or informal means to bring effective change, a practice becomes subaltern.

In urban studies, the problem of subalternity continues to be troubled by the epistemological problem of learning to listen to the subaltern from a somewhat distanced perspective of a theorist. Here, the analytical concept of the subaltern serves to theorise the "vanishing points at the limits of itineraries of recognition" (Roy, 2011, p. 235). Various concepts such as subaltern urbanism (Roy, 2011), urban informality (Alvarado, 2022; Darling, 2017; Roy, 2015), and occupancy urbanism (Benjamin, 2008) have been used to outline politics in the Global South beyond the prescribed formalities of state policies and programmes. Yet, Pune's Slum Rehabilitation Policy (SRP) that seeks to convert the self-built neighbourhoods into apartment buildings already recognises the occupancy claims of those living under conditions of informality and proposes to formally rehabilitate them on the occupied land. Elsewhere, Chattopadhyay and Sarkar (2005) suggest focusing on the popular expressions at the margins of hegemonic structures of power. Though useful, since majoritarian nationalism has lately hegemonised India's popular domain, subaltern practices are pushed towards the margins of popular politics. As such, the subsidiary side of modern binaries of formal/informal, state/popular, and civil/political already has a place in colonial modernity as presently practised in India. Consequently, heuristic mobilisation of subsidiary sides of binary divisions to transgress colonial modernity is challenging in a planning context where modern/colonial binaries are being co-opted by majoritarian nationalist politics (e.g., Govindrajan et al., 2021).

Therefore, to explore subalternity as the invisible and the unrecognisable within colonial modernity, I invoke a decolonial theoretical focus on border-thinking and link it to the literature on urban borderlands. Written from the Latin American context, decolonial theory distances itself from the postcolonial theory's

epistemological problem of learning to listen to the subaltern by representing a critique of modernity/coloniality from the perspective of subalternised and silenced knowledges (Grosfoguel, 2011; Mignolo, 2011). Border-thinking comes to aid in the endeavour to provide a critique from the perspective of subalternised and silenced knowledges. Here, Mignolo (2011, p. 277) suggests that thinking against modernity/coloniality happens by "dwelling and thinking in the borders of local histories confronting global designs." Consequently, decolonial theory's focus on border-thinking to uncover the subaltern side of modernity/coloniality provides a more deliberate avenue. Here, borderlands engender the possibilities of epistemic disobedience against the *bordering* and *othering* power of modernity/coloniality (Grosfoguel, 2008; Mignolo, 2011). Such epistemic disobedience innately present at borderlands helps acknowledge the subaltern agency and politics. At the scale of the city, Ramírez (2020, p. 148) develops a borderland analytic to show how gentrification and urban redevelopment projects unfold through *bordering* practices "that create structural and cultural exclusion in city space." In Ramírez's (2020, p. 149) borderland analytic, borderland space is relational, it highlights the embodied and lived experiences of borderland inhabitants and shows how the city is fought for. As Anzaldúa (1987, p. 3) writes, "A border is a dividing line....A borderland is a vague and undetermined place created by the emotional residue of an unnatural boundary."

Taking decolonial theory's emphasis on borderlands to Pune's urban redevelopment projects, this article particularly focuses on material assemblages at urban borderlands to demonstrate how subaltern agency disobeys the material and symbolic border-making practices of modernity/coloniality. To do so, this article first traces the various borders and borderlands produced by the modernising processes of urban redevelopment in Pune. Here, I do not treat the subsidiary sides of the colonial modernist binary (i.e., informal, public, religious, nonhuman, old) as subaltern. Instead, I focus on the border-making material artefacts at *urban borderlands* to explore the spatio-temporal in-betweenness as the unrecognisable subalternity under colonial modernity. Consequently, building on narratives about the slum rehabilitation projects in two self-built neighbourhoods in Pune, I trace the lived experiences and practices of those subjected to slum rehabilitations at the borderlands produced by colonial modernity in Pune. In the subsequent sections of this article, I first elaborate on the context and the methodology in Section 3. Later, I expand on four types of material assemblages of urban borderlands in Section 4—namely walls, *mandals*, hillslopes and rivulet banks, and alleyways—where the residues of the unnatural modern/colonial borders are experienced. All these material assemblages at urban borderlands provide avenues for subaltern agency and politics. Finally, I conclude that a decolonial perspective on urban borderlands provides an avenue to recognise the subaltern agency and perform epistemic disobedience against the colonial modernist city-making practices.

3. Methodology and Context

This article builds on eight months of ethnographic research of two urban redevelopment projects in the city of Pune. Having been brought up in Pune, I carried out this ethnographic work from a UK higher education institution. Decolonial theory demands researchers to be accountable for the relations of their location and positionality (Manning, 2018; Naylor et al., 2018). Considering this decolonial imperative, my subjectivities persistently straddled between home/foreign, India/West, and colonised/colonising binaries throughout the fieldwork—as they continue to do while writing this article. Some of my ethnographic observations, such as the English/Marathi advertisements also hint towards my own borderland subjectivities. Likewise, the resulting

analysis is also influenced by my borderland troubles, though it also contains the imperative to represent the critique of modernity/coloniality from the subalternised and silenced knowledges.

Growing up in the city of Pune, I have noticed how Pune has modernised to make room for global capital in the past three decades. With a population of over 3.5 million, Pune is now India's eighth-largest city and second-largest in Maharashtra state. About 40% of the city's population lives in what the state calls slums. After 75 years since independence, the early post-independence state's desire to eradicate or modernise slums remains intact with Pune's recently formulated SRP. The SRP seeks to rehabilitate various self-built neighbourhoods into apartment buildings. After India's independence from Britain in 1947, the Indian state's attitudes towards slums have changed from treating "slums as nuisance" (1950s–1960s) and "slums as a solution to housing shortage" (1970–1990) to "government as enabler for housing provision" (1991–2005), and finally to conceptualising "slum lands as a resource for urban growth" (2005–present; Mitra, 2021). In line with India's market liberalisation reforms of the 1990s, the SRP invites private developers to provide free housing for the existing slum-dwellers in exchange for higher incentives in the form of extra buildable space to be sold onto the free market. Rehabilitating bodies from slums into apartments to free up city space for capital accumulation resonates precisely with the racial capitalist redevelopment projects in Oakland, California (Ramírez, 2020). Unlike race and indigeneity in Oakland, caste has acted as a logic for marginalisation of certain communities in underserviced urban areas in Maharashtra (Shaikh, 2021). Many of the residents of the self-built settlements in Pune are from non-elite castes and minority religions and have migrated to Pune from nearby villages due to a series of droughts since the 1950s. As such, their historical and present-day marginalisation is made visible through bordering practices of racialised capitalism as manifested through SRP implementation.

Although the self-built neighbourhoods have their own spatiality, the apartment buildings are designed in the form of private apartments stacked on one another on a piece of land. The self-built neighbourhoods have developed over the years as a group of one to two-storied houses along meandering alleyways. In keeping with the SRP, real-estate developers demolish entire neighbourhoods to construct high-rise apartment buildings. As per the SRP, these apartments are allocated to all the residents collectively forming a cooperative. Like many urban development policies around the world, the SRP is primarily designed to rehabilitate human bodies from the so-called slums into apartments without specific policy guidelines for non-human beings. Where the state's policy mix does consider "nature," nature is separated from humans to be protected from human activities in the form of flood protection zones and biodiversity parks. Moreover, the policy only ever specifies guidelines for building apartments, notwithstanding the various non-residential activities taking place in the neighbourhoods—including religious or commercial activities. Finally, the high-rise apartment buildings provide vehicular parking spaces on the ground floor, ultimately separating the pedestrian zone from the vehicular one. Human activities are consequently expected to be confined to the apartment buildings giving priority to vehicles. All these binary divisions generate numerous borders in the neighbourhoods that I explore in this article.

The two projects being carried out on the self-built settlements are shown in Figures 1 and 2. The two projects were at different stages of implementation, which provided a methodological possibility of abstracting from the particularities of the two contexts and focusing on the politics engendered at the borderlands. This abstraction from empirical particularities helps understand the differentiated yet evidently experienced effects of colonial modernity's border-making practices in both the studied neighbourhoods.

That is, both neighbourhoods have material assemblages at borderlands that are produced at the material and discursive boundaries between the formal/informal, private/public, vehicular/pedestrian, secular/religious, human/nonhuman, or new/old. To explore the subaltern agency and politics through material assemblages at the urban borderlands, I make use of ethnographic observations, policy documents, and in-depth interviews with 60 participants engaged in slum rehabilitation projects. The participants of this research included residents of the two settlements, real-estate developers, landowners, local politicians, and experts. Focusing particularly on what participants *do* with the borders being generated by colonial modernity helps uncover the agency they exercise in disobedience to the colonial modernist border-making practices. The following sections specifically explore four material assemblages at urban borderlands—namely walls, *mandals*, ecological boundaries, and alleyways. These borderlands were chosen due to their significance to the residents' struggle to face the impending slum rehabilitation projects. In other words, I used the references to material artefacts mentioned by the residents along with my own ethnographic observations to extrapolate the logic of disobedience from people's narratives. The rest of this article demonstrates how borderlands become a fertile ground for subaltern agencies and politics to come into being in disobedience to colonial modernity.

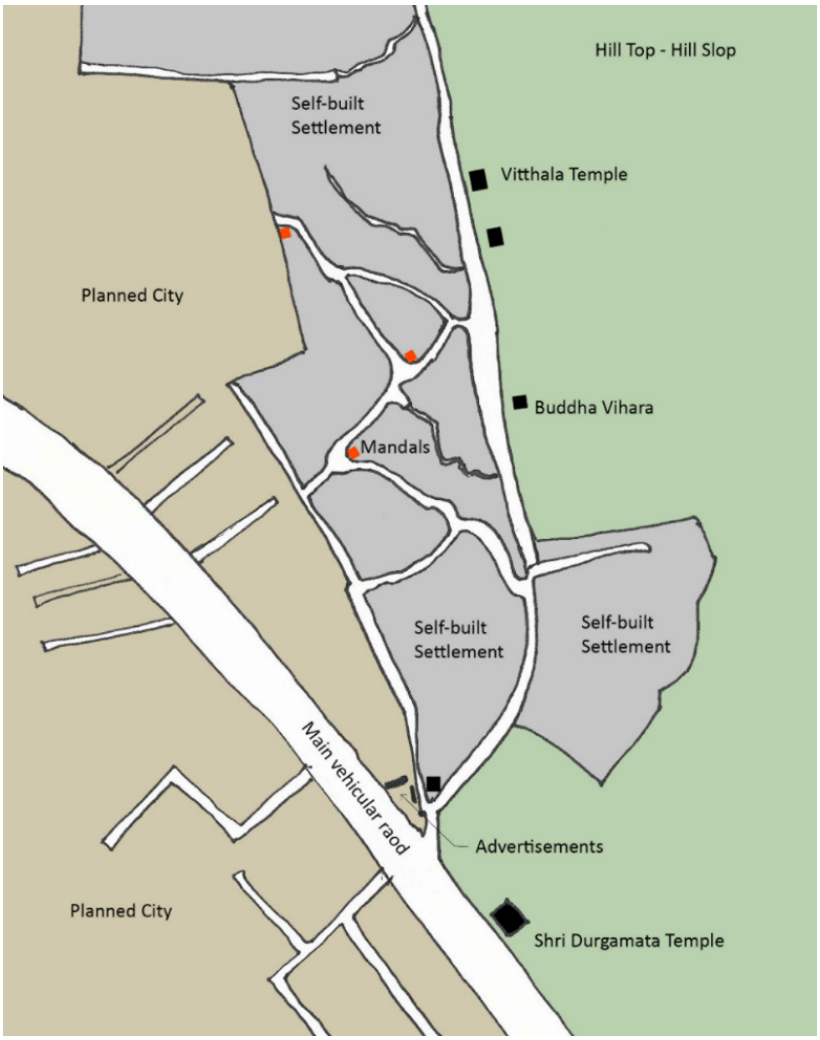

Figure 1. Plan of self-built settlement 1.

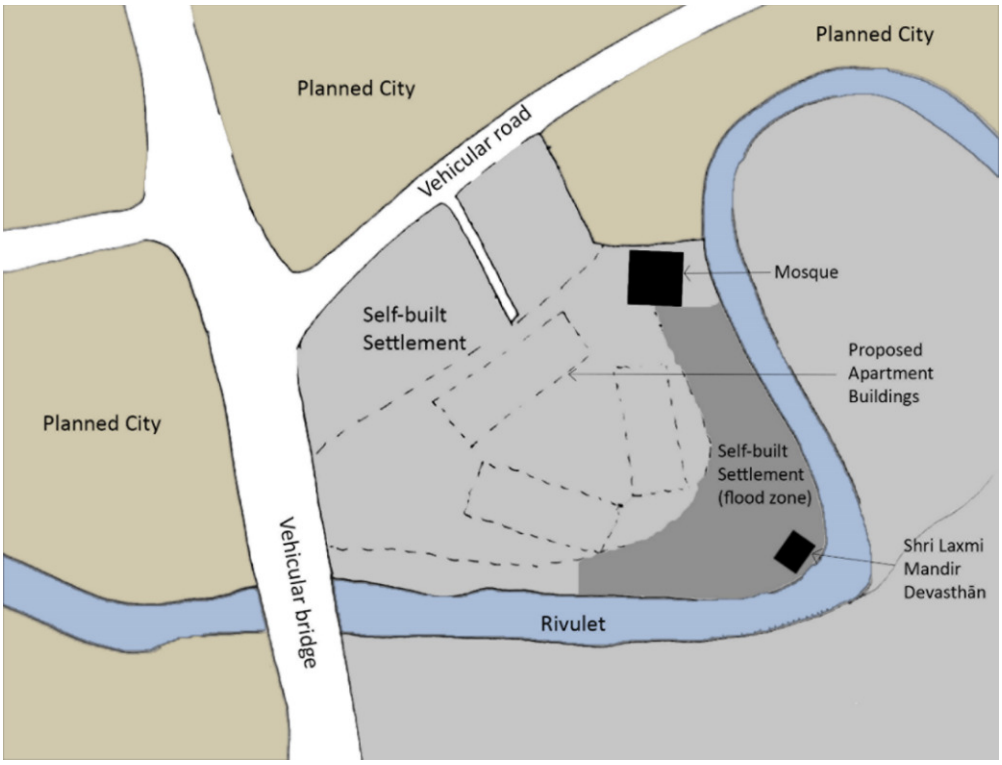

Figure 2. Plan of self-built settlement 2.

4. Material Assemblages at Urban Borderlands

Discursive binary divisions have material effects on cities and those living in them. The Indian state's efforts to modernise cities produce material artefacts such as walls, religious structures, ecological boundaries, and alleyways. These material artefacts are not constructed by the state institutions alone, but also by those subjected to state policies and programmes. Here, material assemblages at the urban borderlands allow the subaltern agency to disobey colonial modernity and produce an alternative city in its stead. In this section, I elaborate on the four examples of material assemblages at urban borderlands that make way for subaltern agency that transgresses colonial modernist binaries.

4.1. Walls

During a transect walk through a recently redeveloped self-built neighbourhood, one of the participants of my ethnographic research, Rambhau, told me about his struggle to secure an access road and a temple in their settlement by shifting a proposed compound wall a few feet sideways. We were standing at the border between Rambhau's recently rehabilitated building and the apartment buildings to be sold on the free market (free-sale apartment buildings) still under construction on the site. Here, free-sale apartment buildings are made feasible on the land where Rambhau lived by freeing up land by housing residents from slums into tall apartment buildings. I could hardly hear Rambhau amidst the sound of drilling through the basalt rock of the hilly site. The construction workers were building the foundation for a concrete wall that would separate the rehabilitation buildings from the free-sale apartment buildings (see Figure 3).

Figure 3. Wall separating free-sale apartment building (on the left) and access road to rehabilitation building (on the right).

Rambhau told me that "the builder is building the wall for his benefit; the wall is not for slum residents' benefit." Rambhau's remark resonates precisely with Breitung's (2011) observation that market logic produces territorial separation for profit-making purposes. A private developer corroborated the fact that separating slum-rehabilitation buildings from free-sale buildings helps in making the free-sale apartments financially comparable to other non-slum development schemes in Pune. Without the conspicuous separation between the slum site and the free-sale site, the prices of the free-sale apartments are much lower. Consequently, the developer was constructing a wall to separate the free-sale housing units from rehabilitation units to attract rich buyers. However, the wall was initially planned to be constructed very close to the hill (on the right-hand side in Figure 3) and the rehabilitation buildings would not have gotten a decent vehicular access road. In effect, the wall triggered and perpetuated the secondary citizenship treatment that the identity of "slum-dwellers" also produces, even after the settlement residents had moved into rehabilitation apartments. Vlassenroot and Büscher (2013) argue that urban development at the borderlands generates a socio-political struggle for identity. But Rambhau's struggle to shift the compound wall a few meters sideways was not to maintain the identity of a slum-dweller but to undo it. Rambhau said to me:

> The developer had brought this wall till here [he gestured with his hand to show an imaginary line on the ground]. The developer said, "Remove all this!" [he pointed at a temple]. Then again, I quarrelled….But I have an intention that, with the help of the state representatives, we get to use this road. The developer was not allowing us to use this road, the state representative quarrelled and got permission for it.

As such, not having a wall between rehabilitation and free-sale apartment buildings would have eliminated the stigmatised identity of the slum-dwellers. However, the developer was intent on constructing the wall.

Therefore, Rambhau's attempt to secure a vehicular road and a temple was the next best attempt to provide the rehabilitated apartment buildings with similar kinds of amenities as the high-income apartment buildings. Rambhau's temple also helped secure a place to celebrate the religious customs of the Wadaar community (a historically marginalised community under the Brahmanical caste system).

Unlike the external walls separating apartment buildings, internal walls within houses also played a role in the making and remaking of households within the neighbourhood due to slum rehabilitation schemes. Given that the state's SRP provides only 25 m^2 apartments against one housing structure in the existing neighbourhood, slum rehabilitation is not a spatially just urban transformation for many neighbourhood residents with houses larger than 25 m^2 and large families. To circumvent the SRP regulations, Mukesh told me:

> I have two kids. So, the developers had told us that "you put a partition wall, show two houses at the time of initial surveys. We [the developers] will put numbers on the houses, we will give two houses for two sons of yours." So, people have built walls and built on top. It has been 10 years since then; now some people have demolished the walls because the walls had started becoming cumbersome. What to do!? Let us see when the development happens, we will rethink about walls.

Mukesh's account shows the tactical use of walls engendered the possibility of securing a place in the modernising city. Using walls to increase the number of slum structures also increases the housing stock in the new redevelopment buildings. In effect, the developer can build more apartments, which proportionately allows them to get additional floor space and make more profit, and residents can secure additional apartments as per their household needs. However, since Mukesh's neighbourhood had not been redeveloped for more than a decade since the negotiations first started, the walls dividing families and houses had started becoming a nuisance. Another participant told me that their family had two kitchens separated by a wall even though it was a single family. The walls dividing the houses for the purposes of modern development are constructed temporarily, yet they acquire the status of permanence within people's lifespans. Over the decades, the housing stock within the settlement has grown multi-fold, and though some households are demolishing the walls to reunite families, others are using them to increase the size of the house. Seemingly inconsequential boundaries materialised because of the state's efforts to rehabilitate slums engender family divisions that are stuck between temporariness and permanence while making up more space in the city.

4.2. Mandals

Walking through the neighbourhoods, it was impossible not to notice the numerous religious structures splintered in between various houses, including *mandals* (see Figure 4). *Mandals* are a type of religious structure in Pune that is located in between different spaces and times. *Mandals* are a social organisation created to organise and fund various religious festivities in Pune. During my transect walks, I noticed numerous Ganapati statues (a Hindu deity) placed inside small rooms constructed in between houses or on the edges of crossroads. Each of these statues belonged to a *mandal*, which collects funds for the Ganapati festival that takes place for 10 days every year. During the festival, the Ganapati statues are removed from the small rooms and placed onto temporarily constructed pandals with decorated interiors. In the analysis of a religious festival in West Bengal, Spivak (2008, p. 187) shows that a dualist episteme guides the arrival of gods and goddesses from "the transcendental semiotic" into this material world of humans during many

Hindu religious festivals. When the Ganapati statues are moved to the pandals, Ganapati is seen to temporarily inhabit the statue for the duration of the festival.

The Ganapati statues are traditionally expected to be immersed in water—lakes, rivers, or seas—at the end of the festival as the deity ascends back to his transcendental world (e.g., Spivak, 2008). The statues would have been made up of clay before the advent of quick-setting plaster. Since the modern-day plaster-made statues do not quickly dissolve into water and thereby pollute the water bodies, the modern state has now banned the immersion of big statues into Pune's rivers. Culturally, any other means of dismantling the statues would be considered sacrilegious. Therefore, most *mandals* choose to store the statue during the year until the next 10-day festival. The non-immersion of big Ganapati statues means that Ganapati does not fully ascend to the transcendental world at the end of the festival. This in-between status of a statue inhabited by a deity once a year and retaining the same sacredness during the rest of the year means that the statues must be respected no matter where they are stored. Many storage rooms constructed in between houses and in the corners of the crossroads consequently attain the status of a religious structure marked by the *mandal*'s name, religious flags, and symbols. A sociality is produced among *mandal* members—which are mostly men—who gather at the *mandals* in the evenings, play games, organise social functions, and raise funds for the next year's festival. In the case of slum rehabilitation, many of my participants also mentioned organising the redevelopments as per different *mandals* where different members of a *mandal* would live in a single apartment building. Temporally and spatially in-between modern divisions between secular/religious, permanent/temporary, and material/semiotic, the *mandals* engender a spatiotemporal milieu of a socio-political organisation that is potent for generating an alternative city. Though *mandals* provide an alternative logic for urban development, it sometimes excludes minority

Figure 4. A mandal constructed at a crossroad.

religions and historically marginalised castes. In such contexts, other borderlands such as hillslopes and rivulet banks provide room for minority religious structures.

4.3. Hillslopes and Rivulet Banks

Both my fieldwork sites were located at the boundary between the city and nature produced through planning practices. One of the neighbourhoods was developed on the slopes of one of the nine hills in Pune and another was developed between a bridge, a vehicular road, and a rivulet flowing through the city. While the development of these neighbourhoods took place in the 1950s and 1970s due to drought-induced rural-to-urban migration, the hillslopes and rivulet banks became an environmentally protected zone in the 21st century. Consequently, the neighbourhoods became borderlands due to the direct enforcement of the modern planning land-use zoning policies. Because of the environmentally protected zones, the in-situ slum rehabilitation projects require higher floor area ratios to accommodate all neighbourhood residents onto a smaller available piece of land. As the real-estate developer of the hillslope neighbourhood aimed to accommodate all existing residents in rehabilitation buildings, the developer of the rivulet bank neighbourhood did not include the households located in flood protection zones in the new apartment buildings. At the time of my fieldwork in 2018, there were 50 houses between the newly redeveloped apartment buildings and the rivulet excluded from the city by a tall compound wall surrounding the redeveloped housing complex.

The 50 households on the rivulet banks had made repeated appeals to the state administration and the developer to get included in the rehabilitation scheme without fruition. Yet, these households had chosen to stay put even though the rivulet bank flooded every few monsoons. Moreover, the residents had made the rivulet bank into a space of sociality and religiosity. Rajesh, one of the residents of the 50 households, had recently constructed a Shri Laxmi Mandir Devasthān (Shri Laxmi Temple God-Place) on the rivulet bank behind the flood-protection wall shown in Figure 5. This Laxmi temple was constructed in *pakkā* (solid) materials such as brick-plastered walls and a tiled floor and was ornamented resembling the temple architecture of the region. Furthermore, a small area was cleared off in front of the temple as an open-to-sky *sabhāmandap* (gathering hall), encircled by state-funded metallic benches and trees.

The future of this temple remains uncertain since the proposals to rehabilitate these 50 houses are pending with the state authorities. If the environmental land zoning regulations are enforced stringently in the future, the temple will be demolished along with the 50 houses. Stuck between the prospective possibility of demolition and the present-day need for sociality, the borderland of the rivulet bank has become a space of socio-religious practice. Yet, above all, the construction of a solid temple structure is a tactical practice of solidifying people's claim to the place and staying put in the city (Weinstein, 2014). As precedence shows just a few meters away from this temple, a similar tactic had made a permanent space for a *masjid* (mosque) in the redevelopment site.

Likewise, when speaking of the hillslope neighbourhood development, one of my participants, Vithoba, told me that many residents had constructed temples on the hillside at the boundary between the neighbourhood and the hill—including himself. The borderland between the human settlement and the legally protected hilltop–hillslope is not barricaded by compound walls near Vithoba's neighbourhood. Given the lack of precise material boundary between human settlement and nature, the local elected

Figure 5. Temple constructed along the rivulet bank.

representatives themselves have supported many residents in constructing temples in these borderlands. Vithoba began building his temple by first securing a piece of land in the borderland and seeking electricity connection from the city electricity board. Vithoba anticipated that a state-recognised electricity connection would secure the tenure of his temple. However, when I probed further on his earlier remark about the state representatives, he told me:

> The state representative asks [he spoke with a loud, deep voice], "With whose permission did you construct? Why did you not ask me?" So then, [he lowered his voice and said] "I have brought material, I was going to come to you, and now that you have come to us, what do I do? Otherwise, I have everything complete." Meaning, everyone's collaboration, i.e., asking everyone, is our necessity…what!? Our actions are not stuck without them [the powerful elites?]; just we should keep going…like Gandhi.

Here, Vithoba was challenging the state's formal authority over natural lands and the construction of temples. In challenging the state authority, Vithoba used the unregulated boundary between the city and nature to first build a temple and later seek approval for it. More importantly, he utilised the state's electricity board approval and the materiality of the temple to challenge the state representative's authority over their settlement, invoking freedom over their ability to make cities. Ultimately, the state representative conceded to his performative challenge to the formal authority over the informal and allowed the construction of the temple in the borderland. The hillslopes and rivulet banks in both sites have religious structures such as temples (Hindu), mosques (Muslim), and viharas (Buddhist). As such, hillslopes and rivulet banks engender a possibility of making a claim to the city and making the temporary permanent, transcending the modern boundaries between the city and nature.

4.4. Alleyways

Alleyways are borderlands that act as a liminal space between the private/public and the vehicular/pedestrian. They can hold "a central place in everyday life and social interaction in a neighbourhood" (Imai, 2013, p. 59). The self-built neighbourhoods that are being redeveloped under the SRP have many meandering alleyways that connect various areas within the neighbourhood. These alleyways perform many functions. Alleyways are used for vehicular and pedestrian traffic, and they are used to celebrate festivities, weddings, and birthdays. As such, focusing on alleyways shows a peculiar emphasis on undoing the private/public or vehicular/pedestrian divide. I was speaking with Mukesh about being rehabilitated into apartment buildings when he brought up the topic of alleyways in the neighbourhood:

> If there is Datta Jayanti or Ganesh Jayanti [public religious festivals], if we have functions like these, then prepare meals etc., park vehicles obliquely this way [one end of the alley], park vehicles obliquely that way [another end of the alley], clean the road and make seating for people there to eat. Ok? Village-like! Nobody says anything. People will not use this alley for the day as thoroughfare, but no bother….It is possible to do family functions as well; but for that, how? If imagine, we do a family function, then the second day we must sweep etc., if the plates are not removed then who will allow us to do functions? That is how it is!

Mukesh referred to the habitual practice where a public thoroughfare is temporarily converted into a place for celebrating festivities as shown in Figure 6. He also articulated the conditions for that possibility to arise, namely blocking the two sides of the street to stop vehicular movement, cleanliness, and permission from other members of the neighbourhood. The boundary between the private/public or the vehicular/pedestrian is drastically blurred under the conditions of an acceptable and contextually verifiable social contract, which here refers to the cleanliness of the streets. As such, the alleyway becomes a borderland that is adaptable, flexible, and shared among all neighbours on an as-needed basis.

Mukesh was not alone in mentioning alleyways in a positive tone. Ramabai, too, considered it worth mentioning while reflecting on the impending slum rehabilitation:

> If they give us apartments, then fine! Whatever happens to everyone will happen to us, right? [But] free [open] feels good, right? The breeze comes, the water, everything is there. Vegetable *wālā* [seller] comes, everything *wālā* comes. No climbing down, no climbing up….Everything at the door….It is all fun! Meaning, how? It is fine. Let the apartment buildings be [we don't want it].

In Ramabai's articulation, the alleyway feels better than the apartment buildings because it brings day-to-day amenities to her doorstep. Instead, she notices that living in a multi-storied apartment building would require her to leave the house for public interaction. Ramabai associated the notion of freedom with the adaptability and porosity of the alleyway. Another resident expressed the same feeling by saying, "I do not understand much about [slum rehabilitations], but however it is in the existing neighbourhood, that way I feel proper. It is free/open. And there [in the new building] it is tied-like [constrained]." Residents do convey these feelings to the real-estate developers to articulate their dissatisfaction towards apartment buildings. That is, the in-betweenness of the alleyway is used to challenge the private/public and vehicular/pedestrian binary divisions advanced by colonial modernity through slum rehabilitation projects. As a transgressive

Figure 6. A vehicular/pedestrian road temporarily decorated for celebrations.

practice, residents of the rivulet bank neighbourhood had negotiated and secured one floor in the rehabilitation building for all the neighbours from one alley. Residents expected to celebrate birthdays and Ganapati festivals in the corridors of each floor, retaining the socio-spatial logics of the neighbourhood alleys, thereby transgressing the strict private/public and vehicular/pedestrian binary divisions.

5. Conclusions

Real-estate advertisements, walls, *mandals*, hillslopes and rivulet banks, and alleyways are material assemblages at urban borderlands that demarcate a division between the new/old, vehicular/pedestrian, rich/poor, secular/religious, human/nature, and private/public dichotomies respectively. Under colonial modernity, the former side of each of these binaries is valued more than the latter, as is the case of Pune's SRP. While reversing the binaries can help radicalise politics, such an attempt to reverse the hegemonic structure of power can often polarise divisions while exacerbating inequalities. Instead, seeing borderlands through the logic of border-thinking helps recognise subaltern agencies that undo modern binaries, not by rejecting them but by inhabiting them and transforming them from within (Anzaldúa, 1987). In effect, urban borderlands generate an alternative spatiality and temporality that produces a different city that transgresses colonial modernity.

This alternative city is not necessarily a new city, but a transformed city that does not abide by colonial modernist binary divisions. Such a city is made of dismantlable walls that produce space without dividing it permanently, *mandals* holding the spatially and temporally in-between deity statues that become a logic for alternative development, spaces between the city and nature that provide room for socio-religiosity, and alleyways that provide room for vehicles, pedestrians, public and private activities on an as-needed basis. Such borderland practices can be seen as a "quiet encroachment of the ordinary" (Bayat, 2000, p. 533). Yet,

these borderland practices become a means to unsettle and transform the colonial modernist binary divisions produced by the SRP. These urban borderlands use the modern/colonial borders to unsettle their own hegemonic power—*unseen* and *unrecognised per se*. Attending to such practices that use the instruments of power to unsettle that very power helps understand subaltern agency.

This article traced subaltern agency's efforts to unsettle the binaries from within and transform binaries to generate an alternative and a more liveable city. It is because these borderland practices remain outside the purview of colonial modernity that they provide useful vantage points to see and uncover subaltern agency and politics. Exploring multiple practices in the urban borderlands and their innate transgressive potentials through the logics by which people inhabit borderlands would help uncover different forms of subaltern agency. The decolonial imperative to dwell at borders for transformative practice, rather than polarising the divide, is critical to such endeavour. Yet, to reiterate Gramsci's remarks (Hoare & Nowell Smith, 1971), the moment these subaltern logics become a manifesto for recognised forms of political practice they will have ceased to remain subaltern. That is, the purpose behind uncovering subaltern agency *in* and *through* urban borderlands is not to reveal it for co-option by hegemonic powers but to demonstrate its usefulness in other contexts. Effectively, learning from subaltern practices at urban borderlands would help dislodge urban theory and practice from its colonial modernist tendencies and generate a decolonial planning practice that supports a more liveable and open city.

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Conflict of Interests

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ARTICLE

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Inhabiting Flyover Geographies: Flows, Interstices, and Walking Bodies in Karachi

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Abstract

Flyovers have featured in critical urban planning scholarship in the Global South as fetishized symbols of modernity, often fragmenting urban environments, fracturing space, exacerbating inequalities, and embodying "worlding" aspirations of city planners. Acknowledging the role of such infrastructure as technologies of (dis)connection in increasingly enclaved cities, I seek to situate the flyover, its material form, and attendant gaps, characterized by raised ribbons of "smooth" flows, leftover spaces, and proliferation of informal practices, as important sites of encounters. As such, I take "borderland urbanism" as an impetus to think flyover geographies anew by locating the flyover as a particular place in the city that is transient, contested, and constantly re-made. Through ethnographic vignettes and interviews, I sketch out everyday urban experiences over and under a flyover in Karachi, Pakistan. I illustrate how the flyover as a spatial and temporal leap is perceived and experienced by a range of differently mobile urban dwellers, paying particular attention to how walking bodies inhabit an infrastructural landscape that heavily privileges cars and motorcycles. Furthermore, I trace how life in the interstices under the flyover is assembled through social collaboration, resisting eviction, and a politics of visibility.

Keywords

flyovers; infrastructure; inhabitation; Karachi; mobilities; urban space

1. Introduction

In a news article in 2013, journalist Mahim Maher wrote about Karachi's tryst with flyovers and sharply noted that while the first one may have been built to save lives, "the ones that came after it *took* them" (Maher, 2013, emphasis added). Tracing the history of the city's first flyover in conversation with various

municipal engineers, she reflected on the proliferating web of elevated concrete lanes. The engineers she spoke with unequivocally declared the city's flyovers dangerous and incapable of solving its traffic and transport woes. My interest follows Maher's problematization nearly a decade ago. The network of over 50 flyovers and underpasses in Karachi, Pakistan continues to grow in a city of approximately 17 million people, further distorting and fragmenting urban life. Scholarship on flyovers, scarce as it may be, has foregrounded segregation, elite imaginaries of a world-class city, formalization, and social ordering as potent forces shaping urban trajectories (Graham, 2018; Harris, 2013, 2018; Tadiar, 2000). Extending this line of work, I am interested in the afterlives of flyovers in Karachi. Given that these structures contribute to further entrench ethnic divisions (Gayer, 2014) and have replaced public transport in planning decisions (G. Khan, 2022), I seek to examine how flyovers meant to benefit elite and middle-class mobilities in the city as a form of "entitled urbanism" (Moatasim, 2019) are socially and materially embedded in everyday life. I reflect on how differently mobile urban dwellers relate to and inhabit a single flyover. Following "borderland urbanism" (Iossifova, 2015), I consider the flyover, its material forms, and attendant gaps as a place in the city that is transient, contested, and constantly remade. Borderland urbanism, as a conceptual frame, attends to the in-between spaces in cities marked by segregation and enclavisation where forms of "contestation and dismantlement" emerge in the "co-presence of the other" in the production of alternate forms of dwelling in the city. While Iossifova (2015, p. 104) makes a distinction between borders as "physical manifestations of political will" and borderlands where formal planning sits alongside other emergent possibilities of urbanity, I consider the flyover as both a border and borderland that amplifies differences in the city. As a border(land) that connects and disconnects people and places, the flyover constitutes complex forms of copresence that are at once conflictual and collaborative. Co-presence here does not necessarily constitute moments of resolve between members of different social classes but is a relational process that reproduces hierarchical relations. Interactions (or lack thereof) between members of different social classes are therefore patterned by uneven development that continually privileges wealthy car-driving citizens. Even as physical separations exist in the form of these elevated road exchanges, encounters take shape through perceptions of the other. Therefore, the material politics of the flyover as it dissects space and bypasses areas is important in understanding how social difference is constructed, lived, and experienced by individuals in Karachi.

Research on the politics of infrastructure offers an extensive understanding of how infrastructures coalesce around state formation (Akhter, 2015; Akhter et al., 2022; Khalili, 2017), mediate political struggles, belonging, and sociality (Amin, 2014; Anand, 2017; Anwar et al., 2020; Becker et al., 2020; Holston, 2009; Speer, 2016), perform aesthetic functions of gesturing modernity and positioning the "global" city (Anand et al., 2018; Kaika & Swyngedouw, 2000; Larkin, 2013; Wu, 2000), subsume gendered bodies in socio-material networks (Truelove & Ruszczyk, 2022), and imbricate the lives of human and non-human dwellers alike (Barua, 2021; Roos, 2022). Enfolding my inquiries in this "infrastructural turn" and extending into the hyper-visible and worlding modes of "infrastructure space" (Easterling, 2014), I examine how flyovers in the increasingly enclaved city of Karachi (Kaker, 2014) function as "juxtapositions of difference" (Iossifova, 2015, p. 104) where infrastructure unhampers the mobilities of certain car-driving urban citizens whilst decelerating and marginalising others. Beyond physical dimensions, I consider how flyover geographies encompass competing imaginaries of urban problems that rub against each other to produce different political positions enabled by class. Moreover, in the concrete and asphalt constellation that emerges, I reflect on how walking bodies, left out of the planning imaginary, dangerously straddle the interstices.

Ethnographic fieldwork for this research was conducted in two trips to Karachi in December 2021 and November 2022 that lasted a total of five months. The case study in this research is the Gizri flyover. Constructed in 2010 by the Defense Housing Authority (DHA), a powerful developer controlled by the military, the flyover connects the DHA neighbourhoods that surround the locality of Gizri. The flyover is suspended over the Gizri commercial area, a diverse market with expensive shops selling bathroom tiles, light fixtures, and kitchen appliances, to stores in disrepair offering tire repairs, ice, and construction materials. Nestled in the interstice underneath, every day street hawkers sell fruit, sugarcane juice, and curries. I conducted interviews with residents, street hawkers, and shopkeepers who encounter the flyover in their everyday lives. The interviews took place in homes and on the road. All interactions and interviews in this article have been anonymised to protect interlocutors at risk of facing displacement in their places of work and residence. Moreover, ethical considerations guiding this research espoused the sparing use of photography in data collection, especially in documenting scenes under the flyover due to the risks posed to street hawkers and residents of Gizri. I also spent time sitting, talking, and walking under the flyover. Even as I tried my best to blend into the everyday rhythms of this site with invariably more men than women, as a woman I was perceptibly visible. This visibility made the work of hanging out around the flyover certainly challenging as I received many stares, but also because the more vulnerable dwellers initially grew wary of my presence and practices of observing, talking to others, and note-taking. Over time and with respectful engagement, I earned their trust. My academic and class background also made me an outsider. Despite my familiarity with Karachi as a home for many years, I was an outsider to the worlds and relations underneath the flyover. As a private vehicle user in the city, I was much more used to taking these sterilised lanes to move from one location to the other, as opposed to inhabiting this landscape without a car with the intention to walk, dwell, loiter, and engage. To reflect on experiences of walking in the city, I walked on some of the city's other flyovers, major roads, and expressways.

2. Locating Flyovers in Bordering Practices

Flyovers dissect urban space and differentiate urban citizens in significant ways. At times their morphology, sans footpath, with restrictive bollards and visual barriers, is implicated in wresting public space exclusively for automobile flows and the urban middle class. Resonating in Karachi's constellations of roads, flyovers, underpasses, and expressways is what Jones and McCreary (2022, p. 19) identify as "zombie automobility," scaffolded by the car that is "so deeply entrenched in our social imaginary," in which transport authorities selectively invoke sustainability only to advance further infrastructural projects privileging private automobiles.

Other times, flyovers as physical borders are forcibly enacted by planners to separate urban space through infrastructural segregation and fracturing of mobilities based on racial and nationalistic lines, a process Graham (2018) calls "flyover apartheid" in his analysis of infrastructural politics in the West Bank. Indeed, as Ashoub and ElKhateeb (2021) examine in the case of Cairo, enclave urbanism is shaped not only by the creation of gated communities but also by the obstructions and limitations wrought by flyovers, highways, and expressways on people's mobilities and capacities to assemble. Such socio-spatial segregation serves to entrench social disassociation. Flyovers, therefore, constitute forms of social and spatial ordering in the governance of traffic (Baviskar, 2020; Tadiar, 2000). By design, they pull areas into zones of connection and disconnection, searing onto the vertical urban landscape singular or multiple concrete conduits through which the city is traversed, lived, and experienced.

As scholars have noted, ideas of congestion, wielded to justify flyovers, construe the problem as more than just the overabundance of automobiles on the road. In urban planning imaginaries, congestion marks the city's unrealized experience of modernity and reflects the desire to formalize what is conceived as uncontrolled and informal (Anand, 2006; Harris, 2018). De-congesting, in developmentalist imaginaries (Robinson, 2006), appears as a perpetually incomplete project that requires unrelenting infrastructural mediation. As such, flyovers are not simply a "technocratic response and remedy to the pressures and demands of rapid urbanization" but configure in significant ways the desires to construct a "world-class city" whereby state resources are directed towards funding projects that privilege the mobility of elite groups with private vehicles (Harris, 2013, p. 344). Graham (2018) notes that urban mobility is structured by a distinct fetishisation of flyovers and expressways that encapsulates promises of growth, progress, and arrival on the "global city" stage. Dominating global city imaginaries, these technologies are confounded by the exaltation of a few urban examples and "the assumption that some degree of interurban homogeneity can be assumed" (Amin & Graham, 1997, p. 417). This manifests in various ways, often in patterns that are situated and bound to flows of capital (Perl et al., 2015). In Bengaluru, India, Gopakumar (2020) considers the techno-politics of a cyclical "regime of congestion" formed by the interlinkages between material, institutional, and political actors that produce congestion in the city as a site of intervention through flyovers and other mega-infrastructure projects that centre on profits and simultaneously re-produce conditions of vehicular congestion.

Moreover, flyovers as symbols of modernity bear significantly on arranging urban temporality and are regarded as assimilating the postcolonial nation into practices of global consumption. In Karachi, Gayer (2016, p. 148) writes that the city government in 2009 promoted its projects by lauding flyovers for providing "the driving pleasure, which had been a dream in the past." Such affective conceptions of flyovers are meant to impart these structures as milestones that are important to achieve for Karachi and its citizens in order to perform progress and rise in the proverbial global city hierarchies. Driving and driving well, therefore, are the performative forces signalling those shifts.

Implicit in the morphology of flyovers, alongside the privileging of automotive mobilities, is a deep anthropocentrism. How the lifeworlds of non-human urban dwellers may be affected often does not feature as a concern. Attempts to re-think flyovers to "accommodate, foster, and modulate other-than-human life" are taking shape in contexts of great tension between the demands of development and conservation (Barua, 2022, p. 37). Yet, it remains unclear whether such forms of "reconciliation infrastructures" will prove to be little more than an "engineering fix: a techno-managerial intervention for a problem created by infrastructures, colonial violence and dispossession in the first place" (Barua, 2022, p. 40). Drawing together these registers that constitute flyovers as a bordering practice in urban planning foreground how the material politics of a flyover splits and fragments the city spatially based on identity and border conflicts, ecologically by privileging anthropocentric mobilities, and temporally by extolling flyovers as harbingers of modernity whilst stunting capacities of growth for areas that are bypassed.

This article aims to evoke flyovers as more than just frontiers in increasingly segregated cities. Paying attention to the multi-dimensional geography of flyovers reveals how social differences are infrastructurally maintained and reproduced by residents who are able to drive over neglected neighbourhoods. The surrounding interstices and the social life they make possible unravel attempts to homogenize urban space, particularly roads as simply spaces of transit. In the case discussed below, I highlight how attempts to

alleviate traffic congestion through the construction of a flyover rests at odds with socio-economic processes, lives, and livelihoods that hinge on the possibilities that the road offers. Drawing on interviews with DHA and Gizri residents, I argue that flyover geographies represent competing imaginaries of urban life enabled by class positionalities that reflect everyday struggles over the right to the city.

3. Flows and Their Discontents: The Case of the Gizri Flyover

The Gizri Flyover was opened to the public in January 2010 after failed attempts to resist its construction in the form of protests by residents of Gizri and a court petition by the NGO Shehri-Citizens for a Better Environment (Alam, 2009). Funded by the DHA, it was designed to "ease residents of DHA" as they crossed the "main Gizri bazaar," described as a "sore point for traffic congestion" in the organisation's annual newsletter (Hussain, 2009). Costing Rs. 560 million, the project was initiated without the legal prerequisite of an environmental impact study and was still declared lawful by the Sindh High Court. The DHA, therefore, managed to build the flyover for its residents and it has been funnelling people over Gizri for the past 13 years (Figure 1).

Ehab, a 39-year-old project manager at a multi-national company who lives in a bungalow with his wife, daughter, and parents in DHA, is one such resident. He was fond of the flyover as he took it every day to his office in Clifton. He called it "absolutely necessary and good planning from DHA." In our go-along interview, I accompanied Ehab to his workplace on a December morning in 2022 in his white Honda Civic, symbolic of his upper-middle-class positionality. Ehab drove without his seatbelt on, which is common practice on Karachi's roads and his speed hovered between 50 to 60 km per hour. He overtook other vehicles often, eager to find an opening that would let him rush through. At the traffic light before we turned to follow Ehab's route through Sunset Boulevard, he turned away a young boy hoping to clean his windshield for a small price by turning on his windshield vipers. While Ehab looked straight ahead, avoiding meeting the boy's eyes, the waving vipers spoke for him: No, not interested. As we turned left from Punjab Chowrangi, infamous for its traffic jams, where despite an underpass, traffic at the intersection is difficult to navigate, Ehab referred to it as one the "worst places to get stuck," due to "motorcycles, rickshaws that come in every direction" and have "no patience," and because the "underpass fills with water every year" during the monsoon. All this was evidence for Ehab that "the government is sleeping." As we drove on Gizri Road, the two-lane Gizri flyover appeared somewhat awkwardly out of place in the middle of two narrow roads on either side that took users in and out of the busy commercial area underneath. A restrictive metal bollard hung over its mouth, with signage indicating that heavy vehicles are not allowed and only light vehicles (the image shows a car) can pass through (Figure 2). On the flyover, we were surrounded by metal sheets that ran along the walls like horse shades. For 1.6 km of the length of the flyover, we saw only the stretch of grey sky and the tops of two high-rise buildings: Bahria Complex 4, a concrete and glass office building, and a shiny new block of apartments.

Ehab said, zooming through the flyover while tapping his thumb on the steering wheel:

> Before this flyover was made, I would try to avoid this route as much as possible because it could easily take you 30–45 minutes. The market is extremely congested. Buses stop every few minutes and people get in and out, shopkeepers are using donkeys to transport steel bars, it's a total mess. No traffic police, people park anywhere….Suffocating. It's hard to believe it's DHA. I don't know what you think but we needed this flyover. Otherwise, we would still be choked down there.

It was not unusual for DHA residents to mistake Gizri as a part of DHA and it is likely that the flyover built by the elite residential developers over Gizri cemented this in their spatial imaginary. I asked him if traffic signals could have been another solution to managing traffic and he responded:

> What would the signal do? The same swarm of beggars collecting and who stops at signals anyway? If there was a signal there would have been terrible jams. And now look, no traffic lights, no beggars, no minibuses stopping in front of you suddenly, so many times I have almost gotten into an accident because of them.

He added reflectively:

> But it's not perfect….Sometimes I have gotten stuck in a traffic jam on this flyover after work. Even with the flyover, there's just too much traffic. Too many cars. You see, even London has a traffic problem but they *also* have buses and trains. Here, nobody wants to give up their comfortable cars.

Ehab's relationship with the flyover emerges from his class positionality (Castells, 1979) and his automobiled urban aesthetic. Automobility, as Urry (2006, p. 18) argues, is a "complex amalgam of interlocking machines, social practices and especially ways of inhabiting, dwelling within, a mobile, semi-privatized and hugely dangerous auto-mobile capsule. The car is not simply a means of covering distances between A and B." Indeed, automobiles significantly shape how people experience and relate to the urban conditions around them. As Ehab gets in his car, the two are simultaneously transformed (Latour, 1994) into a car-driver (Sheller & Urry, 2000), with its own politics, practices, and forms of knowing the city. Ehab's experience of the city, therefore, is shaped by the struggle to enact and maintain flows, as he makes his way through it. Material functions of the car are equally implicated in the process as an extension of the body to relay messages to deter undesired interactions on the road. Speed is produced not only as an operation of the car, but through the body's manoeuvring; braking and accelerating, cutting across, and in front of other moving body-machine assemblages (Gandy, 2005). Driving, as an embodied practice and engagement with the road, hinges on such skills and forms of spatial awareness (Merriman, 2009) that have wider implications for urbanicity. As a car-driver, Ehab relates to urban space through the function of movement and time spent on the road and to non-car users by their inability to move fast. Infrastructure's purpose, therefore, becomes one of unhampering the privileged body in flow. This purpose is materially and socially enacted through easing the stagnation of traffic signals via infrastructural interventions, avoiding interactions with panhandlers who are perceived to pester and disturb the driving citizen, limiting access to public mobile forms such as minibuses that stop often and therefore rub against the inscribed codes of appropriate road behaviours that car drivers may set and urban planning in their favour may enforce. Furthermore, for Ehab, relations with the state hinge on whether infrastructure exists and remains accessible, unblocked, unbroken, and unflooded. Infrastructure, therefore, is the site where perceptions of urban authorities oscillate between "good planning" and a "sleeping" government.

Despite the physical separations elevating those on the flyover, DHA residents often evoked what was underneath in interviews to affirm their feelings of "relief" and "comfort" in being on the flyover. For middle and upper-class residents, the flyover offers an alternative landscape. Landscape is understood here as what Gillian Rose (Merriman et al., 2008, p. 200), reiterating Denis Cosgrove's work, notes as "a particular way of spatially and visually organizing a view, which produced not only a landscape in front of a viewer but also

the viewer as a subject position." Others like Ehab, for whom the flyover cut travel time, referred to the area underneath as "dirty," "busy," and "messy" and contrasted the flyover route as "clean" and "comfortable," sure signs of a city that is "progressing." In making this contrast, often in response to my questions regarding the need for the flyover, interlocutors relied on representing moving through Gizri Road as undesirable. The flyover, as a space of comfortable movement, was therefore always referred to in relation to the congestion perceived underneath. Two points are significant to make here. Firstly, how the flyover is experienced as a landscape hinges on the "presence/absence" of the market and "sits precisely on this tipping point, both joining *and* dividing. It tears things apart, and maybe even threads them together again" (Merriman et al., 2008, p. 203). Visual and physical separations withstanding, the flyover triggered a variety of affective encounters: with the flyover itself, as object and landscape, and with the market underneath. The flyover created feelings of relief, precisely because what is underneath is still imagined, "felt," and "seen." The second point relates to these imagined perceptions of the market landscape that is not physically encountered but affectively recounted as dirty, messy, or ugly. The flyover prompted these "regimes of feeling" (Thrift, 2004, p. 12) reminiscent of the descriptor "guilty pleasures" used by journalist Mahim Maher to refer to flyovers, in ways that are actively "engineered" (Thrift, 2004, p. 12) to maintain spatial and class disparities. Affective, spatial, and imagined encounters on/with the flyover for DHA residents, therefore, reproduce hierarchical relations between elite locations and marginalized areas, further augmenting inequalities that are infrastructurally replicated. Simply put, the flyover does not only produce segregation in the city through its material form but also in the ways that some elite residents "feel" about it and the area of Gizri underneath.

Sometimes, however, the promise of the flyover in alleviating the stresses of traffic is left unmet. As Harris (2015) notes, the relationship between verticality and power escapes straightforward assumptions of the location of power in height. The daily tensions and transformations of the flyover space from a site of flows to a place of blockages exemplify this. At times, the flyover asserts itself as a site of power as it expels pedestrians and buses, hides away parts of the city deemed congested and ugly by the city's privileged residents, and enables flows for DHA's car drivers who are able to escape being "choked down there." At other times, car drivers themselves become the problem of traffic that they so desperately want to overcome and can no longer blame on impatient "motorcycles, rickshaws," as the flyover becomes full, chokes, and stagnates. The verticality that frees car drivers from the interferences of the road then becomes an entrapping device that no amount of bodily manoeuvring can overcome. These moments upset the relations that some car drivers carve with flyovers. As a space meant for smooth flows, therefore, the flyover and its vitality in the city is regulated by the at once transient and constant motions of the city's motorised urban dwellers.

4. "Who Is It Even for?": False Promises of Development and the Trials of Walking

Lived from underneath, the flyover shifts from being an object of "good planning" observed from the car-driver positionality (Sheller & Urry, 2000) to a "mirage" of urban development for those the flyover bypasses. For Suhaib, born in Gizri, whose family has lived there for decades and owns a shop in the market, the flyover is an unwanted imposition. I met him in the heart of the market, at the edge of the road just outside of his father's shop overlooking the space underneath the massive structure. As his voice and my ears strained against the cacophony of roaring engines, sputtering exhausts, and honking horns, he told me that before the flyover was conceived in 2010, DHA had wanted to build a wall to split the road to "fast-track the traffic." These plans provoked some shopkeepers into action who formed an informal alliance, the Gizri Shopkeeper's Association,

to resist the wall. A heavy price was paid for that initial resistance, he said, because instead "they built this monstrosity." Since the flyover, Suhaib said the market has struggled to grow, potential customers from the affluent DHA simply drive over, and the shops are not increasing in value at the same rate they used to. "Even though you see all around you where we are. Surrounded by DHA. Considering the location, the market value should be very high." He recalled the negotiations that took place as the flyover plan was being developed:

> When this flyover was being built, a lot of people had a grasp on the process. We didn't have any association and the association that existed at the time was being run by people on that side [motions to the opposite side of the market, across the road]. We were duped [*Hamaray saath game hua*]. They told the association on that side that they are going to have to demolish their shops….The shops are taking more space illegally. It's unauthorised.

Suhaib pointed to the non-linear occupation of space across the road, where the structure of some shops protruded out further towards the road than others: "The *paanwala* [betel leaf seller] is also coming out of its allotted space, so is the *barafwala* [ice seller], then the shop next to it is pressed backwards….People have taken more space."

As we spoke about what transpired in the negotiations between the "association," Suhaib's side of the market, and DHA officials, Suhaib grew agitated. He said that the association on the "irregular" side of the market was threatened with "demolitions" (*torr phorr*) to make them all "level" (*barabar*). Suhaib shared that when the threat of demolition loomed over the association, they withdrew their opposition to the flyover and became "silent" to save their shops. As for his father and the market along his shop, they were "sold development":

> Well, we thought if the flyover is made, it will be in our favor. They told us that too, and after that, we were silenced [*khamosh kara diya*]. And the mirage [*sabz bagh*] we were shown was that when the flyover is made, there will be a small footpath in the middle, there will be a proper system of parking. There will be potted plants in the middle. Atop the flyover, there will be lights, the walls will be painted, the pillars will be colourful, and DHA is making it so you know it will be great. They made all these promises and the unfortunate thing is… the people in the market who mediated for them to convince the others got nothing in return. They were just the muscles to make it happen. They painted a wonderful picture for us, and we bought it. We were here legally. If you look at this side of the market, it is ordered evenly. But the market on that side isn't. Whoever wanted to take more space and come out front has done it. So, they were threatened and we were sold development. After the flyover was built, they [the shopkeeper's association] got nothing from DHA. They put these lights under the flyover worth millions. They have never been turned on and have decayed. The colours on the walls never appeared. People started putting up their posters, shop owners put up their signs….A mess was made [*gand mach gaya*].

Surely, this road exchange which did not cater to the mobilities of the people of Gizri required a different form of development framing by the developers. It was no longer about necessitating flows, but aesthetic upliftment even as Gizri was being reduced to an interstice—a shrinking neighbourhood quickly being "eaten up by all sides" by the powerful DHA. Where earlier Gizri was connected to its surroundings by forms of passing through and residents and shop owners elicited some material benefits from proximity to DHA, the flyover made sure that Gizri's future would be made dubious; as Suhaib disparaged, "It has left us

behind"—a clear expression of how residents experience a temporal abandonment in the city's development trajectory. The aesthetic upliftment pledged to "trickle down" the material benefits of the flyover never appeared. To Suhaib, it stands as a reminder of intimidation and unfulfilled promises. I asked him if the flyover helped him save time coming to and fro Gizri. He scoffed: "Our lives are here. We live here and work here. I am always under this *bala* [monster]." The practices that enshrine the flyover as an imposition (passing over, development lies, intimidation) produce a different version of its reality for the dwellers of Gizri. Here, it is not the market that is entangled in imaginaries of deterioration but the flyover itself.

Rehana, another resident of Gizri and a 63-year-old Quran teacher working for an upper-middle-class family in an apartment building across from her neighbourhood, had a similar opinion. I first met her walking on Gizri Road as she was out looking to refill her gas cylinder for her stove during an acute shortage. She lives in a small room, approximately 12 m^2, in a house she shares with her son and his family in a small neighbourhood of densely compacted concrete houses and narrow lanes, designated by city authorities as a *katchi abadi* (informal settlement). Inside Rehana's room, an electric fan whirred next to a small, dusty television and a wooden shelf. Tucked amongst her things on the shelf was a Ludo board, a popular board game which she played against herself to pass the time. She crossed Gizri Road three times a week in the afternoon during peak rush hours to teach her students in their home. Rehana shared that she did not leave her house frequently. She sometimes took a rickshaw to go see her daughter in the north of the city, but the journey is too costly for her. Sometimes, her son takes her on his motorcycle but she does not feel comfortable asking him to spend the fuel for her sake. So, she stays home most of the time, leaving the house only when she needs something from the market or to teach her lessons. Her family has never owned a car and she has never driven a motorcycle herself.

Rehana walks wherever she goes. She liked her job but did not know how long she could keep it. She was getting old and slower, she said, and crossing the road had become more difficult due to the "innumerable" cars. She reflected on the shifts that the flyover brought: "One road became two. An old woman like me, when I go to teach….I have to cross two roads now." She is generally "stressed" by the traffic she encounters, the speed, and the "impatience" with which people drive. She had been in accidents, never badly hurt, but she is generally afraid. She tends to walk onto the road with her arms raised and palms open towards the oncoming traffic. Without zebra crossings, traffic signals, or traffic police, Rehana has to navigate and weave her way through the tumultuous surge of cars, buses, motorcycles, and rickshaws on her own. As she steps onto the road, she carefully shuffles through the moving traffic, her body poised in imploring people to stop. Some do, others weave past her, almost grazing her as they go. Some others honk, gesturing towards her to rush. In those chaotic moments when Rehana's body comes in contact with traffic, she shared she felt "weak" and traffic sounded like "screams." Often, she tries to cross the road when someone else is, hoping to trail in the path made by the crossing person. She is much slower, however, than the mostly young men who are able to dash across daringly. She noted acerbically that the flyover serves no purpose for the people in her locality who cannot afford cars. Due to the flyover, the road underneath was narrower than it used to be and traffic had not abated, but worsened. On her way back home from her lessons, Rehana gestured to vehicles in what is supposed to be a one-way road, but bemoaned that "cars come from everywhere," as people go the wrong way to "shortcut." She blamed the police for the lack of traffic governance and for not holding people accountable. She recalled a gruesome accident she had heard about at the Punjab Chowrangi underpass, a busy intersection a few kilometres away that connects to Gizri Road. The accident took place on December 19, 2021, when a speeding car ran over a woman as she was crossing. Rehana heard from witnesses that the woman's "stomach

and intestines spilled out everywhere" and a couple on a motorcycle were badly hurt. She expressed little hope for the driver's arrest:

> Now to catch the killer and take the case to court….Who will do all this? Whatever the police want will happen. Whoever's child did it, he will grease the palms of the police and that will be it. Our law is such. We get hurt, no matter what….If the police were doing their job, so many lives would not be lost on the road.

While ethnic violence in Karachi has frequently served as a frame for scholars to apprehend urban politics (Gayer, 2007, 2014; N. Khan, 2007; Kirmani, 2017; Verkaaik, 2016), the role of urban planning and infrastructure in producing forms of everyday violence have also gained attention (Anwar et al., 2020; Gazdar & Mallah, 2013; Kaker, 2020; Kaker & Anwar, 2022; Mustafa et al., 2019). Much like those who drive, Rehana's walking experiences deeply inform her relationship with the city and the state. While gender norms certainly shape her regimented movements in the city, the striking lack of infrastructure and road safety practices further restrict her capacities to move freely. Taking on the road with only her body as a manoeuvring agent, Rehana embodies constant risk. On Karachi's streets, threat to life is unevenly distributed. Like Rehana, pedestrians on Karachi's roads negotiate daily risks of bodily harm and sudden death as they traverse its hostile geography (Lateef, 2011). In 2016, an estimated 27,582 fatalities occurred on Pakistan's roads (World Health Organization, 2018). In 2022, traffic police are cited to have counted over 300 fatal accidents in Karachi (Abro, 2022) whereas Edhi Foundation, an NGO providing emergency services in the city, is said to have recorded 780 deaths (Desk, 2022). In 2023, health professionals cited that nearly 500 people are injured every day on Karachi's roads (Ayub, 2023). To make sense of the extent of the perils of Karachi's roads for pedestrians, I relied on observations of how people managed to move in the city and my own experiences of walking. Following Merleau Ponty's conception of being-in-the-world as body-subjects, I considered how walking as an embodied activity, "based in 'habit' (i.e. acquired skills, schemas, and techniques)" constitutes human beings in relation to their world (Crossley, 1996, p. 101). Furthermore, extending Mauss's (1979) ideas of walking as a culturally specific technique of the body, I found walking bodies in Karachi to be conditioned by infrastructural specificity, resulting in embodied risk. Pedestrian mobility in planning logic hinges largely on foot bridges that hang over roads (Figure 3). The flyover boom of Mayor Mustafa Kamal's administration enjoined the construction of a vast majority of the city's current 165 bridges, as counted by the cited reporter (Mehdi, 2023). Walking in the city therefore means climbing up and down aluminium, cement, and streel bridges with 50 to 60 steps that are in varying degrees of neglect and decay and completely inaccessible for persons with disabilities (Figure 3). Along thoroughfares, the bridges are few and far between. Without bridges, people, mostly men, resort to dashing through fast-moving traffic and jumping over concrete dividers of two-lane roads. People also often needle their way across roads through gaps in concrete dividers where streetlights were meant to be installed but never were (Figure 4). On thoroughfares with fast traffic, clusters of pedestrians often collected on the edge, waiting for gaps in the onrush of vehicles to make their way across as fast as possible. In one rather dangerous walk on the Lyari Expressway, which is tolled and accessible only to cars, I happened upon rudimentary concrete stairs connecting the expressway to the locality it has effectively bypassed (Figure 5). Built by the people of the neighbourhood, I read the material interventions of the stairs as forms of rendering the city navigable by the urban poor who are deliberately marginalized by its infrastructure. Such practices made apparent that an undercurrent of pedestrian flows take varied and dangerous paths in the city, meaning that walking bodies are always at risk.

Figure 1. Map of Gizri flyover and adjoining areas.

Figure 2. Gizri flyover.

Figure 3. Pedestrian bridge at Shah-rae-Faisal Road.

Figure 4. Walking pathways through gaps at the Gizri flyover.

Figure 5. Stairs leading to Lyari Expressway.

5. Life in the Interstices

Casting a long shadow over the Gizri market, the flyover is lived and experienced differently by the area's residents and frequent dwellers. Many people I spoke to hardly went over the flyover but used it in other ways. Eateries, auto-repair shops, electrical stores, and other businesses advertised their business through posters plastered over the walls of the flyover (Figure 6). Taking more space and sown into this visual collage were political posters with faces of elected officials and party symbols (Figure 7). Lines of daily wage workers (men) sat underneath, facing the road on each side, the tools of their trade placed in front of them, positioned to be visible to passers-by and shop owners who might hire them for a day's work. Street hawkers sold fruit, fresh juice, fried goat liver, chickpeas, and egg curry. Drivers of parked lorries waited for delivery jobs to transport construction materials like concrete blocks, steel, and wood. A flurry of motorcycles stood in sections that were informally reserved for their parking. At other spots, shops stored their wares (electrical generators, sand, concrete blocks, and paint cans). Near "flower street" (*phool gali*), every day shiny new cars owned by DHA residents would be decorated with stemmed and unstemmed roses. Garlands made of marigold, daisies, and roses were carefully placed on bonnets or hung from the roof of the car (Figure 8). The space underneath the flyover, therefore, figured significantly in everyday work. Majid, a stove repairman, hung the frame of a stove on a protruding metal nail from the flyover to catch the eye of people driving by underneath. He sat under it, working on a small corner of the flyover's column. He had a shop in a building a few hundred feet from where he sat, but preferred to sit here to "catch customers." I asked him about the stove hanging over him and he explained that it was to signal his position to drivers from afar so they can plan to stop when they reach him, instead of accidentally passing him by.

Figure 6. Flyover columns feature many layers of advertisements, notices, and political posters.

Figure 7. "The symbol of Karachi's built progress," reads a Jamaat-e-Islami poster amidst a throng of parked motorcycles and cars.

Figure 8. Floral embellishments are added to a customer's car in preparation for a wedding.

In the teeming, crowded, and diverse scenes under the flyover, such forms of producing visibility were habituated by the market itself and the people who passed through it. All actors and their activities under the flyover faced the road, in clear view of the shopkeepers and those driving by in cars and motorcycles. Shopkeepers sometimes relied on the workers for small jobs and fixes. Majed, for example, often did repair work for the shopkeeper of a high-end brand of stoves in the market. Staying visible in that shopkeeper's view was an everyday strategy. Knitted in these relationships, therefore, is the role that visibility plays in entreating livelihood in the interstice.

For street hawkers, however, visibility sometimes stirred the threat of eviction. Many I spoke to were glad to have the flyover as the area underneath extended the space they could take up. Before the flyover was made, it was arduous to exist along the road's edges in the sweltering sun. The flyover affords both shelter and space. However, some shopkeepers frustrated with congestion on the road saw street hawkers as obstructions to traffic and referred to them as an illegal "mafia" taking up unauthorised space. Vendors under the flyover were painfully aware of this rhetoric and took measures to undo this representation. Sarwar and his teenage sons, who operate a lunch cart carrying an assortment of curries, were careful to stay under the flyover and off the road. Sitting on a chair on a platform of the flyover's column while his son stood behind the cart a few feet away attending to customers, Sarwar did not allow cars to park near his cart, making sure that the road space remained free. He bemoaned the blame cast on street hawkers and pointed to the cars parked along the shops: "Look how much their Prados and Landcruisers block the road." Indeed, much of the road space was taken up by cars, particularly large SUVs. In the absence of traffic governance, many street hawkers sought to manage traffic independently to stave off criticism of their presence. Some kept bricks and concrete blocks to stop cars from parking in areas where they did business. Their daily presence and work folded into ordering traffic. Sarwar also made efforts to maintain good relations with the shopkeepers around him. Across the road from him was a restaurant whose owners were Pashtun. Sarwar, identifying himself as Punjabi, said that he and everyone around him practice "cooperation" and that Gizri is not mired in ethnic conflicts typical to Karachi. Indeed, this was an ethnically diverse space where life was ordered not by identity politics but by the rhythms of everyday work and evading municipal interventions. Sarwar, for example, served *chapatis* (flat bread) to his

customers that he acquired from the restaurant. Sarwar's cart, therefore, ensured that a steady demand for bread flowed into the restaurant and these economic ties softened his presence. The owner was less likely to complain to the municipal authorities if he benefitted from Sarwar's business. Many street hawkers in this way were able to draw out acquiescence and construct forms of collaboration (Simone, 2004).

Sometimes, however, municipal authorities conducted raids. Hafez, a third-generation Afghan immigrant who took over his father's fruit cart, told me that even though most vendors are compelled to pay an illicit fee to municipal officers to occupy space under the flyover, eviction drives happen when a new and zealous "senior officer" comes into office eager to "clean up" the area or when someone complains. Most hawkers I spoke with receive word of the impending eviction drive from their contacts and temporarily relocate to smaller streets. Hafez seemed unbothered by the threat of eviction. He has figured out a way that works for him: upending municipal borders. When he "received information" from his informant, he simply moved over to the west of the market which is controlled by a different municipal authority, Karachi Municipal Corporation. Hafez therefore utilizes the fragmentation in Karachi's land control by an array of cantonment boards, trusts, and authorities to resist eviction. By crossing over to where the jurisdiction of the raiding municipal authority does not apply, Hafez is able to keep his cart and his livelihood intact. He chuckled as he told me: "What can they do when it's not their area? They leave me alone. And I come right back when they leave." These matters are not always smooth for everyone and at all times, however. Sarwar's cart was violently confiscated during lockdown on account of the Covid-19 pandemic because he was not wearing a mask. He was made to pay heavy fines to reclaim it. Sarwar shaking with anger at the memory of it, said: "Why do they allow us to set up here if they are going to remove us after all? They shouldn't let us set up in the first place!" Sarwar felt that the mask was simply an excuse to evict him. For him, it is an everyday struggle to navigate the uncertainty that results from how the municipality governs the space through a complex interplay of extortion and eviction drives. Yet, he too, many a times, was saved from eviction by receding to nearby less policed streets when he was warned ahead of an eviction raid. Street hawkers under the Gizri flyover, therefore, resist eviction by being on the move, receding, and hiding when they need to and are entangled in complex relations with figures in authorities that are simultaneously extorters, evictors, and collaborators.

Even as human interactions gripped my focus, I was resolutely reminded of the flyover's non-human dwellers by their frequent interventions. Swooping in and around these material and social arrangements under the flyover were dozens of pigeons. They made their presence egregiously known when during conversations their droppings splattered all over my notebook and hair. This would often invite laughs from my interlocutors who knew very well the dangers of unassumingly standing under the flyover. People waiting for the bus underneath often cast furtive glances upwards to make sure they were safe from any surprises. The pigeons interacted deftly with the people and the environment they inhabited. Crevices in the underbelly of the flyover formed their concrete dovecot and morsels of food that could be found on the ground made their diet. They fluttered to the ground when they spotted a person with a fresh plate of food, eliciting the tossing of some bread and rice. When I asked Hafez if the pigeons bothered him, he was surprised by the question and said no: "They're searching for their place, we are searching for ours." In his understanding, pigeons and street hawkers were cast in a similar struggle for space in the city, both inhabiting its interstices, sustained by its flows but left largely marginalized in city planning imaginaries. The space under the flyover, therefore, as a site of multispecies copresence, unravels anthropocentric renderings of the city's infrastructure and public spaces. It calls to attention the minor modalities through which "other-than-human forces and intensities co-compose urbanicity" (Barua, 2023, p. 2). Installed to

resolve traffic congestion for residents of the elite neighbourhood of DHA, the Gizri flyover corresponds to the "in-between" and "complex surrounds" (Simone, 2012) conjured by its "relational location" (Simone, 2022, p. 6) and diverse articulations as a space of circulation and breakdown, opportunity and precarity, and human and non-human inhabitation.

6. Conclusion

Dwelling on stories of how a flyover figures in the lives of Karachi's human and non-human residents, I propose paying attention to infrastructure as spatial entities that may cut through, open, and transform urban space. By "seeing between enclaves" (Iossifova, 2015) and considering the socialites producing these "non-places" (Augé, 1995), flyovers emerge as crucial spaces in-between, shaping practices of driving, walking, working, and inhabitation. The case discussed here has resonance beyond Karachi. In cities across the Global North and South, flyovers, underpasses, and other road exchanges have been and are drastically changing how cities are lived and experienced. Visions of "modernising" and making traffic uniform often underlie the investments and interventions in infrastructure in planning logic. What is at stake in the political arrangements of these lanes and the urban potentialities they open for some and close off for others is the very diversity and vitality of cities (Jacobs, 1961/1992). This article shows that as cities grow more and more fragmented in the constellation of flyovers, expressways, and underpasses, urban actors are enrolled in specific and unstable relations with these interstices based on class positionalities. It highlights how material, spatial, and affective encounters in and with flyover geographies in the city of Karachi reflect struggles over the right to the city. I have argued that infrastructural inequalities are maintained and reproduced not only through the physical separations rendered by the flyover but also by the affective forms by which some upper-middle-class residents may valorise the flyover and further marginalise and stigmatise undesired areas. Central to this argument is also the notion that the flyover as a spatiality of comfort and speed is a misnomer, identified by drivers like Ehab for whom the flyover straddles the boundaries of convenience and hindrance as these circuits shift from functioning flows to blocked and jammed corridors. Furthermore, this article recollected interactions with and around the flyover from below to emphasize the strains and violence of uneven development as lived and felt by Gizri's residents and street hawkers. Firstly, it relates to the affective experience of "being left behind" due to the (unfulfilled) promises and intimidation tactics employed by the developing authority. Secondly, it identifies how visibility on the road for street hawkers and daily wage workers in seeking employment is crucial but also carefully mediated by forms of hiding to avoid eviction by a municipality that roleplays in contradictory forms as collaborator and evictor. Thirdly, it reflects on how walking bodies left ejected from roads altogether by design are forced to forge liminal paths and inhabit constant risks as they inevitably touch traffic. Crossing the road, without any exaggeration, is a matter of life and death. Fourthly, as spaces of more-than-human dwelling, this article casts a light on how pigeons inhabit flyover geographies and the human-pigeon interactions taking shape through commensal practices. The multiplicities of social life in and around the flyover, therefore, produce it as more than a space of transit. These sites are also spaces of contrived opportunity for humans and non-humans that are maintained through a complex interplay of visibility and invisibility, collaboration, and patronage.

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ARTICLE

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Conceptualizing Place Borders as Narrative: Observations From Berlin-Wedding, a Neighbourhood in Transformation

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Abstract

Place is of central significance to urban planning processes that specifically target community involvement and co-ownership of development decisions. Consequently, the intriguing but often daunting task of understanding how a sense of place emerges, develops, and evolves has been a subject of interdisciplinary study that links the social sciences, humanities, and more recently, cognitive sciences. Since Kevin Lynch's classic study of urban images and mental maps, borders within cities have either directly or indirectly featured as vital meaning-making elements of place identities. However, despite some remarkable precedents, analysis of political and socio-cultural borders has only begun to link place-making and bordering processes in ways that resonate with urban planning studies. In this article, we will suggest that borders emerge in the embodied creation of social space as a means to interpret the environment and stabilise ways of knowing the wider world. Building on our own previous research on participatory place-making initiatives in Berlin, we will indicate how border stories (i.e., the social communication of neighbourhood distinction, relationality, and transformation) represent vital knowledges of place. These knowledges reflect embodied experiences of place as well as contestations and tensions that characterise place development processes. Perhaps most importantly in terms of planning, the salience of urban borders lies in broadening understanding of how and why places function—or fail to function—as communities.

Keywords

Berlin; borders; participatory place-making; place narratives; urban borders

1. Introduction

The central aim of this article is to contribute to the conceptualisation of social borders as cognitive constructs. In doing this, the article focuses on place-making and citizen knowledge of place identities and character. This perspective follows from what might be termed the "ontological" focus in border studies which directs our attention not only to the multiplicity of borders within society but also to their existential necessity and centrality in the forging of group and individual identities (see Almeida, 2023; Andersen & Aubry, 2022; Malpas, 2012; Scott, 2021; Sohn, 2016). Ontological concerns related to borders reflect on the one hand the sense of security that boundedness—a knowing what lies within and outside a specific space—conveys. Just as significant on the other hand are meaning-making processes that, for example, allow a "place" to be perceived as something socially significant. Indeed, a sense of place and its borders is a measure of how individuals and communities relate to their living environments. Places, understood for example as "comfort zones," are routinised and familiarised spatial references that provide meaning and orientation, a sense of "being somewhere." Understood in this way, socio-spatial borders function as markers of place through processes of intersubjective meaning-making, whereby the meaning that emerges is not static but subject to constant change.

The investigation of place as a socio-spatial element of urban life and conviviality has experienced a renaissance of sorts, not only in the social sciences and humanities but also in planning practice (see Ujang & Zakariya, 2015). In a broader sense, place-making can be defined as an active process of imbuing a specific space with meaning and a degree of uniqueness (Foote & Azaryahu, 2009). In terms of its significance as a planning tool, Nasya (2021, p. 17) argues that place-making is "a process of creating places with meaning for its users" often involving "the transformation of a public space, to address or accommodate citizens' needs." In other words, far from being merely a development project, it is the product of everyday practices, uses, appropriations and narrations of "hereness."

Building on insights from recent research on community development in Berlin, we argue that these processes involve border-making in the form of creating and communicating place distinction within wider spatial contexts. In other words, borders are co-constitutive of the creation of meaning and specifically, meaning in the social interpretation of urban environments. we will contribute to the debate on place and investigate how border-making reflects local knowledge of place character and identity. Based on evidence from the Berlin district of Wedding, border-making will be disclosed in the form of narratives that communicate neighbourhood uniqueness and relationality with regard to other neighbourhoods and areas. These narratives also reveal tensions and contestations related to perceived disruptions of place coherence and familiarity.

An important aim of the research highlighted here was to emphasise the importance of citizen knowledge in understanding specific senses of place as well as community development dynamics. Employing community reporting methodology and involving a representative cross-section of neighbourhood residents, the project curated local stories of everyday life in a highly diverse and in many ways unique community. As we will demonstrate below, the narratives that emerged from this "storytelling" have much to say regarding the production of socio-spatial borders—They reflect embodied experiences of place as well as contestations and tensions that characterise place development processes. In the concluding part, there will be a brief discussion regarding the practical consequences of this approach.

2. Ontological Turns: Debating Social Borders and Place

Border studies have devoted considerable attention to the means through which borders are socially produced and have provided detailed analyses of socio-political borders as a nexus of power, identity, culture, and historical memory (Andersen et al., 2012; Barthel, 2020; Brambilla, 2015; Popescu, 2012). Similarly, as part of its broadening research perspectives, the field of contemporary borders research has experienced an "ontological" turn in which the intersubjective nature and social meanings of borders have received considerable attention (Di Paolo & De Jaegher, 2015; Högström & Philo, 2020; Marsico & Varzi, 2016). At the same time, despite the reification of state borders, and their physical, virtual, or discursive iterations, a greater appreciation of the role of place and socio-spatial borders has emerged. This has provided potential for a better understanding of why borders within society are created and how they reveal themselves. Moreover, the constant production of social-cultural place boundaries offers the potential for opening up new spaces that reflect intersections, encounters, and new affinities which emerge as a part of social life (Hafeda, 2016; Váradi & Virág, 2018). For example, in elaborating on the case of "welcome cultures" in response to anti-refugee politics, Andersen and Aubry (2022. p. 11) argue that the ad hoc creation of spaces of inclusion reflects an "ontological politics whereby Europe is identified in…non-linear, multilayered creative and disjunctive processes involving a vast number of actors, practices and forces." What is expressed here is a space of possibility beyond the institutional violence of exclusive (state-centric and securitised) borders.

As part of an ontological perspective on border studies, we assume that borders emerge in the embodied creation of social space and that they serve as a means to interpret the environment and stabilise ways of knowing the wider world (Malpas, 2012; Scott, 2021; Scott & Sohn, 2018). This is also suggested by Rosch's (2017) elaborations on participatory sense-making which support the idea that borders (for example, within society and cities) emerge in the interaction between imagined and experienced space. Along similar lines, we can interpret urban borders as a nexus between everyday practices of differentiating social space, instrumental place-making, for example, as a project of urban development, and the ontological need for a sense of rootedness in place.

Reflecting on the work of Doreen Massey, Jirón (2023, p. 1) suggests that place is constantly created through social interactions and interrelations and is inherently heterogeneous, thus reflecting the multiplicity of social realities that co-exist in spatial proximity. If we develop this idea of space further, we can argue that borders emerge as space-creating processes that do not require linearity or physical barriers. In his study of urban border crossings of French banlieue residents, Almeida (2023) argues that urban borders are not only created through administrative power but are also reproduced in embodied negotiation of socio-spatial differences. Similarly, Donnen (2019, p. 2) has described urban border-making processes at the edges of places characterised by conflicting masculine identities in Central Brussels (Place Fontainas). Donnen (2019, p. 2) suggests that such everyday notions of border make it "possible to understand the interweaving of the sociospatial anchorings of place and the reproduction of intra-urban borders in everyday movements and interactions."

2.1. Linking Place-Making to Borders

Urban borders can be defined "externally," for example through stigmatisation or other forms of representation, but also created from within a place by its residents. These borders are essentially about the character and qualities of a place that distinguishes it from other places. To an extent, these are not revolutionary ideas. For example, since Lynch's (1960) and Nasar's (1990) classic studies of urban images and mental maps, borders within cities have been either directly or indirectly referenced as markers of place identities. However, analysis of political and socio-cultural borders has paid relatively little attention to processes of place-making. On the other hand, the ontological perspective on socio-spatial borders invites us to investigate continuous processes of place appropriation in social, cultural, and political terms.

The intriguing but often daunting task of understanding how a sense of place emerges, develops, and evolves has been a subject of interdisciplinary study that links the social sciences, humanities, and more recently, cognitive sciences (Cresswell, 2013; Maricchiolo et al., 2021; Rajala et al., 2020; Tuan, 2001). As part of cognitive processes that contribute to place attachment, Scannel and Gifford (2017, p. 275) suggest that individuals "develop a mental representation of…place, containing a mental map and route knowledge of the place's arrangement, as well as other information such as knowledge about the history of the place, and particular place affordances." Moreover, according to Foote and Azaryahu (2009, p. 96), a "sense of place can refer to positive bonds of comfort, safety, and well-being engendered by place, home, and dwelling, as well as negative feelings of fear, dysphoria, and placelessness." They also suggest that "sense of place is also used to describe the distinctiveness or unique character of particular localities and regions."

As mentioned above, our understanding of place-making is inclusive and can involve instrumental iterations as well as everyday spatial practices in the sense of Bachelard (1958/2014) and de Certeau (1980). To be sure, we agree with Berglund and Gregory (2019) that place-making as something purely instrumental is problematic—It can in fact entail a form of cultural production based on falsified or whitewashed local histories and simulacra of authenticity. However, our understanding transcends place-making as something "imposed" on a specific site; we argue that at its most basic place-making is a practice of creating place distinctions that are of an organic, every day and even spontaneous nature. The pioneering work of Tateo and Marsico (2019) has indicated how (urban) environments are selectively created depending on our abilities to interact with the world; in their interpretation, borders are co-constitutive of emotion and affect. Based on auto-ethnographies of urban borders, Tateo and Marsico describe how joy, fear, anxiety, enthusiasm, awe, admiration, and curiosity are among the sentiments that are evoked in the (embodied) experience of socio-spatial transition—e.g., by moving from one space (room, neighbourhood, city, country) to another. Place-making can therefore involve the creation of spaces of individuality and familiarity that can also be mutually shared with a wider community—The welcoming cultures mapped by Andersen and Aubry (2022) and performative spaces of refugee inclusion on Lampedusa that Brambilla (2015) has documented are both good examples of this. Moreover, if we understand place as comprising a wider community, place-making also involves narrations of place identity and spatial practices that are intersubjectively communicated.

2.2. Social Borders and Narrative Method

As we have suggested in our theoretical approach to place-making, borders are created in the sense-making and meaning-making processes through which space is differentiated and notions of place are generated.

By the same token, socio-spatial borders are rarely static; they are constantly adapted to changing environments as a means with which to maintain their meaning-making properties. In order to capture this processual understanding of border-making in empirical terms, the narrative method helps to identify urban place distinctions that create a sense of specific "hereness." The focus is not on cognitive mappings of urban borders as such. What is perhaps more salient are the stories of those who are actively bordering and relating the embodied experience of place specificity and relationality with regard to wider urban contexts. We thus argue that border-making can be detected in the creation and intersubjective communication of urban place (or neighbourhood) narratives.

At the same time, cities are objects of narrative representation and interpretation, sites where, following Popova (2014), intersubjective meaning-construction, for example through the enaction of a narratorial viewpoint by a storyteller who "co-authors" with others that which is read (in this case a neighbourhood or place). In an analogous manner, we can conceive that cognitive processes are disclosed in the collective and intersubjective creation of place narratives. A narrative approach to understanding the production of urban place borders has been elaborated by Scott and Sohn (2018). Here, a sense of place has been expressed as active appropriations by local residents who have incorporated new place ideas as part of their everyday geographies. In the specific cases of Berlin and Budapest, borders have been revealed in spaces of contrast that reflect the impacts of physical and social transformation as well as multiculturalism on the evolutions of multi-layered senses of place. In Scott and Sohn's (2018) approach, urban borders are also propagated by place narrations generation by social media, commercial websites, and the press.

3. The Wedding Case Study: Community Reporting and Mapping

The research methods employed in the Voicitys and Kieztraum projects involved a narrative approach to studying perceptions of urban diversity, including the "hyperdiverse" Berlin subarea known as Wedding. For the purposes of this discussion, the most significant method used was dedicated to mobilising the voices of local citizens through the method of community reporting. In addition, interaction with local stakeholders, civil organisations, and policymakers as well as media analysis provided vital contextual background to understanding how Wedding is experienced as an exceptional place with the greater context of Berlin's recent development.

Community reporting employs a bottom-up approach and non-directed conversations with citizens (Geelhoed et al., 2021). In both Voicitys and Kieztraum, reporting of place perception reflected the viewpoints of different segments of the local society. In total 32 persons (storytellers) were interviewed (17 of which were female and 15 male). In terms of age groups, selection reflected an even distribution between different cohorts. Rough parity between newer and more long-standing residents of the area was also achieved. Analysis of storytelling was performed through a process of curation, that is through synthesis and the grouping of information according to different common storylines (see, for example, Our Voices, 2016). Following Fotopoulou and Couldry (2015), data was thus curated in a way that involved weaving various individual narratives into a set of consistent themes.

In addition to community reporting, the Kieztraum project engaged in participatory exercises aimed at exploring emotional attachment to places in Wedding and the definition of the distinguishing, even unique, features of these places. The aim of community mapping projects organised by Kieztraum in Wedding was to

reveal specific places in Wedding that elicit feelings of positive ownership for the citizens who live and work there, primarily through awareness of shared experiences of place and identification with different neighbourhood locations. As part of the mapping exercise, participants were asked to express their own embodied experience of place and transitions between neighbourhood places, describing smells, music, and soundscapes as well as visual and other atmospheric cues. Places were collected on an online map (https://mapmehappy.com) and participants were asked to indicate the places that provided positive experiences, were accessible to all, and could be shared with family and friends. Selection criteria were chosen to reflect gender and age balance as well as length of residence, ethnic diversity, and other aspects. Extreme care was taken to address privacy and informed consent issues, recordings, and videos of interviewees (storytellers) were conducted based on individual approval. Additionally, local stories were contrasted with media reports and often negative "external" perceptions gleaned from print and social media sources. As part of curating these various accounts of life in the neighbourhood, the two projects allowed for the identification of place narratives that distinguish, and thus in our interpretation, border Wedding from the rest of Berlin.

3.1. Place Narratives as Socio-Spatial Borders

We will now focus attention on border-making as expressed in place narratives in the case of the Wedding area of Berlin. Wedding is part of the Mitte District (Bezirk Mitte) of Berlin and is a traditionally working-class area and former industrial centre that remains one of the city's poorest areas. Wedding is also one of the most diverse areas of Berlin with foreign-born residents making up almost 60% of the population. While Wedding has maintained much of its traditional working-class character, multiculturalism is also highly visible in the types of shops and services flourishing in the area.

One popular narrative about Wedding that has circulated in past years is that of an exceptional space where hyperdiversity and relative harmony co-exist. In the Galerie Wedding (2017) blogspot, we can read that:

> Wedding is a portrayal of the world, only in miniature. People from an array of social and cultural backgrounds coexist here. They all lend the district its unique character, making it a place of diversity and contrast, yet we still hear that Germany is only recently becoming a country in which people from different places, milieus and religions exist side-by-side. But this has long existed in Wedding.

At the same time, the Wedding area lies within the last gentrification frontier of Berlin and there are indications that this situation of diversity might be subject to considerable stress in future. As a result, there have been a significant number of programmes targeted at social regeneration, community-building, and sustainability. Action research such as that carried out within the scope of the Voicitys, Kieztraum, and other projects has been motivated by a desire to maintain and support urban diversity. Working with Berlin district administrations and projects of social integration, for example, non-governmental organisations have been important actors in attempts to strengthen a sense of place cohesion in ethnically and socio-economically diverse areas. Moreover, a sense of urgency has informed this research given destructive, anti-urban political forces that would create divisions and thus generate or resurrect hard social boundaries between ethnic groups and social classes.

The Voicitys project (2018–2019), collected stories about neighbourhood belonging from local residents while the second, Kieztraum (2019–2020), was focused on participatory place-making (see Keresztély et al., 2019; Urban Civic Education LAB, 2021). The two projects operated from the assumption that the social, cultural, and political borders inherent in diversity are in fact potential spaces of encounter and dialogue (Keresztély & Trowbridge, 2019). Among other citizen engagement activities, the Voicitys and Kieztraum projects collected stories and perceptions of Wedding as a diverse neighbourhood from more than 30 local residents representing a cross-section of highly varied personal experiences of living in a diverse community. In addition to community reporting, the Kieztraum project engaged in participatory exercises aimed at exploring emotional attachment to places in Wedding and the definition of the distinguishing, even unique, features of these places.

In the following, we will briefly document three interlinked storylines that emerged from the curation of Voicitys and Kieztraum results, each of which reflects specific modes of socio-spatial border-making:

1. The specific character of Wedding: Diverse yet cohesive;
2. The uniqueness of Wedding in relation to other neighbourhoods;
3. Wedding versus the "outside": The threat of becoming "just another" gentrified place.

Before proceeding, some caveats need to be mentioned. The narratives presented here are of course very general in nature and represent the voices of a tiny fraction of the local population. We are also aware that, given interview questions related to issues of diversity and neighbourhood identity, some responses might have provided a more positive picture of the situation. Nevertheless, the narratives reflect shared understandings of place and thus reveal ways in which bordering processes involve constructing a sense of "hereness" vis-à-vis other places and socio-spatial contexts.

3.1.1. The Specific Character of Wedding: Diverse yet Cohesive

Among the central place border narratives revealed in the stories of local residents is that of Wedding as an exceptional area representing both continuity and change. Unlike other inner-city areas of Berlin, Wedding has escaped many of the socio-economic and cultural impacts of gentrification and has retained traditional working-class neighbourhood elements. Moreover, while retaining a sense of Berlin-specific "authenticity," in socio-cultural terms Wedding is identified as a part of Berlin that epitomises multicultural diversity. It bears mentioning that diversity is indeed seen as a defining element of Wedding's unique character.

Many of the individual stories revealed a picture of Wedding as accommodating and resilient despite manifold changes since the 1989 fall of the Berlin Wall. Since then, migration into the area has increased and become more diverse. Africans, Asians, and others from around Europe have moved into the area and begun opening cafés, shops, and small businesses. One storyteller recalled that the "neighbourhood was originally a working-class area with a large Turkish community and other European communities." Yet despite these changes—and not being a wealthy place—this person depicted the area as "very vivid" with "a strong exchange between its different communities."

Building on this theme, local storytellers also conveyed the idea that Wedding's singularity as a diverse place is underlined by a sense of local cohesion unlike other areas of Berlin such as Neukölln, another highly diverse

area in the central city. As one resident commented: "Diversity here means that there are a lot of people creating something together." Yet another storyteller added that "people here behave peacefully and with no violence because they all got the idea since they came that our diversity builds a stronger community." What such comments suggest is that positive notions of diversity within the stories gathered are being drawn from the connections between people living in the neighbourhood.

One common theme that connects the various stories suggests that people's positive notions of diversity are specifically formed by living or working in Wedding. Indeed, several of the stories related by locals expressed the idea that, in Wedding, diversity makes for a cohesive society and that Wedding could be a role model in this case, despite some of the frictions or perceived external threats of gentrification and systemic racism. This idea is reflected in comments such as: "Wedding is changing perceptions on tolerance, especially people from Saxonian villages should come and live here to see what diversity is" (Keresztély et al., 2019, p. 115).

Moreover, local residents often used the phrase "at least here" in reference to the perceived cohesion of the area. As one storyteller outlined, it is "very tolerant [here], especially in Wedding, and therefore I only see benefits. You get to know many other cultures. And I hardly see any disadvantages. Not in Wedding." The stories also suggest that what makes diversity in Wedding as positive as the stories suggest is not total assimilation, but rather interactions and the forming of new, joint cultural understandings. This appears to partly explain why people feel warmly towards diversity in Wedding, and to the cohesion of both newcomers and the *Urgesteine* (people who have lived there all their lives).

In terms of the physical environment, it is not just the visual appeal of historic public spaces and buildings in Wedding, but the ways in which the spaces allow for interactions between people, as several interviewees pointed out. New spaces that have emerged in Wedding also contribute to a greater degree of cultural interaction. As one person explained: "If you walk down the street, you can see many Arabic and Turkish stores and restaurants. There are a lot of opportunities to interact with other people and learn from other cultures and see how other cultures are." Such spaces are valued as they allow for interaction between people and thus foster betting understanding between different groups and individuals. This in turn can result in, as one woman put it, people respecting practices which differ from their own happening in shared spaces.: "People let me practice my religion and respect me when I am praying," she said. Moreover, as one person explained: "When there are different communities it is not always easy, and it can only work if there is one or several spaces where people of different origins can meet." As would be frequently repeated during interviews with locals, there are concerns that gentrification will change the character of the area, threatening the sustainability of shared spaces and limiting access to people without social privilege.

3.1.2. Wedding Is Unique in Berlin and Perhaps Germany as a Whole

Several storytellers brought up the fact that they had never experienced racism in Wedding, but had experienced it or feared experiencing it in other areas of Germany. What this suggests is that the understanding of diversity, particularly in terms of its positive reception and cohesion between people from different backgrounds, is quite specific to Wedding. In this respect, Wedding is not a "typical" German or even Berlin neighbourhood, and the stories highlight the importance of preserving the area's diversity as it is.

A sense of place is therefore also underscored by comparisons with other neighbourhoods in Berlin and elsewhere. As one local resident related: "Wedding provides (for now) a section of Berlin where people belong to different groups (whether based on race, religion, sexuality, etc.), can build their lives together." Another storyteller suggested: "Here I think everything is very well accepted, your sexuality and your religion. I think in the rest of Germany it might be different, so I think Wedding is a good start for living diversity and accepting it."

Despite the heterogeneity of the participants in Voicitys, their stories indicated that difference is seen as a positive local characteristic and a relative strength in comparison to other parts of the city. Berlin is narrated as a special place generally, but Wedding is seen by many of its residents to be a more cohesive place than other multicultural areas of Berlin. As mentioned above negative references were made, for example, with regard to the Neukölln district as a somewhat unsuccessful alter ego of multiculturalism. One Turkish storyteller said that, in Neukölln, "the Turkish are less willing to contribute to the neighbourhood and therefore integration isn't the same as it is in Wedding."

3.1.3. Wedding Versus the ``Outside''

There are tensions between Wedding and the "outside world" (see Institute of Community Reporters, 2018, p. 43). There is awareness of stigmatisation and negative characterisations of Wedding that are generated in the media and by voices external to the area. Ultimately, this has led to the neighbourhood being further associated negatively with poverty and migration. At the same time, the spectre of change led from "outside" in the form of gentrification and rapid neighbourhood change is a constant subtheme in narratives of Wedding's transformation. The internet hyping of Wedding that adds to perceived coolness is also reflected in new cultural and gastronomic attractions such as the new Silent Green Kulturquartier that many find alienating. Indeed, the issue of "UFOs" (i.e., projects "dropped down from space" onto the neighbourhood and appropriating local public spaces) was addressed in conversation with members of the Pankstrasse Neighbourhood Management team (Quartiersmanagement Pankstrasse) in March 2018. In this way, Wedding is also narrated as the next potential target of large-scale gentrification, a process that would threaten Wedding as a model of diversity (Malplat, 2017). Above and beyond this, negative representations, including stories of crime, trash, and chaos, reverberate in the popular media as well as in official documents. Perhaps most damagingly, sensationalist press reports, including recent YouTube videos of Arab clan blood feuds, shootings, drug problems, and desolation, tell a fearful story of Wedding as "the city's bloodiest district" ("So brutal ist Berlins blutigster Bezirk," 2022). In addition to popular forms of stigmatisation, the inclusion of Wedding neighbourhoods in administrative geographies of "problem areas" (*Problemzonen*) has considerable media impact (Klein, 2015). The Structural Atlas of Berlin (Senatsverwaltung für Wissenschaft, Gesundheit und Pflege, 2022), for example, identifies Wedding as one of the poorest and most difficult areas of the city. There are fears that such negative reporting could threaten the viability of places that promote diversity. This sentiment is expanded on further with storytellers suggesting that rather than focus on negative interpretations of diversity, policies should instead focus on Wedding's unique and positive place characteristics. Some of the locals interviewed sensed that they were targeted because of a dislike of multicultural places, for example, among public officials, and structural racism, particularly its institutionalised forms in the police force and employment offices. It is highlighted moreover that although there is a system in place to support newcomers, the bureaucracy of the system presents a barrier to people who wish to use it.

Positivity about Wedding and people's enthusiasm towards life in the neighbourhood is overshadowed by some deep-rooted concerns. A key perceived threat is gentrification which until recently has proceeded slowly and less visibly in Wedding. As one storyteller suggested: "People that have the money are buying places [in Wedding], renting them to some other people who cannot afford anything else." What threatens this living environment, it seems, are external factors that are not specific to the Wedding neighbourhood but are "imported" from outside. These stories paint a relatively positive picture of diversity in Berlin and even more specifically in Wedding as an exceptional space. Many of the stories convey the idea that diversity makes a cohesive society and that Wedding could be a role model for this case despite some of the issues that people discussed like the external threats of gentrification and systemic racism. The major fear is that of existing communities being pushed out. Many say they would prefer Wedding to stay as it is, even forgoing physical improvements; most storytellers expressed fear of the disappearance of familiar places and specific characteristics that distinguish Wedding's neighbourhoods. Above all, there are fears that Wedding might lose its diversity and be converted into another white, middle-class, and sterile neighbourhood where shops, cafés, and social spaces mainly serve tourists.

4. Some Policy Dimensions

The policy ambitions of the research discussed above centred on the integration of citizen knowledge of place identity, diversity, and community cohesion as a resource for urban regeneration programmes. Moreover, the Voicitys and Kieztraum projects sought to develop the narrative of Wedding as an exceptional place and the idea that "it is different outside" as a policy message. One key learning about what has contributed to Wedding's current identity as a diverse yet cohesive neighbourhood is the availability of spaces where people who live in the area come together and interact, thereby creating a sense of shared place. Place-mapping exercises carried out by the Kieztraum project (Figure 1) also confirmed the sense of uniqueness of Wedding that was also reflected in fears that the recognisability and familiarity of the area could suffer from gentrification, making Wedding "just like any other wealthier area in central Berlin."

As elsewhere, participatory place-making in Wedding has involved re-thinking how the city can be understood and organised as a highly diverse community (Urban Civic Education LAB, 2021). Community mapping involves the sharing of place experiences and emotions in order to better understand dissonances between local (internal) place perceptions and those external to the neighbourhood, often expressed in stigmatising media narratives. By identifying the elements of neighbourhood that encourage a sense of shared space, counter-narratives were elaborated that challenged characterisations of the area as dirty, unsafe, and unliveable. At the same time, residents participated in designing actions in public places in order to enhance social cohesion and maintain the local positive assets of diversity.

In this sense, suggestions for policy agendas were elaborated that emphasise the need to stabilise community cohesion through measures targeted at diverse public services, social communication and improvements in the physical environment (Keresztély et al., 2019). This sentiment is expanded on further with storytellers suggesting that rather than focusing on negative elements rightly or wrongly associated with diversity, policies should rather build on the existing strengths of Wedding's relative social cohesion and tolerance.

Figure 1. Community mapping at the Pankeparcours in Wedding, 31 August 2019. Photo by James W. Scott.

5. Discussion and Conclusion

In this brief research article, we have attempted to provide evidence of the co-constitutive nature of ontological borders and a sense of place. Results from the two projects support the suggestion that place is defined by ontological borders that emerge through embodied experience with urban environments and the everyday practices of citizens. Moreover, these borders reveal themselves in narrations and other forms of place representation that express specific unique qualities, attachments, and tensions between internal/external processes impacting life within neighbourhoods. Place borders are also defined by the contrast of local experience and self-awareness of place specificity with popular and often negative sensationalist place narratives. In this way, borders materialise through tensions between lived and embodied experiences of place and narrations of place that are based on idealised and often negative perceptions. Although not discussed at length here, it should be mentioned that the storytelling and mapping methods used in the two projects involved the mobilisation of local knowledges of place in order to co-create possible scenarios of community development, both in social and environmental terms. In order to do this, the two methods also involved inquiry into how local residents make sense of place and place borders through socio-material entanglements with their neighbourhoods.

In terms of identifying the challenges and opportunities of diversity the ontological borders approach resonates with Piekut and Valentine's (2016) theoretical perspective that links diversity to perceptions, that is, how diversity is lived and experienced within a community. According to this interpretation, diversity exists in the different ways that it is subjectively recognised and can be characterised by the positive and negative sentiments it evokes. Perceptions of diversity are conditioned by a number of factors—demographic factors, cultural and socio-historical backgrounds, as well as the socio-ethnic composition of urban places. The relationship between place openness and diversity is key, particularly given stigmatising and largely externally generated stories of diverse neighbourhoods as "problem areas."

The findings from the stories and participatory place-making exercises suggested that Wedding residents are less concerned about problems with diversity or conflict between cultures and more concerned about social segregation. The storytellers fear the disappearance of long-standing spaces and the changing image of the district. They are afraid that the neighbourhood might lose its diverse character and be turned into another sterile, White, middle-class neighbourhood where the bars, restaurants, and social spaces serve mostly tourists.

In closing, however, it is necessary to reflect on the limitations of our approach. The evidence provided here is arguably from an exceptional case of hyperdiversity. In future research, it would be fruitful to engage in comparative analysis that includes areas characterised by a greater sense of socio-cultural and socio-economic tension, and in this way test and develop our place border criteria based on uniqueness and relationality. Nevertheless, as this study suggests, borders between urban places are only partly configured by administrative boundaries. Ultimately, borders reveal themselves as social and material entanglements. Moreover, at their most basic borders work as complex instruments of meaning-making rather than simply creating divisions between societies and groups.

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Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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Bordering Practices in a Sustainability-Profiled Neighbourhood: Studying Inclusion and Exclusion Through Fluid and Fire Space

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Abstract

Borders are essential in the current planning of cities since new forms of social relations are needed to support more sustainable ways of life. In this article, we present a case study of a sustainability-profiled new neighbourhood, Vallastaden in Sweden. We focus on how sustainability is enacted in different socio-material versions, which often include defusing borders between private and shared spaces. Shared space in Vallastaden includes spaces to facilitate meetings, such as *felleshus* (built as semi-communal, ground-level buildings, semi-indoor spaces, and greenhouses), winter gardens (built as rooftop, semi-private, semi-indoor, and social spaces), and the shared brook-park Broparken and farm-park Paradiset with rental allotments and communal gardens. Analysing how bordering practices create inclusion and exclusion, we study their consequences for the everyday lives of humans and non-humans in Vallastaden. We conceptualise these dynamics as fluid and fire space in order to make the ontological politics of bordering visible. Our study shows that the borders in the planned shared spaces are dynamic and create both fluid and fire space, depending on their socio-material relations. The research shows that planners need to take these heterogeneous socio-material relations into account when creating borders because, otherwise, they risk creating unfair exclusions.

Keywords

bordering; fire space; fluid space; neighbourhoods; social sustainability; Sweden; urban planning

1. Introduction

Neighbourhoods are neglected in studies of borders (Iossifova, 2013) and there has been a recent call to study neighbourhoods in order to develop our understanding of bordering processes (Scott, 2021a, 2021b)

and bordering practices (Iossifova, 2020). Borders are not static but dynamic and constantly negotiated spaces and it is essential to understand the ways in which bordering practices are enacted and contested, and how they intersect with issues of power, identity, and territory (Agnew, 2008). In urban planning, these issues are especially important because the built environment frames our everyday lives, making some ways of living more accessible than others. Architectural borders are filled with meanings and can aid in managing relations between the public and private and different levels of being social (Iossifova, 2020). The way in which borders create inclusions and exclusions through the demarcation of difference is foundational for how societies create categorisations, communities, and identities. Due to its many political and ethical connections, Scott (2020, p. 5) proposed "bordering" as a new paradigm for research "linking ontological and ethical questions to processes of border-making." Bordering postulates that, in practice, borders are enacted in multiple ways (Sohn, 2016). In this article, we seek to build on these notions of bordering and the salience of neighbourhoods in these processes by studying Vallastaden, a neighbourhood located in Southeast Sweden, which was recently planned and built to showcase social sustainability in the built environment. The case is especially interesting because Vallastaden was promoted as a role model for future urban planning, and it therefore comes with high stakes in terms of which lives and communities it promotes.

Sustainability-profiled neighbourhoods are relatively common in Sweden (van der Leer et al., 2023), but they have been criticised for creating enclaves for affluent socio-economic groups (cf. Iossifova, 2015; Medved, 2016). In the spatial planning process of Vallastaden, social sustainability was enacted through a range of different interventions. The architecture firm OKIDOKI was hired to plan the neighbourhood as a result of its success in an architectural competition arranged by the municipality. The winning proposition put forward *tegar* as a medium to create a diverse and socially sustainable city district. The building plots were small, and the planning was tight to create a feeling of being part of a community, while still having your own front door and garden. Social sustainability is in the planning documents described as a diffusion of private and public space and a focus on creating space for meetings between residents. The design of Vallastaden aimed to form new, more fluid borders as part of this sustainability agenda, a phenomenon that has previously been observed in other studies (Grundström, 2022; Högström & Philo, 2020).

Bordering is achieved in a multitude of ways in Vallastaden. The more veiled expressions of bordering might consist of joint narratives and historicisations, while the production of maps is more tangible, whether printed on paper or digitalised. To discuss these different practices, we suggest a framework inspired by Law and Mol (2001), where spatialities are understood as enacted within heterogeneous networks and what are referred to as regional spaces, such as cities, countries, and continents, come into existence as bounded and distinctive (Law & Mol, 2001). Thus, reality does not precede the mundane practices by which we interact with it but rather is shaped within these practices (Mol, 1999). Understanding borders as enactments in practice rather than social constructions means that they are not only perceived as different but are also enacted in different versions, sometimes separated in time and space, at other times co-existing. Mol (1999) suggests ontological politics as a concept to discuss the consequences of the choices of what, and how, realities and objects are enacted. In relation to our case study, the enactment of Vallastaden as a sustainable city district is ontological politics in the making, because it shapes, and is shaped by, mundane and professional practices in the everyday. Bringing in ontological politics, our study contributes to border studies by further exploring the ethical and normative issues of exclusion and inclusions of bordering, which the field has been argued to be ill-equipped to handle (Brambilla, 2015).

Inclusion and exclusion are sometimes elusive practices, and to further deepen our analysis we turn to Law and Mol (2001) and their understanding of space as regional space, networked space, fluid space, and fire space. Regional spaces are recognised as objects that have been clustered together within boundaries where difference is suppressed, and they thus encourage the uniform treatment of these objects. In contrast, networked spaces are defined by their internal relationships rather than their boundaries. In networked space, Euclidian space can be folded to bring the distant close and render the close distant, depending on their relations. While all space is constantly made and remade, fluid and fire spaces are yet more dynamic and in flux. In fluid space, change is always in process, albeit sometimes slowly, but always in a state of flow. In fire space, some objects are enacted that cannot co-exist without friction, thus leading to disruptive change. In relation to borders, fluid and fire space come with different processes of exclusion and inclusion, as we will show in this article.

Space and borders are inseparable because they are enacted simultaneously and depend on each other. Our focus is on how ontological politics is enacted through bordering, and consequently what spaces are made present in different constellations of social-material actors. This brings forward the multiple borders (Sohn, 2016) involved in enacting socially sustainable urban space in planning and practice, and their consequences for residents, both human and non-human. The cases of bordering in Vallastaden that we discuss below are sites of tension, where negotiations, valuations, and inclusions/exclusions are enacted. These spaces are contested and undergoing change, and will be analysed as fluid and fire space. The aim of this article is therefore to understand how bordering practices, analysed as fluid and fire spaces, create inclusions and exclusions in the neighbourhood of Vallastaden. This is studied empirically through document analysis of parts of the planning process, and interviews and workshops with residents of Vallastaden. Starting from the levels of community defined by the architecture firm OKIDOKI, we illustrate enactments of borders in socio-material relations, taking both human and non-human actors into account.

2. Understanding Bordering Through Fluid Space and Fire Space

Mol and Law (1994) use fluid space to envision space as constantly changing and in motion, with human and non-human entities becoming entangled and forming new relations (see also Law & Mol, 2001; Sohn, 2016). In fluid space, neither boundaries nor relations mark the difference between one place and another. Instead, boundaries are lucid and in constant flux. Unlike their concept of networked space, where objects are immutable and do not change, fluid space is continuously transforming. The change is gradual and incremental, enabling the performance of continuity even as associations and forms of attachment shift and move (Law & Mol, 2001). This creates a simultaneous sense of stability and adjustment. In their work on an African bush pump, de Laet and Mol (2000) show how the object changed its shape over time, losing one part and having another part added, while still retaining stability as a bush pump. The transformation was gradual and slow such that, after a while, all the parts had been exchanged, but the bush pump still remained the same object. In a similar manner, space can change its shape gradually over time. Borders can be crossed at different times and by different actors while still holding together as one space. The bonds that hold fluid spaces together lack stability. While no individual component can be singled out as absolutely necessary, the failure of all components signifies the end of what once existed (de Laet & Mol, 2000). Fluidity of space has been used, for example, to discuss periods of drought in Tanzania (Goldman et al., 2016), where fluid spaces were enacted in multiple ways depending on local settings. The number of cows using the local water and pasture, rainfall, and human movements across borders were all significant for the enactment of drought for some groups

in Tanzania, while other definitions are used in other countries, and even by other groups within the same country. Fluid space enables the authors to simultaneously follow the enactment of drought across multiple locations and networks and understand the ways in which it is the same, while also being slightly different things (Goldman et al., 2016). Moreover, following how policy travels, Prince (2012) argues that fluid space aids in understanding spaces that lack strong networks, where connections are made between different places and contexts "but not necessarily making one subservient to the other, or both subservient to the fluid space itself" (Prince, 2012, p. 328). However, not all enactments of policy are equivalent, and by thinking with fluid space we can make the transition between different spaces visible and open up opportunities for alternatives as well as critiques of acts of power (Prince, 2012). In our study, fluid space aids us in understanding how spaces are changed gradually, over time and space, and thinking of these changes as ontological politics, the consequences of these changes are made visible. This allows for a critical discussion of the interpretation of social sustainability and its inclusions and exclusions which is enacted in Vallastaden.

Law and Mol (2001) also introduced fire space as a way to explore entities "in the form of a dancing and dangerous pattern of discontinuous displacements between locations that are other to (but linked with) each other" (Law & Singleton, 2005, p. 347). The constant changes in fire space are defined by discontinuity and the enacting of different versions of an entity in different places. What becomes important in fire space is how, and where, these different versions are made present or absent, and how they still affect central entities' multiple juxtapositions (Wittock et al., 2017). What is absent has an impact on a situation in various ways and, by focusing on what is being othered, we can understand how fire space can achieve constancy by enacting simultaneous absence and presence (Law & Mol, 2001). Furthermore, it is important to note that, while fluidity relies on gradual change to ensure constancy, a topology of fire generates constancy through abrupt and discontinuous movements (Law & Mol, 2001). Fire spaces hold objects that are "flickering" in presence, being variously constituted in different locations and in versions that may be discontinuous with other versions. For example, the constitution of insurance and its consequences for everyday life and knowledge has been studied as fire space because it is sometimes characterised by jumps and discontinuities (Booth, 2021). Booth (2021) shows how the co-constitution of index insurance for farmers and development organisations is influenced by insurance as fire space. The contrasting realities of the farmers' traditional knowledge and the agencies' emphasis on adaptation and sustainability create unpredictability and otherness. Despite the threats to continuity, the disruptions to farmers' existing traditional knowledge and farming practices were enacted as necessary for integrating them into global agricultural systems (Booth, 2021). Borders change in fire space in an abrupt manner, and in Vallastaden these changes are due to frictions between contradicting needs, regulations, and interests. Studying the exclusions necessary to create fire spaces that still hold together makes normative choices visible as it shows when some interests or needs are prioritized over others.

In our study, fluid and fire spaces aid in analysing how the shared spaces in Vallastaden, with their more lucid borders, maintain or create new exclusions and inclusions. Focusing on the changing nature of borders and the collection of actors with their relations can facilitate an analysis of borders as multiple, where presence and absence are vital. It also enables a critique of bordering, as we can show how different versions of space and borders are imbued with different ontological politics, and thus affect actors unequally.

3. Method

With our aim to understand bordering practices in Vallastaden, we draw on Flyvbjerg (2006) to examine an extreme case marketed as the neighbourhood of the future and the different relationships and practices involved. The initial phase of this research focused on the planning process and the various documents used during the early stages. These documents were collected from the municipality and were used in the planning of Vallastaden. The documents include the "idea programme," which describes the vision for the district, quality documents, various policy documents, urban planning documents, documents from an architecture competition, and criteria documents for prospective clients looking to buy land in Vallastaden. In this article, the competition contribution by the architecture firm OKIDOKI is the most central for the analysis. Furthermore, we conducted workshops with 21 residents to gain insight into their everyday lives. These workshops provided a method for listening to residents' experiences and understanding how the built environment shapes everyday life. The workshops each involved between two and four participants between the ages of 20 and 62. Participants were recruited from personal connections and a Facebook group about Vallastaden, with some participants being more involved in shared activities in the district than others. The workshops took place in the home of one of the participants or in a *felleshus* and were led by one researcher while the other took notes. Participants were asked to draw a map of their own Vallastaden and then discuss which places they liked, which places mattered to them, places they avoided, and routes they travelled or walked. This methodology helped to create "mental maps" and establish a connection between the discussions in the workshops and the environments in Vallastaden. This method facilitated the collection of narratives, associations, and metaphors that carried specific content and meanings in relation to place.

We also observed the environment by walking through the area and photographing the changes that occurred over time. We focused on how borders were enacted within the environment and how they changed, as well as how people used the different spaces. Additionally, we analysed an open Facebook group created by some of the residents. This Facebook group served as a space for sharing thoughts, ideas, struggles, and complaints about living in Vallastaden. We collected written messages posted in the group but excluded any personal information. As the group is open for anyone to join, the material is openly accessible, and we did not consider it sensitive or personal; hence, we did not contact group members for consent.

4. Fluid and Fire Space in Vallastaden

In the following text, we present and discuss our empirical case Vallastaden in order to understand how bordering processes in planning and everyday life create both inclusions and exclusions. Focusing on how space is enacted and how it changes in relation to different actors, both human and nonhuman, we begin by analysing the initial stages of the urban planning process in order to understand the vision behind Vallastaden. Moving on to the built environment, we then follow how the vision was turned into practice to understand how this shapes everyday life in the city district through its inclusions and exclusions.

4.1. Planning for a Sustainable Neighbourhood

Borders are at the heart of architectural and urban planning practices, where they materialise as demarcation lines on plans and maps, creating exclusions and inclusions and separating public space from private (Iossifova, 2020). In the planning for Vallastaden, this became clearly evident because bordering was

central to the vision for the neighbourhood. The planning process for Vallastaden started with Linköping Municipality exploring an idea for a new state-of-the-art neighbourhood. After some initial planning, a contest for the master plan for Vallastaden was announced. The proposition called Tegar, from the architecture firm OKIDOKI, won the competition and their ideas guided the first stages of the detailed master plan for the neighbourhood. The *tegar* concept historicises this newly built residential area and spatialises the area with reference to Swedish mediaeval history to make present the social life of small-scale farming. It signalled a preference for local everyday life, growing crops close to home for your own consumption, and conducting your social life within your immediate surroundings. To understand how OKIDOKI planned to put this vision into practice, we first need to understand the different social levels underpinning the planning principles in Vallastaden (see Figure 1).

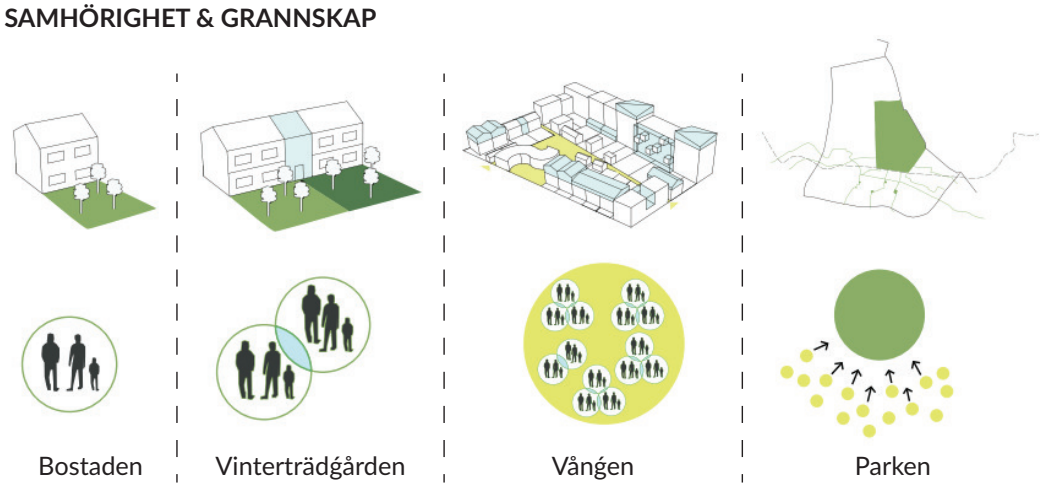

Figure 1. Image taken from the winning proposition for the Vallastaden master plan. The heading translates to "Togetherness & Neighbourhood" and the words at the bottom of the picture show the different levels of community, translating to (from left to right): "Dwelling," "Winter garden," "Close neighbourhood," and "Park." Source: OKIDOKI (2012, p. 4).

The concept of the *tegar* was based on historical time when land ownership and land use consisted of a patchwork with many complicated borders between owners and farming activities (OKIDOKI, 2012). The Vallastaden master plan map and the description of the spatial planning contain frequent references to this period in Sweden, which is also found in several other European countries and the US (Rackham, 1997). Similarly, the legally binding map showing the division of properties in Vallastaden contains unusually small lots and looks like the patchwork pattern of a historical *tegar* land division (Linköping Municipality, 2013). The historicisation of the place for Vallastaden manifested both visually and in the narratives presented in the master plan. Strips were commonly present in the visual presentations and coloured to accentuate the variety and diversity of the proposed new settlement (Figure 2).

As we can see in Figures 1 and 2, there are clear borders between different spaces, enacting them as regional spaces on the maps, with spatial borders separating them from each other. However, in the text, these borders are less stable, and the openness between the private spaces and their immediate surroundings indicates more fluid spaces. The description of *tegar* stated: "Selions were originally a social insurance for crop failures and a system to share the most arable land. Simultaneously it provided prerequisites for encounters in everyday life" (OKIDOKI, 2012, p. 2). The description in the master plan signals consensus and harmony, a life lived

close to nature and your circle of family and neighbours. Equally, it might signal the hard work that is required to sustain your livelihood and social life, as the references to mediaeval circumstances also indicate. This historicisation shaped the identity of the neighbourhood and conceptualised borders as fluid in relation to their immediate surroundings. The relations connecting spaces are spatially defined social relations, whereby the close community creates the inclusion of spatially located members while excluding others. For the private space, there are thus fluid borders allowing local actors in, while, at the community level, borders are less lucid. The inclusions and exclusions are historically motivated because the idea of community from mediaeval times is enacted as being more sustainable than modern life.

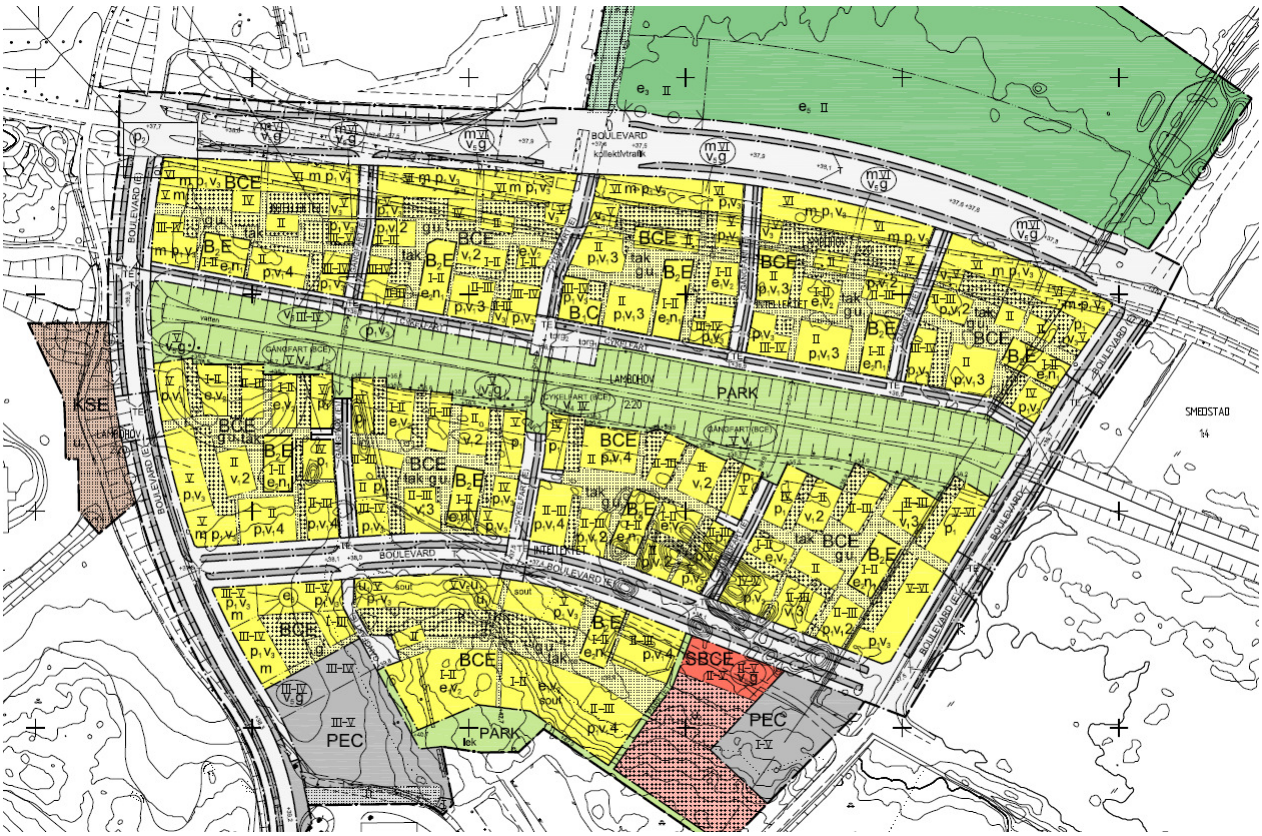

Figure 2. The Vallastaden master plan. Source: Linköping Municipality (2013, p. 1).

Due to Vallastaden's location, relatively distant from the city centre and separated from other neighbourhoods, urban planners gave it the role of bridging different parts of the city. This made it into a form of urban borderland (Iossifova, 2019). From another perspective, Vallastaden could be perceived as an enclave (Iossifova, 2015), with only newly built homes for those who can afford them, and spatially disconnected from other neighbourhoods. These different versions of Vallastaden can only be simultaneously enacted without causing friction by the displacement of the other in time or space. Therefore, the idea of Vallastaden as a junction, in line with its sustainability agenda, but socio-economically and visually enacted as an enclave, was criticised by residents in our workshops, who questioned the homogeneity of the neighbourhood. The ontological politics intertwined in the planning for Vallastaden thus come with problematic ideals, creating tensions and sometimes reinforcing traditional borders. In the following sections, we further unpack the ontological politics of Vallastaden by focusing on how the built environment creates inclusions and exclusions in practice.

4.2. The Changing Borders of the Home

The private home is sometimes enacted as a protected sphere in the documents (such as in Figure 1), while in other spaces the aim to create a diffusion between the private and public is evident. Certain public spaces, located beyond the walls of the private home, are deliberately designed to extend the home. These include pathway patterns resembling carpets, squares referred to as "outdoor living rooms," and Fredrik Norén's public art piece Break which features furniture positioned in the "large living room of Vallastaden" (Linköping Municipality, 2017).

In addition, the idea of building community through *tegar* created a dense neighbourhood where the borders between the private home and public spaces were easily crossed. Some residents are closely connected to the life of the neighbourhood through large windows at ground level alongside the well-used pathways. Participants in our workshops and in the Facebook group for residents living in Vallastaden talked about how they sometimes feel that people passing outside their windows are present in their living rooms. Likewise, the dense planning gives residents close visual access to each other's homes. As one resident explained: "And if you're supposed to have one metre between the houses, why do you put windows in the middle of someone's…opposite each other? I have someone's kitchen in my bedroom…why?" (Viola, healthcare worker, 35 years old).

The visual crossing of borders enacts the home as fluid in ways the urban planners did not anticipate. Borders between houses are not just dependent on walls, but also on spatial separation. Having more space between the houses would enhance the feeling of privacy, but it would also prevent other types of border crossing. In one of the cooperative multifamily buildings, a small openable window was installed in a bedroom, but its handle was removed because the space immediately outside was needed for a fire escape for a neighbouring building. The residents in the multifamily building experience problems with overheating during summer and the loss of the opportunity to ventilate became an issue. The densification of Vallastaden thus created a need to cross borders between buildings, with the regulations for one building reaching into the bedroom of the residents in another. The change for the residents who cannot open their window is disruptive, with a handle being removed between one day and the next. The change was needed to remove the risk of people being burned alive in other buildings, and thus the enactment of this space is dependent upon absence (of risk). In this sense, the home is enacted as a fire space, because the fire regulation created a disruptive change and presence was dependent upon absence (Law & Mol, 2001). The discontinuity of window opening to reduce temperature is a result of planning for high density, but also a consequence of other sustainability measures taken in Vallastaden. As we discovered in our research, overheating is a significant problem for many residents because higher demands for energy efficiency than the national regulations mean that the houses have more insulation, but the design and direction of the buildings pay little attention to this problem. The ontological politics of enacting sustainability as community built on spatial closeness, energy-efficient houses, and excluding overheating issues can lead to a small window becoming a large disruption and thus creates fire space.

While borders between private homes sometimes become an issue for human residents, other residents have very different conceptions of home, as the cat Sixten shows. Sixten lives in a house close to Vallastaden but has a habit of walking into homes in Vallastaden in search of attention or food. In fluid space, animals might move freely, disregarding borders set by humans (Bear & Eden, 2008). Bear and Eden (2008) show how fish

move across human-made borders, changing their identity by belonging to different stocks at different times and thus requiring the certification of the fishery to enact space as fluid. In the case of Sixten, he not only moved between different outdoor spaces but entered buildings and even homes (Figure 3). Sixten does not care about lines on a map or material marks of separation, such as doors (as long as they are left ajar), or traditional borders between homes, such as hedges. He enacts most spaces as fluid without considering that not everyone shares his view of spatial relationships. He has his own hashtag (#Sixten) in the local Facebook group and, while most people seem to appreciate him, he sometimes disrupts the lives of other residents with his lack of respect for borders. Some residents fear that he will trigger their dogs, or that he needs food or care that his owners are not providing. His crossing of boundaries creates friction and discussions in the Facebook group about who should care for his well-being and whether it is in his best interest to be let into homes as he might forget where he actually lives. Sixten shows how borders and space are made and remade depending on the subject's agency and the arrangement of actors. A student working on an assignment sitting alone in their apartment might find Sixten a welcome distraction, while a couple with dogs fear that their dogs could hurt him, and his presence therefore becomes disruptive. The presence of dogs has the potential to enable Sixten to create fire space, while in most other situations his smooth gait will allow him to flow through life and space.

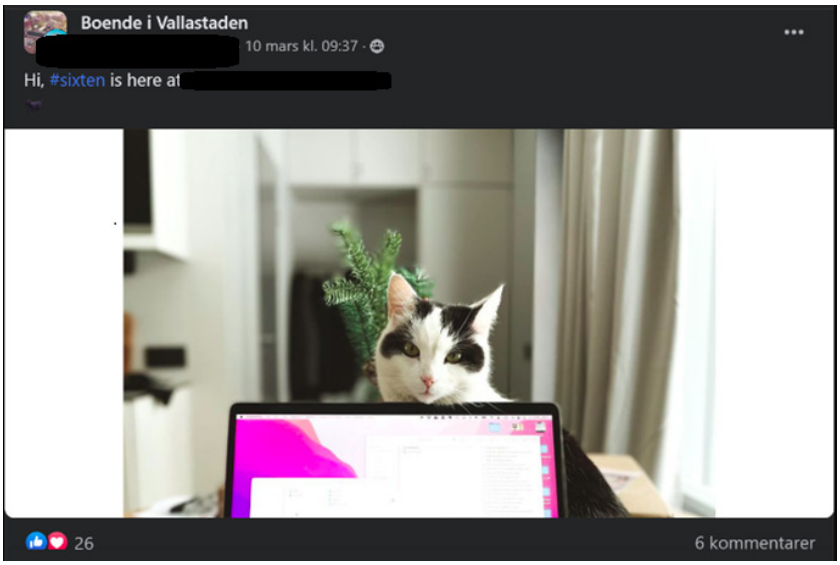

Figure 3. An image posted on Facebook by a Vallastaden resident showing the visiting cat Sixten in this resident's home.

The sustainability agenda enacted through the built environment has the potential to create fire space in human homes, causing the residents to become overheated and unable to remain indoors during summer. Sixten, on the other hand, seems to have all of Vallastaden as his home and only occasionally creates fire space with his unwelcome presence. Unaware of the urban planner's efforts, he has taken the social sustainability agenda to heart and thrives in the dense and open neighbourhood. Understanding borders and their ontological politics can thus only be done with regard to agency in socio-material relations, as they can make space suddenly change shape. While this is the case also for human border relations, including the cat Sixten broadens the scope of the analysis of bordering by considering non-humans as residents on, at least analytically, equal terms as humans. In the current situation of climate and environmental crisis, non-human subjects need to be made more visible in planning processes.

4.3. Enacting Shared Space as Winter Gardens

"Within each *teg*, the neighbours share a winter garden. Here social sustainability meets ecological sustainability. The winter garden forms the interface between the public and the private, and functions as a semi-private zone" (OKIDOKI, 2012, p. 2).

The next level in the local community building in Vallastaden, as suggested by OKIDOKI, consists of the winter gardens. Property developers were committed to some sustainability efforts in Vallastaden, and one such option was to build a winter garden. Winter gardens were built primarily on rooftops (Figure 4a) and occasionally at ground level (Figure 4b). While winter gardens provide protection from the wind, they also allow residents to view the surrounding landscape, creating a connection to the neighbourhood. These spaces are fluid in the sense that they enable meetings between residents of a building and blur the borders between their private homes. However, the residents attending the workshops told us that these spaces had failed in this effort: "Our winter garden is like a skeleton. It kind of works but it should be greener and have more plants. It's used sometimes during the summer, but the rains comes in" (Valdemar, IT professional, 32 years old).

While we found some well-kept winter gardens, another resident told us that only one person cares for their winter garden, which is not enough. In addition, only residents of the building where the winter garden was located could access these spaces, creating a sense of exclusion for people who lived elsewhere. Borders were created by the stairs where the winter gardens were located on the roofs, by locked doors to which only residents had access, and sometimes by signs stating that these spaces are "private" (Figure 4b). The enactment of community in winter gardens is thus also one of separation and depends on the absence of uninvited guests. In line with Law and Mol (2001), winter gardens can be conceptualised as fire space because the community of these winter gardens is dependent on absence (of "outsiders") and it requires disruptive efforts to cross the borders (either breaking open locked doors or violating the social border by ignoring signs). However, at second glance, the space is more fluid, as some types of visitors, such as lost birds, can occasionally fly in through small openings. When this happens, borders are crossed not only by non-humans but also by residents from other houses. For instance, when a bird entered but could not exit a winter garden, a resident from an opposite building sought assistance through the Vallastaden Facebook group. The resident received help from someone living in the building and thus managed to cross the border to the winter garden, although not in person, with assistance from technology.

These examples involving the winter gardens show that the reshaping of borders can be enacted in different ways and that conceptualising borders thus needs to be done with different actors and different forms of border crossing in mind. The role of technology in enacting space is becoming ever more influential as many city districts have a space on the internet connected to them. The Facebook group for residents of Vallastaden is such a space where connections are constantly made, but also where disruption appears when opinions differ. The Facebook group is not only both a fire and fluid space at different times but also part of the identity of Vallastaden. It enables border crossings between houses as part of a common (geographical) ground and creates new arrangements of actors. In this case, the enactment of winter gardens is dependent on the heterogeneous networks of birds, humans, the built environment, and technology collectively.

Figure 4. Winter gardens on a rooftop (a) and ground (b) with a sign saying "Private." Photographs by Wiktoria Glad.

4.4. Enacting Social Sustainability Through Parks

Two parks were important in the enactment of social sustainability shared space (Lang & Mell, 2020) in the planning documents: Broparken (in English, the Bridge Park) and Paradiset (in English, the Paradise). Broparken acts as a backbone for the area, containing the brook Smedstadbäcken at the centre of the neighbourhood, and Paradiset was designed as a separate space and an escape from the high-density housing area. Both parks were planned as a nod to past times and connect contemporary lifestyles with the social life made possible in the *tegar* small-scale farming communities. When we asked Vallastaden residents to make a drawing of their neighbourhood—of their "places," "routes," and "meeting places"—all the drawings included the brook, and most placed it at the centre of their drawing (Figure 5). Some of the drawings included a heart close to the brook, as we asked all participants to show in their drawings: "Where is your heart in Vallastaden?" The brook was drawn among the first features drawn on the sheet of paper that we provided for each of the workshop participants of the workshops, and, in several cases, other features were added and drawn in relation to the stream of water.

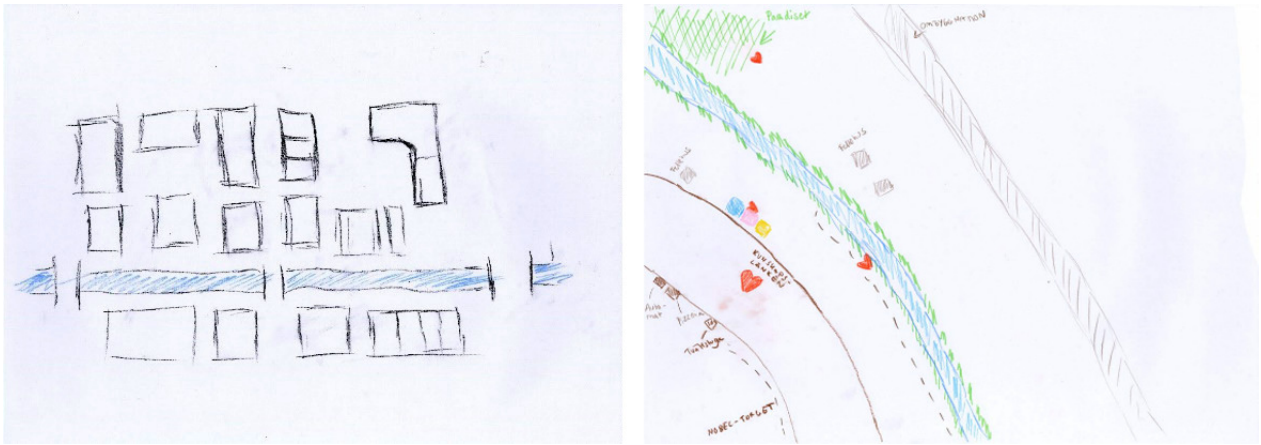

Figure 5. Drawings made by residents participating in our workshops in Vallastaden.

In this fluid space, the water in the brook runs independently of the borders imposed on the stream. Smedstadbäcken had been straightened into a ditch in previous centuries, but when social sustainability became the theme for the Vallastaden development, the stream was included as a part of the Broparken designs and its meanders were recreated. Broparken balances the functionality of the brook as an open stormwater catchment basin with the park as a recreational area. The park is equipped with paths, bridges, outdoor seats, and boardwalks to facilitate social interaction, and has been described as the "lifeblood" of Vallastaden (Swedish Architects, 2020). This is also where our workshop participants walk their dogs, enjoy a picnic, and use the paths for moving within and outside of Vallastaden. The brook could have acted as a barrier or border between different parts of Vallastaden, but residents in our workshops enacted it as a space for recreational and social practices. Even so, the park also stirs up strong emotions with its changing nature. Vallastaden was launched with a public exhibition in 2017, and at that time the park was carefully tended and neatly ordered. However, over the following years, unruly nature was allowed to take more control. Some residents saw the vegetation as too wild and complained that the park was poorly managed. The planners, on the other hand, argued that it was always in the design to have it as meadowland rather than a manicured lawn. While the changes in Broparken have been slow, through centuries of crafting and controlling by humans to a less tightly kept version today, the absence of control turned it momentarily into a fire space. However, the complaints were only voiced by some and, compared to the social connections the park makes possible, have to be recognised as a less prominent feature of the park.

Paradiset Park was designed as a "farm park," where rented allotments for hobby growers and a public park were woven together. Historical references were made to the agricultural past of this area, with its small allotments and shared facilities for urban micro-scale farmers. Old patterns of farming and living would be imitated in the park, and would especially showcase the traditional agricultural products of the region (OKIDOKI, 2012). In the master plan, Paradiset was presented as the new big park for Linköping and the plan described how the park would nicely connect to existing nearby outdoor recreational areas. In contrast to other allotment areas in Linköping, Paradiset is not fenced off, it is open all year round and accessible to visitors. The borders of Paradiset have been left to eventually become defined and made visible in answer to the needs of the park's users. Such a need eventually arose for the hobby growers when their crops were—accidentally or deliberately—harvested by visitors (Krook, 2021). In fluid space, both visitors and crops had uncertain identities because the lack of fences and walls around the park signalled accessibility and availability, but invisible borders were present for the inclusion and exclusion of humans and non-humans. Visitors might be one of the 79 gardeners of Paradiset, occasional visitors who enjoyed a walk in the farm park, or visitors who came with the aim of harvesting someone else's crops. Crops may be someone's private property, but in some places in Paradiset crops, fruit on trees, and berries on bushes are free for everyone to pick and enjoy. Depending on exactly where these crops, trees, and bushes are situated within the farm park, and your own status as a visitor or hobby grower who rents an allotment, you could harvest and pick berries and fruit in some of this space. Incidents involving the unwanted harvesting of crops spurred the posting of signs with messages like "Private" (Figure 6). In this fire space, parts of the public park were enacted as private land and borders between public and private were established. After the signs were posted, crops were left alone and the Paradiset gardeners were able to harvest them (Krook, 2021).

Figure 6. Sign in the "farm park" Paradiset says "Private: We who farm here in Paradiset work hard all year round to be able to enjoy our harvest, please respect that!" Photograph by Maria Eidenskog.

4.5. Felleshus and the Responsible Residents

Felleshus in Vallastaden come in many designs and shapes, but can be identified through their occupation of a central place in each quarter. They are described in the master plan as hubs for a variety of services for the residents, such as household waste recycling, allotments for gardening, and sports facilities (e.g., ping-pong tables). The master plan suggested that each *felleshus* should be unique and not only serve residents from the immediate surroundings but also provide social activities to attract residents from the entire Vallastaden neighbourhood (OKIDOKI, 2012).

The building designs are inspired by large-scale greenhouses and "houses within greenhouses" as *felleshus* include a mixture of spaces for socialising, gardening, cooking, and overnight guest rooms (Figure 7). *Felleshus* are prominent structures in the Vallastaden neighbourhood and are part of shaping Vallastaden as something tangibly different from conventional city districts. The *felleshus* are owned and managed by quarter-based associations, and all residents are members of a *felleshus* association in their quarter. The responsibilities for daily maintenance and care, for the energy, water, and sewage bills, and for organising events for members fall on the association. Different *felleshus* reveal different ways of dealing with these responsibilities, and this is visible partly from just passing by or by looking at the individual *felleshus*' Facebook pages. When you pass by, several of the *felleshus* look unused and with their prominent appearance as massive glass constructions, they create a void. The absence of humans and artefacts that could signal human presence is conspicuous, as is the lack of social activities that could be expected to take place, especially during the cold seasons.

Figure 7. Examples of *felleshus* in Vallastaden. Photographs by Wiktoria Glad.

In fluid space, the artefact *felleshus* continues to be a *felleshus* even when some parts of it are changed. Some residents in Vallastaden tinker with the interior and exterior of these buildings, equipping the glazed facades with sunshades and the inside with furniture for relaxation and socialising. Gardening is a popular activity in some *felleshus*, and the large greenhouse designs make it possible to grow small trees, climbers, and various edible plants. Through the glazed facades, these *felleshus* appear to be accessible, because most of the space is visible from the outside, but access to *felleshus* is strictly managed through the quarter-based associations. Incidents, often connected to parties hosted by some of the many university students in the area, have made some *felleshus* unavailable for any activities during certain periods of time. In this fire space, *felleshus* are the opposite of what these artefacts were planned and designed to be: a locked, inaccessible space without any social activities. Affected by events in the past, *felleshus* in fire spaces are unused and stand as monuments to failed management.

Felleshus were planned and designed to be gradually developed, to evolve into spaces that would fit the specific residents of the neighbourhood, thus a fluid space experiencing incremental, ongoing changes (Law & Mol, 2001; Mol & Law, 1994). The *felleshus*, through their materiality, prominent possession of space, and shaping of borders, make certain of the activities proposed in the plans present and other activities absent. The imagined residents, as described in the master plan of the OKIDOKI architects (Figure 2) and planning documents from Linköping Municipality, were sociable, with a predilection for meeting other residents and engaging in gardening, sports, and park life. Some current residents might fit this description, but residents are individuals, something that the architects and planners failed to acknowledge in their plans for Vallastaden. This shows how the ontological politics involved in the planning and building of Vallastaden is one of exclusion, where unwanted residents are made absent and where access to (partially) shared space is highly constrained.

5. Conclusions

Studying bordering practices of both humans and non-humans in Vallastaden in terms of fluid and fire space (Law & Mol, 2001; Mol & Law, 1994) means acknowledging the movement, fluidity, flickering, and constant change taking place within the socio-material. The ontological politics (Mol, 1999) of enacting borders in Vallastaden has become visible through our focus on how inclusion and exclusion create different forms of

space. This approach has aided us in studying bordering by attending to the multiplicity of borders and space with an openness towards different and unexpected actors. Bordering comes in many different versions and to analyse this complexity we need to study bordering in practice with a wide range of actors in mind. Animals and their relationships to space provide an opportunity to further understand the role and creation of fluidity, but we need to centre the analysis on these animals' subjectivity by focusing on the animals themselves, rather than the systems of which they are a part (Bear & Eden, 2008). In our study, understanding the socio-material relations involved in bordering in Vallastaden, and its consequences for human and non-human residents, allowed for a critical discussion of the ethical choices made in the name of sustainability. This study furthermore contributes to discussions on bordering by presenting a theoretical approach which makes a broader array of socio-material relations and the ethical choices interwoven in planning processes visible.

Relations between buildings, residents, animals, and ways to practise borders create border multiplicity in Vallastaden. One example is the public park Paradiset, where accessibility for all should not be interpreted as permission to "enjoy everything" available there. Fruit from one tree might be available to eat, while fruit from an adjacent tree might be forbidden. Everyday life in this neighbourhood implies different approaches to borders of inclusion and exclusion, which are not always obvious to either residents or visitors. Space can also change shape dependent on the arrangement of actors, such as hot temperatures changing a home to a place to escape from or the cat Sixten who easily crosses borders while also creating chaos dependent on his encounters. The difficulties involved in bordering are also revealed in the planning process, where, in the efforts to create an identity of social sustainability for Vallastaden, the neighbourhood could also risk becoming an urban enclave (cf. Iossifova, 2015), socially, spatially, and functionally separated from the rest of the city. In line with previous research (Grundström, 2022; Högström & Philo, 2020), we agree that, in future spatial planning, architects and planners should work towards more fluid or porous borders, despite the difficulties they bring. In addition, we argue that they need to consider the tensions and challenging tasks of creating room for fluid and fire space in relation to both humans and non-humans, as well as considering the political consequences of exclusion when planning for fluid spaces that risk turning into fire space.

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Conflict of Interests

The authors declare no conflict of interests.

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Transformations of the Beirut River: Between Temporary and Permanent Liminality

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Abstract

This article presents the case of the Beirut River corridor in Lebanon, which defines the administrative border between the capital Beirut, its eastern and south-eastern suburbs. The Beirut River has undergone several transformations from being a lotic environment to becoming complex urban infrastructure. This is often unnoticeable due to the scarcity of its running water and its walled existence at the edge of administrative boundaries. The separation from its riverbanks, disconnection from the urban fabric, and continuous pollution have contributed to its liminality, being simultaneously neither present nor absent. To understand this in-betweenness, the river's spatial, temporal, and social liminality are analysed by identifying major events, actors, and key urban planning interventions that impacted the river at the national, city region, and local scales. The article explores the development of the river corridor both in terms of urbanisation and population dynamics; its distinct positionality in different periods that corresponded to major events and decisions made; and the contrasting river experiences and perceptions across generations, which vary between reminiscence and aversion. By examining the various transformative processes, collective practices, perceptions, and diverse actors, the article highlights the contextual implications of this obdurate liminality, but also Beirut River's potential alternative future positionality amidst present and imminent urban challenges.

Keywords

actors; Beirut River; border; canalisation; liminal; scale; social practices

1. Introduction

The Beirut River separates the capital city Beirut from its eastern and south-eastern suburbs. This article explores the river's transformations over time and its multiple positionalities, which have resulted in its in-betweenness on the spatio-temporal and social levels. Important milestones include the beginning of the area's urbanisation in the 1920s; the river's canalisation, which happened in 1968 and 1998; and an awakening regarding its social and environmental importance since 2009.

Urban rivers, particularly in developing countries, face numerous challenges caused by various drivers, including becoming alienated, hidden, invisible, forgotten, or dead (Travassos & Momm, 2022, p. 11; Youssef & Abou Ali, 2017). Urban rivers are interesting natural voids. These voids are useful due to their timelessness that highlights "new perspectives on our everyday reality" (Gruchow, 1988, p. 10 in Lawrence, 1997, p. 4). Although considered as "natural borders" (Krause, 2016), rivers are state-owned properties, which depending on their role, are formalised on maps into physical, institutional, or normative borders (Elden, 2007; Imai, 2013). Being organised under power influences, political priorities, and information-based administrative decisions, such urban borders form a territory with borderlands on either side (Elden, 2010; Krause, 2016; Mountz, 2010). The river is often a porous and liminal border, which shapes and allows interactions and negotiations across its two borderlands; the latter are often contrasting or contested areas based on practices, experiences, or perceptions (Imai, 2013; Morehouse, 2004). In reference to liminality, Lawrence (1997, p. 1) calls for further exploring "the roles played by ambivalence and hybridity [liminality] in everyday life," which affect practices and experiences including the ecological, economic, socio-spatial, and socio-cultural aspects (Elden, 2007, 2010; Krause, 2016; Imai, 2013).

The river's dynamic, liminal state provides opportunities for creative reconciliations across borderlands, which in themselves form the possible transformation between the present and the future (Imai, 2013; Zartman, 2010). In addition to the decisions, processes and practices that have shaped them spatially and given the border a width, borderlands could be understood through the involved actors, power relations, and socio-cultural processes (Diener & Hagen, 2010; Mountz, 2010; Paasi, 2005; Zartman, 2010). Therefore, understanding borderlands requires studying them at various scales, and from different perspectives (Zartman, 2010). Similarly, urban rivers literature indicates the importance of exploring different actors' roles and "politicized" decision-making through history to understand past influences on rivers, which were based on prevailing knowledge, values, and regulations, their current state, and future trends (Travassos & Momm, 2022, p. 4; Zingraff-Hamed et al., 2022), signifying the strong relation between the border and its borderlands.

Studying urban rivers at different scales would explain their role longitudinally as connectors serving infrastructural purposes at the international or regional scale, and laterally as possible local borders or connectors, where their treatment and width affect their positionality within their borderlands (Kondolf & Pinto, 2017, p. 183; Loftus & Harley, 2005). The variations of the impact on rivers' positionality is dependent on contextual specificities, whether natural, historical, morphological, political, or social (Castonguay & Evenden, 2012; Mauch & Zeller, 2008; Shaw et al., 2021). Urban rivers research highlights the technical approach to dealing with them as conduits, weaving other infrastructure along them, with less attention paid to the connection between rivers and their banks. In this case, rivers become marginalised, especially if inhabited by precarious population. They could gentrify in the case of new riverfront real estate

development within neoliberal real estate market dynamics and either way, issues of environmental and spatial justice become critical (Travassos & Momm, 2022).

While the literature highlights urban rivers' recurrent positionality as liminal space, there is limited research on this positionality and its local social and perceptual implications (Krause, 2016). This framework is particularly useful in examining the Beirut River. This article addresses several questions: What characterises Beirut River as a liminal space? What were the triggers behind its liminality over time? How is the river experienced by different individuals and groups over time? What are the implications for its positionality?

2. Liminal Space

Literature on liminality has been widely used across disciplines. Liminality is associated with the condition of in-betweenness, and suggests a dynamic border position, without being on either side of it (Hynes, 2009; Knudsen, 2009; Smyth & Kum, 2010; Waardenburg et al., 2019, p. 939). Liminality holds the potential for transformation that hinges on the past but signals a different future (Imai, 2013). The term liminal derives from the Latin "limen" or threshold and suggests a transition that is spatio-temporal (McDowell & Crooke, 2019, p. 326; Thomassen, 2012).

Analysing the interlinked spatial, temporal, and social dimensions of liminality, provides the framework to understand urban rivers' changing positionality within different contexts (Agier, 2016 in Waardenburg et al., 2019, p. 940; Thomassen, 2012; Turner, 1974). Spatial liminality refers to the surrounding borderlands, reminding of the state of in-betweenness. An urban river and its ecosystem might connect or disconnect and interact partially or fully with the surrounding urban fabric, depending on its natural or modified morphology, according to processes and practices responding to different priorities. The extent of exchange across borderlands varies according to the liminal space's porosity either physically or functionally (Imai, 2013; Sleto, 2017). Temporal liminality begins with a "triggering event" (Waardenburg et al., 2019, p. 941) and signals different time intervals that are indicative of broader social struggles and negotiations among actors (Imai, 2013; Thomassen, 2012). More than one triggering event could occur over time due to power struggles, which would perpetuate liminality. For urban rivers, triggers could refer to decisions regarding their contextual role, such as canalising them, a transformation that affects the local level yet provides opportunities (Imai, 2013). Referring to triggers, Lawrence (1997) states that actors involved in transforming a liminal space support each other in maintaining it as such and are equally supported by the practices of other actors who have been conditioned to live with the liminal space.

Social liminality refers to the state of in-betweenness as experienced by individuals and groups and as manifested in shaping meanings in the process (McDowell & Crooke, 2019; Waardenburg et al., 2019). The river as a liminal space presents a temporal struggle and negotiation extending between the past and the present as memories, and imaginaries for a possible future (Lawrence, 1997). These are expressed through the "changing life patterns, everyday practices, and personal tactics" (Imai, 2013, p. 59). Liminality is particularly suited to study unstable or "challenging environments"—such as Lebanon, a country in perpetual and prolonged instability—to check potential alternative futures (McDowell & Crooke, 2019, p. 335). Murphy and McDowell (2019) extend the temporal dimension of liminality, to address unstable contexts and refer to permanent or obdurate liminality, which is defined as "a collective longitudinal experience of ambiguity and in-betweenness within a changeful context, [which] allows us to think of it [liminality] less as

a transition and as more of a prolonged and potentially negative hiatus to an unknowable future" (Murphy & McDowell, 2019, p. 56).

The lens of liminality enables understanding how river transformations at the macro-level from its natural to canalised state impact urban life at the micro-level. This includes an exploration of power relations among actors, and specifically individual actors who could innovate and stop the condition of obdurate liminality. These "fringe actors" often work separately or collectively towards awakening ecological and social concerns (Geels & Schot, 2007, p. 400; Kanger & Schot, 2019). For these actors to achieve transformations, it is necessary to bridge across structural differences in unstable contexts, through approaches such as: place-based or interest-based ones, consensus orientated ones or working towards institutionalising the actors' coalitions (Mady & Chettiparamb, 2017). Regarding Beirut River, while several studies addressed its border position and deteriorated environmental state (Shaban, 2021; Trovato et al., 2016; Youssef & Abou Ali, 2017), this article explores its liminal position in relation to urban planning decisions, actors, and social practices.

3. Methodology

This article builds on document analysis including publications, academic theses, websites, reports, population data from the Lebanese Crisis Response Plan, urbanisation data from the National Council for Scientific Research (CNRS), and building permits from the Order of Engineers and Architects in Beirut. The data is provided for several districts in two governorates: in Beirut, the districts of Ashrafieh, Medawar, and Remeil; in Mount Lebanon, the district of Baabda with Baabda and Furn El-Chebback, and the district of Matn with Bourj Hammoud, Mekalles, and Sin El-Fil.

From January to February 2023, the author conducted six online in-depth, semi-structured interviews with actors who engaged with the river. The interviewees included two researchers R1 and R2 who worked on the Beirut River, one architect and activist R3, one academic R4 who held a course about the river, one artist R5, and one resident and former member of Bourj Hammoud municipality R6. These interviews provided information on everyday activities related to the river. Also, seven structured interviews R7 to R13 were conducted with residents born between 1946 and 1973 who live or have shops in the eastern suburbs of Bourj Hammoud and Sin El-Fil. The resident interviews provide some indications to memories and perceptions of the river. These were coupled with the interviews done by Frem (2009). Frem's thesis is a comprehensive reference documenting the river's development in relation to national events and triggers and is referred to specifically in Section 4.

4. The Liminality of the Beirut River

Starting in the mountainous upper Matn region of Lebanon, the Beirut River Basin is fed by two rivers that merge to form the 15-kilometre coastal river corridor crossing flat peri-urban, mixed hilly and flat suburban, and urban areas, before discharging its water into the Mediterranean Sea (Institut d'Aménagement et d'Urbanisme, 2016; Shaban, 2021). This seasonal river transports sediments during winter and is almost dry for the rest of the year (Frem, 2009). Administratively, Beirut River meanders through several municipalities: the capital Beirut, particularly the districts of Ashrafieh, Medawar, and Remeil in the Beirut governorate; Bourj Hammoud, Sin El-Fil, and Mekalles in the Matn district; and Furn El-Chebback, Jisr El-Basha, and

Hazmieh in the Baabda district (Figure 1). The river is managed by the Ministry of Energy and Water (MEW) and not by the adjacent municipalities.

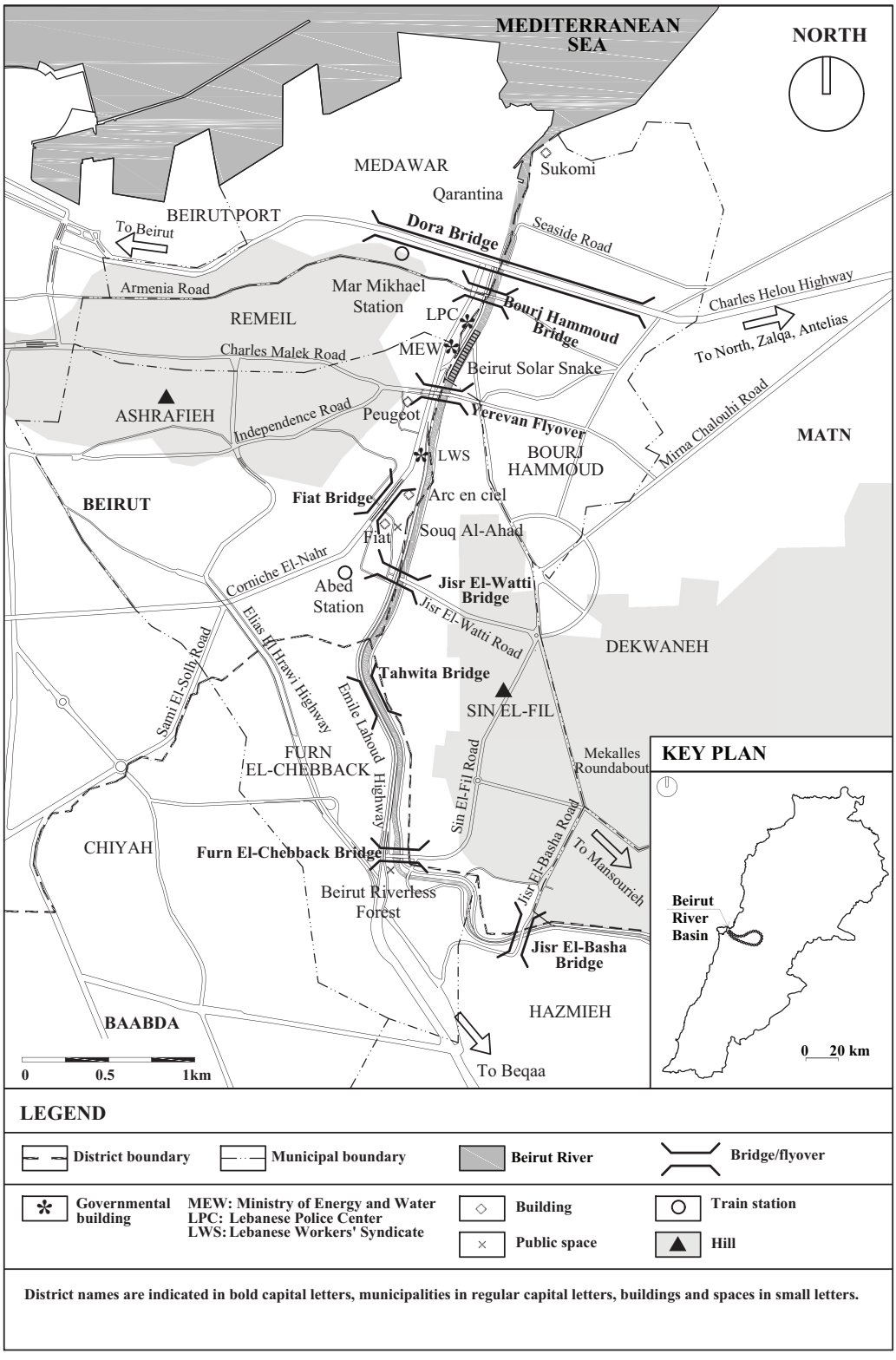

Figure 1. Beirut River corridor and administrative boundaries.

Moving along the river corridor, which developed at different periods, three land use zones could be distinguished. The first to the south comprises remaining fragmented, agricultural land in Jisr El-Basha, Furn El-Chebback, and Sin El-Fil amidst increasing real estate development encroaching on the agricultural plain (Trovato et al., 2016). The second middle zone spans from Beirut, Sin El-Fil, and Bourj Hammoud to the coastal highway. It includes predominantly industrial uses in Mekalles (Sin El-Fil), mixed and residential uses in Sin El-Fil, Bourj Hammoud, Ashrafieh, and Remeil. To the north, the third zone between the coastal highway (Charles Helou) and the estuary in Bourj Hammoud and Medawar (the former wetland), is partly occupied by industrial activities, namely solid waste management (previously by Sukomi), and the slaughterhouse in Quarantina, which closed in 2014. The following sections address the research questions and examine the river's liminality and its borderlands as transformed prior to, during, and after canalisation.

4.1. Spatio-Temporal Liminality

Being an urban river meant that Beirut River was both a reason for urban agglomeration and a victim of urbanisation. The first Roman bridge across the Beirut River was replaced by the current one linking Remeil to Bourj Hammoud, and the river was used as a source for potable water, water mills, and irrigation (Haqqi, 1918/1993). Given the riverbanks' fertile soil, agricultural activities were prominent by the riverside until the 1920s when urbanisation spread along the middle zone of the corridor except along the already existing railway and related infrastructure (Frem, 2009). The river served the nearby population, specifically the Armenian since 1922, whose settlements expanded in 1928 and 1939 (Fawaz & Peillen, 2002; Frem, 2009; Figure 2). Urbanisation continued with Beirut port's increasing significance and expansion in 1948, and poor neighbourhoods emerged around the port (Arnaud, 1997).

The 1950s–1960s was an important period for Beirut in terms of urban planning, an economic and urbanisation boom, with industries flourishing around the capital. Lebanese and foreign experts defined major infrastructure, industrial zones, urban densities, centralities, and areas in need of upgrading along the river (Verdeil, 2009). However, implementing and controlling the plans were unsuccessful due to limited capacities in the state apparatus, and prevailing market interests (Verdeil, 2009). This boom generated more traffic and triggered infrastructure development, such as the road network based on the 1931 Danger plan, specifically the construction of the coastal highway, the tramway, Corniche El-Nahr (Pierre Gemayel Boulevard), and several vehicular bridges—executed during the 1940s and in 1970—across the river including Dora, Bourj Hammoud, Sin El-Fil, and Jisr El-Basha (Davie, 2001 in Frem, 2009, p. 45; Figure 2). At the foot of Ashrafieh and Sin El-Fil, car sale companies located such as Fiat and Peugeot (Ruppert, 1999). Adjacent to the port in Medawar and Bourj Hammoud—the northern river zone—some services and industries emerged, and with the decline of tanneries and silk factories after World War II (Jidejian, 1997), industries near the river gradually changed to oil reservoirs and residential areas in the 1950s (Frem, 2009).

These activities required unskilled labour, which led to the construction of relatively cheap housing and emergence of informal housing along the corridor in its northern and middle zones (Fawaz & Peillen, 2002; Frem, 2009, p. 54). While the working class resided along the river, "middle class Maronites settled further away in residential areas of Sin El-Fil, Sioufi [Ashrafieh], Furn El-Chebback, and Hazmieh" (Frem, 2009, p. 58) In the Armenian settlements, the Bourj Hammoud municipality, and Armenian NGOs built housing units for the Armenians in the 1950s until 1959 (Fawaz & Peillen, 2002). Another densification trigger came with the 1954 zoning ordinance, which allowed for an increase in floor to area ratio "under pressure from speculators,

builders lobbies, and influential Arab capital" (Davie, 2001 in Frem, 2009, p. 55). The southern zone towards Sin El-Fil and Mekalles featured predominantly furniture and construction material industries. The 1954 Ecochard plan for Beirut included a road network based on his earlier plans, while Ecochard's 1964 plan proposed another highway that is currently the interchange at Furn El-Chebback and Hazmieh.

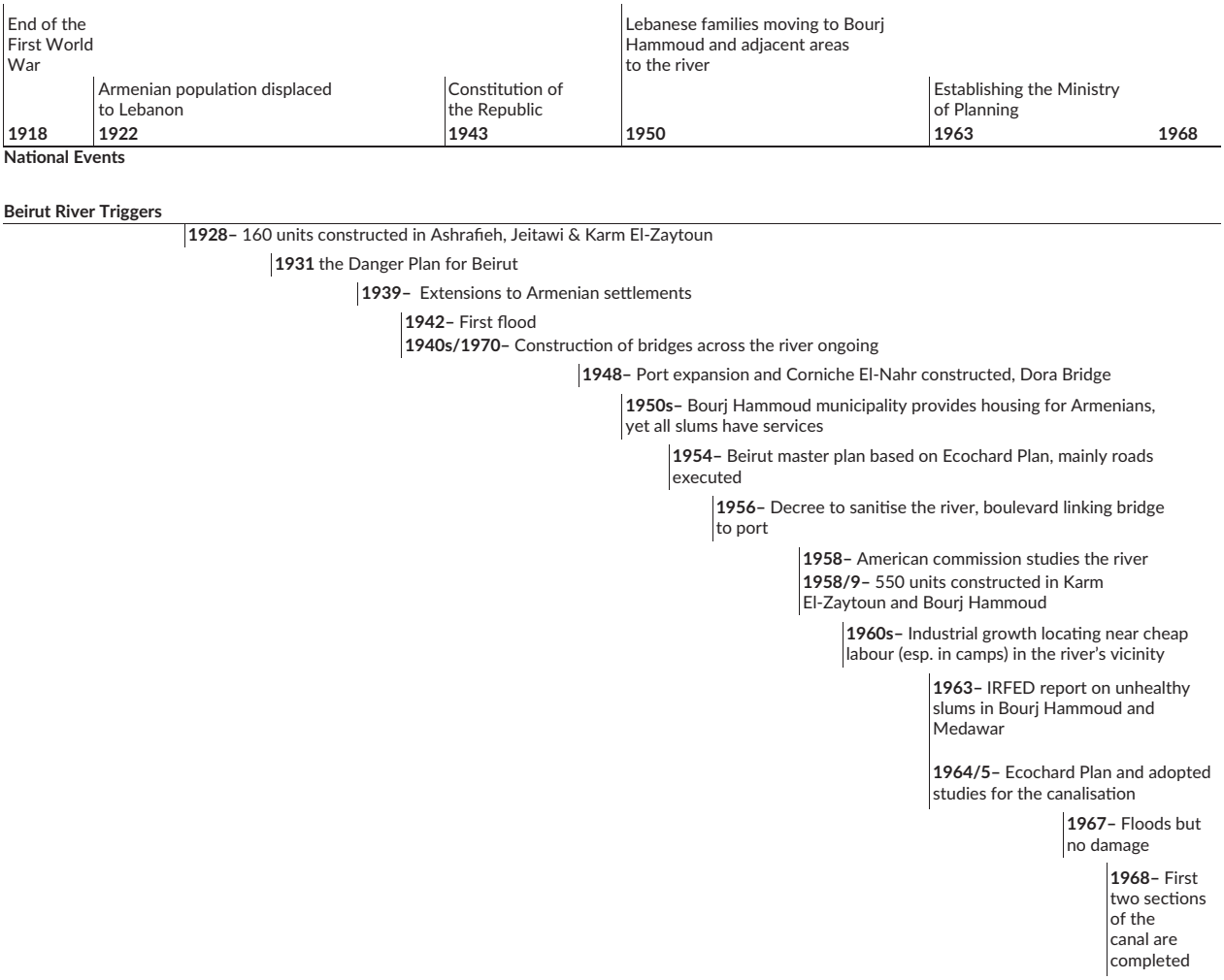

Figure 2. Timeline indicating the period before canalisation.

The first trigger to reconsider the river's positionality was the flood in 1942, which affected the informal settlements. This event prompted the government in 1956 to issue a decree for the river's canalisation, and in 1958 an American study was prepared for that purpose (Davie, 2001 in Frem, 2009, p. 33). The canalisation project had a dual role of technically managing floods and cleansing slums, which were reported as insalubrious in 1963 by the IRFED mission and supported by Ecochard's 1964 plan. Another

flood in 1967 caused no damage, yet the decision to execute the canalisation was irreversible. The canal was built in three segments along with proposed highways, interchanges, bridges, and stormwater infrastructure (Frem, 2009). The Ministry of Planning executed the first two canal segments in 1968 after which no flooding damage was recorded (Frem, 2009). Then the civil war erupted in 1975 and lasted until 1989 (Figure 3).

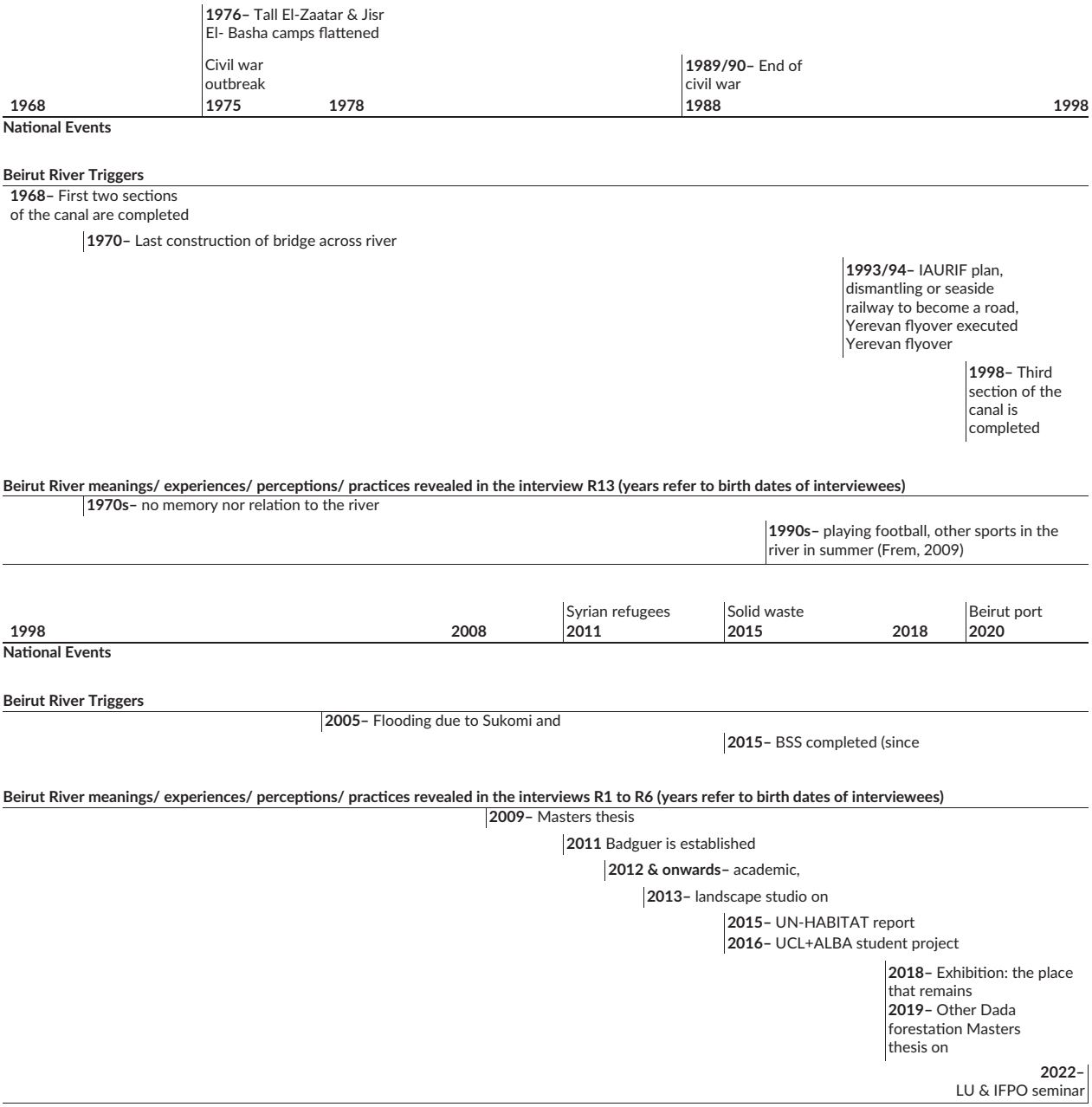

Figure 3. Timeline indicating the period during and after canalisation.

This war resulted in a weak state with weak planning, the emergence of polycentric development, communitarian provision of services (Combes & Verdeil, 1996), construction violations, unplanned densification, and the rise of the real estate market with private developers marginalising the environment,

agricultural land, and social networks. The war caused Beirut's division along a north-south demarcation line continuing to its suburbs, and significant population displacement occurred across the country (Mady, 2022a). The war's impact was evident along the river corridor, whose eastern bank became part of the eastern divide, and witnessed a population influx. The war tensions were equally scaled down to the river's neighbourhoods "nurtured by the amplification of deep social inequalities and degraded living conditions" (Davie, 2001 in Frem, 2009, p. 58). During the war some Armenians remained in the area, the well-off or second generation relocated, the Palestinians were uprooted, and a second wave of displaced Lebanese population arrived to the areas of Tahwitta, Hazmieh, Mansourieh, Zalka, Antelias, and beyond (Fawaz & Peillen, 2002).

Data from the CNRS on urbanisation between 1964 and 1998—spanning from before the war until its end—indicates a decrease in urbanisation in Medawar, Ashrafieh, Remeil, and Bourj Hammoud, which were affected by the war, and relative growth in the areas of Baabda (Hazmieh), Mekalles, Furn El-Chebback, and Sin El-Fil. In 1994 and based on earlier IAURIF plans, the Yerevan flyover was executed, which itself resulted in population displacement (Fawaz & Peillen, 2002; Frem, 2009, p. 47; Figure 4). The third canal segment was executed in 1998 along with the Emile Lahoud Highway (Frem, 2009), creating a physical disconnection between Beirut and its eastern suburbs, reinforced by Corniche El-Nahr and a local primary road on the eastern side.

Figure 4. General view across the riverbanks and the Yerevan flyover.

The canalisation affected the river's trajectory, and administratively appended its flood plain to the Beirut Municipality (Frem, 2009, p. 34). The newly appended fluvial domain, which is non-constructible by law, was reclaimed by MEW, used for governmental buildings and yards, and some land given to NGO headquarters such as Arc-en-Ciel (R1—S. Frem, interview, February 21, 2023). Also, the public domain resulted in disputed land between the Beirut and Sin El-Fil municipalities and was used as a Sunday marketplace (Figure 5), which itself was described as a liminal space (Mady, 2022b): "The channel's adopted plan revealed the politics of its resulting form, which shifted towards the suburbs rather than Beirut….This shift has produced an immediate adjacency between Bourj Hammoud and Sin El-Fil and the canal" (Frem, 2009, p. 36).

Based on CNRS urbanisation data, the period between 1998 and 2005 witnessed remarkable growth in the south-eastern suburbs particularly in Baabda (Hazmieh) and Furn El-Chebback. This trend continued on the

eastern riverbank between 2005 and 2010, along with further growth to the west in Ashrafieh and Medawar. From 2010 to 2016, all the surrounding areas expanded except for Remeil. Bourj Hammoud received Syrian refugees after 2011, who settled in some neighbourhoods with poor infrastructure that suffered from seasonal flooding (UN-Habitat, 2017). Along the eastern riverbank, the area between Furn El-Chebback and Sin El-Fil was placed under a planning study, which prevented real estate development during the study period (R1—S. Frem, interview, February 21, 2023). Yet, since 2005, with the ongoing state of weak planning, real estate pressure led to annulling the study and constructing luxurious residential and mixed-use construction in formerly farming or industrial land, along with the conversion of industrial buildings, signalling the area's gentrification (Mady, 2022b).

Figure 5. Width of the river cross-section, both sides, and Souq Al-Ahad.

The post-war urbanisation along the river corridor was closely linked to population dynamics. While the available population data from the Lebanese Crisis Response Plan covers the period from 1998 to 2016, it reflects the remarkable pressure on Bourj Hammoud—mainly caused by the flow of displaced Lebanese, foreign workers (Egyptian, Ethiopian, Sri Lankan), and Syrian refugees (Fawaz & Peillen, 2002). Post-war Bourj Hammoud, Medawar, and Remeil were attractive to incoming population due to their "social tolerance to different ethnic groups" (Frem, 2009, p. 58). The population also increased in Hazmieh, Ashrafieh, and Sin El-Fil. The population growth figures corroborate the changes in urbanisation explained earlier.

Data on building count and uses between 2005 and 2017 as provided by the Order of Engineers and Architects building permits indicates variations in the river corridor's three zones. In the south, mixed residential, industrial, and commercial uses prevail in Hazmieh, reaching the river's flood plain; in Jisr El-Basha and Furn El-Chebbak, agricultural spots remain. In the middle, more mixed residential and some light industries prevail, and notable in Sin El-Fil is the gentrification mentioned earlier (Figure 7). In the north, there are residential, industrial, and port activities and some services. Comparing the two riverbanks, the western one (Beirut) is predominantly high-rise residential with some mixed uses, services, cultural, and recreational facilities, while the eastern (Bourj Hammoud and Sin El-Fil) is residential with commercial and industrial prevalence. The western bank is significantly denser than the eastern one as indicated in the permits between 2005 and 2017.

Beirut River's transformation reveals its liminality, which could be interpreted through a longitudinal reading reflecting its role at the national and city region scales; it provided space for transport infrastructure connecting the port through a transit route to the inland in the Beqaa, then to Syria and beyond. The river's relation on either bank was asymmetrical; it was detached from the capital by the motorised highways, while a local road maintained its relation to the eastern suburbs (R6—A. Mangassarian, interview, February 23, 2023; R2—F. Nour, interview, February 20, 2023). A lateral reading reflects local variations across the three corridor zones. The in-betweenness of the river corridor manifests on either riverbank through the binaries of capital city, suburbs, and peri-urban areas; different urban expansion and population growth patterns; different communities residing on either side along the river; different infrastructure and services; and varying levels of pollution, land price, and building density. Being a border, and with the additional infrastructure layers, the river is considered as the back of these administrative borderlands, rather than an active waterfront. Frem (2009, p. 72) indicates that "in the name of efficiency, sanitation and flood mitigation, such public works annihilated cultural ecosystems which allowed previously the interaction of people with existing habitats." With this positionality, what diverse perceptions, experiences, and meanings were generated around this liminal space?

4.2. Social Liminality

In addition to the spatio-temporal liminality, social liminality is evident in the contrast between reminiscences and realities that are reflected in the stories of the elderly and younger generations. These refer to diverse experiences, perceptions, and meanings that different generations attributed to Beirut River in the interviews conducted in 2023 by the author and the ones held by Frem (2009).

Before canalisation there were negative and positive perspectives on the river. For the state, sewers discharged from houses, and tanneries caused sanitation problems, generating a negative space associated "with decay, slums and health hazard" (Frem, 2009, p. 59; see Fawaz & Peillen, 2002 on the 1956 IRFED report). The interview with R6, a resident and employee at the Bourj Hammoud municipality, reflected the river's advantages. Before canalisation, the river was used daily, and crossed during summer. On weekends it served as a recreational space for family picnics and was considered "the breathing space for the population." Most importantly, in mid-summer, Vardavar—an Armenian festival related to water—was celebrated by the river. Only the narrow path along the river was inundated in winter but not the nearby houses. These houses were bulldozed and considered as having no value, although they "were ancient, they had stories, stories of people, a community" (R6—A. Mangassarian, interview, February 23, 2023).

From Frem's (2009) interviews, a respondent born in 1933 indicated a strong relation to the river: children playing, fishing, using its water for cooking, while the estuary was a place to visit and admire the view. Prior to the river's canalisation, the estuary was a recreational area with a restaurant, and a pilgrimage site (R3—A. Dada, interview, January 30, 2023; R5—L. Hakim-Dowek, interview, January 30, 2023). The 1940s generation added washing clothes on Saturdays, fruit trees, crossing the river when the water was low, water reaching the houses in winter, and the pleasure of being by the river until the industrial activities came in the 1960s. Reference to the old Roman bridge and the tramway was also made (Frem, 2009). From the February 25, 2023, interviews, R7 and R8, the 1940s Bourj Hammoud respondents' bitterness with its state was noticeable. Respondents indicated that the other bank had a different political Armenian community and was visited only when something was unavailable in Bourj Hammoud. The 1960s respondents also

indicated the political adversity among the Armenians residing on both riverbanks, with the bridge acting as a battlefield. One respondent appreciated the canalisation for separating the two areas (Frem, 2009). These aspects were echoed by the R9–R12 respondents who shared memories of swimming in the river, crossing to the other side by bicycle, Armenian informal housing on the western riverbank, different functions on both sides, tanneries along the eastern riverbank, and the rival political parties Tashnak in Bourj Hammoud and Hanshak in Badawi (Beirut; interviews, February 25, 2023). Other 1960s respondent highlighted the river's pollution by factories, despite the legally required 20-metre buffer for industrial activities (Frem, 2009).

The river's new cement walls and riverbed led to its separation from the city, and "gradually the people forgot about its presence for good…all those practices were gone." In addition to the walls, the Beirut Solar Snake (BSS) further disconnected the river from the city in Bourj Hammoud. As for the remaining eastern bank, the road is crossed by nearby shop owners, who take a break in the shade of the river wall, a "phenomenon not practised on the other side." For those who knew the river "it was an element of nature; it became a technical device" (R6—A. Mangassarian, interview, February 23, 2023) Despite Bourj Hammoud municipality's attempt to embellish the river wall by commissioning in 2004 the Armenian artist Kelekian to cover it with mosaics ("Embellishing Beirut with artist Lena Kelekian," 2022; Figure 6), the canalisation produced a psychological boundary, ending some of the communities' river-based cultural rituals and—except for few children who ventured exploring it—hiding the river for those who encountered it after 1968. This included younger Armenians, Lebanese from other parts of the country, refugees, and foreign workers (R6—A. Mangassarian, interview, February 23, 2023) (Figure 3). One 1970s respondent R13 remembered crossing the river with a wooden ladder, an indication of water scarcity, while another indicated having no memory nor relation to the river (Frem, 2009; interviews, February 25, 2023). The 1990s respondent mentioned playing football and other sports in the river during summer (Frem, 2009).

Figure 6. The mosaic wall and the BSS in Bourj Hammoud.

Bourj Hammoud Municipality "had no capacity and was sceptic because it considered that it did not have the power to change things" and consequently had no vision for reinstating the river. This weak position was evident when despite the municipality's objection, the MEW decided to cover one river segment with the BSS (MEW & Lebanese Center for Energy Conservation, 2020), which further deepened its liminality (Figures 1

and 6). The older generation considered that "the river does not belong to us anymore, which is very deplorable. They had stolen from us all that life, all that view." What was taken away from the community were "the two lungs: the river and its banks, and the shore…so we need lungs, a long promenade can be integrated in the city fabric along the river and can be that lung" (R6—A. Mangassarian, interview, February 23, 2023).

On top of the physical divide, the river's abuse by industries and individuals led to solidifying its liminality. Other than the natural sediments, the river transported organic waste from the wholesale vegetable market in Sin El-Fil, and effluents from the industrial areas in Mekalles, Sin El-Fil, Jisr El-Basha, and Hazmieh (Frem, 2009, p. 39). One striking example was the red dye disposed in the river in 2012, which led the Minister of the Environment to urge "the Hazmiyeh and Baabda municipalities to cooperate with it [the ministry]" ("Environment Ministry launches probe as Beirut River turns red," 2012). The Sukomi solid waste management facility built on reclaimed land at the estuary and the Quarantina slaughterhouse contributed to the pollution and disfiguration of the northern zone (Frem, 2009, p. 40; Figure 7). Additionally, individuals considered the river as a disposal location for unwanted objects and pets, such as a crocodile found in 2014 ("Hunter captures crocodile in Beirut River," 2014). The river's liminality was further reinforced by the solid waste management crisis, which turned it into a flow of garbage (Baghdadi & Burke, 2015). The state's response to the solid waste management and the execution of the BSS were among the triggers for activists to raise awareness on Beirut River.

Figure 7. Gentrification in Sin El-Fil and the estuary.

4.3. New Meanings: From Permanent to Temporary Liminality?

The reminiscences of the depleted natural river, its utilisation as infrastructure, its current invisibility, and its treatment as a disposal channel, all reflect different knowledge and value sets accompanying the interventions of diverse actors (mainly governmental, local authorities, politicians, industrialists, and the real estate development) over time. The interventions since 1968, reinforced by the river's ongoing deterioration, disconnections, and drastic changes along its banks, have generated a "collective longitudinal experience of ambiguity and in-betweenness" (Murphy & McDowell, 2019, p. 56), which led to its obdurate liminality. This positionality has triggered an awakening among new actors with different knowledge and value sets that strive to reverse the river's obdurate liminality, with a clear shift from a technical and utilitarian, towards an

environmental and social role that acknowledges its local significance. This section provides an overview of some efforts towards a possible future direction for Beirut River by addressing it longitudinally and laterally (Figure 3).

The longitudinal interventions included scientific research on the river's importance on the national scale, which addressed the river basin (Institut d'Aménagement et d'Urbanisme, 2016); water resource management considering climate change, population growth, and water stress (Shaban, 2019); and the river's ecological role (Ghiotti et al., 2020). Similarly, the river's water resource potential was revealed by "using the water that is significant instead of having it wasted and resorting to the construction of dams," or its social aspect as an urban public space (R2—F. Nour, interview, February 20, 2023; see also Frem, 2009). The river was equally an academic subject in local and international design studios exploring environmental justice, landscape, and agricultural revival along urban rivers (R4—T. Mishkani, interview, February 23, 2023; Trovato et al., 2016).

The lateral interventions addressed the river's relation to its adjacent population, especially on the suburban side. One category of interventions included a workshop with the youth in the area for raising awareness on the river (Fattouh, 2016; Friedrich Nauman Foundation, 2023), or broader awareness activities including an organised tour along the river (Sursock Museum, 2020), and different art exhibitions (Avakian, 2016; Hakim-Dowek, 2016; Joreige, 2021; Morales, 2020; Nucho, 2020). Another category included the establishment of Badguer in 2011 in Bourj Hammoud, a renovated house of Armenian culinary and crafts culture, which became a community hub, and was studied within the crafts network in Bourj Hammoud by the NGO NAHNOO, and more recently in a UNESCO project addressing Armenian crafts (R6—A. Mangassarian, interview, February 23, 2023; NAHNOO, 2018, 2019). A third category was the implementation of a Miyawaki forest in the Sin El-Fil municipality riverside (Dada, n.d., 2018). While the initial intention was to involve the concerned ministries, theOtherDada consultants only managed to sign a memorandum of understanding with the Sin El-Fil Municipality. Realising this forest comprised involving residents in partnership with the NGO TandemWorks, recruiting volunteers, getting training from foreign experts, crowd funding from SUGi NGO and the private sector (R3—A. Dada, interview, January 30, 2023).

5. Discussion

Beirut River's value as an urban void was overlooked, and the "natural border" was transformed by the state to define an actual institutional, physical, and normative one between the differentiated borderlands of the capital and its suburbs. The prolonged liminality, and with the contributions of various actors, happened on several levels, including increasing the river's width by adding the canal and road infrastructure, the contrasts between both riverbanks, even within the Armenian community with the rival political parties; disputes over the river's legal border between the Beirut and Sin El-Fil municipalities; the multiple state entities (different ministries and directorates) involved with the river without a unified strategy; the numerous municipalities with little interest and no power to collaborate for a shared strategy for the river—a state property governed by the MEW. This obdurate liminality was opposed by the porosity through some connections such as the spillover of gentrification from Ashrafieh in Beirut towards Sin El-Fil, or more recent awareness raised by NGOs on the areas affected by the Beirut port explosion. Hence, opportunities for re-negotiating the river's local role emerged.

Disregarding environmental and social aspects, the dominant state decisions considered the river longitudinally and prioritised the country's modernisation, and the facilitation of trade from the port to the hinterland. This led to actions based on engineering knowledge, using urban planning tools, resulting in changes to the river's morphology that were evident on the updated map. Laterally, memories, practices, and experiences of the river were undermined, overlooked, or rejected. Beirut River as an agricultural hinterland was historically dissociated from the modern capital city (Jidejian, 1997), houses of transient population were not valued, and relations to the lotic environment were ignored, despite cultural and communal practices. This created an obdurate liminal space with distinct borderlands and a dissonance with the river's natural state.

Different priorities for the river were set by diverse actors, reflecting competing interests for the river as infrastructure or a social leisure space, a backyard, or a waterfront. For the authorities, it was cleansing the river's insalubrious milieu next to the capital city and optimising the use of this void by constructing additional roads and infrastructure to widen its cross-section, specifying land uses that should be supported or removed, zoning and building densities in the suburbs, and dumping solid waste during the 2015 crisis thus rendering the river partly invisible. For market players and with ongoing weak planning, it was facilitating mobility from the port to the hinterland and optimising under-utilised or undefined urban land for real estate development. For industrialists especially post-war within a weak state with laxed control and absent planning strategy, it was violating and abusing the river as a disposal facility. For municipalities, it was managing the unplanned growth of the marginalised population, neglected low-income housing, and associated economic activities, then coping with the adjacency to the canal. For the residents and during its presence, the river was approached as part of the urban environment and people's everyday practices. It was seasonally adapted, and locally appropriated as a resource for different domestic, leisure, and livelihood purposes. The river acquired social values and cultural symbolism, and its banks reflected the livelihood of its inhabitants. After canalisation, residents used coping tactics to make the best of the walls, still using the usurped void as a backdrop for their everyday lives.

The emphasis on the river as a conduit has led activists, artists, and academicians to raise awareness on its socio-cultural role and attempt to re-stitch its riverbanks. Their actions marked the breaking of the "collective longitudinal experience" of prolonged liminality, and a shift from the state as the primary decision-maker to new actors trying to establish a dialogue with the state and local authorities through mediators or directly on their own (UN-Habitat, 2015). Their proposals encapsulated creativity and innovation that promised transformations of returning the river into its urban context through building shared place-based and interest-based identities. Yet, they have fallen short of reversing the river's condition, except in some spots. Coalitions such as the one formed by Dada allowed for upscaling the causes and arriving to an understanding with the local authorities, but not institutionalising them. However, the disaggregated state apparatus that oversaw the river, the disempowered local authorities and voiceless residents remain obstacles in achieving transformation. Also, the impact of these actions remained uncertain with the ongoing instability in Lebanon, and prevailing market players who do not see the financial gain in reversing the river's state, amidst a weak state, and the absence of planning control and strategies.

6. Conclusion

This article explored the transformation of the Beirut River corridor, from a lotic environment to an urban conduit, which over time became a liminal space due to several triggers. These included urbanisation, accompanying infrastructure and economic activities, population dynamics, the 1942 flood and the decision to canalise the river, and the river's uncontrolled abuse. This liminal state manifested in diverse urbanisation patterns, population dynamics, and social experiences on both riverbanks, and the river's erasure from people's perceptions as reflected in the contrasting stories of the elderly versus the young. Using the liminality framework with the spatial, temporal, and social dimensions provided the possibility to explore Beirut River's prolonged in-betweenness and identify attempts to alter this positionality through scholarly, artistic, and activists' initiatives. These included changing knowledge and raising awareness on the river's environmental role, and valuation of its ecological function amidst climate change; recognising the need for supporting agriculture and alerting on the lack of policies to protect the remaining fluvial plain from predatory real estate development; acknowledging its significance as a socio-cultural space, with community identities contributing to everyday life with the lack of open urban spaces within this area. The article calls for alternative approaches enabling new actors to reinstate Beirut River into the city, counteract the inaction of some decision-makers amidst weak planning and the neoliberal market's prevalence, and support the development of policies and regulation towards socio-spatial and environmental justice. It also sets the basis for further exploring the river's role following the Lebanese perpetual crises since October 2019, especially with implications related to limited state funding, the involvement of NGOs, population dynamics, and reconsidering the port blast-affected area. The Beirut River could still play its role as an open urban space between Beirut and its eastern suburbs.

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Conflict of Interests

The author declares no conflict of interests.

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ARTICLE

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The Liminality of Subcultural Spaces: Tokyo's Gaming Arcades as Boundary Between Social Isolation and Integration

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Abstract

This article explores the concept of liminal spaces in Tokyo, specifically focusing on gaming arcades as transitional spaces between social isolation and integration. The decline of the once-popular arcades since the 1990s raises questions about their usage, accessibility, and affordability in contemporary Tokyo. After clarifying the concept of liminality and urban borderlands, the article examines various case studies in central Tokyo, argues that arcades serve diverse purposes and highlights the importance of reintegration of such liminal spaces to bring people from different backgrounds together, providing entertainment, competition, and ritualized encounters. Employing ethnographic fieldwork, including participant observation, interviews, and secondary data analysis, this study recognizes the gaming arcade not only as a physical but also as a mental and social space. The arcades embody the hopes, fears, and aspirations of their users, blur boundaries, offer immersive experiences, and foster a sense of community, comfort, and nostalgia. Such insights allow us to understand how identities are constructed and negotiated in these spaces. In conclusion, the article advocates for a nuanced approach to urban planning that recognizes the value of subcultural spaces like gaming arcades and emphasizes the need to preserve and integrate these spaces into the broader urban fabric. By doing so it can be understood how these liminal spaces can contribute to a diversity of social interactions, community-building, and a better understanding and revitalization of urban borderlands if integrated and managed in the right way.

Keywords

collective memory; community; gaming arcades; liminality; social integration; social isolation; third spaces; Tokyo; urban borderlands

1. Introduction

Liminal spaces can be defined as transitional or in-between spaces where the everyday boundaries and structures of society are temporarily suspended or dissolved. In these spaces, individuals may experience a blurring of familiar spatial references, such as distinct boundaries or clear paths, leading to a sense of disorientation. Spatially, they are physical locations literally situated in-between; temporally, liminal spaces exist as a transitional state between past and future, where normal routines and temporal markers may be disrupted or fluid (Turner, 1969, 1982). Victor Turner, one of the leading scholars in this area, connects liminal states to a suspension of social order and norms for groups or individuals. Such transformative experiences can then provide opportunities for personal growth, self-reflection, and the potential for profound cultural changes (Turner, 1979).

Airports as transitional areas between different locations or stages of a traveler's journey are an example of a physical liminal space that creates a sense of in-betweenness and suspension of normal routines (Augé, 2020). Temples, sacred groves, or initiation grounds that are used for religious or cultural rituals can also be considered liminal as individuals undergo transformative experiences and engage in symbolic practices that challenge conventional social categories (Derks, 1998). Similarly, festivals and carnivals create transient spaces that disrupt social norms and hierarchies as traditional roles and identities might be temporarily disconnected and boundaries between performers and spectators blurred (Bestor, 1985). In a wider sense, occupy movements, which established temporary camps in public spaces to challenge social and economic inequalities, creating alternative communities and disrupting the conventional uses and power structures of urban borderlands, can be seen as liminal spaces as well (Massey & Snyder, 2012). It is important to note that liminal spaces can manifest in various forms and contexts, and their characteristics may differ depending on cultural, social, and historical factors (Turner, 1969).

Urban borderlands refer to large zones between urban areas of cultural diversity, social tension, and economic disparity, and frequently serve as meeting points for different communities or are areas that have undergone significant urban development changes (Iossifova, 2013). Often, a blurring of boundaries and a mixing of identities occurs, creating a sense of in-betweenness. van Houtum and Eker (2015) define them as zones of social and economic transformation, where new ideas, practices, and forms of expression emerge. As such, they can foster creativity, innovation, and the formation of hybrid cultural identities (van Houtum & Eker, 2015). However, liminal spaces and urban borderlands may also be marked by challenges and conflicts when different bodies navigate interactions and negotiate positions within them (Bene & Benkő 2022).

Moreover, liminal spaces and urban borderlands can influence each other in several ways: liminal spaces can provide a space for people from different backgrounds to come together and interact, which might also help to bridge divides within urban borderlands (Robertson, 2018). Conversely, a neighborhood that is located on the border between two cultures (e.g., different subcultures or sub/main culture) could be considered an urban borderland, as it could be seen as a source of inspiration for the creation of new liminal spaces, such as art galleries or performance spaces, that explore the intersection of these cultures (Sulaiman, 2014). Thus, the relationship between liminal space and urban borderlands can be complex and dynamic, as it can change over time (Fourny, 2014). Furthermore, both types of spaces represent challenges and opportunities for urban planners as both a potential source of blight and decay as well as a chance for creative reuse, adaptation, and social innovation (van Houtum & Eker, 2015).

2. Tokyo Arcades as Liminal Spaces Located Inside Urban Borderlands

In this article, we will highlight the unique characteristics and societal values that make gaming arcades worthwhile to be considered for preservation and argue that urban policymakers should consider the urban typology of subcultural gaming arcades as spaces that bring people from all walks of life together (Migliore et al., 2021). Arcade games like Pong, Space Invaders, and PAC-MAN catapulted gaming arcades to their status as one the most popular pastimes in the late 20th century until they reached their "golden age" in the West during the late 1970s and early 1980s. Until this day they share many characteristics with their predecessor, the penny arcades of the past, such as usually being inside and open to the public without entrance fees and, like this, providing light amusement protected from the elements. Their defining feature, however, remains the offering of coin-operated and thus automated entertainment. One coin will rent the game, usually until the player loses. Since the 1990s, gaming arcades have experienced a continuous decline in popularity, caused by many factors, prominently the introduction of home consoles and the more complex gameplay they offer. In the US and Europe, arcades are considered almost extinct and remain only as nostalgic remembrances (Horowitz, 2018; Kent, 2010; Kocurek, 2015).

In Japan, gaming arcades had a different trajectory as arcade games only increased in popularity throughout the 1980s and 1990s. Since then, Japan's arcades—or game centers, as they are commonly called in Japan—have been experiencing a decline, too. While they remain a common sight in Japanese cities today, of the around 22,000 game centers in 1989, only 4,000 remained in 2019 (Pelletier-Gagnon, 2019). Covid-19 and the imposed restrictions on public gatherings and operating hours for businesses accelerated this development when already struggling businesses had to face extended periods of closure and deal with guidelines that directly opposed the common activities in game centers (Agency of Cultural Affairs, 2020). However, in recent years, many centers have undergone a transformation and now focus on creating safer and more family-friendly environments with lighter and cleaner spaces. Some have incorporated additional attractions like indoor adventure playgrounds, photo booths, mechanical crane games, and rhythm-based games to attract a wider audience. This has caused a shift in perception and acceptance which helped to reframe the centers as a dynamic, liminal space on multiple axes, in-between places (work/school and home), in-between times ("after work, before the last train"), and for people in-between ages (high-school students who have to go home "by the time when people under 18 have to leave," young unmarried men, and retired, elderly men; Hussain, 2020). Gaming arcades are places that exist somewhere between the private and public sphere, between reality and fantasy, between decay and disappearance, between subculture (*otaku)* and mainstream; a space designed for entertainment and escapism, yet also associated with negative behaviors and social stigmas (Lin & Sun, 2011).

2.1. Contextualizing Gaming Arcades

To contextualize game centers, we need to understand that there is a variety of liminal spaces in Japanese cities that differ in terms of their primary activities, social dynamics, and the liminal experiences they offer. With their emphasis on play and entertainment, game centers as well as maid cafes can be considered ludic spaces. Hostess clubs and love hotels lean towards hedonic experiences, focusing on pleasure and enjoyment. Coffee shops (*kissaten*) and neighborhood bars can encompass elements of both. While each of these examples represents a social in-between space involving strangers with varying degrees of intimacy, game centers are typically interactive spaces dedicated to arcade games that cannot easily be experienced elsewhere. They

offer entertainment, competition, and ritualized encounters through different gameplays and tournaments that allow for skill-building and socializing among gamers (Nicholls & Ryan, 2008). By providing a transitional and transformative environment for their customers, game centers can be considered liminal spaces where individuals and groups can temporarily escape their everyday lives (Turner, 1969, 1982).

By representing a distinct subculture and attracting a specific demographic, gaming arcades and their unique atmosphere can contribute to the landscape of urban borderlands. Their presence might have an economic impact by attracting visitors, potentially increasing foot traffic, and benefiting local businesses such as food vendors, shops, and other entertainment venues. Since game centers often occupy large structures, they can cause the transformation or repurposing of buildings and thus contribute to the revitalization and economic growth of the surrounding urban borderlands, especially major transit station areas (Simpkins, 2020). It however can also lead to noise, disruption, dependency (Wardle et al., 2014), or the displacement of residents in surrounding areas (Kidokoro et al., 2022). This article aims to contribute to the discussion of the urban borderland concept by showing how Tokyo's arcades interact with and influence the broader urban borderlands in which they are located. These arcades serve as hubs where individuals from various backgrounds come together, blurring the lines between different communities within urban borderlands and offering a unique perspective on how liminal spaces can be integrated within the broader urban context and contribute to social interaction and community-building. The main purpose of this article is to evaluate the recent transformation of gaming arcades as liminal spaces, from a prominent social setting to facing challenges and shifts due to factors such as the rise of home consoles and changing societal perceptions (during the Covid-19 pandemic these spaces were heavily influenced by stigmatization and concerns regarding public health and safety (de Rosa & Menarini, 2021).

3. Aims, Questions, and Methodology

To understand the nature, potential, and influence of the gaming arcade, the different spatial dimensions of these areas and the perspectives of those who gather, interact, and socialize in them will be explored (Sennett & Sendra, 2022). To fully embrace the potential of arcades to serve as liminal spaces that bridge different worlds, promote inclusivity by accommodating diverse individuals, and help revitalize urban areas by providing engaging spaces for recreation and community-building, a more nuanced approach to urban design and planning is needed. The article aims to provide deeper insights by asking:

> RQ1: What are the spatial dimensions and user perspectives within gaming arcades that define them as liminal spaces?
>
> RQ2: What are the social dynamics between different users and how does it influence the sense of community and social integration?
>
> RQ3: How do gaming arcades blur different boundaries and influence the urban context they are situated in?
>
> RQ4: How could gaming arcades be more effectively preserved and integrated into urban development strategies?

To address these research questions, a case study approach was adopted, allowing the researchers to conduct an in-depth investigation of specific cases to gain a comprehensive understanding of specific phenomena at play. The study focused on three gaming arcades: MIKADO Takadanobaba, TRF Nakano, and GIGO Takadanobaba. These arcades were selected for their prominence, unique characteristics, and representation of different types of liminal spaces to showcase the diversity of arcades and thus provide a comprehensive understanding of the spatial, social, and cultural aspects of arcades and their significance within the urban landscape (De Kort & Ijsselsteijn, 2008). Takadanobaba and Nakano (Figure 1) are both well-known and popular districts in Tokyo and represent different types of urban borderlands: Takadanobaba is located in Shinjuku, known for its youth culture and nightlife; Nakano is located in the Nakano Ward, which is well known for its anime and manga culture.

In addition to visual analysis and participant observation, thirty interviews were conducted with various individuals associated with the arcades, including regular patrons, experienced players, beginners, staff, and other relevant stakeholders. The researchers applied a snowball sampling method, allowing the identification of additional participants through referrals from initial interviewees, to reach people who are not easily accessible but important for the study. Additionally, purpose sampling was utilized to ensure that people of different ages, genders, or gaming interests were interviewed (Parker et al., 2019, p. 863).

To gain a comprehensive understanding of arcades, the researchers maintained a dual perspective as both observers and participants, which allowed them to experience the arcade culture firsthand while also objectively observing and analyzing the various cases and their urban environments. This dual position enhanced the depth and validity of the research findings. Potential risks such as bias and subjectivity were

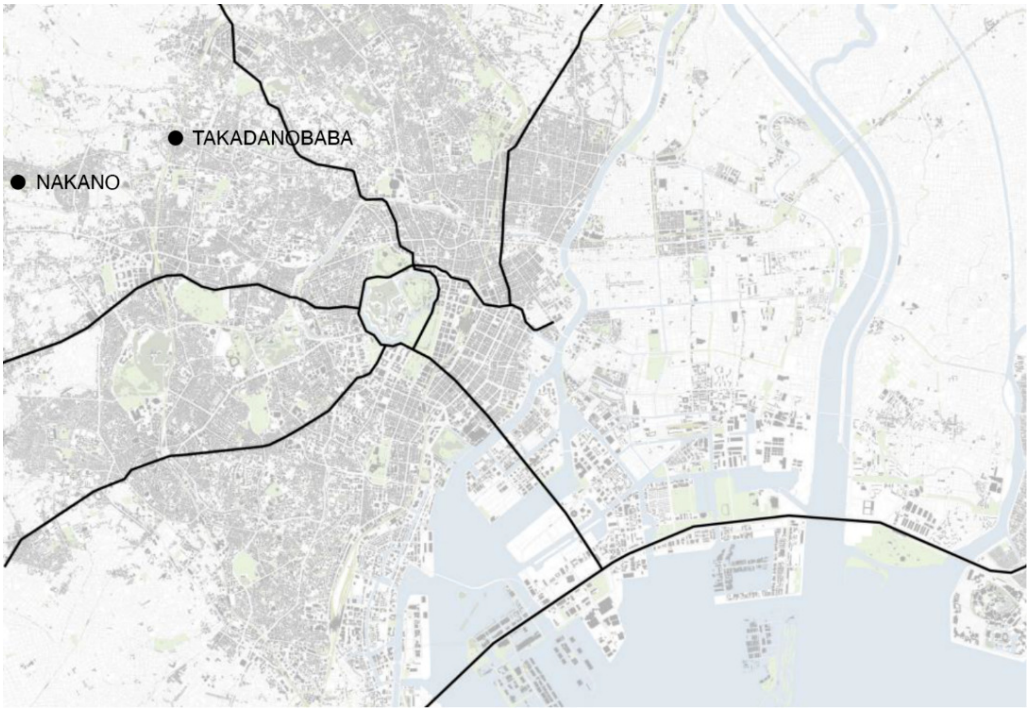

Figure 1. Location of Takadanobaba and Nakano.

considered and mitigated through careful data collection and analysis (Berger, 2015). The autonomy of the interviewees in determining the focus and depth of their responses was ensured (Bavinton, 2007). To enhance the rigor and validity of the study, data triangulation was applied (Marshall & Rossman, 2014) and the findings were cross-referenced and validated by revisiting the gaming arcades, observing activities, and confirming their observations with the collected interview data (Enosh & Ben-Ari, 2016). This approach facilitated a comprehensive understanding of the liminality of gaming arcades, capturing the experiences, perceptions, and behaviors of individuals within these spaces and their urban context.

4. Case Studies

4.1. MIKADO Takadanobaba

The gaming arcade MIKADO Takadanobaba is located only a two-minute walk away from Takadanobaba Station, one of the busiest commuter hubs in Tokyo. With a historical legacy of equestrian activities, the neighborhood is now mainly known for its vibrant nightlife scene of karaoke bars, jazz clubs, and cheap izakaya that mainly cater to the student population of both nearby Waseda University as well as various Japanese language schools. Also, home to a large community of Southeast Asian immigrants, Takadanobaba exemplifies an urban borderland where multiple cultures, identities, and lifestyles coexist and interact. New forms of expression and belonging are often generated in these spaces where tradition and modernity, local and global, as well as high and low cultures converge. This is illustrated by MIKADO's name being written above the automatic entrance door in Japanese calligraphy, a style choice that blends well with the surrounding traditional Japanese and modern international stores. At the same time, it distinguishes MIKADO from modern game centers: While contemporary arcades announce themselves usually in a louder fashion (both literally with the noise of machines and happy music spilling out of the building and figuratively with branded design and bold colors), MIKADO features a more unassuming look (Figure 2a).

Inside, customers are greeted by even more traditional Japanese elements, such as a *noren* (traditional fabric dividers hung between rooms) and a frog plush labeled as the "god of MIKADO" (Figures 2b and 2c). Since the

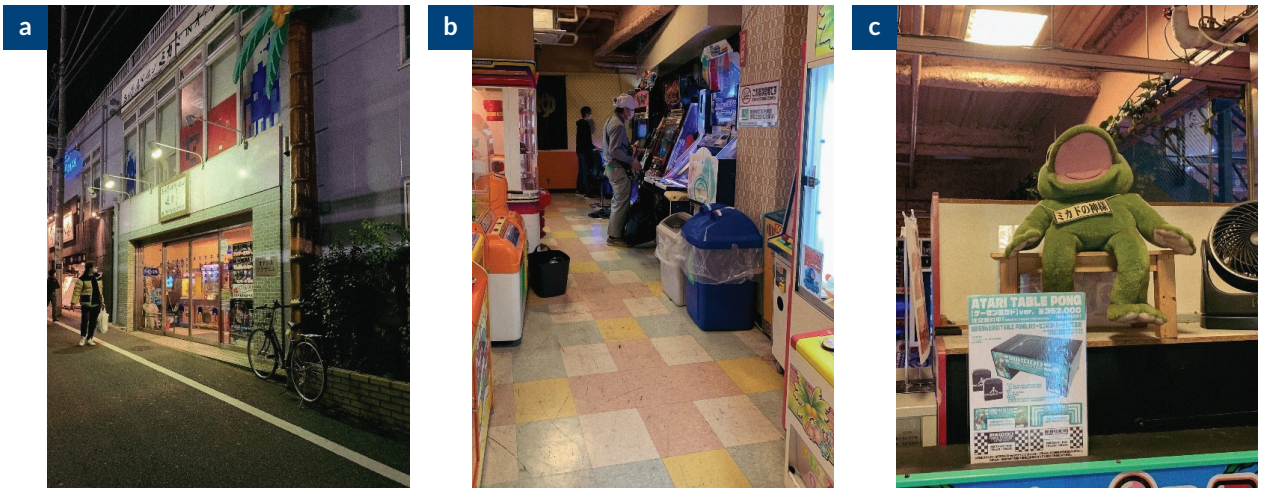

Figure 2. Approaching MIKADO Takadanobaba and first impressions upon entering.

Japanese word for frog—*kaeru*—also means "to return," this plays with the notion of homecoming in multiple ways. It can be understood as a greeting for the returning regulars but also as a more metaphorical return to a place of nostalgic remembrance.

The first floor, with its walls painted in wild patterns and covered with an eclectic selection of posters, gives an impression of varied, light amusement. Customers first must find their way through a labyrinth of simulator games, which include shooting, driving, and flying. Since most of these can be played together, they especially attract customers that enter as a group and, in the daytime, we could even observe parents playing the games with their children (Figures 3a and 3b). The second floor is devoted to classic cabinet games arranged in long rows and seems aimed at more committed gamers. In the afternoon, two or three single players might be dispersed among one row, yet in the evenings, at weekends, and especially during tournaments, the rows are so jam-packed with players and onlookers that it is difficult to pass through (Figure 3c).

4.1.1. Interactions and Behavior in Space

The space is exceptionally well set up to blend into, loiter, and do things on your own accord. Simultaneously, with the cabinets arranged in long, parallel rows, it is not immediately clear what the onlooker's gaze is aimed at. With the players being too absorbed anyway, one can approach people (at least physically) without awkwardly placed barriers. MIKADO holds daily tournaments for its patrons and live streams them on their YouTube channel (ca. 100,000 subscribers as of March 2023).

During competitions, a spatial peculiarity might be observed: The competitors, while playing, have no way of acknowledging each other's presence. Once the game begins, their encounter is mediated by the screens, and they interact solely through the game's interface as the cabinets, being arranged back-to-back, completely block any view of their opponents. Additionally, the loud noise makes it impossible to hear each other's voices. For one example, around the competitors, however, crowds of spectators can gather, and they do not seem to know each other—they usually consist of acquainted regulars and people not related to them—comments are made (amazing, *sugoi*) and from here small conversations start. Like that, the players, while being isolated in their virtual world, generate an active, social environment (Figure 3c).

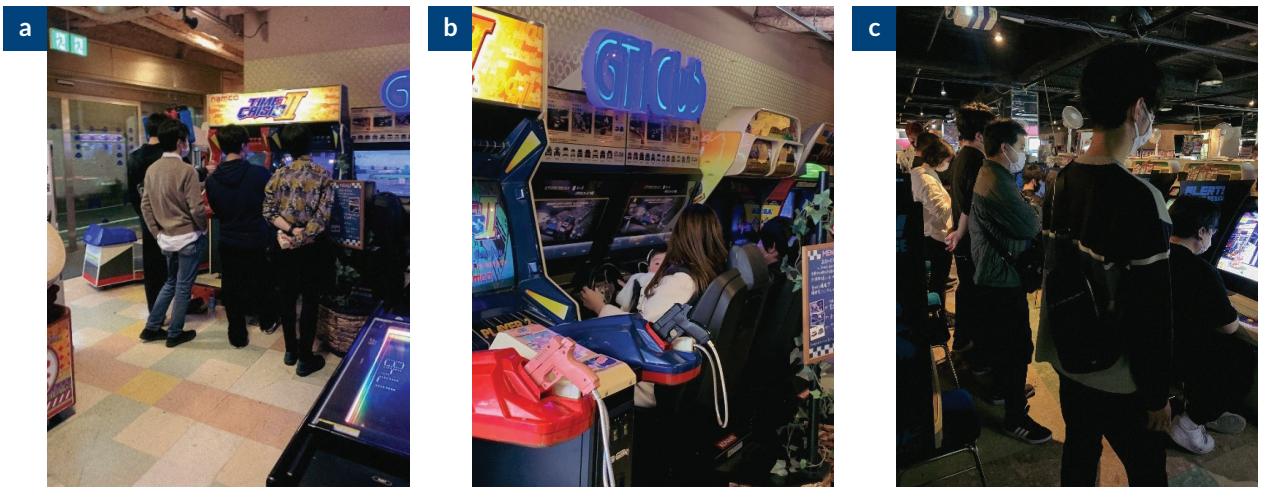

Figure 3. Observing different activities inside the arcade and during competitions.

When tournaments take place, the atmosphere seems more welcoming, as people acknowledge others ever so slightly (for example apologizing before passing by). Outside competition times, even on the weekend and in the evening, the atmosphere on the second floor is more reserved. Overall, however, the space seems to allow for a variety of activities and behaviors to happen: People play by themselves or participate in the competitions with all the planning/arrangements that go along with that. Some people instruct their friends or even their children on how to play a game and on one occasion a teenage couple was seen strolling through the aisles while eating ice cream that they bought at one of the vending machines on the second floor. Thus, the space is not hyper-controlled or hyper-focused (unlike for example TRF) and simultaneously supports both passive and active behaviors.

Trying to talk to a player, we first get ignored, but after some minutes, he is ready to chat: "The space itself is one of the best things about arcade gaming! Going to the game center, especially together with friends and you see and hear all these amazing things…I feel like a kid in a candy store." His friend later adds that "of course, arcade games are created for a more short-term experience but there is that thrill…getting hooked on a particular cabinet and meeting strangers to team up with or play against."

He further emphasizes his longing for the social interaction he misses when playing games at home. At MIKADO, engaging with others becomes a highlight, and he recalls making numerous new friends and even rivals. "They taught me the art of losing with grace!" he exclaims. Despite some viewing game centers as childish or uncool, he believes many people find genuine enjoyment in them. A foreign visitor, lamenting the disappearance of arcades in their own country, highlights casualness as a key aspect of their charm, appreciating the ability to casually visit after work or on a whim. The convenience of location in a walkable city remains essential for an arcade's success. Reflecting on Tokyo's contemporary arcade culture, he shares: "Having witnessed the decline of arcades back home, I expected nostalgia to overwhelm me at MIKADO. However, Tokyo's plentiful game centers and the ease of access to these spaces prevent that sense of loss, maintaining a wonderfully casual atmosphere."

When approaching a man in a suit, he tells us a similar story: "I often come here during lunch break….Sometimes after work too, before I go home, to wind down and wait for the evening rush hour to pass." Especially at noon and in the early evening the space is frequented by salarymen in suits and the words of the interviewee mark MIKADO as an extension of this way home and associate it with in-between times, signifying a feeling of liminality in both temporal and spatial terms. This casualness seems to contribute to MIKADO's broad appeal and can also be observed in one of the arcade's main visitor groups: older, retired men who can be found here at any time and often stay for extended periods. The reason MIKADO is so attractive to them might be that they have more time to kill and often lack purpose or other places to go. While they do not seem to interact much with each other or the younger patrons, they are as much accepted as any other visitor. In this sense, MIKADO displays a certain duality: On the one hand, it is known for its competitions, for very high-level players chasing high scores, while on the other hand, it invites others to casually drop in and aimlessly roam around. MIKADO's appeal as a space of comfort for a wide variety of people was most prominently reflected in an incredibly successful crowdfunding campaign during the height of Covid-19 in 2020, when 3,872 supporters from Japan and abroad pledged over 37 million yen to protect this space from impending bankruptcy due to Covid-19-related restrictions (Campfire, 2020).

4.2. TRF Nakano

Nakano is a densely populated neighborhood that, despite being conveniently connected by multiple train lines to the large cities of Shinjuku, Shibuya, and Ikebukuro, did not develop as a large-scale commercial district and instead remains a mainly residential area. Home to many manga artists since the 1950s, it has become a hub for *otaku* culture that coexists with a vibrant local culture and traditional events around the various shrines and temples. Nakano simultaneously holds space for the modern and quirky as well as the traditional and serene and as such can be considered an urban borderland. The game center TRF Nakano, unlike MIKADO, is not located in a separate building but instead is found inside of Nakano Broadway, whose main entrance is reached by walking through the covered Sun Mall *shotengai* (shopping street) which starts right at the north exit of JR Nakano Station. At most times of the day, Sun Mall is a bustling place, the commercial center of the area, with locals lining up to buy fresh meat or bento boxes while visitors browse through the small novelty stores or famous sweet shops. At its end, Sunmall connects to Nakano Broadway (Figure 4a), one of the main attractions of Nakano. Dubbed *otaku* mall, it is a windowless multi-story labyrinth-like structure containing dozens of small stores that are devoted to highly specific niche interests relating to manga, anime, and games (Figure 4b).

When ascending the stairs to the fourth floor, TRF is not yet visible but already audible by the electronic sounds of the gaming machines and the frantic clicking of buttons and joysticks. Crammed into the space are 18 retro cabinets and the view is almost bland in its utilitarian appearance. TRF does not make much effort to brand the store. Additionally, there is a lack of more "playful" machines to lure or ease you in, like electromechanical games, simulator games, or merchandisers found in modern game centers like GIGO but also in MIKADO (Figure 4).

Especially when compared to MIKADO, the relationship between location and atmosphere seems slightly paradoxical. Despite being much easier to stumble upon and much more "publicly" located in the hallways of Nakano Broadway, even lacking a door, TRF seems to have a much higher inhibition threshold that potential customers must cross. For all its open and accessible appearance, we immediately feel as if we are intruding or

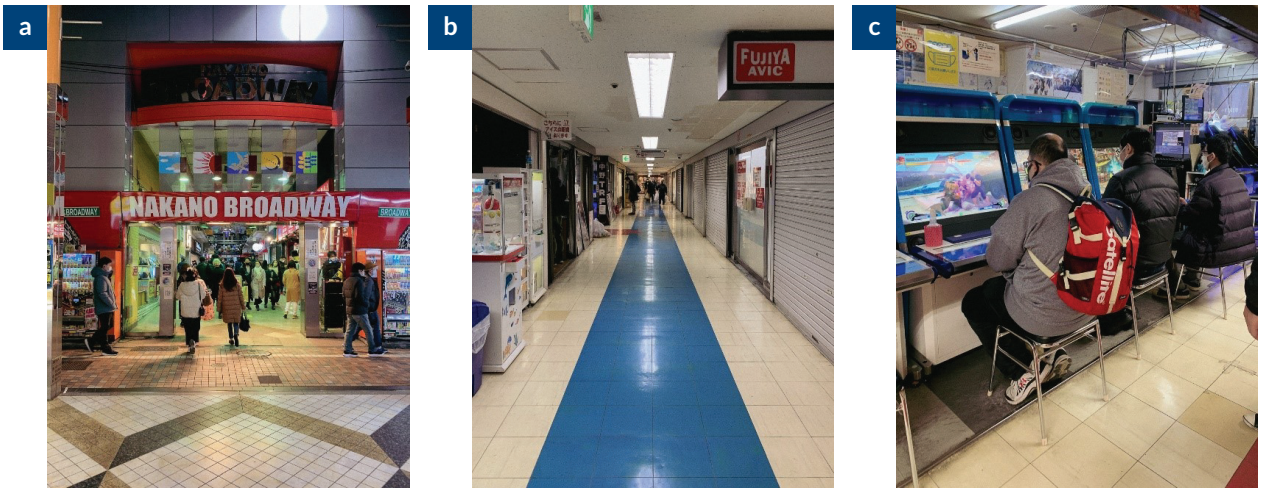

Figure 4. Entering Nakano Broadway, approaching TRF, and players sitting at cabinets.

"disturbing a private party." When positioning ourselves among the four or five other people who are watching the three active players, we cannot just slip in and merge into the background like we were able to do at MIKADO. Instead, we receive stares from the other patrons and the shopkeeper that make us feel out of place. Though this might be caused by the much lower number of visitors, which naturally makes individual people stick out more, our discomfort might be best explained by the spatial setup and circumstances.

While MIKADO fills up a whole building, TRF has a stage-like feeling, due to the garage-like set-up of the store, which opens to only one side and is closed by a shutter when the store is not operating. However, this stage also puts the spectator into the literal spotlight, as the ceiling lights of Broadway illuminate everything and everyone brightly instead of veiling them in darkness as is the case in MIKADO (Figure 4c). Like that, the attention is not as naturally drawn towards the screen as the main attraction and light source, but also to everything else that is happening in the vicinity. Thus, at TRF, the observer also becomes an observed object (Berger, 2015).

Furthermore, with the space being so small and most of the machines clearly visible, there is no need for moving around after choosing a spot and thus, doing so anyway would be strange and draw even more attention. It goes against the unspoken behavioral rules of the place (Lin & Sun, 2011). This inhibition towards roaming also implicitly prevents casual observers from entering the back row of the space that is completely hidden from sight. As it is very cramped, there is no way of casually observing the players in this area of the store; it would require a very conscious decision to cross this threshold where one would then have to stand very close to the players to observe them. TRF is clearly separated into an inside and outside, both regarding the physical space and the initiation status of players. Even though this arcade is so publicly situated and part of a larger complex with many passers-by, it gives a strong impression of an insider space.

4.2.1. Anxiety of Being on Display

Trying to talk to a man in his 30s standing next to us, we get to know that he is here for the first time. He states:

> I am quite conscious about being bad at these games, especially because there obviously are so many veteran players here….I thought it would be way too embarrassing to struggle with the controls so publicly, so I was thinking of checking out the space before playing but actually, the cabinets don't have very detailed instructions on how exactly to operate the games. I tried to push myself…but I didn't really get it and I felt too much on display.

Another bystander and beginner joined our conversation, saying that he thought he would be better at gaming but soon realized that everyone around him was so much more skilled which made him feel embarrassed and "super out of place": "I was worried that I might annoy the regulars with my fumbling around."

A few minutes later, there is a chance to talk to an experienced player in his 40s who has a more lighthearted view on newcomers: "True, there are no manuals and few tutorials compared to other game environments….But I'm also more the type to just insert a coin and learn by trial and error. I don't really care what others think or if I look like a fool." Another seasoned player states:

> It is nice to have new players around here, we need them to keep the arcade alive. Also, no one is advanced from the get-go and there are people who can help you….I actually became friends with some staff members who helped me to get better.

With its spatial restrictions, TRF thus does not encourage as wide a range of behaviors as the other game centers, which is also reflected in the homogeneity of both its visitors and onlookers—mostly streetwear-clad men in their 30s and salarymen in suits. We did not encounter families or groups of teenagers at this game center. As indicated by the interviewees, the space is dominated by experienced players, operating with speed and ease. Beginners seem rarer, which seems influenced by the fact that the players are so much on display. TRF feels more competitive, professional, and very intentional. While MIKADO has a more open quality that encourages customers to stroll around, TRF is less about a spatial experience of exploring and drifting between different games, roles, and activities and, instead, appears to be created for a distinct purpose: to offer a very specific set up of retro games for *otaku*-like gamers.

4.3. GIGO Takadanobaba

Taking up three floors in a seven-story building named Grand Tokyo, which also contains Big Echo Karaoke and a chain restaurant, the Takadanobaba branch of GIGO game center is situated right next to Takadanobaba Station, across the well-known Sakae Dori and only 100 m away from MIKADO. Despite being in close proximity to one another, the initial impression of the two arcades is very different. MIKADO has a more utilitarian appearance with posters announcing upcoming tournaments and might not even be noticed as a game center by passers-by. In contrast to that, GIGO has a much more franchised, commercial appearance. Plastered around the wide-open entrance, colorful posters inform the customer about a new collaboration with the popular anime series *Spy x Family*, LED lights are flashing and changing colors, and the electronic noise from the machines layered over cheerful background music is spilling out onto the street.

As is the case with most modern game centers, the first floor is dedicated to merchandiser games, starting with small machines offering goods as small prizes (mostly plush keychains of popular anime characters) to lure visitors in. Behind them, bigger, uniform-looking machines (exclusively UFO Catchers by Sega) are arranged in a perfectly aligned fashion, allowing us to clearly view the entire aisle and offering a rather open impression, especially when compared to the winding paths of MIKADO or the crammed garage space of TRF (Figure 5a).

Another contrast to MIKADO is immediately obvious: The space is brightly lit. Spotlights are placed evenly along the ceiling and the crane game machines themselves also have internal lights. The machines are pink and white and are filled with cute and round plush animals and dolls, colorful figurines in boxes, or oversized versions of popular snacks and candy.

The ground floor does not seem remarkably busy during the evenings, but in the afternoons (when school is over), the space fills up quickly. Compared to the darker *showa*-style (MIKADO) and *otaku-style* (TRF) arcades, this bright game center seems to attract a very different audience: young girls, couples and even parents with children. We can spot a variety of school uniforms, especially girls coming here to try to win cute trinkets representing their love for certain characters or anime. In general, the space seems much brighter and more youthful with the light-colored machines, the cheerful music, and the cute prizes, giving a more agreeable impression than the dark, utilitarian appearance of MIKADO and TRF.

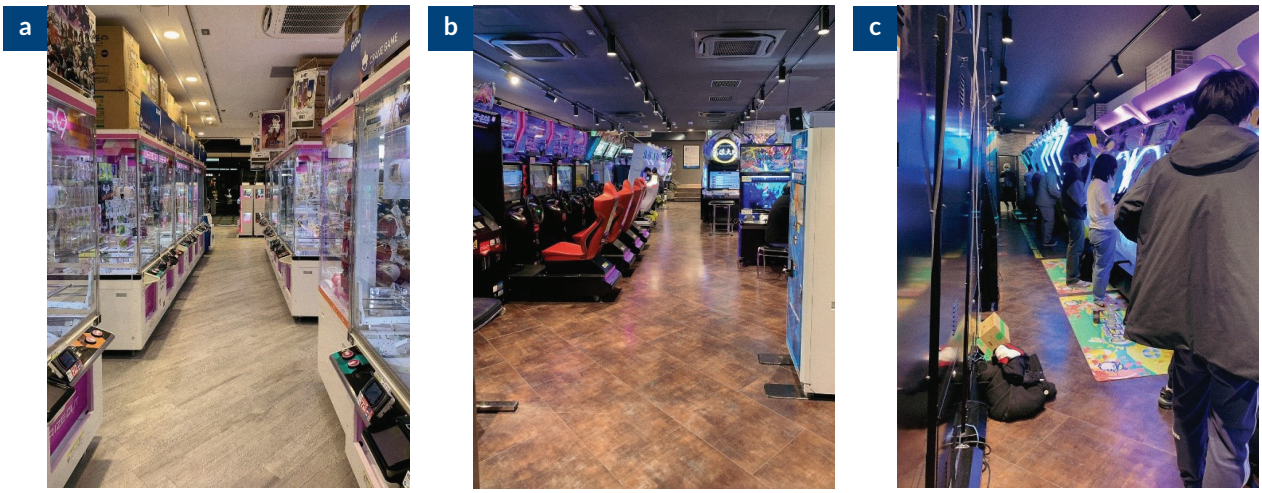

Figure 5. GIGO with brightly lit games on the first floor and musical games in the basement.

In the basement, video (cabinet) games, driving simulation games, and musical games can be found, and the space seems to appeal to a more mature audience than the cheerful merchandise area on the first floor. The walls and ceiling are painted in dark gray tones and the floor is covered in tiles with a glossy wooden effect, that reflects the ceiling lights and screens, giving the basement more of a "grown-up" appearance (Figure 5b). Still, this area, too, seems rather sleek and more clearly organized than MIKADO's maze-like setup.

4.3.1. Absorbed in the Game

The players in the basement seem to be mostly coming alone and immersing themselves in the games (Figure 5c). We approach one player who thinks that while people at MIKADO might stroll the aisles in search of an old favorite or of an obscure game they have never played before, people coming to GIGO seem more "determined" and gravitate towards specific games, especially when it comes to rhythm games.

After asking him whether he usually comes with a specific plan in mind, he lets us know that he tries to make time two or three days a week to play after his shift is finished, often just to relax but not to meet other players. He comes to this store because it happens to have a specific game he likes to play and says he would go to any game center that has it and that is convenient, indicating that he does not feel a strong attachment to the space itself, that it is interchangeable to him.

Around the corner, a group of two boys and one girl in their early 20s are huddled around a driving simulator game, one of them playing and the other two laughing and encouraging the driver. Next to them, we see a man in his 40s playing one of the more classic cabinet games while explaining the game to a woman sitting to his right. The staff members, who are much younger (university student age) than the staff of the other arcades, are very friendly and polite, constantly shouting welcome (*irasshaimase*). They are often busy rearranging toys in the machines and are also playing by themselves. Once they have won a prize, they put it back in. They also wear easily identifiable uniforms, leading to a more obvious distinction between customers and staff and giving the impression of a friendly but supervised space.

Approaching some more customers we meet a young man who says that he often comes with friends, and they usually play driving games because it is an experience that they cannot have at home. He confirms that other simulator games are fun as well, but because almost everybody has played Mario Kart before, they often are drawn to that game.

Another young woman in her 20s explains that she often tries the UFO Catchers, spending around 500 yen when she drops in at this or another game center. If she does not win, she gives up after that. Sometimes, if she really wants something, she will go up to about 1,500 yen. Her friend replies that that shows great self-restraint, something she herself does not have as she is always in danger of spending way too much money. At the end of our talk, she states: "For most of the better prizes you have to spend a bit to move it into a good position, and especially if I already spent a lot of money on trying to get one prize, I cannot stop."

Other customers are more curious about the players themselves as one bystander explains:

> I really enjoy watching people play games, especially when they play sound games at super high speed because they will use their whole body. But I was wondering if it makes players uncomfortable if I stand somewhere behind them and watch them play.

Talking to some gamers about how they feel when they are being observed, we learn that people standing behind players and watching is considered a tradition in arcades: "If you're really good, sometimes an audience will gather behind you, as proof of your skills. If you end up losing, it might hurt your pride but on the contrary, an audience will make the win feel even better." One gamer adds that "it feels nice if even one person is interested in me playing. But yes, for people who are not very good or confident, observers might make them feel very uncomfortable." In recent times, however, crowds are dwindling, so having an audience has become more of a rare experience: "The only places where you can still see that kind of scene regularly is in 'sacred' game centers like MIKADO or TRF."

5. Discussion: Spatial and Social Characteristics of Urban Borderlands

In the following, we will highlight the spatial and social characteristics of MIKADO, TRF, and GIGO, while examining their relationship with the concept of urban borderlands. Each arcade reflects and influences its surrounding urban borderland in unique ways, contributing to the diversity and cultural fabric of their respective neighborhoods. MIKADO epitomizes the concept of a liminal space by blending elements of traditional Japanese culture with modern arcade gaming, which creates a unique space that straddles the boundaries between nostalgia and contemporary entertainment. By incorporating calligraphy, *noren* curtains, and the iconic *kaeru* frog, MIKADO becomes a living testament to the coexistence of various cultural identities within the urban borderland of Takadanobaba. It provides a symbolic "homecoming" for some customers who connect with these traditional elements, while simultaneously attracting a diverse audience intrigued by the contrast and diversity it offers. The arcade's ability to cater to different levels of engagement and interest further solidifies its status within this urban borderland.

MIKADO welcomes both casual gamers seeking light amusement and dedicated players looking for more immersive experiences. This inclusivity and role as a community hub contribute to the dynamic nature of this urban borderland, where diverse communities and interests intersect. Despite the seemingly isolated nature

of gaming, the arcade fosters an active social environment. Tournaments especially create opportunities to learn and share. Thus, MIKADO represents a place of communal gathering where people observe, comment on, and converse with each other, resulting in a sense of belonging and comfort, akin to finding a "home away from home." The arcade's impact extends beyond its immediate surroundings. MIKADO not only reflects the local culture of Takadanobaba but also actively contributes to the neighborhood's vibrancy by providing a unique and lively attraction that draws in customers from different backgrounds and locations. In essence, MIKADO strengthens Takadanobaba's reputation as an urban borderland known for its embrace of *otaku* culture and entertainment.

TRF offers a different perspective on the urban borderland concept, emphasizing the preservation of arcade gaming culture. Like MIKADO, TRF is dedicated to keeping the spirit of the golden age of arcade games alive. However, it does so with a distinctly "underground" and subcultural atmosphere which distinguishes it as a unique liminal space within the urban borderland of Nakano Broadway. Furthermore, TRF's spatial layout and the feeling of being on display create a distinct experience that aligns with the concept of urban borderlands. While casual customers tend to feel self-conscious amidst the intense gaming environment, revealing the blurring of various boundaries and barriers, TRF's regular customer base, predominantly consisting of men aged from their late 20s to 40s alongside some older salarymen, creates a tightly knit community, all unfolding within this urban borderland. Unlike MIKADO, which appeals to a broad spectrum of gamers, TRF caters to a more specialized demographic. The absence of simulator games and UFO Catchers further reinforces this exclusivity. TRF's positioning on the fourth floor of Nakano Broadway serves as an inherent filter, drawing individuals with a particular interest in *otaku* culture, and consequently, its small size underscores its function as a unique liminal space within the Nakano Broadway urban borderland, exerting also its limited influence on the wider neighbourhood. While Nakano Broadway is home to various businesses targeting infrequent visitors and tourists, TRF consistently draws a loyal base with its regular tournaments and limited opening hours, which mirrors the sense of community, nonetheless also associated with urban borderlands.

GIGO Takadanobaba presents a different perspective on urban borderlands compared to MIKADO and TRF. GIGO intentionally targets a younger audience, predominantly composed of teenagers, families, and individuals in their 20s. Its strategic location right next to the train station and low entry threshold make it accessible to walk-in customers. In doing so, GIGO serves as a space for teenagers and young adults seeking affordable and light entertainment, mirroring the concept of an urban borderland as a place for diverse groups to gather. Unlike MIKADO and TRF, where dedicated communities form around gaming, GIGO prioritizes commercial success over community-building. Visitors often view it as a convenient stopover rather than a space to forge deep connections. This commercial approach aligns with the notion of urban borderlands as places of commerce and transit. While GIGO may lack the sense of community found in MIKADO and TRF, it still contributes to the broader urban borderland of Takadanobaba. Its low entry threshold makes it an attractive destination for those passing through, reinforcing the neighborhood's reputation as a vibrant urban borderland. GIGO's presence in the area adds to the diverse array of entertainment options, enriching the cultural fabric of Takadanobaba.

In summary, these three gaming arcades—MIKADO, TRF, and GIGO—exemplify various facets of the urban borderland concept within the context of Takadanobaba and Nakano Broadway. MIKADO bridges traditional and modern elements, fosters a sense of community, and actively contributes to the neighborhood's vitality. Contrastingly, TRF, with its underground ambiance and exclusive allure, operates as a unique liminal space of

otaku culture within the broader urban borderland of Nakano Broadway. GIGO, on the other hand, targets a younger and more mainstream audience, prioritizing commercial success while still contributing to the vibrant urban borderland of Takadanobaba. Thus, each arcade, in its own unique way, embodies the urban borderland concept, enriching the cultural diversity of its surroundings.

6. Conclusion

This article has explored the concept of liminal spaces in Tokyo, with a particular focus on gaming arcades as transitional spaces within urban borderlands. Throughout our discussion, we have highlighted the intricate relationship between these liminal spaces and the broader urban context. By examining case studies such as MIKADO, TRF, and GIGO, we have uncovered the diverse ways in which gaming arcades embody the essence of urban borderlands. Liminal spaces, as we have mentioned, represent transitional or in-between areas where societal norms and boundaries are temporarily suspended or blurred. These spaces challenge our conventional notions of time, space, and social order.

Within Tokyo's urban landscape, gaming arcades serve as quintessential liminal spaces, existing at the crossroads of various cultural, temporal, and social dimensions. Our investigation has revealed that gaming arcades, such as MIKADO, can simultaneously bridge traditional and modern elements, fostering a sense of nostalgia while embracing contemporary gaming trends. They become places where diverse communities converge, transcending the boundaries of mainstream and sub-culture. In the case of TRF, we have seen how such space can cater to specialized demographics, forming a close-knit community of enthusiasts in liminal space. GIGO Takadanobaba demonstrates that gaming arcades can be accessible to a younger and more mainstream audience, contributing to the vibrancy of urban borderlands by attracting a wider range of visitors. In this sense, GIGO adds to the diverse array of entertainment options available in Takadanobaba and enriches the neighborhood's cultural fabric.

Our findings show that gaming arcades in Tokyo serve as important liminal spaces for people from different backgrounds, as they provide a space where people can come together to play games, socialize, and learn about different cultures. This helps to create a sense of community and understanding among people who might not otherwise have gathered and interacted within such spaces and contexts. Old-school game centers like MIKADO have especially been re-appropriated to respond to people's longing for the past, with the subconscious repressed by modernity turning ordinary, everyday, and familiar places into "secret" places of desire (Ivy, 1995). The arcade forms an imaginative boundary between past and present, allowing people to remember certain moments and re-encounter places of their childhood. Yet, newcomers and younger customers see the arcade in a different way, experiencing the nostalgic spirit, but enjoy the arcade either for competitive gaming (TRF Nakano) or pure entertainment reasons (GIGO). As such, each arcade fulfills a role as a liminal space that expresses different voices, thoughts, and personal opinions about political, economic, or social changes going on.

Moreover, the article emphasized the fact that the relationship between liminal spaces and urban borderlands is dynamic and multifaceted. Liminal spaces like gaming arcades provide a platform for people from different backgrounds to come together, fostering inclusivity and diversity within urban borderlands. They contribute to the economic vitality of their surroundings by attracting visitors and increasing foot traffic, which can lead to the revitalization of urban areas. However, it is important to acknowledge that this

relationship is not without its challenges, as the presence of gaming arcades can also lead to negative issues. In essence, gaming arcades in Tokyo serve as crucial components of urban borderlands, enriching the cultural tapestry of their neighborhoods and offering unique spaces where individuals can momentarily escape the confines of their everyday lives. These spaces challenge, reshape, and blur the boundaries between different communities within urban borderlands, ultimately contributing to more inclusive and equitable urban environments.

As we move forward, it is imperative that urban planners and policymakers should recognize the value of these subcultural spaces like gaming arcades. They should consider preservation efforts that acknowledge their cultural and historical significance, their accessibility to a wide range of individuals, and their potential to contribute to the local economy and the revitalization of urban borderlands. By actively integrating and managing these liminal spaces, they can ensure their continued existence and relevance in a rapidly changing gaming and urban landscape. In doing so, they not only preserve a unique aspect of urban culture but also foster a deeper sense of community and understanding among the diverse inhabitants of our cities.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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ARTICLE

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Migrants in the Old Train Wagons Borderland in Thessaloniki: From Abandonment to Infrastructures of Commoning

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Abstract

The article examines the living and infrastructuring practices of homeless newcomer migrants who find shelter in abandoned train wagons in the west end of Thessaloniki, an area described as "one of the biggest train cemeteries in Europe." Hundreds of train wagons have been abandoned there over the years, especially after the 2010 financial crisis, when the state-owned railway company was faced with significant financial difficulties. These abandoned wagons form an urban borderland and have provided temporary shelter to numerous homeless and unregistered migrants who stop in Thessaloniki on their route to Central and Northern Europe. Although there is a significant number of studies which discuss the formal infrastructures provided by the state and the NGOs, little attention has been given to the various ways by which homeless and unregistered migrants create and self-manage their own infrastructures to meet their needs. The article aims to shed light on this shortage while examining the (re)production of arrival infrastructures by the migrants themselves. In doing so, the article builds upon the concept of abandonment and attempts to enrich it by drawing on the theories of arrival infrastructures and urban commons. It combines spatial analysis and urban ethnography in order to explore how an urban borderland with abandoned infrastructures, like the train wagons, are re-used and transformed into commoning infrastructures, where newcomers and settled migrants join their forces in their attempt to support each other, meet their needs and of "becoming otherwise."

Keywords

abandonment; arrival infrastructures; borderland; commoning; homeless people; infrastructures; migrants; shelter; Thessaloniki

1. Introduction

The article concerns the less visible migrant populations that reside in Thessaloniki for short periods of time. The city of Thessaloniki is an important hub in the movement of migrants from Turkey to the Balkans and then to Central and Northern Europe, as it is located at the crossroads between South–North and East–West of Greek territory. Migrants arriving in Thessaloniki come mainly from North and Sub-Saharan Africa, the Middle East, and Central Asia. To this day, on one hand, the Greek state has set up a series of refugee camps in the perimeter of Thessaloniki, and on the other, several thousand migrants live either in rented apartments or in occupied spaces in the urban fabric of the city. However, it should be noted that the living conditions of homeless migrants have so far received little attention.

Amir's story is illustrative. He is a migrant from Algeria, who arrived in Thessaloniki through Turkey in 2017. At first, he lived for two years as an asylum seeker in the state-run refugee camp of Diavata on the outskirts of Western Thessaloniki. However, his asylum application was rejected and therefore he no longer had the right to stay in the refugee camp. Since then, he has been homeless and without papers. In order to survive he sought refuge, like many other migrants without papers or unregistered newcomers, to the abandoned train wagon areas in the western part of the city. He has been living there for the last three years and according to his own words:

> There are abandoned train wagons right next to the railway station. Several dozen migrants have stayed there for one–two years. Then, there is a cluster of abandoned train wagons next to Chinatown, before the port area. However, next door is the office of the neo-nazi organization Golden Dawn and there have been occasions when nazis attacked the migrants in these wagons. Then, there are abandoned wagons near the red lights district, which is somewhat safer. Then, there are abandoned train wagons in the wider area, which are used as a place to stay but also, and most importantly, they are used by migrants to hide and jump on freight trains leaving for Balkan countries.

There is important literature examining the living conditions in the state-run refugee camps (Gemenetzi & Papageorgiou, 2017; Papatzani et al., 2022; Pechlidou et al., 2020; Tsavdaroglou & Lalenis, 2020) and the political squats—occupations and mobilizations of solidarity with migrants (Kapsali & Karaliotas, 2021; Tsavdaroglou, 2019)—in Thessaloniki. However, the living conditions and processes of subjectification that concern the homeless and unregistered people on the move remain until now an unexplored field. This article aims to cover this research lack by unravelling and examining the commoning practices among people on the move in the borderland area of abandoned train wagons on the west side of Thessaloniki. Thus, this article contributes to the discussion of how borders are shifting and rescaling to urban space (de Genova, 2015) and addresses the question of how newcomers' urban socio-spatial practices, especially in urban borderlands, are related to border security and cross-border mobility. The discussion on international and state migration policies, especially on the borders' perimeter of states, has been extensively examined and in recent years there has been a conceptual and research shift towards the study of the city as the place where newcomers arrive, become visible and claim presence (Darling, 2017; Meeus et al., 2020; Tsavdaroglou et al., 2019). The contribution of this article is to demonstrate that urban borderlands constitute yet another crucial, however until now relatively neglected, field of research in which newcomers' practices of inhabiting, meeting, organizing, and planning subsequent border-crossing movements take place. Admittedly, newcomers' presence in urban borderlands is related to the broader migration policies. Thus, as we will show

in our case, people on the move prefer to stay invisible (Khosravi, 2010; Papadopoulos & Tsianos, 2007) in urban borderlands in order not to be detected by the authorities and then continue their journey applying for asylum in a Central or Northern European country. In this sense, the case of the abandoned train wagons in Western Thessaloniki will hopefully contribute to shedding light on people on the move practices in the urban borderland and to relate them to the Greek state borders' securitization and European asylum restriction policies.

The area of West Thessaloniki can be conceptualized as a complex urban borderland site and, in this article, we focus on its western part, which precedes the residential areas of the municipalities of Menemeni, Eleftheriou-Kordeliou, and Thessaloniki (see Figure 1). This area is an extensive intermediate space between the city and the countryside. It is the so-called "Western Entrance" to Thessaloniki through which major road and railway axes pass, as well as other infrastructure networks (gas pipelines, oil pipelines, etc.). In addition, this area has been the main production area of the city from the end of the 19th century and the beginning of the 20th century, mainly for activities in the secondary sector, with extensive industrial and craft zones, some of them organized following official urban plans, and other large areas unorganized and arbitrarily structured (Christodoulou, 2015; Gemenetzi, 2017; Hastaoglou-Martinidis, 1997). In the 1990s, with the fall of the Eastern Bloc, many of the industries relocated to neighboring Eastern European countries where there was cheaper labor power (Kalogeresis & Labrianidis, 2010). Also, in the last decades due to the economic crisis, several others have been closed down. Therefore, a large number of former industrial buildings have remained empty to this day. Some of the abandoned factories were used to create state accommodation centers—camps for refugees in the summer of 2016—with one still active today. Additionally, the area includes medium and high disturbance uses such as oil and gas refineries, illegal dumping and garbage areas, warehouses, and gas stations. Also, there are uses such as the city's biological cleaning, penitentiary store—prison, migrants deportation center, Roma settlement areas, a red light district, as well as the commercial port are located in the area (see Figure 1). The residential uses occupy a very small part of the wider area. Therefore, it is clear that this area could be perceived as "the backyard of the city," where most of the "unwanted" and disturbing uses are placed. Unregistered people on the move and homeless migrants without papers have also found refuge in this urban borderland area.

Borderlands are usually geographic margins and spaces in-between that separate nation-states, territories, and the "us" from the "other," and are demarcated by borders, lines, walls, and surveillance mechanisms. Although many times they are heavily securitized, some borderlands are "relatively open, porous and unregulated" (Plonski & Walton, 2018, p. 6). Borderlands also constitute transit situations and waiting zones (Agier, 2016), socio-cultural and transitional areas where "two or more cultures edge each other" (Anzaldua, 1987, p. vi), and "spaces of disorder, loss, tiredness and tardiness" (van Houtum & van Naerssen, 2002, p. 131). In recent years there has been a renewed interest in the so-called "urban borderlands" as contested spaces (Jaber, 2018), arenas of border control (Lebuhn, 2013) and spaces that newcomers claim as a refuge (Daher & d'Auria, 2018). According to Iossifova (2015, p. 91), urban borderlands are "the claimed, appropriated, inhabited, shared, continuously negotiated, maintained and often even nurtured spaces of co-presence and coexistence." Indeed, in our case study, we seek to examine and highlight the social relations of cohabitation of homeless migrants who reside in the West Thessaloniki borderland of abandoned train wagons and use them as places to stay, recover, sleep, hide, network, get in touch with others, and to think and plan their next steps. Thus, in our case study, the old train wagon borderland is a place of coexistence where sharing and commoning practices of solidarity take place. In order to examine

the aforementioned living situations, the article is based on the literature on mobile commoning, abandonment, and arrival infrastructures. Mobile commoning concerns the mutual help and sharing practices among mobile populations. In our case study, these practices occur in the urban borderland of old train wagons abandoned infrastructures and we will highlight the potentialities of the transformation of the abandoned infrastructures into arrival infrastructures of commoning.

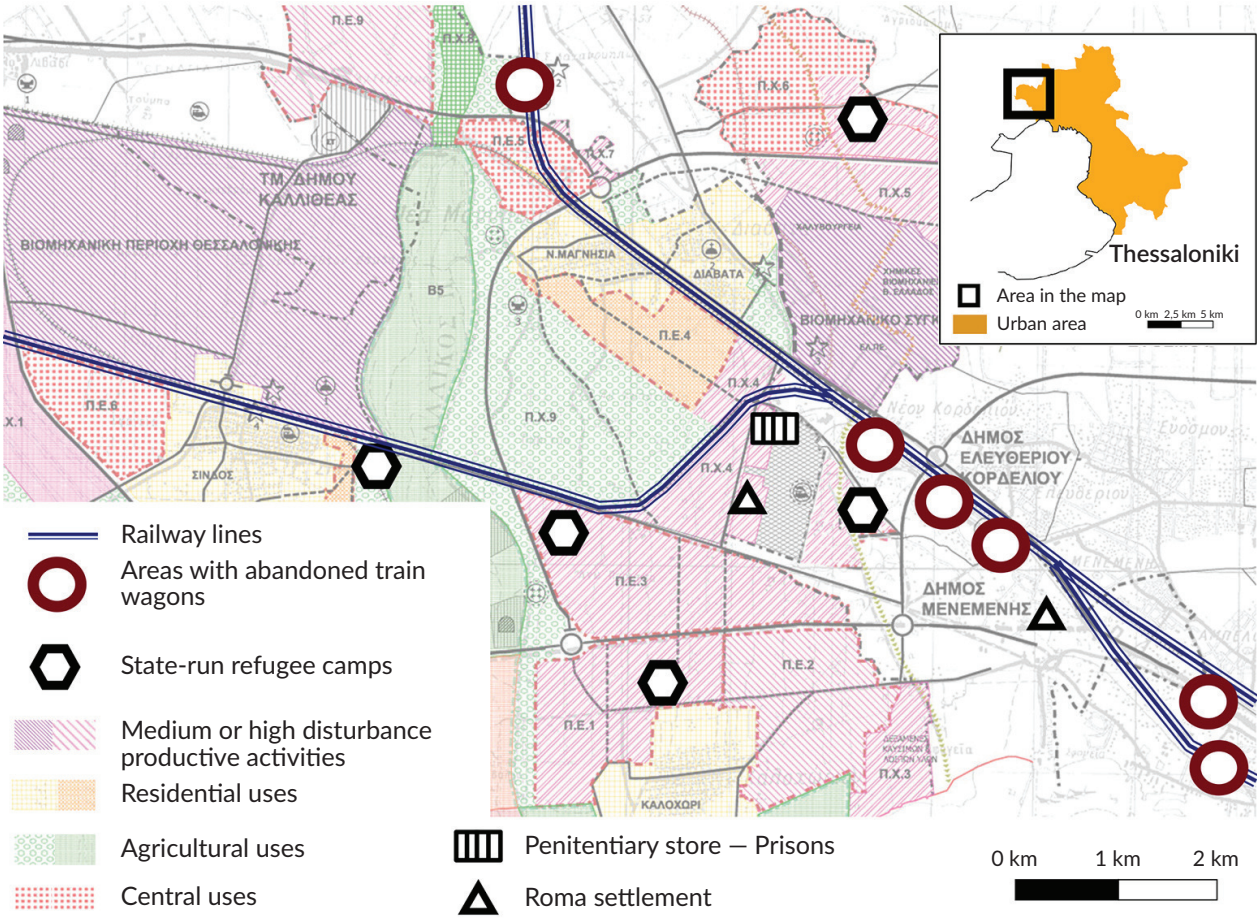

Figure 1. Map of land use in the municipality of Echedoros on the west side of Thessaloniki and positions of abandoned train wagons and state-run refugee camps. Source: Authors' work based on the land uses map of the General Urban Plan of Echedoros Municipality (Greek Government, 2011).

The field research took place during the period of summer 2021 to autumn 2022 and includes urban ethnographic methods like participant observation, field notes, designing maps, collection of articles from local press and websites, and semi-structured interviews with migrants, representatives, and volunteers of international humanitarian organizations, and several informal conversations. We have conducted 30 interviews and four focus group discussions. The migrant participants are from the following countries: Afghanistan, Algeria, Iran, Morocco, Pakistan, Palestine, and Syria. Many interviews were conducted with the assistance of interpreters. Taking into account that people on the move are in a vulnerable position, the names of the research participants have been changed in order to protect their identities. Also, for the purposes of this research, the consent of the interviewees was requested so that parts of the interviews could be used and published. Access to the field was made possible through already-established relationships and new contacts that emerged during our fieldwork via snowballing. In terms of participatory

observation, we made dozens of visits to the areas of the abandoned train wagons and it took quite some time to gain access to the field. The main difficulty we faced was that the people on the move who live in the abandoned wagons do not have legal papers and therefore find it difficult to trust and talk about their living conditions to someone they do not know. This difficulty was overcome as we established relationships with humanitarian organizations that provide food and assistance to the people on the move and several times we participated in the food distribution process. Equally important was the help from migrants who now live permanently in Thessaloniki but have lived in the areas of the abandoned wagons, and know the conditions, and therefore acted as mediators so that we could have access.

2. Theoretical Discussion on Migration Policies of Abandonment, Arrival Infrastructures, and Mobile Commoning Practices

In order to examine the living conditions of people on the move in the abandoned train wagons borderland it is necessary to elaborate the concepts of migration policies of abandonment, arrival infrastructures, and mobile commoning practices.

According to Gross-Wyrtzen (2020, p. 887), abandonment should be theorized "not as absence of government but a technique of governance that targets the racialized poor." This argument echoes Harvey's (2006, p. 397) concept of the state's "organized abandonment" in order to give space for private investments to develop. Meanwhile, according to a number of scholars (Aalbers, 2013; Peck et al., 2010), with the financial crisis of 2010, what becomes crucial is not the unorganized abandonment of state infrastructures and the liberalization of the already free markets, but the need for reliable governance that will ensure the operation of the free market and in this mission each state, with mechanisms of security, law and control has a central role. This process can be conceptualized as a political technology of governance that is accompanied by policies and mechanisms for strategic abandonment of the protective welfare state services and infrastructures that leads to the precariousness of the population, especially the most vulnerable social groups such as the migrants and the poor (Leshem, 2017). In particular, regarding the situation of migrants in the EU, it can be claimed that abandonment "is associated with the hardening of migration law and its implementation, which undermines migrants' rights" (Aru, 2021, p. 1624). In line with a number of studies (Darling, 2009, 2016; Kalir, 2017), it is clear that a growing number of newcomers are excluded from the European asylum system; they become "irregularized" (Aru, 2021, p. 1624) and therefore they are abandoned without having access to public services and facilities that are crucial for their livelihoods. At this point, it could be argued that, in the case of Greece, the policies of abandonment are also linked to the increasing cuts in NGO funds, the closing of refugee camps, and the reduction of asylum seekers' accommodation places in housing programs. Another particularly interesting dimension in our case is that the migration policies of abandonment are connected to a previous phase of abandonment that concerns the economic crisis in which Greece found itself during the last decade. As outlined by Leshem (2017, p. 621), "abandonment has become a structural component of the neoliberal state" and in particular "abandonment draws attention to the material economies that surround us, to structures and infrastructures." Indeed, in the case of Greece, the neoliberal austerity programs resulted in the massive abandonment of public infrastructures which, inter alia, led to the numerous abandoned train wagons in Western Thessaloniki. Here we can observe an interesting coupling. In terms of infrastructures, the condition of abandonment offers the possibility to reuse the abandoned infrastructures for the benefit of the newcomers. Our research case demonstrates exactly this argument. The materialities of abandoned

infrastructures are intertwined with the abandoned lives of newcomers and in a subversive way, one remakes the other. The newcomers, while giving life to the abandoned infrastructures, at the same time, rebuild their own lives. In the case of abandoned train wagons, the newcomers recover, gain strength, meet other migrants, and find ways to resume their journey. Thus, the infrastructures of the abandoned train wagons have the potential to be transformed into arrival infrastructures for newcomers. At this point, it is worth mentioning that the newcomers' capacity to reuse the abandoned wagons, according to their needs, forces us to rethink the analytical category of abandonment. Thus, we want to highlight that beyond the Western-centric approach of abandonment, due to the gradual deregulation of the welfare state in the Western world in recent decades, most of the newcomers leave from countries where people rely less and less on state support. According to the relevant literature in the Middle East, subaltern urban populations invent innovative informal practices of survival, especially in outdoor activities (Bayat, 2012), producing mundane geographies and spatialites (Bou Akar, 2012). Therefore, possibly, people on the move are familiar with the production of space without the support of the state or due to that very absence of the state they develop skills and survival strategies and cultivate capacities "to recognize their limitations, and yet understand and discover opportunities and inventive methods of practice, in order to take advantage of the available spaces to resist and move on" (Bayat, 2012, p. 125). It is likely that these techniques, knowledge, and experiences are valuable vehicles for their survival during their journey to Europe.

At this point, crucial is the recent discussion on arrival infrastructures. According to Meeus et al. (2019, p. 1), the concept of arrival infrastructures concerns "those parts of the urban fabric within which newcomers become entangled on arrival, and where their future local or translocal social mobilities are produced as much as negotiated." Also, Kox and van Liempt (2022, p. 167) make the point that there are "supportive as well as exclusionary infrastructures at the state and civil society levels." Thus, arrival infrastructures constitute a rich variety of multi-actor and multi-site artefacts, services, and technologies through formal and informal, institutional and non-institutional channels (Felder et al., 2020; Meeus et al., 2020). For our purposes, it is significant to emphasize infrastructures not only as a noun but also to bring to the fore the verbal form of "infrastructuring." To put it differently, arrival infrastructures are also practices, "'infrastructuring practices'…within, against, and beyond the infrastructures of the state" (Meeus et al., 2019, p. 1). In light of these practices, arrival infrastructures may acquire a transformative dimension (Meeus et al., 2019, p. 17) which in our case is particularly important. The borderland of abandoned train wagons is transformed from a collapsed state-owned train company infrastructure to a squatted and grassroots arrival infrastructure for homeless migrants and people on the move. In fact, as we have already mentioned, newcomers in Thessaloniki depart from countries of Asia and Africa, where they are very likely to have developed their own survival practices, to have taken action and to have produced their own infrastructures beyond the official rules (Alimia, 2022; Sanyal, 2014). According to Simone's (2004, p. 410) research in African cities and his approach to "people as infrastructures," it is very likely for the urban poor to have the "capacity to improvise" (and to produce infrastructures themselves). Thus, in his words, "regularities…ensue from a process of incessant convertibility—turning commodities, found objects, resources, and bodies into uses previously unimaginable or constrained" (Simone, 2004, p. 410). Accordingly, taking into account the above parameters, the crucial questions that come to mind are: In what ways were the abandoned wagons transformed into a shelter for the newcomers? And what socio-material infrastructuring processes occurred there?

The concept of mobile commoning can shed light on the transformative processes of infrastructuring practices in the borderland of abandoned train wagons. To put it succinctly, we are talking about mobile

infrastructuring commoning practices. Mobile commoning can be perceived as "actions that are shared through acts of co-mobilization" (Sheller, 2018, p. 169); hence, they are commonly produced by people on the move and, according to Papadopoulos and Tsianos (2013, p. 179), they are based on "shared knowledge, affective cooperation, mutual support and care between migrants." Indeed, as we will show, it is exactly these kinds of social practices and relationships that occur among the people on the move in the abandoned train wagon. Here it should be also highlighted that the mobile commons are "neither private, nor public, neither state owned, nor part of civil society…rather, the mobile commons exist to the extent that people use the trails, tracks or rights and continue to generate new ones as they are on the move" (Trimikliniotis et al., 2016, p. 1039). Consequently, the arrival infrastructuring practices of people on the move in the abandoned train wagons are generated beyond the official, institutional, and formal infrastructures and are based on the commoning relationships of mutual support among the newcomers and supporting solidarity groups.

3. People on the Move in the Borderland of Abandoned Train Wagons in Thessaloniki

The area of abandoned train wagons is known as one of the "biggest train cemeteries in Europe" ("A breath from Thessaloniki," 2021). Hundreds of train wagons have been abandoned there in recent decades, especially after the 2010 financial crisis, when significant cuts were made to the state-owned railway company until its privatization in 2017. Thessaloniki is the main railway hub of Greece, as, since the time of the Ottoman Empire (end of the 19th century, beginning of the 20th century), it has been connected by rail with Turkey, Bulgaria, North Macedonia, and Serbia as well as with Southern Greece. The central railway station of the city is located at the western entrance of the city and an extensive railway network is developed in the wider area of the west side of the city (see Figures 1 and 2). Today, there are hundreds of abandoned wagons in this area that are mainly used by homeless and unregistered migrants. Since March 2016, with the closure of the so-called "Balkan Refugee Corridor" and the EU–Turkey "common statement" that aimed "to end the irregular migration from Turkey to the EU" (European Council, 2016), thousands of migrants have tried to cross Greece without registration. One of the main stops on their route is Thessaloniki, and the borderland area of abandoned wagons has been a relatively safe place for their temporary stay. In fact, there is a multitude of enclaves of abandoned wagons and abandoned buildings in close proximity to wagons in the wider area of Western Thessaloniki in which unregistered migrants find temporary shelter (see Figures 1 and 2). Echoing Anzaldua (1987, p. 3), in the borderland, "the prohibited and forbidden are its inhabitants." Indeed, it is the people without papers, the people who are forbidden from entering Europe, who inhabit the borderland of the abandoned train wagons.

In the words of Johanna, a German volunteer in an organization that provides food to the migrants in the train wagons area:

> A lot of people who arrive in Thessaloniki, because the living conditions in the official structures like state-run camps are unbearable or they do not want to be registered, remain homeless. They are mostly those who stay for a short time, or just stay for a few days and then continue their journey. The few days they are in Thessaloniki, they usually stay in abandoned buildings or abandoned train wagons. They are in a way invisible people, invisible from the system, invisible from the city and they live in invisible places. There are hundreds of reports of the situation in state-run camps, but nothing is said about homeless migrants. No one knows exactly what is going on here.

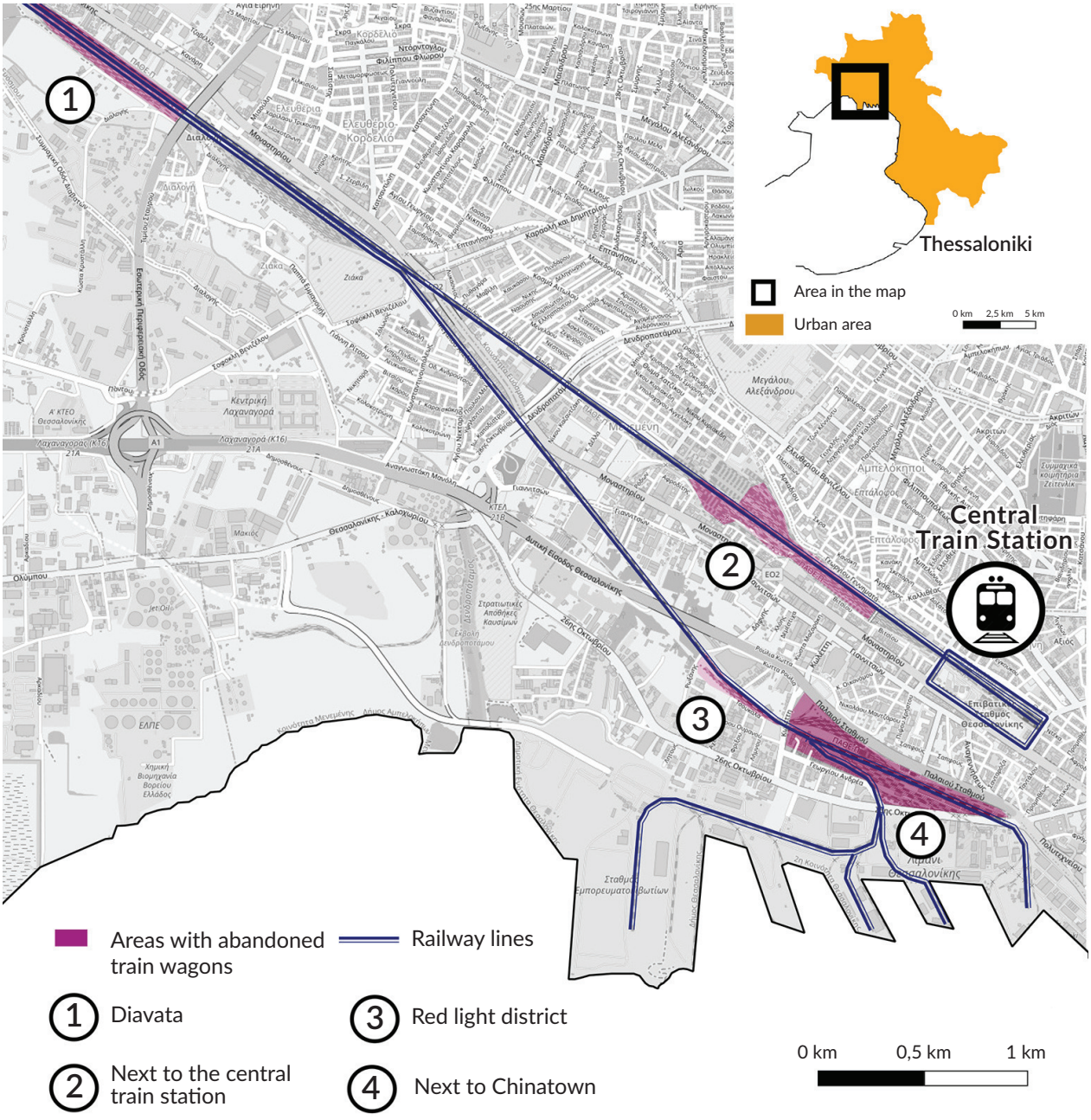

Figure 2. Areas with abandoned train wagons on the west side of Thessaloniki.

In fact, the story of inhabiting abandoned train wagons started in the summer of 2016, when, the Softex refugee camp was created right next to a large cluster of abandoned wagons (see Figures 3 and 4). Many refugees, who were expelled from the camp, started to use the wagons as temporary accommodation. Also, next to the abandoned wagons is the railway line that connects Thessaloniki with Belgrade and Central Europe. So since then, many newcomers have sought to hide on freight trains to continue their journey to central Europe without being documented.

Here we should note that due to the Greek state migration abandonment policies, a large number of newcomers merely pass through Thessaloniki or stay for short periods of time. These people on the move

are mainly unregistered young male migrants, who try to cross Greece and the rest of the Balkan countries, being careful not to be detected by the authorities and not to be registered so that they can then apply for asylum directly in Central or Northern European countries. The reason for this choice is the fact that according to the Dublin Regulation III (Regulation (EU) No 604/2013 of the European Parliament and of the Council of 26 June 2013, 2013), someone has the right to apply for asylum in the EU only in the first country of arrival—member state of registration, e.g., in our case Greece. Nevertheless, if they register in one state and seek asylum in another member state, then the latter has the right to send them back to the country of registration. An additional reason that a large number of people on the move try to avoid registration in Greece is the fear of increasing police ill-treatment, torture, and especially the fear of illegal deportations and pushbacks to Turkey (Border Violence Monitoring Network, 2020). It appears then that abandonment constitutes an irrefutable governance technique as the Greek state's immigration policies of abandonment intend to transform Greek territory into an inhospitable place for newcomers. Therefore, governmental policies of abandonment have a dual objective; on the one hand to discourage newcomers from entering the country and on the other hand, in case they do enter, for the latter to feel abandoned and unwelcome and therefore to move invisibly to the next Balkan countries.

The locations and number of people who choose to stay in the old train wagons change depending on police patrols, possible attacks by neo-fascist groups, and the circulation of information among migrants. A reference location is the streets Acheloou, Empedokleous, Frixou, Limnou, and Roxanis (see Figure 3; see also Point 3 in Figure 2), next to the red light district, in which a number of self-organized organizations are active such as Wave, Medical Volunteers International, Mobile Info Team, Border Violence Monitoring Network, and Equal Legal Aid. These organizations provide legal support, distribute daily meals to homeless migrants, and, in an adjacent rented building, they have created a community center, where they have facilities to provide clothes, sleeping bags, blankets, shoes, washing machines, showers, and a first aid clinic. Even though this community center is located next to the red light district, none of the participants in the research reported to us having any conflict with the activities of the sex industry or any incident of sexual exploitation. In our questions about possible problems of coexistence both the people working in the humanitarian organizations and the people on the move who live in the train wagons told us that it is like two parallel worlds coexisting on the edge of the city. Also, many of the migrants who live in the train wagons help with food preparation, laundry, interpreting, and giving directions to the newcomers.

As Sophia, a volunteer from France who participates in the food preparation, points out:

> We used to distribute food inside the building, but now due to Covid-19 we only do it outside. Food is distributed every day at 17:30. At the moment, 100 people come to the food distribution every day, while a month ago we had about 150–200 a day because the weather was better. Also, many people, most of them I would say, have tried to cross the border into Macedonia or Albania and then Serbia and Bosnia and haven't succeeded, so what they do is they come back here to Thessaloniki for a few days and then try to leave again. So we might see someone come every day, then disappear for a few weeks and then come back. In other words, this place is somehow a point of reference, people on the move know it and feel a relative sense of safeness.

Figure 3. Abandoned train wagons next to the red light district (the sign indicates the direction the red light area is located).

Also, in the words of Said from Morocco, who is living in the abandoned train wagons:

> I would say that these people have saved my life, their help is excellent, they do not discriminate and they do not ask where you are from, if you have papers, etc.....They offer food, clothes, sleeping bags, medicine, all the basics, for me that's enough. They helped me a lot with my leg. I had broken my leg when I jumped the fence between Turkey and Greece. Even though I was very dirty, it didn't make any impression on them, they helped me a lot. A few months ago a friend from Morocco arrived through Turkey here in Thessaloniki. He was with a group of five, six other people, but unfortunately, the others were arrested by the police and sent back to Turkey, only he managed to be saved, even though the policemen beat him very badly. He came to the wagon where I live, I hid him for 15 days, the doctors from Medical Volunteers International took care of him, gave him medicines, he had wounds on his legs and they healed them, and now he has arrived in France.

Thus, the abandoned train wagons play a vital role as arrival infrastructure for the people on the move. We can say that they are "similar to the transit spaces where migrants rest for a while, reconnect to their communities, call their relatives and friends, earn more money to pay the smugglers, collect powers, prepare their new becomings" (Papadopoulos et al., 2008, p. 217). Indeed, the borderland of abandoned wagons constitutes a place of protection, meeting, rest, healing, and re-planning of future paths. However, what are the internal social relationships and processes that take place between people on the move?

Figure 4. Sign in the area of the abandoned train wagons written in Arabic and English warning migrants trying to pass the railway lines that it is dangerous because of electricity.

4. Newcomers' Infrastructuring and Mobile Commoning Practices

The train wagons have been abandoned for many years, most are rusted, with broken windows, ripped seats, and holes in the floor, many of them are burnt as the newcomers have no other way to keep warm and light small fires. Also, the vegetation around them is extremely dense, like small jungles, an autonomous ecosystem has been created next to the city in which the newcomers find refuge. In and around the trains there are scattered objects, food cans, beer cans, plates, forks, calling cards, shoes, and clothes, which bear witness to the constant passage of people (see Figures 3, 5, and 6). Due to the precarious and extremely difficult conditions, the people who live in the abandoned train wagons are young men and those we met were between 18 and 45 years old. Possibly, the poor sanitary conditions and lack of suitable living conditions prevent children, women, and the elderly from finding shelter in the abandoned train wagons.

Hakim from Algeria lives with other newcomers in an abandoned train wagon and describes the living conditions and their infrastructuring practices as follows:

> This is where we sleep. It's hard to sleep inside the wagon, it's very dirty. We have cleaned and are trying to make this place suitable for sleeping. In the winter, or when it rains, some also sleep under the train, between the tracks and the wagon. We put cardboard boxes on the ground or when we find some mattresses and blankets on top of them and then we sleep with sleeping bags and maybe a

> blanket on top. You have to be careful, the wagon is rusty, it has holes in some places, and especially at night without light it is dangerous. We have made this here like a room, we sleep close to each other. We sleep seven people here. Some nights some can't sleep, they are usually newcomers and they have nightmares, then the rest of us try to calm them down. We need to support each other, otherwise, it's very difficult.

Figure 5. Shoe left on the rails next to abandoned train wagons.

The living conditions in the abandoned wagons are extremely difficult and the sustainability, operation, and defense of the abandoned infrastructures, which were transformed into arrival infrastructures for the newcomers, take place through commoning practices, mutual care, and support. In fact, we can recognize practices of extending commoning. Extending commoning is based, as Stavrides (2016, p. 44) notes, on "a constant opening of the circles of commoning" or, as Hardt and Negri (2009, p. 254) underline, on "expansive circuits of encounter," which in our case study occur not only between the newcomers and solidarity groups but also between "oldcomers" and "newcomers," allowing the migrants to invent spaces of co-habitation, friendship, and solidarity. These solidarity practices played a pivotal role in the material maintenance of the train wagons' arrival infrastructures but also in the migrants' claim to the right to stay and to move as they broadened connectivity and solidarity.

The words of Jilali a newcomer from Morocco, who lived for a period of three months in the train wagons area and now is working in a humanitarian organisation, are defining:

> The area of abandoned train wagons is mainly attended by people who are not accepted at the Diavata state-run refugee camp and are homeless. The living conditions for homeless migrants are very difficult, especially in the winter. Cold, rain, snow. They have no clothes, no heating and no food. It is a big risk to live in these violent conditions and at the same time to be chased by the police and to have no money. For me these people are brave. I was in their position, I understand them, and I admire how they manage and survive in these very difficult conditions in the winter and then with what courage they plan their trip to the Balkans or Albania and then Italy.

Here it is also worth noting the words of Hussein from Palestine which may be the answer to Jilali's comment:

> The very interesting point in the long migrants' journey to Europe is that they come in contact with other people on the move, establish friendships and relationships of solidarity. For example, here in the train wagons during the food distribution, many people have met, have come in contact, even from different countries, with different cultural backgrounds. I have even met people who, even when from the same country, considered themselves enemies, but now here in the wagons, they come together, support each other, and form small groups to move to the next countries.

Consequently, the borderland area of the train wagons is not simply a relatively safe refuge, but it has transformed into a place of networking and connectivity between the newcomers. In this way, pre-existing perceptions and prejudices may change and new friendships are created.

Hussein continues by saying that:

> I think that when you are on the move, when you seek to find a safe country and a better life, you are more open to learning and experiencing new worlds, new cultures, new perceptions. It is possibly an unconscious choice, but it happens. The movement opens up new perspectives that you did not imagine. It is the moment of your life when you are possibly more open than at any other time. You can more easily create relationships with other people, relationships that would have seemed unimaginable to you before starting your journey.

Figure 6. Bag, clothes, shoes, and biscuits left in an abandoned train wagon by migrants who have left, and that will probably be used by the next people on the move.

Thus, we can argue that the borderland of abandoned train wagons also constitutes a borderland in the lives of people on the move. It is a life in-between, a temporary station between here and there, a life, which, despite being extremely difficult, includes the possibility of new gatherings, friendships, and transformations. At the same time that people on the move transform the train wagons, they also re-organise border-crossing plans and re-imagine their lives beyond the specific borderland space. In the words of Anzaldua (1987, p. 195), "To survive the Borderlands you must live *sin fronteras*, be a crossroads." In fact, the abandoned train wagons could be seen as a crossroad where transformative processes take place through "acts of commoning" (Tsavdaroglou et al., 2019, p. 122), that is practices of mutual care, co-living, and co-imagining future plans. It is especially worth noting that according to several scholars (de Angelis, 2010; Stavrides, 2016; Tsavdaroglou et al., 2019) commoning always has a transformative potentiality as it creates new values of solidarity and sharing. Thus, the practices of co-existence, togetherness, and living in common of people from different countries of origin are essential elements that allow us to recognize the borderland of train wagons as a form of possible "transnational commons" (Tsavdaroglou et al., 2019, p. 125).

5. Conclusions: A Transformed Borderland, From Abandoned Infrastructures to Infrastructures of Commoning

In this article, we aimed to unpack the living conditions of people on the move in the borderland of abandoned train wagons in the west area of Thessaloniki. To conclude, we want to highlight three main arguments for critical awareness.

First, our research demonstrates that abandonment is a primary practice of EU and Greek state migration policies. People who have fled their countries of origin and are looking for a safer life in Europe face policies of "exclusionary governmental infrastructures" (Meeus et al., 2019, p. 2) and multifaceted regimes of hostility, deportations, and pushbacks. According to Gross-Wyrtzen (2020, p. 894), "abandonment manifests materially in both bodies and space." Indeed, in our case study, there is a clear connection between the migrants' abandoned lives with the increasingly reduced state-led arrival infrastructures and services, mainly with the termination of institutional housing programs.

Second, our research aims to highlight that the situation of abandonment could become an opportunity for subversive practices, like the commoning practices among the people on the move in the abandoned train wagons. It is possible that people on the move have already experienced abandonment in their countries of origin, and this might be one of the main reasons for their fleeing and emigration. At the same time, equally possible is that they have already developed survival skills and have acquired knowledge of converting abandoned materialities into survival vehicles and infrastructures crucial for their livelihood. In our case study, people and wagons are abandoned and invisible in the borderland of the city. Yet, we can observe that, under the deck and out of the radar of authorities, numerous subversive practices that exercise "the right to move" and "the right to stay" have occurred. Thus, the condition of abandonment can trigger social practices that may transform abandoned state infrastructures into newcomers' arrival infrastructures.

Third, we argue that not only the city but also urban borderlands are "strategic locations" (Darling, 2017, p. 184) for the rescaling of border control. In addition, these areas possibly also function as spaces of sanctuary, especially for unauthorised people on the move. Actually, the area of abandoned train wagons constitutes a borderland which is at the same time a divided area but also an area of connectivity. According to Iossifova

(2015, p. 91), "borders and boundaries…not only divide, but also join them together." In our case study, we confirm Iossifova's argument as the multiple enclaves of abandoned train wagons in West Thessaloniki are transformed into interconnected arrival infrastructures for the people on the move. At the same time, we can extend Iossifova's argument as on a larger scale, the borderland of abandoned train wagons constitutes a stopover point and a joined node in the long journey of people on the move. Admittedly, the urban borderland of the abandoned train wagons is in constant dialogue with the border security policies and cross-border mobility potentialities. Actually, the borderland of abandoned train wagons is a site of arrival and departure as it connects the routes of people on the move from Turkey to Thessaloniki and then to the next Balkan countries (see Figure 7). The testimonies of our research participants unveil that the borderland of abandoned train wagons is like a "porous membrane" (Stavrides, 2016, p. 69). It is not only a crucial connection to the linear route of people on the move from East to West and from South to North, but it is also a relatively safe refuge for people who are pushed back from Balkan countries and have come back to Thessaloniki. They recover and then they try to continue their journey again and again in the ongoing struggle to cross borders.

Figure 7. Graffiti in the abandoned train wagon on the west side of Thessaloniki. On the backside, an Austrian freight train can be seen. At the time of the photo, a group of people jumped on it to continue their journey to the next countries.

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Conflict of Interests

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Spatial Appropriations Over Europe's Borderland: El Principe's Growth as a Vestige of Colonial Urbanism

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Abstract

My work investigates the spatial transformations generated by conflicting competencies in the border city of Ceuta, a Spanish exclave on the northernmost tip of Morocco. Due to its strategic location, Ceuta became the gateway to the Spanish Protectorate over Morocco. Its implemented masterplan was rooted in the colonial urbanizing strategy of social segregation; yet failed to encompass the entirety of the territory, rendering the border area a site for informal urban settlements. Spain's 1986 accession to the EU granted the exclave a new role as an icon of Fortress Europe, hindering migration movements toward mainland Europe and, due to the municipality's neglect of the multifarious stranded migrant groups, settlements ballooned into districts along the border checkpoints. This article investigates the spatial conflicts generated by the border and how these, in turn, shape the borderland. It examines how supra-national actors manipulate urban planning to establish dominance, ostracizing the border region, and studies whether migrants' spatial practices can effectively disrupt their socio-spatial segregation. Focusing on the border district of El Principe, a twofold methodology is followed: A top-down perspective is built through mapping, examining historical masterplans, policy analysis, and interviews, and a bottom-up stance is included, grounded on participant observation and semi-structured interviews, revealing migrants' spatial appropriation tactics.

Keywords

borderlands; Ceuta; colonialism; gray spacing; urban planning

1. Introduction

At the northernmost tip of the African continent, separating Morocco from the Spanish exclave of Ceuta, the European border realizes its most fully fledged incarnation. Aiming to hinder migration movements from reaching Europe, the wall has become a powerful institution, whose main purpose is to demonstrate an imposed political order. Accordingly, the border infrastructure conveys not only a meticulously managed apparatus but also a space entirely monitored and patrolled by armed forces. Despite the heightened control, an extensive informal urban sprawl—represented by the district of El Principe—emerges as a practice of dissensus. In contrast to the thoroughness with which authorities control the border and the extensive financial sums regularly invested in strengthening it, the socio-spatial processes materializing at its feet and constituting the border districts have been blatantly disregarded, indirectly permitting the powerless to appropriate the borderland.

This article explores the power dynamics resulting from the border infrastructure and how they contribute to the formation of socio-spatially excluded spaces. Following a multiscalar approach, it explains how supra-national actors such as the military regimes, the EU, the Spanish government, or the municipality, use architecture and the built environment to establish dominance. Rather than through the imposition of architecture, this article examines the manipulation of the built environment through its perpetual neglect, intentionally excluding the border districts. From a bottom-up perspective, the article examines the spatial tactics that emerge amid that abandonment, and the subsequent construction of a community that evades the authorities' control yet further isolates itself, and in so doing, contributes to the reproduction of the border.

In the construction of urban space, architecture and urban planning can become a tool to exercise power over population groups, often serving a political agenda (Misselwitz & Rieniets, 2006; Weizman, 2007). As the scholarship on borders illustrates, the architecture of borders has been a pivotal device implemented by states to demonstrate their political power, portray their sovereignty, and justify their national identity (Balibar, 2002; Brown, 2010). However, borders not only build the identity of sovereignties but also "provide horizons and compass points for knowing and belonging" (Brown, 2010, p. 71). Therefore, they are utilized by people to construct their identity, values, and, ultimately, their sense of security and protection. The fear of the Other embodied in the border infiltrates social life, contributing to the illusion of an omnipresent yet undefinable threat (van Houtum & Strüver, 2002; van Houtum & van Naerssen, 2002).

In establishing the properties of an open city, Sennet (2006; Sennet & Sendra, 2020, p. 29) defines a border as the "edge where different groups interact." Therefore, it becomes a site for unregulated development. By associating borders with medieval walls, he describes them as anarchic spaces that unfold at the limits of the central control (Sennet, 2006, p. 92). Following Sennet, and understanding the border as a space of interaction, Mezzadra and Neilson (2013) emphasize the inherent productive potential borders offer. While the term *productive* may be misleading due to its positive connotation, it rather describes the urban expansion linked to the commercial nature of borders. However, the city of Ceuta, as an icon of Fortress Europe (Castán Pinós, 2009, 2014; Ferrer-Gallardo, 2008, 2011), instead of planning the foreseeable urban growth associated with the border, has not embraced its productive potential (Cimadomo, 2023). Thus, the entire border region has been left deliberately unplanned for decades, facilitating the formation of two border districts, which, nourished by the exchange brought by the border, have grown connected to the two

border-crossings: Benzu in the north and El Principe in the south. Accordingly, they have developed increasingly excluded from the exclave and its city center.

The fact that the state authorities have dismissed the border territory is linked in this article to what Yiftachel (2009) defines as the politics of gray spacing—indefinitely positioning population groups between the security of legality and the uncertainty of eviction. Yet, the central power employing gray spacing as a control method is now subverted by its very implementation. Hence, affected marginalized communities use their displaced position for empowerment and claim of belonging (Yiftachel, 2009).

Continuing with the same binary, although architecture is used to exercise and manifest power, it can be manipulated by the powerless as a form of resistance. Thanks to their daily participation in the urban dynamics, inhabitants become producers of space, endowing them with political inclusion (Lefebvre, 1968/1996; Purcell, 2002). Thus, the difference between migrants and legal citizens is neutralized, for both are redefined as urban subjects (Sassen, 2013). As Darling (2017) states, migrants' everyday spatial practices, such as building makeshift shelters, networking, or engaging in informal employment, are understood as political acts, questioning the categorization of citizenship. Furthermore, their everyday urban practices, appropriating space and reconfiguring the city, can be read as a creative form of resistance to claim their autonomy from the prevailing forces (Hall, 2015). Accordingly, research focused on geographies of forced migration and their resulting spaces of resistance must be shielded, as it can redefine "new orders that contest the power of transversal borderings" (Sassen, 2013, p. 4).

The spaces at the edge of society that gather the powerless are defined by Iossifova (2013, 2015) as borderlands. Akin to gray space, borderlands grow excluded from society and are determined architectonically by the inhabitance of out-of-use space. Although they are imposed by the powerful, scholarship has ascertained that the persistent daily practices of the powerless can remove them (Baumann, 2016; Iossifova, 2013, p. 8). In the Spanish exclave of Ceuta, the border district of El Principe, appropriated and constructed by its dwellers amid the authorities' neglect and developed at the margins of society, classifies as a borderland, in which residents, through their daily practices, have claimed their own space of community. Centered in the border district, this article explores whether the spatial practices of the powerless can undermine the constructed borders or if they are effectively reproducing them. Furthermore, it examines the gray spacing strategies employed by macro-scalar actors to promote the formation of borderlands, socially excluding and urbanistically neglecting the border territory.

Despite the varied migrant population groups Ceuta hosts, including Sub-Saharan migrants, cross-border workers, hidden or detained unaccompanied minors, or the second-generation Moroccans, this research focuses on the latter, as they represent the majority of El Principe's population, and the presence of other migrants in the neighborhood is virtually nonexistent. During my interviews with the residents of El Principe, they firmly expressed their desire to be named Spanish Muslims, prioritizing their nationality over religion. Sociologist Rantomé (2012) explains that although Catholics of Ceuta seldom engage in religious practices, they construct their identity as Spanish Christians to differentiate themselves from the Muslims and to include themselves in what they consider to be Ceuta's "unique" identity, Spanish Christians (Rantomé, 2012). This form of identification, based on religion, was confirmed in the interviews conducted during fieldwork and is, therefore, employed throughout the article.

After decades of neglect, Spanish Muslims appropriated the borderland, populating what would become El Principe, a district where currently 15,000 Spanish Muslims reside—approximately 18% of Ceuta's population. The lack of urban planning structuring the neighborhood's overcrowding and the absence of essential urban equipment have provoked structural social problems. As a result of the gray spacing policies, with the territorial border as a backdrop and excluded from the city center, El Principe has grown to become one of the most dangerous districts in Spain, with 30% unemployment and a high birth and mortality rate, paired with an inordinate school dropout rate. The alarming situation reached by El Principe stresses the need to expand research looking into the entanglement between politics and architecture, which nowadays, should incorporate a spatial understanding of borders (Schoonderbeek, 2015).

Therefore, grounded on archival research, mapping, and secondary research, the third section of the article is dedicated to understanding the border district's evolution as a neglected space since the beginning of the 20th century, covering the military regimes, its transition into democracy, and accession into the EU.

Based on ethnographic observation and semi-structured interviews conducted with the president (Kamal) and vice-president (Bashir) of El Principe's unique neighborhood association (Asociación de Vecinos Principe Felipe), the third part illustrates the tactics Spanish Muslims exercise to appropriate space and build community. From a top-down approach, the fourth section examines the urban planning strategies attempted by the municipality to regulate informality and allegedly improve El Principe's impoverished urban conditions. The methods constituting this section include policy analysis to examine the different master plans and semi-structured interviews with the City Architect (Jose Pedro Pedrajas) as well as a Technical Architect working for the municipality, to understand the reasoning behind the abandonment of El Principe.

2. Origin and Formation of a Neglected Borderland

The Wad-Ras Treaty, signed in 1860 by Spain and Morocco, established the current border, along which the urban borderlands developed. During the Spanish Protectorate (1912–1956), the territory fell under its sovereignty and the area remained largely ignored, leading to the settlement of self-built constructions and the origin of El Principe. With Morocco's independence (1956), the border delimitation was no longer recognized by the Moroccan Kingdom, influencing the power dynamics among the macro-scalar agents and altering demographic movements. The more contemporary context describes the trans-scalar impositions set by the EU and their impact on El Principe's development.

2.1. Spanish Protectorate

As the 19th century closed with Spain losing its colonies in the Americas and the Philippines, the prospect of a new colony in Morocco marked the 20th Century's beginning. The Conference of Algeciras (1906) ratified the commitment to this colonization dividing Moroccan territory between Spain and France (Bravo Nieto, 2004). Due to its strategic location, Ceuta became the door to the Protectorate of the Spanish sphere of influence.

Under Franco's regime, seeking to implement a unified colonial strategy of urban planning, Pedro Muguruza was appointed Directorate General for Architecture (Albet i Mas, 1999; Bravo Nieto, 2004; Cimadomo, 2023). Muguruza was assigned with reorganizing the public works of the Spanish protectorate and proposing a new master plan for Ceuta that could solve the ongoing urban deficiencies the city experienced

such as the lack of social housing and the informal urban sprawl that expanded beyond *Campo Exterior* and into the border districts. However, the master plan's memoranda (Muguruza, 1946), did not reference the social housing shortage or the increasing urban informality problem.

Influenced by the segregationist ideas implemented in the French Protectorate and following a colonial agenda, Maguruza employed the zoning tool (Bravo Nieto, 2004). Accordingly, he divided the territory into three distinct areas: to the east, the Monte Hacho, with an abrupt topography hosting a defensive function; the city center, with the most significant buildings and privileged housing; and the Campo Exterior, with neighborhoods for the migrant workers required to build the Protectorate (Muguruza, 1946).

In analyzing Muguruza's master plan and contrasting it with Ceuta's actual extension (see Figure 1), two conclusions come to the foreground. First, he equipped the city center with the most important buildings and privileged housing for the upper class, as it had to reflect the identity and dignify the status of the exclave as the "Door to Africa" (Muguruza, 1946). Thus, he set the basis for the prioritization of the center. Furthermore, by allocating the migrants to Campo Exterior, he prompted a socio-spatial division that today structures the exclave's social hierarchy and urban dynamics. Second, the scope of the master plan did not include the entirety of the territory. Muguruza overlooked the region surrounding the border and failed to tackle the urban sprawl growing in the border districts. Having left the neighborhoods unplanned, informal settlements expanded uncontrollably.

Muguruza's plan prioritized the city center in an effort to reinforce Spanish Christian sovereignty and ignored the social housing shortage and informal urban development at the border. Although implemented under a fascist regime and following a colonial agenda, future master plans developed under a democratic government, such as that of 1992 and the 2021 plan with its approval still pending, have failed to address the original urban deficiencies, leaving unchecked colonial dynamics established by Muguruza. As detailed in Section 4, they have allowed for the proliferation of substandard living conditions, the informal expansion of the border districts, as well as the rampant criminal activity taking place throughout them. What is more, the failure to address these issues would ultimately deepen the divide between the center and the border districts along with the gradual reinforcement of the border.

2.2. Entrance Into the EU and the Establishment of the European Border

Throughout the first half of the 20th century, as the entire territory fell under Spanish authority, the border territory had been largely ignored and was generally assumed to belong to the Ministry of War. With Morocco's independence (1956), tensions at the border arose, reinforced by the Moroccan Kingdom's claim of Ceuta as Moroccan sovereignty and the consequent refusal of the border's legitimacy. As of the 1960s, Moroccan migrants seeking improved living standards found the unclaimed borderland a convenient location for settlement due to its proximity to their country of origin and easy access to a stable residency for the undocumented. Moroccans took advantage of the ambiguous situation and occupied the borderland, progressively converting it into a point of first entry.

Ultimately, with Spain's accession to the EU, the borderland received increased attention, for it was no longer the border between two countries but two continents, representing one of the most contested borders in the world. Despite the strategic situation of the borderland and the time, resources, and funding invested in

the erection of the border infrastructure and its securitization, the indifference towards the border district persisted. Moreover, the unpredicted consequence of European legal requirements on the development of the border district further situated it as an excluded borderland.

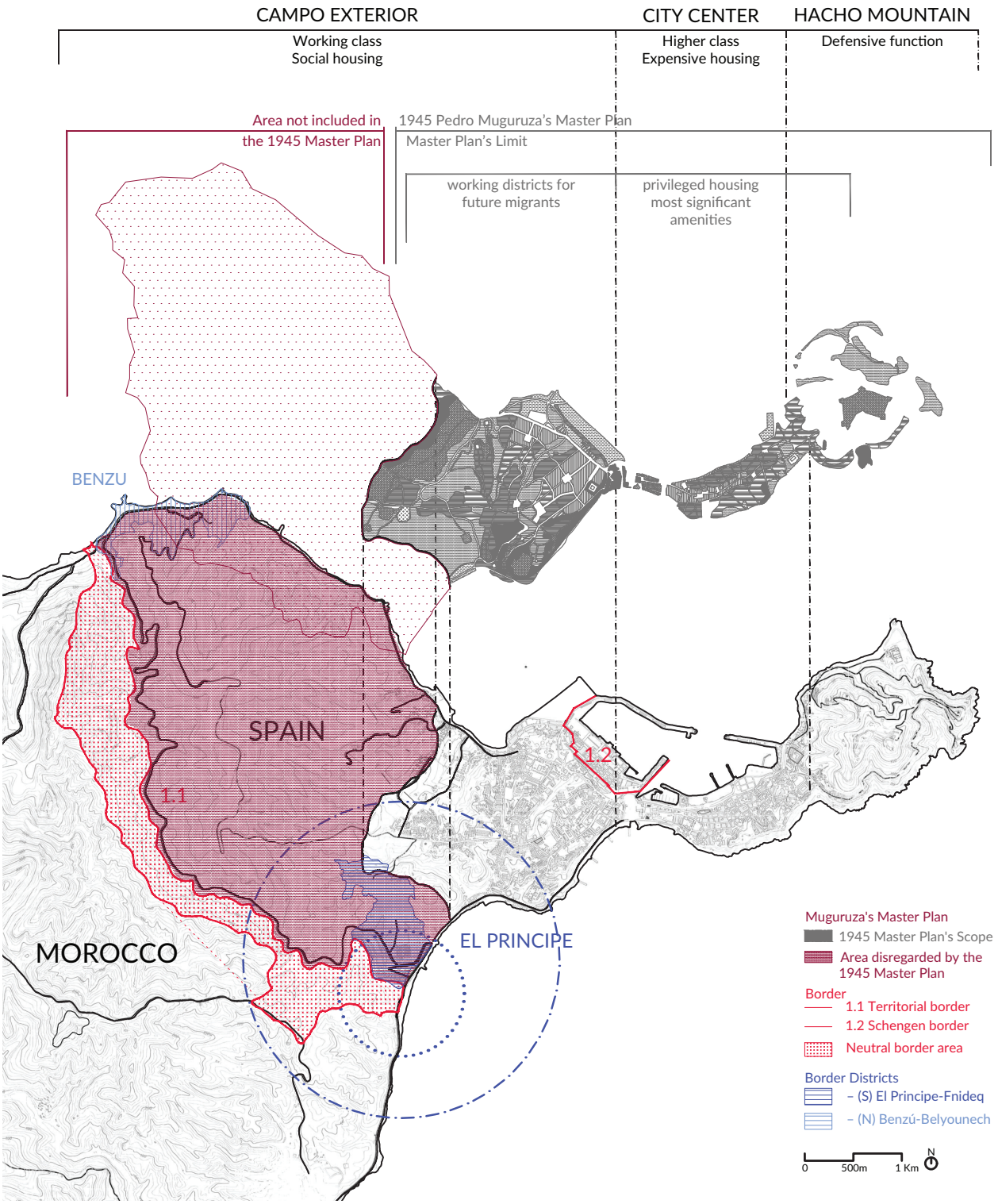

Figure 1. Muguruza's master plan overlapping Ceuta's current socio-spatial division, border-districts, border-crossings, and military expansion. Made by the author.

2.2.1. Ley de Extanjería (Law on Foreigners)

After Franco's death (1977) and under a democratic government, Spain requested accession to the EU. Yet, before being admitted (1986), Spain had to comply with the European legal requirements, which demanded the draft of a law on foreigners to reassure other European members of their control over migration (Freeman, 1995; Geddes, 2005). The enactment of the 1985 law on foreigners meant a major social upheaval, and its outcome mainly affected Spanish Muslims (Castán Pinós, 2014; Rantomé, 2012). It was the first Spanish migration law passed to regulate the status of foreigners in the country. It offered migrants from countries with colonial ties to Spain, such as the Philippines, or the Americas, the possibility of rapidly gaining Spanish nationality (Boletín Oficial del Estado, 1985). Nevertheless, despite Morocco's proximity to Spain, geographically and historically, the law did not include it, effectively discriminating against the African country (Castán Pinós, 2014; Planet Contreras, 1998; Rius Sant, 2007). Therefore, Moroccan migrants, who had been living in the exclave for decades, were forced to decide whether to initiate the naturalization procedure, which could take up to 10 years, or remain illegally in Ceuta.

The Muslim population collectively refused to apply for residence permits. They rejected being regarded as "foreigners" and the 10-year naturalization mandate. Hunger strikes and demonstrations ensued, alleging the exemption to the law in the exclave ("Musulmanes de Ceuta y Melilla se unen," 1985). The Christian population considered the protests a provocation. Hence, to counteract Muslim pressure, Spanish Christians took to the streets, demanding the law's implementation (Planet Contreras, 1998; Rius Sant, 2007). Tensions escalated until the government agreed to grant Spanish citizenship to those who could demonstrate proof of residence in Spain for over 10 years. Thus, 10,000 Spanish Muslims were naturalized in Ceuta (Castán Pinós, 2014; Gold, 2000; Planet Contreras, 1998; Rantomé, 2012).

Although the confrontations derived from the law on foreigners made the Spanish Muslim community visible, it stirred profound animosity between the two communities. Moreover, despite the large number of naturalizations, many Spanish Muslims continued to live unregistered, excluded from social life. Naturally, El Principe, as the migrants' first point of entry, was directly affected by the law's enactment. On the one hand, from 1986 onward, make-shift constructions spread exponentially. The assumed public character of the land and its resulting economic advantages attracted migrants, who continued to reside in the borderland undocumented. On the other hand, the status of El Principe consolidated as an arrival neighborhood, where an ethnic concentration established itself.

According to the 1986 census, prior to the law, 50% of inhabitants stemming from both ethnic groups lived together in the border district (Instituto Nacional de Estadística, 1987). However, the exemption to the foreigners' law and the extensive naturalization of migrants generated an interurban migration phenomenon. Rantomé (2012) explains that the expansion of the Spanish Muslim population in areas where they were formerly a minority, as was the case of El Principe, provoked the departure of Spanish Christians, who, triggered by a racist sentiment, relocated to districts where the presence of the Muslim population was negligible. He defines this phenomenon with the widely used term *white flight*. This theory is underpinned by the access to subsidized housing Spanish Christians were granted, for the vast majority worked in public positions for the state or the military, whose service was compensated with accommodation. The ultimate conclusion of white flight was the homogenization of the districts, which in Ceuta fostered the growth of prevailing racial segregation, with a Spanish Christian majority in the city center and the formation of ethnic neighborhoods in the border districts, populated by Spanish Muslims.

2.2.2. Exemption From the Schengen Agreement

As Spain was required to comply with legal modifications to access the EU, a similar process ensued with the Schengen Agreement. Although it was signed in 1991, for it to be enforced (1996), Spain had to establish a border infrastructure in order to meet European standards. Precisely in this in-between period, the border construction began. Despite the immense impact the Schengen Agreement had on Ceuta, with its 10-meter-high wall and the widespread border control, the exclave remained partially excluded from the Schengen zone in order to facilitate a more fluid movement of persons and goods between the Spanish exclave and the Moroccan hinterland, exempting the trade of goods from customs controls and Moroccan residents of the province of Tetouan from visa requirements. Furthermore, Ceuta remains partially excluded from the free movement Schengen endowed the European territory to allow the continuity of identity checks and border controls for travelers coming from the exclaves (Boletín Oficial del Estado, 1994).

The erection of the wall has brought to the foreground the prioritization given to European securitization and the control of migration, disregarding legitimate and urgent urban demands. Despite the substandard housing conditions and the lack of urban equipment from which the border district suffers, these shortcomings remain overlooked, while extensive sums of money and cutting-edge technology continue to be invested in the border's improvement. The construction of the first fence and the following renovations in 2005 and 2014 alone totalled €95.932 million (Akkerman, 2019).

Furthermore, the legal requirements of National Defense require the border infrastructure and its surrounding area to maintain a width of 300 meters (Articles 3, 7, and 9 of the law), as a "security area," where no work or activity may be carried out without the express authorization of the minister in charge (Boletín Oficial del Estado, 1978). Consequently, the area included between the border and the 300-meter offset line is subject to this law. Although parts of El Principe overlap with the defined security zone (see Figure 3c), the land had remained unclaimed and its occupancy ignored, indicating the intentionality in leaving the district at the margins of authority.

3. Gray Spacing Tactics by Spanish Muslims

Amid the neglect experienced by the district over the past century and its banishment to the margins of authority, Spanish Muslims exercise daily spatial tactics demonstrating that they are active in the construction of their own spaces of resistance. Thus, through their spatial practices, they have created an organically expanding district comprising a maze of narrow alleys and characterized by a Moroccan influence.

3.1. Moroccan Influences Circumventing the Border

Traditionally, Moroccan homes follow a typology centered around the courtyard. Natural ventilation and illumination are sought in the interior space, whereas the outer facades are essentially closed to the outside. Underlying this housing typology is a sense of privacy in which domestic life unfolds in the interior courtyard. Housing constructions in El Principe are cramped, and many do not have the space to accommodate an interior courtyard. However, this sense of privacy is depicted by the small number of windows on the outer facades and the tendency to protect them with metal lattices.

This model of constructing intimacy from the outside to within is also reflected on the urban scale. In navigating the district from the outside, familiarity with the layout is essential, as there are several layers to be penetrated from the main streets. One needs to understand the entry points in the district that connect the labyrinth-like system of alleys. Despite the alleys being public spaces, their closely knitted network and narrowness provide a domestic feeling leading into the district's center. Thus, it is as though El Principe had organically fenced itself off.

Despite the border presence, the tight social grid Spanish Muslims have woven reaches into the neighboring Moroccan provinces. Several territorial continuities challenge the border infrastructure, such as language or religion. The predominant language in El Principe is Darija, a vernacular form of Arabic widely spoken in Morocco. In the Muslim religion, residents look toward Morocco to determine dates for religious festivities, which fluctuate yearly across the Muslim world, such as Ramadan, Eid al-Fitr, or Eid al-Adha. Furthermore, to maintain the connection with Morocco and ensure the further reproduction of Spanish Muslims' religion, marriages tend to be arranged with relatives living in Morocco. Thus, Spanish Muslims have forged a solid and complex network of connections among the neighbors of El Principe that stretch across the border into Morocco. The influence of the Muslim religion has altered the urban landscape, for there is a strikingly high number of Mosques in relatively compact space, which characterize the outline of the district and distinguish it from the rest of the exclave.

Finally, the adoption of Moroccan traditions is ubiquitous throughout the district. In fact, during my interviews, El Principe was always associated with Morocco and even referred to as a "Little Morocco," both by Spanish Muslims and Christians.

3.2. Constructive Tactics

Settlers of El Principe chose to reside by the borderland for several reasons. As a neighborhood of arrival, it provided proximity to their relatives in Morocco and a familiar safety net. Due to the limited availability of urban land in the exclave, the cost of living is unaffordable for low-income citizens. Therefore, the unclaimed land of El Principe poses an economic advantage, for by informally settling, they would avoid submitting to the urban discipline and the remittance of licensing fees.

During my interview with Bashir, Vice President of El Principe's neighborhood association, he illustrated the tactics employed to build the district's houses without the authorities' knowledge. He emphasized that the construction process needed to be hidden, to avoid a potential eviction. Hence, to conceal the construction site, migrants would fence the area with corrugated metal sheets. After establishing the first floor, the metal sheets would be removed, revealing the improvised façade raised undercover. The erected house constituted a residence, legally impeding the authorities from forcing eviction.

The community support played a fundamental role. The constructions were achieved collectively, with the assistance of the neighbors in finding, assembling, and transporting materials, sharing tools or their constructive expertise, and offering temporary lodging to the family whose shelter was under construction. Furthermore, the dialogue among neighbors is essential to introduce one's house within the urban maze of El Principe. In the neighborhood, the streets do not have names, and the numbering of the houses is informally defined by the residents. Aligned to the organic shape of the improvised streets, newcomers

would occupy the next available land plot. Should they have relatives, the new family members would be offered a division of the preexisting family plot or an extension of the construction. Thus, as depicted in Figure 2, unfolding along the main streets crossing the district, the neighboring communities constituting El Principe were formed.

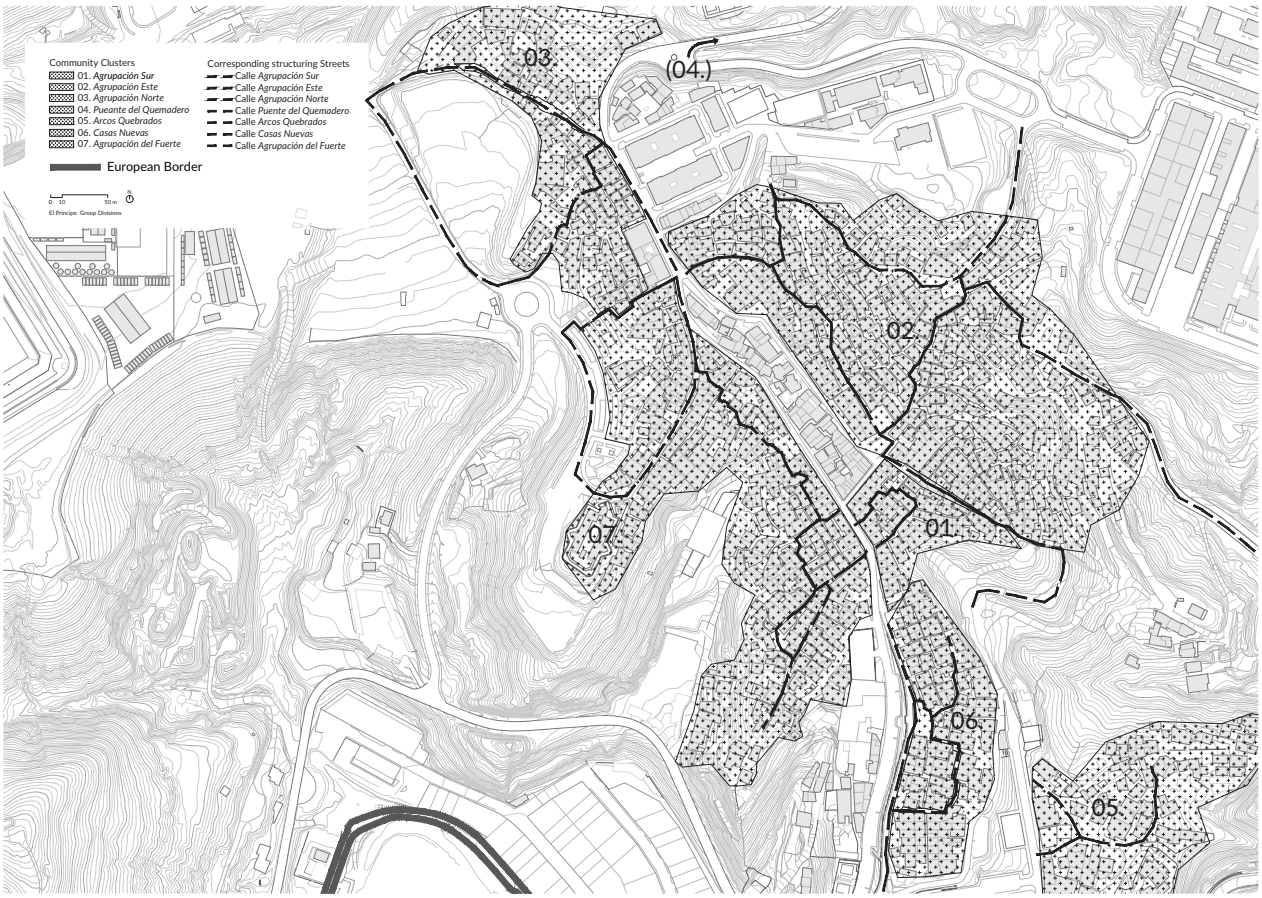

Figure 2. El Principe's expansion and formation of the neighborhood communities constituting it. Made by the author.

3.3. Seeking and Customizing Space

The spatial limitations shape construction, lending buildings a constant "work in progress" appearance. Spanish Muslim families are typically numerous and present a higher birth rate (32,5%) than Spanish Christian families (7,8%; Instituto Nacional de Estadística, 2023). Often, to accommodate large or expanding families, spatial extensions to buildings are required. The building typologies of El Principe reveal two constructive techniques that demonstrate spatial expansion, both in the open possibility of developing in height or horizontally. Constructively, to have the option to raise the building one floor to host future generations, rebar is left exposed, protruding out of the concrete for future structures to eventually be attached. Making complete use of the space is evidenced in the floorplan, as distances between houses barely reach 80 cm, forming corridor-like allies throughout El Principe. Generally, additional stories expand on the surface area covered by the ground floor in search of a horizontal expansion, further constraining the narrow alleys.

Other spatial appropriation and belonging tactics can be observed through El Principe's construction. Since the district has grown as an informal settlement, it is not determined by any compulsory typology or urban alignment. Accordingly, residents are unrestrained in personalizing their houses and, in doing so, claim the space as a product of their own. However, in many cases, it does not rely on the dwellers' design inclinations but on the availability of materials, largely smuggled from Morocco, or repurposing discarded material from the streets.

Constructive elements utilized to customize the dwellings are diverse, including metal window lattices ranging from simple, vertical bars to the more intricate with golden, organic shapes. The houses' skirting represents another customizable element, often adorned with glossy tiles, bricks or stone cladding, or coarse plaster painted in vibrant colors. Here and there, doors and window frames are carefully enhanced with stone-like materials, tiles, or covered by an array of shingles.

Figure 3. Constructive tactics at El Principe. (a) El Principe's eastern sight depicts its under-construction character and alley, (b) revealing the horizontal expansion thanks to cantilever beams; (c) exposed rebars; and (d) the corrugated metal sheets concealing the construction process. Photos by the author.

3.4. Illegal Activity and Drug Smuggling

The Spanish Muslim community, isolated from the rest of the exclave, together with the closed urban structure of the district, has enabled the spread of illicit narcotics trafficking. Hashish is transported from Morocco to the Peninsula, whereas benzodiazepines travel from the Peninsula into Morocco. Moreover, the district hosts the traffic of weapons and humans. Due to the steep school dropout rates (54,8% according to the EPA; Instituto Nacional de Estadística, 2023), and the meager employment opportunities available to the youth, they fall prey to drug related activity, where there are higher possibilities to earn money and the required skill set is minimal (Jiménez Gámez, 2019). Alas, two dominant drug gangs proliferate in the impenetrable urban maze of El Principe. The fight between the gangs to gain territorial control takes an urban character as it involves street confrontations with firearms and bladed weapons, shootings of rivals' families, or setting fire to urban equipment, such as garbage containers or abandoned cars and vans. Thus, along with this illegal activity comes a high level of violence, which has progressively embedded itself in the district, ultimately hindering its potential re-integration into the exclave's urban structure.

Despite the urgent need for security, in 1998, the municipality eliminated the police station from the district, provoking a gradual rejection of the security forces. Should the police enter El Principe, they are often ambushed and pelted with a barrage of stones (Testa, 2022). The intricate urban structure of the neighborhood, with its narrow streets and dead ends, does not facilitate the officers' actions. The defying attitude towards authority has increased proportionally with the establishment of the drug gangs and the removal of the police station. The lack of protection there, where it is most needed, stands in stark contrast to the extensive police presence in the city center, where violence is the exception. The elimination of the police station further demonstrates the municipality's contempt towards the border district, allowing the spread of violence and relegating it to the margins of authority.

4. Gray Spacing Strategies Implemented by the Municipality

Having disregarded the borderland for so long, the expansion of the district has devolved into an increasingly convoluted challenge to address on an urban and social scale. Since the 1992 master plan, the municipality has superficially attempted to provide a solution to the district's segregation, rather than structurally addressing it. As explained in the following points, the lack of an accurately defined land registry or the implementation of partial plans and master plans, inherently represent gray spacing policies and contribute to the general neglect of the borderland, exacerbating its socio-spatial segregation.

4.1. The 1992 Master Plan

Almost 50 years after the implementation of Muguruza's master plan, corresponding with the aftermath of the law on foreigners (Cimadomo, 2023), the 1992 master plan was enacted. The plan's memoranda criticized the obsolete conditions of the housing stock and described the dwellings' constrained size which ranged from 30 to 60 m^2. Striking was the uninhabitability of the homes. A significant number lacked the bare minimum of amenities: 21% did not have a bathroom, 10% were missing a toilet, and 35% did not have hot water (Ayuntamiento de Ceuta, 1992).

As aforementioned, Muguruza's plan did not pay particular attention to the soaring number of shanty towns developed in Campo Exterior. Consequently, in 1992 the problem of urban informality was still present. Although it was widespread, it was particularly acute in the border districts of El Principe and Benzu. Furthermore, the memoranda highlighted the absence of essential municipal utilities in the border district, which provoked serious social problems: cultural exclusion, a rising level of delinquency, and a decline in formal education standards (Ayuntamiento de Ceuta, 1992). Seeking a solution, the municipality regarded eradicating shanty towns and substandard housing as its primary goal, explicitly stressing the urgency in El Principe. Regardless of the determination with which the municipality endeavored to improve the district's conditions, the border remained excluded from the analysis (Cimadomo, 2023), and these plans never surpassed the paper format. Accordingly, the shanty town of El Principe consolidated itself and continued growing informally.

4.2. Partial Plans Blocking the District's Expansion

Seeing the difficulty in addressing El Principe's informality and improving the social housing shortage the city still encountered, in 2007, the Spanish government, through its prime manager of public land at a national level (SEPES), and in collaboration with the municipality of Ceuta, approved the construction of subsidized housing, "Loma Colmenar," at the northeast side of El Principe (SEPES, 2015).

The promotion of these housing blocks aimed to widen the inventory of public housing in Ceuta. Allegedly there should have been an open process by which citizens with disadvantaged social backgrounds could apply to rent an apartment for an affordable price but not purchase it, for the Ministry of Development, would retain possession. However, the regional Deputy Minister of Housing ignored it and opaquely manipulated the list of housing beneficiaries, causing tremendous controversy, for he disregarded citizens with legitimate housing demands ("La asamblea impulsa una comisión de investigación," 2015; "Loma Colmenar: Legalidad, transparencia y justicia," 2015). Moreover, many residents of El Principe were unable to access subsidized housing, for they remained unregistered, thus unable to leave the district.

Loma Colmenar's location followed the urban equipment demands expressed in the 1992 master plan, destined to overcome the deficiencies of El Principe (Ayuntamiento de Ceuta, 1992). In addition to increasing the social housing offer, and providing urban equipment, as the technical architect mentioned during our interview, "Loma Colmenar attempted, in a structured manner, to set limits to El Príncipe." As Figure 4 illustrates, the northeast side of El Principe is effectively blocked by Loma Colmenar.

Thanks to the state's assistance, the project Loma Colmenar increased the social housing offer in the exclave, for the municipality alone could not have provided the financing. Although the project tackled the social housing shortage, rather than fundamentally addressing the urban deficiencies in El Principe, it functioned as a superficial solution, for it did not grapple with the informal urbanism. Moreover, the municipality's mismanagement heightened the project's failure and demonstrated its inability to include the border district.

4.3. Who Owns This Land? The Military or the Municipality?

During my interview with the City Architect, Jose Pedro Pedrajas, he explained that the municipality had permitted the widespread informal urbanism simply because they did not know which territory belonged to

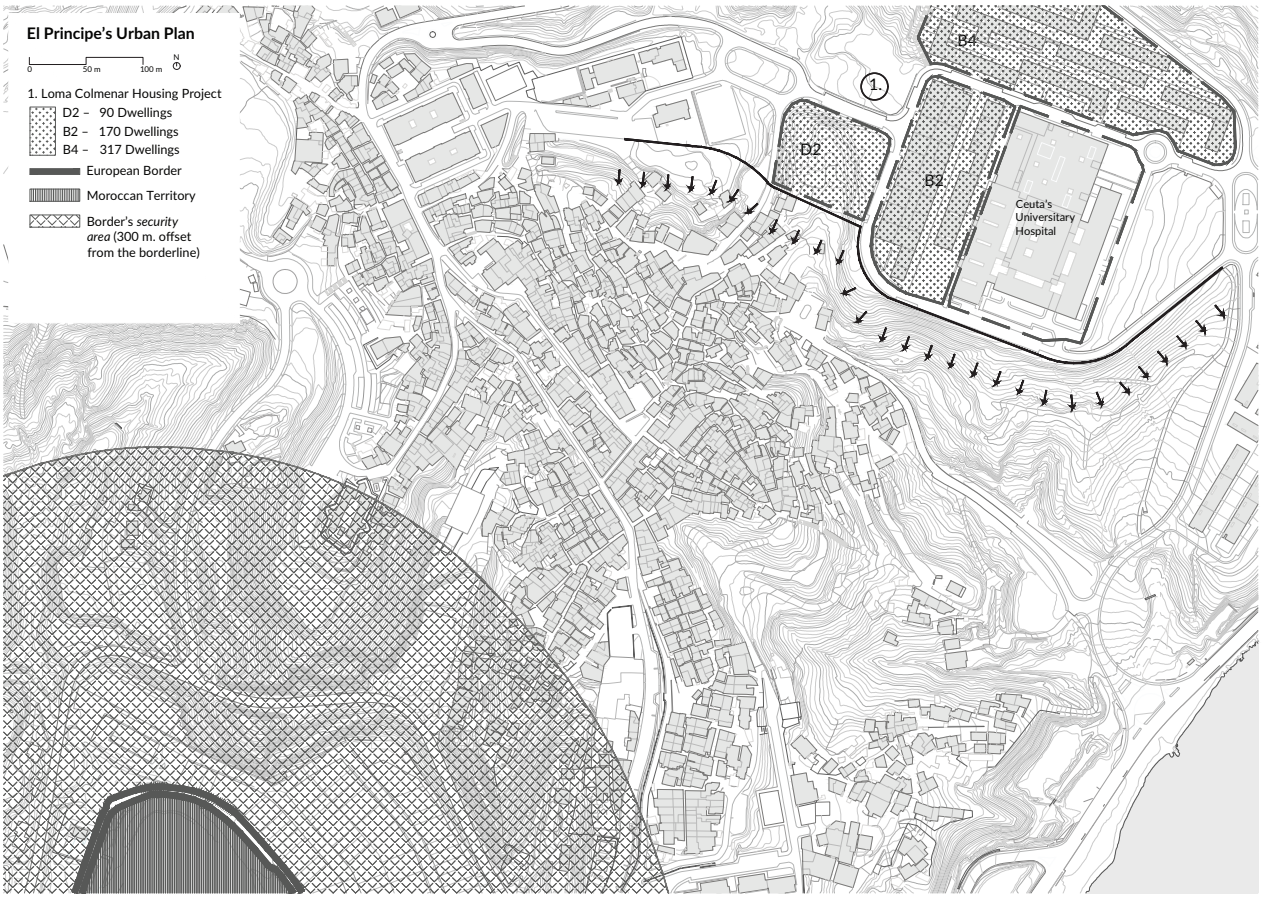

Figure 4. El Principe's urban plan, the Loma Colmenar project, the border, and the border's security area. Made by the author.

them. Referring to El Principe, he stated: "It was a disaster. The city could not exercise its power of urban discipline over their territory because there was no municipal inventory defining what our properties were."

He further clarified that the municipality's lack of awareness resulted from the district's situation at the borderland, for allegedly, during the Protectorate, the Ministry of War had control over it. Therefore, the municipality neglected any responsibilities over the land. Analyzing the evolution of the land registries focused on El Principe, Jose Pedro Pedrajas' statement is called into question.

The first land registry, dated in 1868, clearly illustrates the territorial limits of each plot, demonstrating the distribution of the land among several owners, whose names were handwritten, as is the case of the municipality (Ayuntamiento) and the engineer military troops (Cuerpo de Ingenieros). The 1922 land registry followed a color code in which yellow represented the city council and gray identified the military. As Figure 5 demonstrates, the land distribution and the plots' geometry hardly varied from 1868 to 1922. Again, in the following land registry (1934), the division of the territory remained unaltered. Although the land limits of both the military and the municipality were well-determined from 1868 until 1934, after the civil war, the forms of government alternated from a military regime to a democracy. Also, Morocco shifted from a subject of the Spanish government to an independent nation. However, the fact that the plot geometries were clearly delineated challenges the City Architect's statement regarding the municipality's lack of clarity.

Figure 5. Land registries' evolution based on the municipal archive's maps, delineating military and municipality territories, illustrating the border and superimposing El Principe's current extent. Sources: Espinosa de los Monteros (1868); Alto Comisariado de Ceuta (1922); Instituto Catastral Geográfico y de Estadística (1934); Ciudad de Ceuta (2007). Maps edited by the author.

Finally, in 2007, the last land registry was drafted. For 73 years, Ceuta depended on a parcel plan defined before the civil war. How could it be that despite the almost unaltered state of the plots, no authority claimed the territory? Also, why was no effort made to draft a land registry that could define sovereignty over the property?

One possible answer could be that no government agency was interested in land adjacent to the border, spatially excluded from the city center, covered with barracks and shacks. No authority desired to recognize El Principe as theirs, for then they would be forced to confront the inherent problems at the borderland. Naturally, this consolidated the district's situation at the margins of authority and paved the way for increased gray spacing policies to be implemented in El Principe.

4.4. The 2021 Master Plan

The lack of interest the municipality has shown in its property has contributed to the ongoing abandonment of El Principe. Residents will continue to appropriate the space irregularly and reside in informal settlements at the borderland, further reproducing the social deficiencies associated with the lack of urban planning.

The problem can no longer remain unchecked, and action to address the situation is urgently required. The new master plan (whose final approval is still pending) has acknowledged the scale of the problem. To provide a plausible solution the municipality has divided the area into 14 sub-sections and plans to build a constructive dialogue with the neighbors (Ayuntamiento de Ceuta, 2021). However, its effective implementation remains in question. In the following excerpt from the interview with the City Architect, he reveals his doubts: "It is going to require extensive management. And I don't know if we're going to be able to move it forward because there's no precedent, there has been no planning in the past years."

Other supra-municipal agents, such as the EU, the Moroccan, or the Spanish government, influence the municipality. While, admittedly, their leverage is minimal, it is also their responsibility to firmly demand change to eradicate Ceuta's socio-spatial segregation. Despite acknowledging the urgency with which the district's urban problems should be addressed, the architect's excerpt questions the municipality's capacity, which suggests the lack of hope in El Principe's potential to improve and its resulting virtual abandonment.

5. Conclusions

By acquiescing to the policies derived from Ceuta's border character, the municipality has completely submitted to Fortress Europe's agenda. In doing so, it has devoted itself to maintaining the border infrastructure rather than exert its potential to address urgent issues affecting the borderlands' residents. Having surrendered El Principe to the border, the district has virtually become an extension of it, as it is spatially segregated, and host to an excluded and stigmatized population group.

Considering the socially reproduced phenomena borders generate, embodying the threat of the Other (van Houtum & Strüver, 2002) and segregating society, in the eyes of Spanish Christians and even the municipality, El Principe is no longer part of Ceuta but an extension of Morocco. This shift of the social boundary, from the border to El Principe, is confirmed by the sentiment of otherness the city center experiences towards the border district. What is more, the presence of the wall, reinforces the notion of the perceived otherness the wall itself purports to protect the exclave from.

By living informally, citizens of El Principe remain unregistered, disenfranchised, and de facto ignored by the government and the municipality. However, in the authorities' abandonment, they have constructed a community and a self-sufficient district. Moreover, in the face of its ongoing exclusion, inhabitants of El Principe resort to the Moroccan hinterland for the support they do not receive from the municipality or the Spanish government, overlooking the authorities and gradually isolating the district. Thus, Spanish Muslims' informal daily practices proved their complete emancipation from the municipality, socially and spatially. Understood as political acts (Darling, 2017, p. 189), migrants' spatial appropriation and construction of their community space suggest "minor critiques of the categorization of citizenship" and the question of who is legitimate.

As opposed to the municipality seeking dialogue with the border districts to address their many urban and social issues, as have been described in master plans such as the 1992 or the pending 2021 proposal, it only puts forward superficial urban policies to contain its growth, as the Loma Colmenar project demonstrates. What is more, its inactivity has left colonial urban policies in place and unchecked, prioritizing the center to validate the Spanish Christian dominance and neglecting the border districts. This ultimately contributes to the formation of a segregated society and confirms that urban planning can be manipulated to exclude populations. Amid the exclusion El Principe citizens experience, they have developed an autonomous community and, in the words of Baumann (2016), constructed their ethnonational space, yet, simultaneously, they have gradually fenced themselves off from the rest of the exclave.

In view of the fact that the population of El Principe has expanded exponentially, it is striking that the municipality has altogether relinquished its authority over the borderland. Naturally, this demonstrates a form of victory for the weak, for migrants, with their flexible spatial tactics, have seized control over the border district, adjusting to the opportunities found in the fissures of the imposed power and manipulating space to their needs (De Certeau, 1984). However, rather than undermining their socio-spatial exclusion (Baumann, 2016), migrants' everyday spatial practices have added to their further seclusion from the center and the reproduction of the border.

This reveals the intentionality of the authorities in constructing borderlands. Maintaining the infrastructure of the border and thereby further reproducing the problematic conditions that define El Principe's abandonment is a more sustainable, cost-effective mode of conduct than addressing the deep-rooted issues of the border districts. The authorities' prioritization of the border infrastructure, in contrast to the deliberate deprivation of the districts of much-needed aid, only stands to bolster the wall as an object emanating representative power (Brown, 2010). Sennet's (2006) position on borders as spaces that unfold at the limits of central control is thus confirmed and expanded, for it is precisely at the limits of Ceuta where authorities scramble to impose a representative infrastructure for their central dominance. The wall and the implementation of gray spacing policies will, in time, uphold the alienation of the borderland and socio-spatially multiply the polarizing effect of the border.

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ARTICLE

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Economic–Sanitation–Environmental (Dis)Connections in Brazil: A Trans-Scale Perspective From Minas Gerais State and BH Microregion

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Abstract

Brazil's economic, environmental, and infrastructural landscape is characterised by local and regional inequalities, particularly evident in Minas Gerais state and the municipalities surrounding its capital, Belo Horizonte (BH) microregion. This research examines three primary domains: (a) economic metrics such as GDP per capita, wages, and formal employment; (b) the availability of clean water and sewage systems; and (c) the frequency of emergency decrees. It aims to ascertain whether these factors can delineate economic, health, and socio-environmental divides within the BH microregion and between its urban and rural areas. Economically, a pronounced gap exists between GDP growth and wage stability, underscoring disparities between the BH microregion and the broader state. While the BH microregion boasts higher salaries and GDP, it also grapples with a heightened cost of living. Disparities in water and sewage infrastructure are stark between urban and non-urban locales, with the latter often lacking access. Emergency decrees are correlated with municipal GDP, with lower-GDP areas experiencing more crises, albeit to a lesser extent in the BH microregion. Cluster analysis reveals a nexus between frequent emergencies, lower GDP, and improved access to water and sewage services. Addressing these challenges requires comprehensive public policies to foster local well-being and alleviate economic, infrastructural, and environmental disparities within both the state and the BH microregion.

Keywords
Brazil; development studies; drinking water; emergency declaration; Minas Gerais; regional planning; sanitation infrastructure; sewage coverage; social inequalities; socio-environmental justice

1. Introduction

Boundaries serve to delineate entities, spanning from physical bodies to constructed edifices, from local neighbourhoods to sovereign nations. Their demarcation not only separates distinct units but also establishes the framework for interaction within the shared socio-spatial environment across various scales and dimensions (Vis, 2018). Even when boundaries are clearly defined by one entity and understood by others in proximity, this does not necessarily imply an equitable distribution of control within the broader spatial context. The mutual formation of boundaries often reflects asymmetrical power dynamics, shaping the parameters governing the flow or obstruction of resources, such as people, finances, infrastructure, and services (Iossifova et al., 2020; Santos, 1996).

Furthermore, influential actors operating at larger scales may exert pressure to maintain or dismantle certain boundaries, thereby influencing local or regional socio-political and economic configurations (Bourdieu, 2014). From a transdisciplinary standpoint, the distinctions between local and regional categories transcend mere physical dimensions, encompassing multiple layers such as legal, administrative, political, economic, and sociocultural factors. These layers exhibit varying degrees of fluidity, allowing for intersections or impositions that underscore the socially constructed nature of scales and the heterogeneous socio-spatial variables that shape them (Marston, 2000).

Illustratively, consider the watershed basin as an ecosystem unit composed of the main watercourse, its tributaries, and the surrounding lands forming the drainage network. While topographical relief morphometrically defines the basin, its dynamic nature arises from geological, climatic, land use, lithological, and vegetative features (Teodoro et al., 2007; Tundisi & Matsumura-Tundisi, 2010), constituting an open system.

Legal delineations of rivers often serve as territorial borders between municipalities or even states and countries within the same basin, impacting their interrelations. The physical boundaries of watersheds establish a regional identity, facilitating the formation of committees, defining their territorial scope, and setting the eligibility criteria for participation. Despite the committee's aim to establish common guidelines for water management, each municipality retains relative autonomy in local development, influencing the power dynamics between larger and smaller spaces. Policies regarding water and sanitation in one municipality can significantly impact downstream counterparts, either positively through responsible environmental practices or negatively through permissive approaches to unsustainable economic activities (Falkenmark & Folke, 2002).

However, lax regulations on land and water use, coupled with ineffective environmental and health institutions, can lead to adverse consequences for downstream areas, from water scarcity to disasters (Jedd & Smith, 2022; Wolf et al., 2023; World Health Organization, 2019). In essence, regional hydro-ecological management cannot supersede the legal boundaries of local administrations, resulting in a complex interplay

of power dynamics favouring politically and economically dominant actors across different scales (Arrojo-Agudo, 2021; Heller, 2020, 2022). Local governments which are sympathetic to the delegation of public water and sanitation service management to the for-profit actors legitimate three privatisation goals: (a) amplify these actors' political influence and maximise their profits; (b) legitimise their natural monopoly, which is an opportunity to increase prices, neglect quality and reduce costs; and (c) create an imbalance of power in the relations of these actors with consumers and with the state that provided them a long-term concession. Such overlapping aspects undermine the human right to water and sanitation (Arrojo-Agudo, 2021; Heller, 2022). Poor or economically unequal countries are the spaces where such issues frequently occur.

While some Brazilian social policies have mitigated income inequality (e.g., Bolsa Família programme), challenges persist, especially in the realm of economic development, access to public services, and resilience to disasters (Gobetti, 2024). Analysing multidimensional poverty necessitates an integrated approach, combining economic data with indicators of well-being, such as sanitation access and susceptibility to hazards. The regional/subregional level of analysis would capture the specificities of these dimensions (Fahel & Teles, 2018). As the regional scale being considered gets smaller, the challenges of the municipalities therein become more evident (Góes & Karpowicz, 2019).

By examining these aspects within the context of the Minas Gerais (MG) state, which shares geographic and demographic characteristics with the rest of the nation (Institute of Applied Economics Research, 2012), insights into hidden processes at the national level can be gleaned. In this study, we examine socio-spatial disparities across three key dimensions: economic dynamics, infrastructure development, and emergency management. We focus on the state of MG and the Belo Horizonte (BH) microregion, contrasting multiple socio-spatial units and tracing their development over time.

This study's three key dimensions are intrinsically linked to specific Sustainable Development Goals (SDGs), reflecting their profound significance in achieving global sustainability. First, the examination of the economic variables (GDP per capita, average salary, and admissions and dismissals of formal work) aligns directly with SDG 1 (no poverty), SDG 8 (decent work and economic growth), and SDG 10 (reduced inequalities), as these elements are fundamental to addressing economic disparities and fostering inclusive growth. Second, the analysis of public access to drinking water and sewage systems is central to SDG 6 (clean water and sanitation), highlighting the critical role of infrastructure in ensuring basic human needs and health. Third, the focus on the evolution of emergency decrees connects with SDG 11 (sustainable cities and communities) and SDG 13 (climate action), underscoring the importance of resilient urban planning and response to environmental challenges. These aspects demonstrate direct linkages to these SDGs and exemplify the interconnectedness of these global goals. For instance, effective emergency management, a key component of this study, indirectly influences other areas, such as public health (SDG 3) and education continuity (SDG 4), producing a cascading effect. This integrative approach underlines the criticality of prioritising these aspects in public policy agendas at all levels to address the multifaceted challenges of sustainable development holistically.

The guiding question of this work is: Are these three sets of variables—GDP per capita, average salary, and admissions and dismissals of formal work; drinking water and sewage collection services; and municipal emergency decrees—useful to identify economic, health, and environmental invisible boundaries? The next

sections of this article are organised as follows: In Section 2, the definitions of concepts such as scale, region, rural and urban are given. Section 3 details the characteristics of MG state and the BH microregion and describes the variables, data sources, and statistical methods adopted. In Section 4, the data and analysis evidencing the boundaries are presented and discussed. Section 5 concludes the article.

2. Conceptual Framing

A region is a junction between territory and the social environment that amalgamates a common history and identity with practices of self-organised solidarity, political rules, cultural repertoires, and economic specificities (Brito, 2008; Santos, 1996). The official definition of a region in Brazil considers it the hierarchical congregation of a set of municipalities, based on the dynamism of their concrete components, which unite and transform them, such as the urban network (Brazilian Institute of Geography and Statistics [IBGE], 2017). A microregion is characterised as pieces of the region that present different economic features (production, distribution, exchange, and consumption) between them (IBGE, 1990). For statistical purposes of regional delimitation as a spatial structure, the IBGE (1990) considers the municipal and state limits established by official political-administrative acts, which means municipalities and states are the units that form microregions and regions. The simultaneous visualisation of the state, microregional, and municipal scales collaborate to identify if one dynamic is reflected in the other, as well as if there are governance issues expressed in anachronistic political and economic mentalities, resulting in layers of inequalities (Gabardo et al., 2021) in employment opportunities, access to infrastructure, and protection against disaster risks.

In the Brazilian geohistorical context, urban and rural spaces are distinct but linked zones. The urban setting is a space moved by capitalist social practices, concentrating the economic, political, and symbolic power that operates social relations dialectically. The main spatial object of the urban setting is the city. The city is an ambivalent form-content that: promotes human densification while segregating its inhabitants; catalyses and quickly circulates wealth, resulting in prosperity for the few while promoting precarious work for the many; encourages network actions while atomises the social movements and social conflicts (Lefebvre, 1974, 2016; Santos, 1985). The city is the locus of various infrastructures, which are technical objects that instrumentalise, enhance, and zone non-material forms of everyday sociability, such as flows of people, contracts, communication, and goods. The gradations of availability and quality of these technical objects in city subspaces make clear the existence of distributional imbalances of well-being (Haesbaert, 2013; Lefebvre, 2016; Santos, 1985). However, the urban goes beyond the city and advances into the countryside. The Brazilian socioeconomic formation of the rural zones expresses the unequal development in the network territory derived from the flows of command and control dictated by the urban processes. Ambiguously, the primary activities (of productive or extractive nature) that capitalist forces exert on the rural zones naturalise non-capitalist relations locally, from denying labour rights to the persistence of slavery-like work (Haesbaert, 2009; Martins, 1985, 1996). Thus, the urban space dynamizes while absorbing the rural zones, forming a *rurban* space (Silva et al., 2002). It is an articulation between extractive activities (e.g., mining, originating from concentrated capital, and participating in the global circuit of commodities, with negative local socio-environmental impact), industry, commerce, and services in the city (Silva et al., 2002) or through agro-industrial complexes connected to the global market, which gives rise to land concentration, expulsion of peasants, and precarious work conditions (Siqueira & Osório, 2001). Due to the outstanding importance of agriculture for the Brazilian economy, the new policies to strengthen family

farming, certifications of sustainable extractivism, and ecotourism also point to a process of rural renovation and empowerment, allowing it to have a less asymmetrical integration with the urban space.

All these aspects are being considered by the recent Brazilian institutional territorial discussions to comprehend the contemporary ways of hybridisations or continuum between rural and urban (IBGE, 2023b). However, the differentiation between these spaces remains, as distinct territories and zones with specific land use policies, financing lines and subsidies, instruments of taxation, etc. One of the relevant territorial dividing lines is the (in)access to water and sewage public infrasystems. Another is the type of susceptibility to hazards. Despite the slow pace of these infrasystems in reaching peripheral urban areas, in rural ones, they are persistently postponed, requiring residents to seek self-provision strategies. While the urban area becomes partially defined by the places where the water and sewage pipes can reach, the rural area, in contrast, becomes partially defined as a place where water provision is made by trucks, direct surface water collection, water wells, or rainwater collection, with unverified potability and requiring rationing strategies, thus resulting in distinct hygienic implications between them. Rural and urban vulnerabilities to natural hazards differ regarding spatial extensions and types of damaged or destroyed objects, each demanding specific response measures and recovery times. The above-mentioned scales and spaces indicate that their boundaries, in some cases, are rigid, constituted by symbolic and concrete walls, regulations, and checkpoints that dictate the prohibited and access zones of (dis)connections between them (Santos, 1985). In others, these limits are fluid regarding the actors, objects, and actions they activate or mobilise.

This study adopts a framework for the analysis of socio-spatial disparities across three critical dimensions: economic dynamics, infrastructure development, and susceptibility to hazards. We conduct a comparative analysis between the scales of the MG state and the BH microregion and scrutinise the urbanisation process by juxtaposing urban and rural areas and tracing their temporal evolution. The economic dynamics analysis examines the relationship among municipal economic activity levels, average salaries, and labour market dynamics, employing the national minimum wage as a benchmark for economic assessment. This approach facilitates the examination of economic disparities and their spatial manifestations. In addressing infrastructural development, our focus narrows to the provision of basic public services, specifically drinking water and sewage collection, and their accessibility to citizens. This analysis underscores the infrastructural disparities between urban and non-urban areas, emphasising the challenges in achieving universal access to essential services. The third aspect scrutinises the local capacity to cope with hazards, assessed through municipal emergency decrees. In Brazil, such decrees are issued only after a disaster has occurred, indicating losses and damages beyond the local capacity to manage. Therefore, these decrees serve as a reliable institutional measure of local resilience (Valencio et al., 2022). After analysing the dynamics of each aspect and delineating the borders between political-administrative scales and urban and rural areas, we present a multidimensional examination of the interplay among economics, infrastructure, and disasters. This aims to identify how economic and infrastructural factors influence susceptibility to hazards.

3. Methodology

3.1. Area of Study

MG is the fourth largest state in Brazil, with 583,513.98 km^2 (IBGE, 2022), equivalent to 2.4 times the size of the UK. This state is divided into 853 municipalities, the greatest number across Brazilian states,

representing 15.3% of the country (see Figure 1). It has a total population of 21,411,923 inhabitants (10.0% of the country) and a population density of 36.5 inhabitants/km^2 (IBGE, 2022). Still, significant variations are observed in its constituent municipalities, with a population ranging from 833 (Serra da Saudade) to 2,315,560 (BH) inhabitants, and population density from 1.3 (Santa Fé de Minas) to 7,609.9 inhabitants/km^2 (BH; IBGE, 2022). As displayed in Figure 1, the territorial area of the municipalities is also diverse, ranging from less than 5 km^2 to over 10,000 km^2, and the urbanisation level ranges from 0.2% to 98.7% of the territory of the municipalities. Hence, MG is an essential state to be studied, as, on one hand, it has the greatest diversity of demographic features compared to other Brazilian states, and, on the other, it is similar to the diversity observed at the national scale (IBGE, 2022; Institute of Applied Economics Research, 2012). Coloured in green in Figure 1 are the 24 municipalities that integrate the BH microregion, where BH, the state capital, is located.

MG state is also an environmental micro-expression of the whole country. In terms of ecoregions, it has three of the six main biomes of Brazil: *mata atlântica* (rainforest, humid, mild temperatures, typical of south and southeast areas and coastal zones), *cerrado* (savannah, dry, warm temperatures, typical of centre-west, southeast and northeast parts of the country), and *caatinga* (xeric shrubland, desert, hot temperatures, typical of the northeast region of the country; Figure 2a). In addition, concerning the distribution of the population, the proportion of municipalities in each population range (according to the official bands defined by IBGE, 2022) is similar to Brazil (Figure 2b). Therefore, by analysing the MG state, one could obtain a first picture of the expected panorama for the country.

Zooming in on the BH microregion, it is the most urbanised, demographically dense, and economically active area of the state: Of the 14 municipalities in the state with over 40 km^2 of urban area, six are in the BH microregion. Hence, it is vital to compare the processes occurring in the BH microregion with those occurring across the MG state to clarify the role of urbanisation. Figure 3 exhibits the spatio-temporal evolution of the urbanisation process. The state capital, BH, at the centre of the map (Municipality 11), was already highly urbanised (blue) in the decade of 1980. By the next decade, the observed urban area (blue and maroon) covered almost the entirety of BH municipality and significantly expanded the urban area of its neighbours. Municipalities more distant from the state capital tend to have lower and later urbanisation. The BH microregion has a characteristic, common to other microregions in the southeast macro-region part of the country, of constituting a space in which the density of productive, financial, technological, and informational investments catalyses a greater urban population contingent and induce metropolization (Santos, 1996). This becomes evident in the way in which the urban features of the state capital merge with the surrounding municipalities, forming concentric urbanisation rings, especially in the west–northwest axis in which the urban territory advanced over rural areas, particularly in the municipalities of Contagem, Betim, Ribeirão das Neves, Vespasiano, Ibirité, e Santa Luzia in the decade of 1990. By the time the economic, infrastructural, and emergency decreeing datasets used in this study started, in 2006, the urbanisation in the BH microregion had already settled, with a concentration in the municipalities close to BH municipality in the west–northwest direction, and the absence of new significant horizontal expansion (i.e., non-observation of significant areas in pink and lime of Figure 3). However, the urban dynamics in the core of the BH microregion penetrate the rural world at the edges, from workers who live in the countryside and work in the city to new technologies coming from urban centres dictating the rhythm of extractive and productive activities in the countryside (Silva et al., 2002).

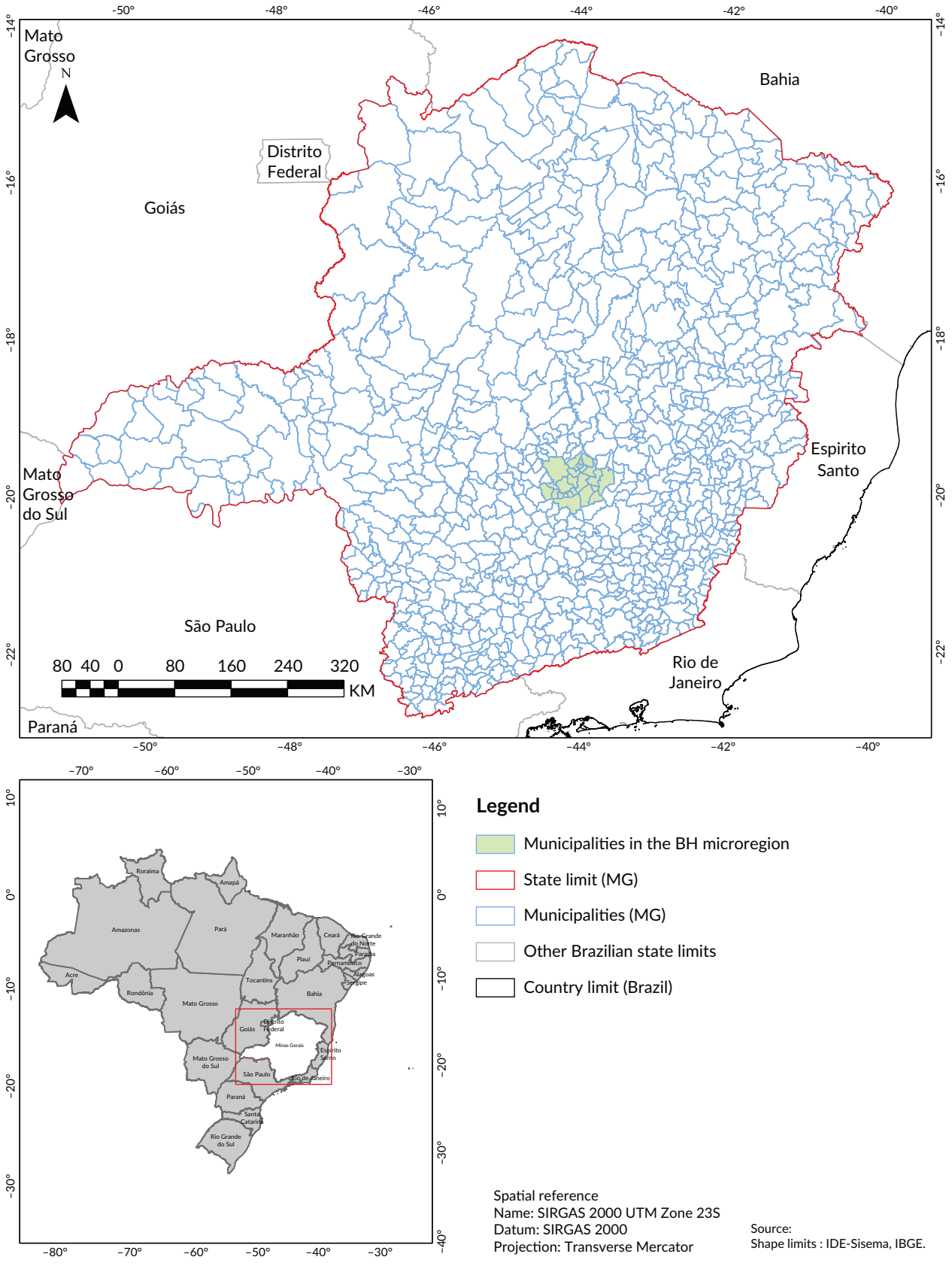
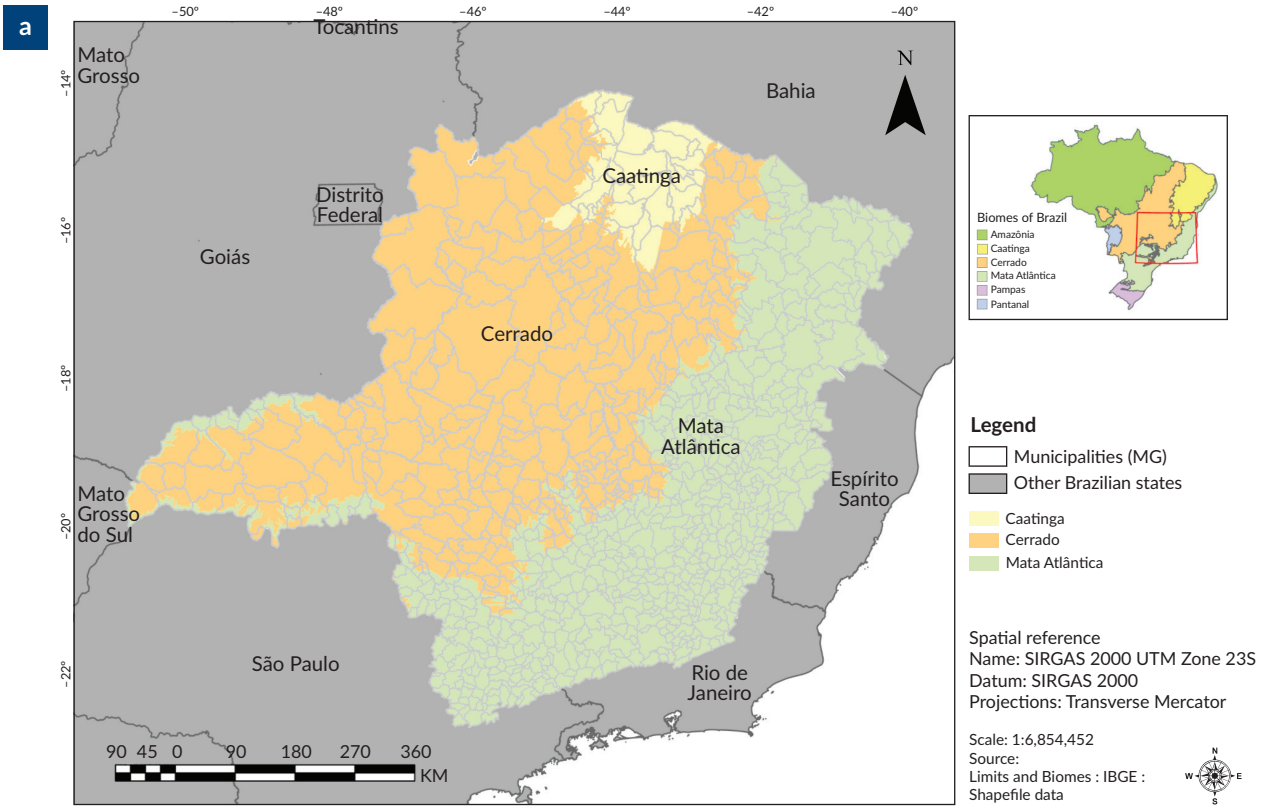


Figure 1. Location of MG state and the BH microregion in the Brazilian territory. Source: Authors' work based on data from IBGE (2023a) and IDE-Sisema (2023).



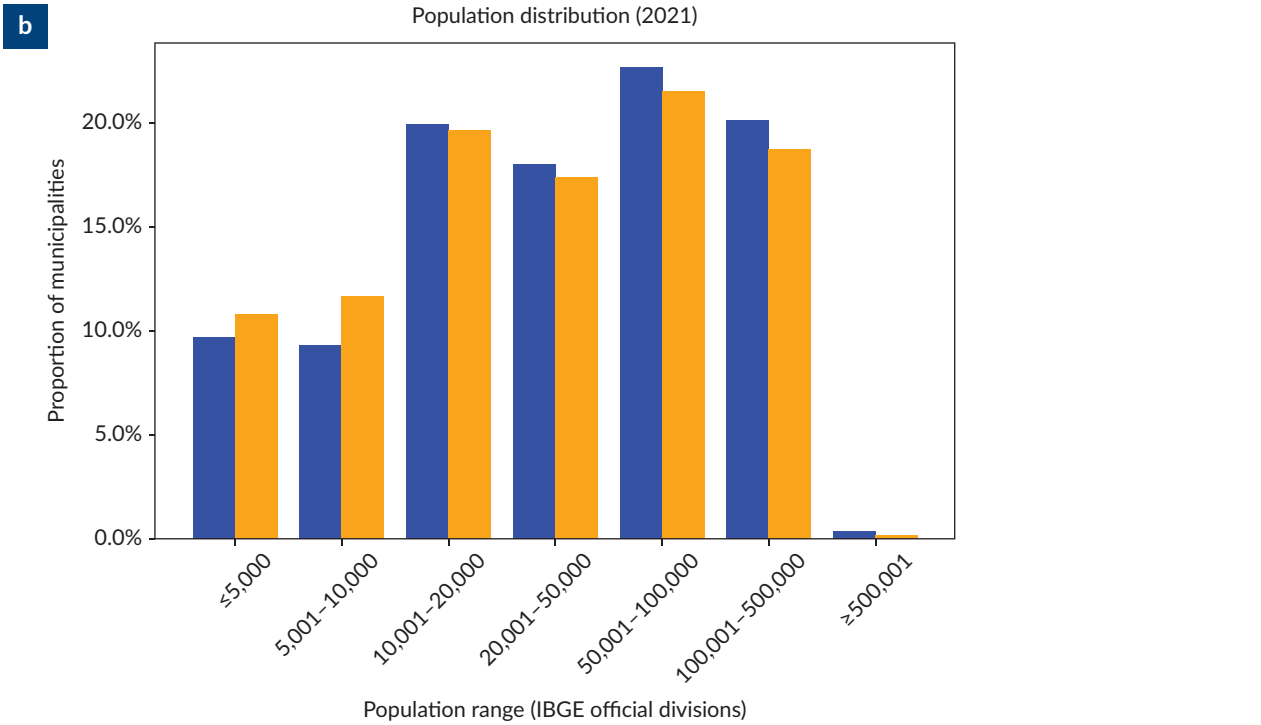


Figure 2. Similar features of the MG state and the country: (a) diversity of biomes in the state, with areas of forest and mild climate typical of south-southeast and coastal zones (Mata Atlântica) and areas of dryland vegetation and warm climate typical of the centre and northeast parts of the country (Cerrado and Caatinga); (b) distribution of population of Brazilian municipalities and MG state municipalities. Source: Authors' work based on data from IBGE (2019, 2022, 2023a) and IDE-Sisema (2023).

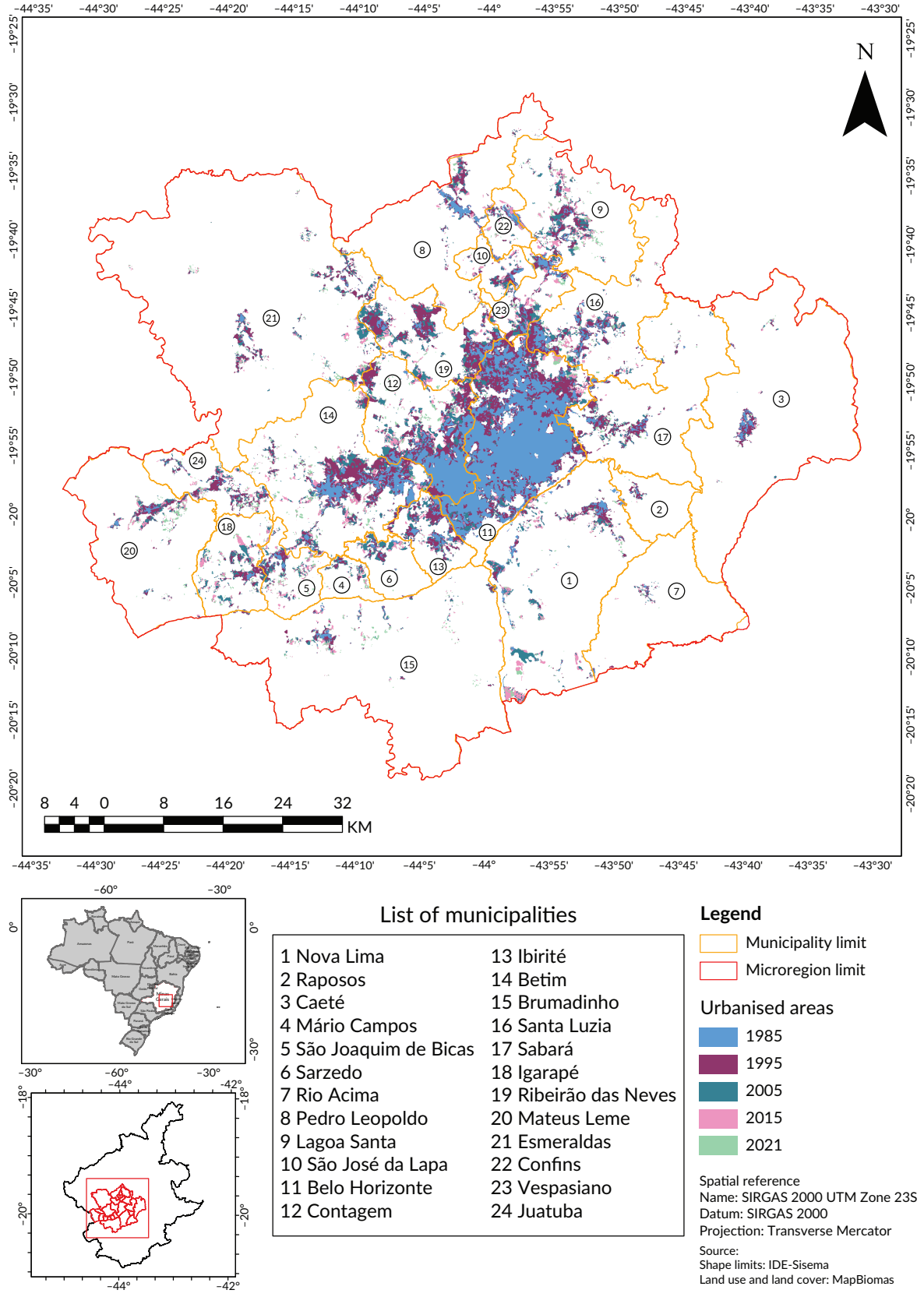


Figure 3. Urban expansion process in the cities of the BH microregion, 1985–2021. Source: Authors' work based on data from IBGE (2023a), IDE-Sisema (2023), and MapBiomas (Souza et al., 2020).

3.2. Variables and Methods of Analysis

To demonstrate the socio-spatial fissures in the three aspects of this study (generating and distributing wealth, availability of drinking water and sewage collection services, and capability to face hazards), open quantitative data, available in virtual databases of Brazilian public institutions, were collected and systematised covering a period of 15 years between 2006 and 2020. The variables described below were selected to analyse the evolution of each aspect of this study.

First, the economic aspect was analysed by the articulation between the variables: total population, GDP, average salary, and admissions and dismissals of formal work. The GDP and average salary were scaled with respect to the national minimum wage. Data for total population refer to the resident population estimate in Brazilian municipalities, produced by the IBGE (2021). Data for GDP are made available by IBGE, in its portal Cidades@ (IBGE, 2022), in partnership with State Statistical Agencies and State Government Secretariats. Data for average salary was also extracted from IBGE's Cidades@ portal, based on its Central Business Register (IBGE, 2023c). Data for the admissions and dismissals of formal work was extracted from the General Register of Employed and Unemployed (n.d.). The national minimum wage historical dataset is compiled by the Inter-Union Department of Statistics and Socio-Economic Studies (2024).

Second, the aspect of the provision of basic public services was analysed from the perspective of two variables: drinking water and sewage collection coverage. The data related to the total and urban population coverage were extracted from the National Sanitation Information System (2023). From the difference between the two, it was possible to calculate the data for the non-urban population coverage. Such information is provided by the drinking water and sewage collection companies (in the Brazilian context, they are institutionally referred to as sanitation companies) and may present significant gaps, particularly concerning sewage collection, which some municipalities have only recently started to inform. To avoid distortions, the analysis of this data is given as the number of informing municipalities in each water coverage/sewage collection level. The sewage collection data analysed here does not contemplate the existence or absence of wastewater treatment facilities in the municipalities.

Third, the aspect of susceptibility to hazards was analysed using data from municipal emergency decrees, sourced from the Integrated Disaster Information System (2023). These decrees, which detail the number and types of associated hazards, offer valuable insights into societal responses to local hazards. Notably, for this study, emergency decrees related to the global Covid-19 pandemic were excluded to focus solely on localised hazards. Emergency decrees serve as more than just legal and administrative tools; they represent significant indicators of societal responses to hazards. Firstly, they officially acknowledge the involvement of various social actors, including residents, businesses, and local administrations, in addressing susceptibility to hazards. Secondly, they signal the escalation of societal disruption, prompting government intervention and resource allocation beyond the conventional norms of democratic accountability. This may involve the imposition of temporary states of exception to expedite response and recovery efforts (Valencio et al., 2022). In Brazil, most emergency decrees pertain to the challenges municipalities face in dealing with hydrometeorological phenomena, such as floods and droughts. This study aims to investigate whether both the MG state and the BH microregion exhibit similar patterns in this regard. Following individual analyses of each aspect and visualisations of their evolution using descriptive plots, the multidimensional association between these aspects was explored.

After analysing each aspect individually, with descriptive plots of their evolution, the multidimensional association between the aspects above was investigated. Scatter plots were employed, with each municipality represented as a point, economic and water/sanitation variables on the x and y axes, and emergency decrees depicted by point colour. To identify clusters within this multidimensional dataset, unsupervised machine learning techniques—specifically Gaussian mixture models with centroids computed by K-means—were utilised (MacQueen, 1967; Reynolds, 2009), implemented using the Scikit-Learn library in Python. The graphical representation of clusters aids in discerning the presence of distinct groups within the data, which may not be immediately apparent from the scatter plot alone. Additionally, it facilitates comparison between cluster features through the centroids, shedding light on their unique characteristics or potential overlap.

4. Results and Discussion

4.1. Economic Dynamics

In Brazil, in recent decades, the economic growth formulas adopted by governmental authorities stimulated private concentrated businesses, some of them through the leverage of the public sector, when considered strategic by the State (Schaeffer et al., 2003). This controversial partnership of the State with big for-profit actors has not always been reflected in an effective improvement in formal employment opportunities and workers' income. Technological innovations appeared in different sectors of the economy, and new forms of financial capitalisation were created that dispense human labour or absorb it through precarious work relations, as in the phenomena of outsourcing and uberisation. Even when there is a salary increase above inflation, the cost of living in the city tends to be onerous because the prices of public services (transport, energy, water, and communication), house financing or rent, food, and the like are readjusted at amounts not compatible with the income. For example, in terms of housing, Góes and Karpowicz (2019, p. 132) find that, in Brazil, "richer regions have higher price levels; conversely, poorer regions have lower price levels. Thus, adjusting for spatial price differences compressions nominal differences in incomes." Another indicative is the expressive degree of indebtedness of Brazilian families (78.3% in March 2023) or the level of default (29.4% in March 2023), according to a study by the National Confederation of Commerce of Goods, Services and Tourism (2024).

Examining the state's economic context, GDP per capita has been increasing in the municipalities, indicating a rhythm of prosperity. The number of impoverished municipalities (GDP per capita < 1.5 minimum wage) declined while the number of municipalities in the highest band increased (Figure 4a). In the BH microregion, the most economically dynamic, the impoverished municipalities also declined, as occurred on the MG state scale. The highest band stabilised in 2012, which was in tune with the national economic stagnation, corresponding to the prolonged economic crisis in the period (Figure 4b).

However, the GDP per capita of the BH microregion remained proportionally higher than the rest of the state, signalling the stabilisation of wealth concentrated in this space compared to the other state areas. Despite the GDP per capita growth, the average salary remains the same throughout the analysed period. The average salary level in the state is concentrated in the two lowest bands (i.e., less than two minimum wages; Figure 5a). Meanwhile, in the BH microregion, most municipalities have average salaries in the medium band, between two and three minimum wages (Figure 5b). However, the cost of living in the BH microregion is higher than in the rest of the MG state, so the citizens do not necessarily experience better conditions.

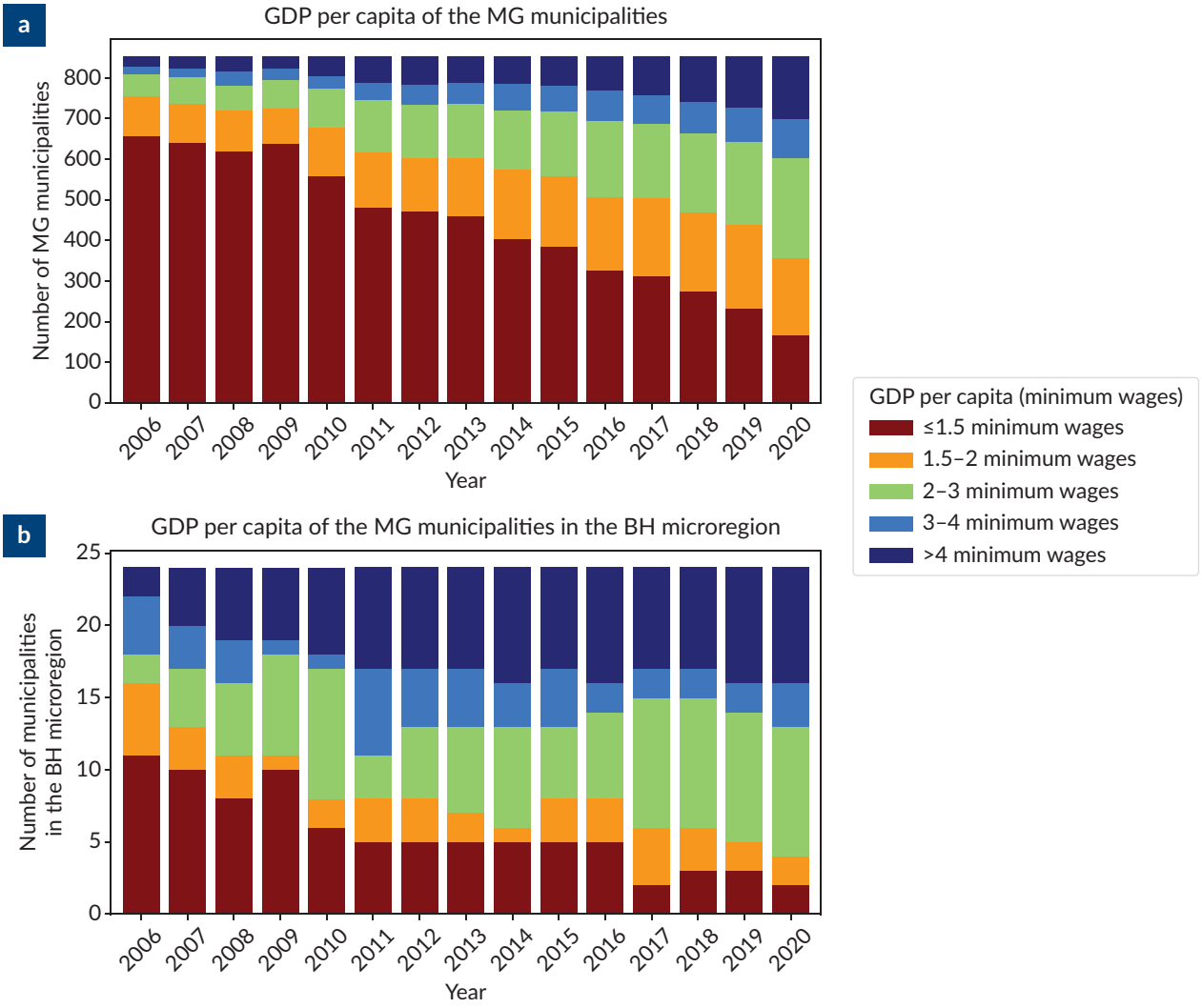


Figure 4. Evolution of the GDP per capita, in national minimum wages, in (a) the MG state and (b) the BH microregion, 2006–2020. Source: Authors' work based on data from IBGE (2022).

In association, Figures 4a, 4b, 5a, and 5b are the reflection of an economically expansionist context in several municipalities, indicating the *rurban* process, in which the cities are the dynamic core that subjects the rural areas, translated to the boundaries between the highly urbanised BH microregion as well as the (mostly rural) remainder of the state. It means that, although the economic boundary between the BH microregion and the remainder of the state exists, as given by the differences in GDP per capita and salaries of Figures 4 and 5, which are indicators of distinct economic dynamics, such boundaries are becoming more fluid, according to the time evolution. On the other hand, some municipalities may be receding in their growth ambitions, either because public finances are limited and unable to trigger policies to stimulate the economic agents constituted there or due to the administrators' lack of interest in attracting new investments to the locality.

Regarding employment levels, the BH microregion witnessed two processes. Until 2011, there was an increase in formal hiring. In 2012–2014, there was a relative hiring stagnation. In 2015–2017, there were more layoffs than hiring, marking a recessive rate. From 2018–2019, a recovery process began compared to the previous one, with more hires than layoffs (Figure 6). No official data has yet been provided after 2019 on a municipal

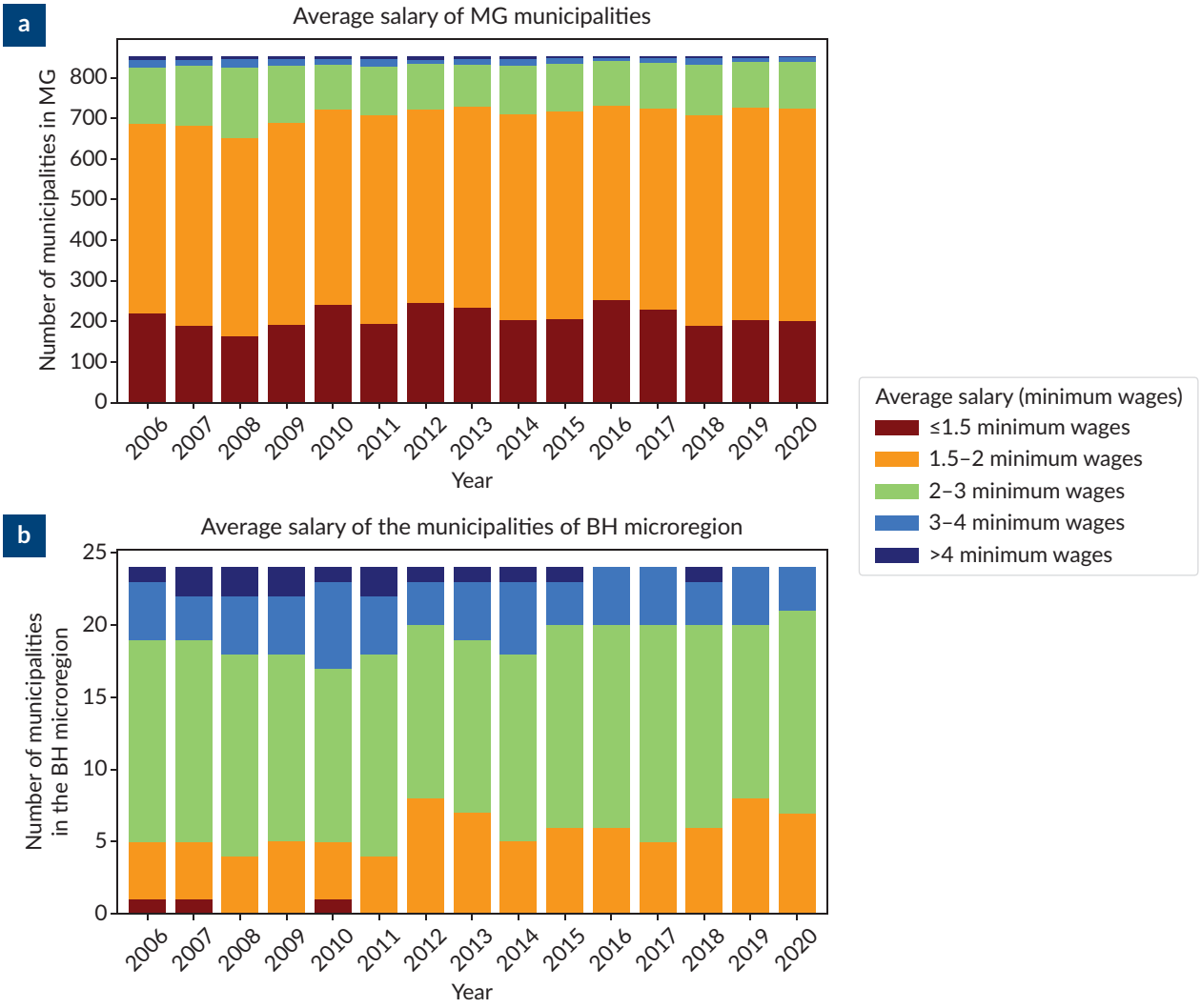


Figure 5. Evolution of the average salary, in national minimum wages, in (a) the MG state and (b) the BH microregion, 2006–2020. Source: Authors' work based on data from IBGE (2022).

scale, but it is assumed that the pandemic context had a negative impact on formal employability. Despite the economic activity level increasing, measured by the GDP per capita growth, this is not reflected in salaries or in local citizens' employment opportunities. However, any loss of momentum rapidly affects the workers through the termination of employment contracts. So, the workers' standard of living progressively declines because employment and wages do not evolve satisfactorily compared to a city that becomes more prosperous.

4.2. Provision of Infrastructure

The second aspect of this study problematises the public commitment to providing drinking water and sewage collection coverage (which, in Brazil, are designated as sanitation services). In this study, we are limited to investigating sewage collection, and not treatment, due to insufficient data on the latter. Regarding drinking water coverage, there is a sharp contrast in the public provision in the non-urban and urban areas of the MG state. While most of the urban population of the municipalities had over 90% of the provision of public water services, less than 50% of the non-urban population in these municipalities have

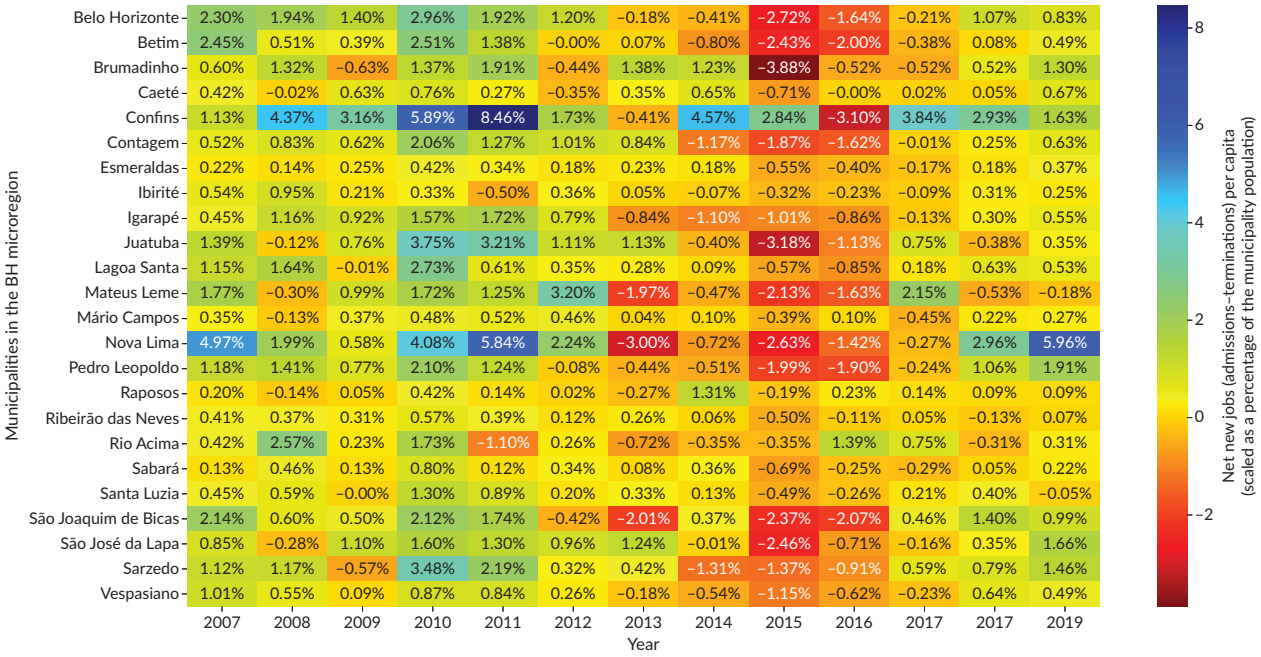


Figure 6. Net new jobs (admissions minus terminations), scaled as a percentage of the municipality population, BH microregion, 2007–2019. Source: Authors' work based on data from the General Register of Employed and Unemployed (n.d.).

access to this (Figures 7a and 7b). However, although small, there is an increasing trend in the water provision to the non-urban population in this state, characterised by the growing number of municipalities in the highest band of water provision to non-urban areas (Figure 7a). This is due to the implementation of local water capture and treatment solutions physically disconnected from the urban infrastructure but still maintained or supplied by the local government, such as artesian wells and water trucks. The same trend cannot be said of the urban population, where the drinking water provision has declined since 2015, with a reduction of the highest band and an increase in the middle bands of coverage (Figure 7b). Looking at the BH microregion, the contrast between a non-urban population with very low access to public drinking water and an urban population with almost total water services coverage is evident, like what is observed in the MG state (Figures 7c and 7d). From the sub-spaces in this microregion, there was also a decline in the water coverage for the urban population in 2015 (Figure 7d), but the increase in the coverage of non-urban areas is not observed (Figure 7c). As the BH microregion is strongly urbanised, the proportion of the total population with access to drinking water is better than in the rest of the state. Still, once the border of the urban and the non-urban population is evidenced, the municipalities in this microregion perform even worse than their state counterparts in providing public water services.

Considering the provision of public sewage collection services, the data informed by sanitation companies presents a more significant number of gaps than in the case of water coverage, which is translated in the growing number of informing municipalities over the years in Figures 8a to 8d. Once again, on the state level, the non-urban population is mainly in the lowest band of public sewage collection coverage (less than 50%; Figure 8a), while the urban population is mainly in the highest band of public sewage coverage (over 90%; Figure 8b), although, in this case, a non-negligible proportion of the urban population is in the middle bands. Therefore, the divide between the urban and non-urban access to public sewage collection services is observed. Focusing on the BH microregion, the contrast between a non-urban population almost exclusively

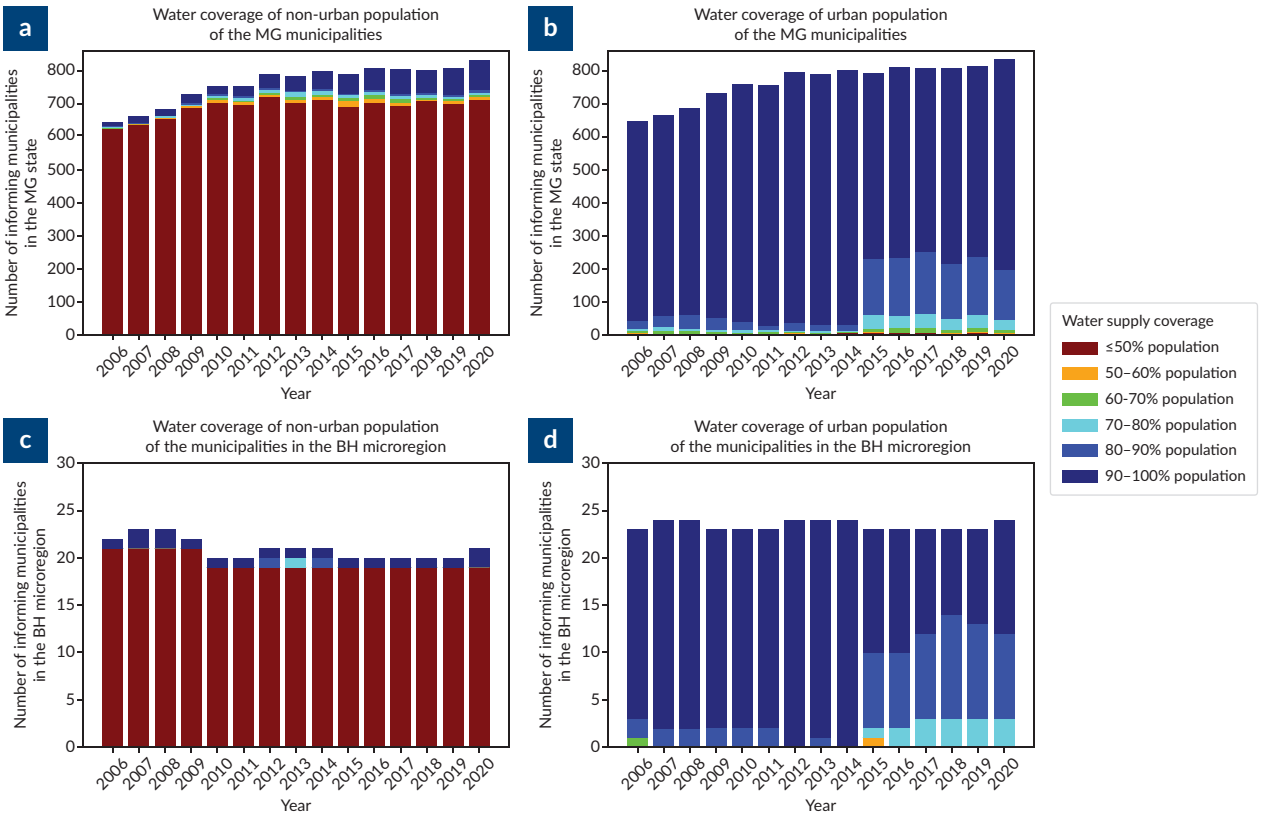


Figure 7. Evolution of public water supply coverage: (a) MG state non-urban population, (b) MG state urban population, (c) BH microregion non-urban population, and (d) BH microregion urban population, 2006–2020. Source: Authors' work based on data from the National Sanitation Information System (2023).

in the lowest band of access to public sewage collection services (Figure 8c) and the urban population with greater access (Figure 8d) is again verified. However, for sewage collection, the urban population in the BH microregion face greater difficulties in obtaining access to public sewage collection than water, with significant proportions in the middle and even in the lowest band of public sewage collection coverage (Figure 8d). This is especially evident after 2015 when an increase in BH microregion municipalities in the lowest band of public sewage collection provision to the urban population (less than 50%) was observed. In other words, water and sewage are important aspects to delimit which social groups, located at different spatial scales, are closer or further away from the human right to water and sanitation. In association, Figures 7 and 8 reflect the existence of an invisible boundary in the human right to water and sanitation between the urban and non-urban groups. From a multilateral perspective, this can be considered a serious violation of the State's obligations to meet the minimum well-being requirements of citizens who remain helpless, as it makes the various and necessary uses of water unfeasible and exposes these communities to aggravated health risks (Heller, 2022). Above all, the human right to water and sanitation must be constantly reaffirmed as derived from the right to a minimum standard of living, which requires not only that infrastructures and services are available to everyone, and at affordable prices, but that any type of existing barriers, such as those of a legal or bureaucratic nature, be eliminated. It is especially concerning to observe, in Figures 7 and 8, the increase in the municipalities at the middle-lower levels of water and sewage coverage in urban areas after 2012. It means that fragmented spaces of lack of access to such services are being born in the cities and an indication that there is a significant imbalance in the material conditions of the inhabitants to live with dignity there. This coincides with the onset time of the economic crisis that affected the country.

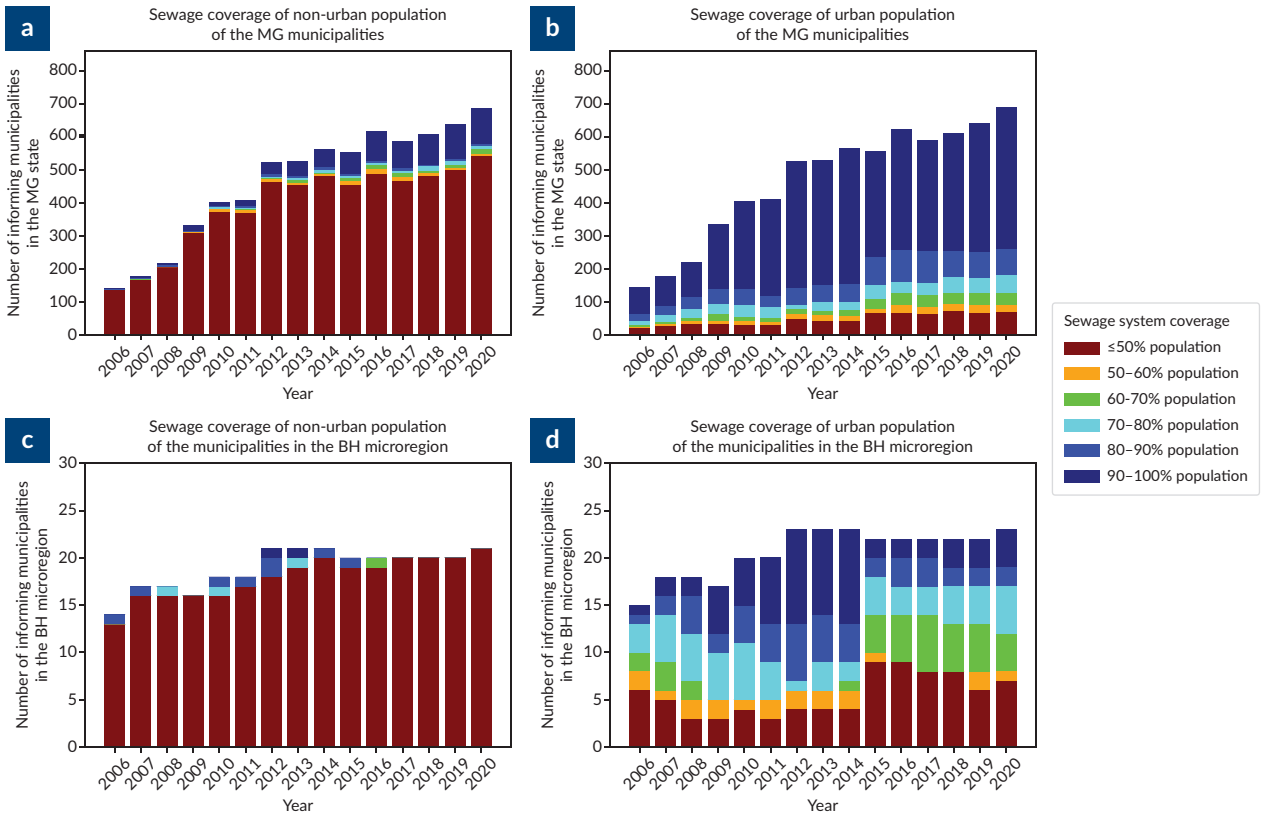


Figure 8. Evolution of public sewage system coverage: (a) MG state non-urban population, (b) MG state urban population, (c) BH microregion non-urban population, and (d) BH microregion urban population, 2006–2020. Source: Authors' work based on data from the National Sanitation Information System (2003).

4.3. Local Susceptibility to Hazards

The third aspect of this study is the characterisation of the local susceptibility to hazards, which is assessed by the evolution of emergency decrees. Regarding the type of hazard (Figure 9a), the most decrees in the MG state are associated with hydrometeorological phenomena, alternating between floods and droughts. This is the same as the national pattern (Valencio et al., 2022). The number of emergency decrees per year in this state oscillates between 100 and 467, which is considerably high for a state with 853 municipalities. An increased susceptibility is likely associated with the limited economic conditions of a municipality to cope with an occurrence, once the damage and losses might be greater than the institutional support capacity, leading to higher chances of emergency decreeing. To investigate this hypothesis, the evolution of the emergency decrees with the GDP per capita of the issuing municipalities has been compared. Indeed, between 2006 and 2019, it is observed that most decrees were concentrated in the lower two bands of GDP per capita (less than two minimum wages; Figure 9b). An outlier was observed in 2020, with a significant proportion of the higher bands of GDP per capita taking over most of the emergency decrees due to the floods in the BH microregion and southern MG state (Figures 9b, 9c, and 9d). The urbanised and economically dynamic BH microregion issued six or fewer emergency decrees in each year of the period, except for the 2020 flood event when 25 emergency decrees were issued (Figure 9c).

The data suggests that there is an invisible boundary between the BH microregion and the remainder of the state regarding susceptibility to disasters, as the first tends to have an emergency decree rate of about

0.12 decrees/municipality per year (excluding 2020), while the latter tends to have a rate of about 0.20 decrees/municipality per year. Unlike the state, the BH microregion shows no association between GDP per capita and the issuing of emergency decrees (Figure 9d), partially due to the close distance of these municipalities to the state capital and the ability to call the state institutional apparatus for support when facing a threat. When disasters happen, the prevailing governmental and media narratives focus on measures taken to rehabilitate the affected people—such as opening shelters and delivering food and clothes to them—and shy away from the improvement of recovery policy, reinforcing a mismatch between the institutional perceptions and the affected social groups' expectations (Schneider, 2008; Valencio & Valencio, 2018). The maintenance of high levels of emergency declaration across the state, often recurrences of the same hazards, indicates this institutional unpreparedness and mismatch with the population's needs and rights.

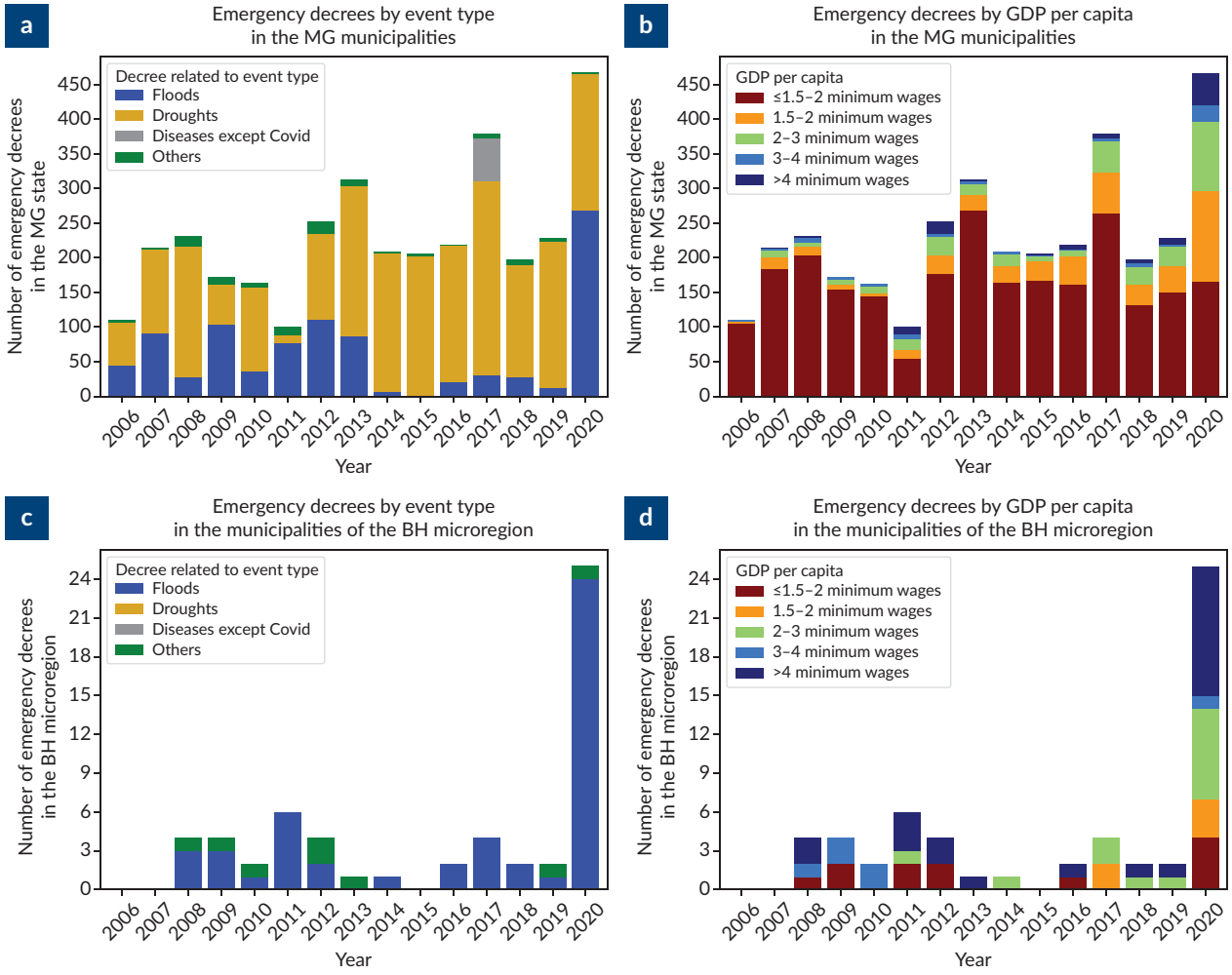


Figure 9. Evolution of emergency decrees evolution: (a) MG state by event type, (b) MG state by GDP of the municipalities declaring an emergency, (c) BH microregion by event type, and (d) BH microregion by GDP of the municipalities declaring an emergency, 2006–2020. Source: Authors' work based on data from Integrated Disaster Information System (2023).

4.4. Relationship Between Economic Dynamics, Public Infrastructure Provision, and Susceptibility to Hazards in MG State

Finally, we investigate how the three aspects—economic dynamics, provision of public water and sewage services, and susceptibility to hazards—are associated in the MG state. Hence, we analyse the distributions through a scatter plot of average GDP per capita, mean total population with public water supply and sewage collection systems, and the total number of emergency decrees in the period (Figures 10a and 10b). Using Gaussian mixture models (Reynolds, 2009) with centroids computed by K-means (MacQueen, 1967), two clusters were identified from the data in both plots. These clusters were also plotted in Figures 10a and 10b,

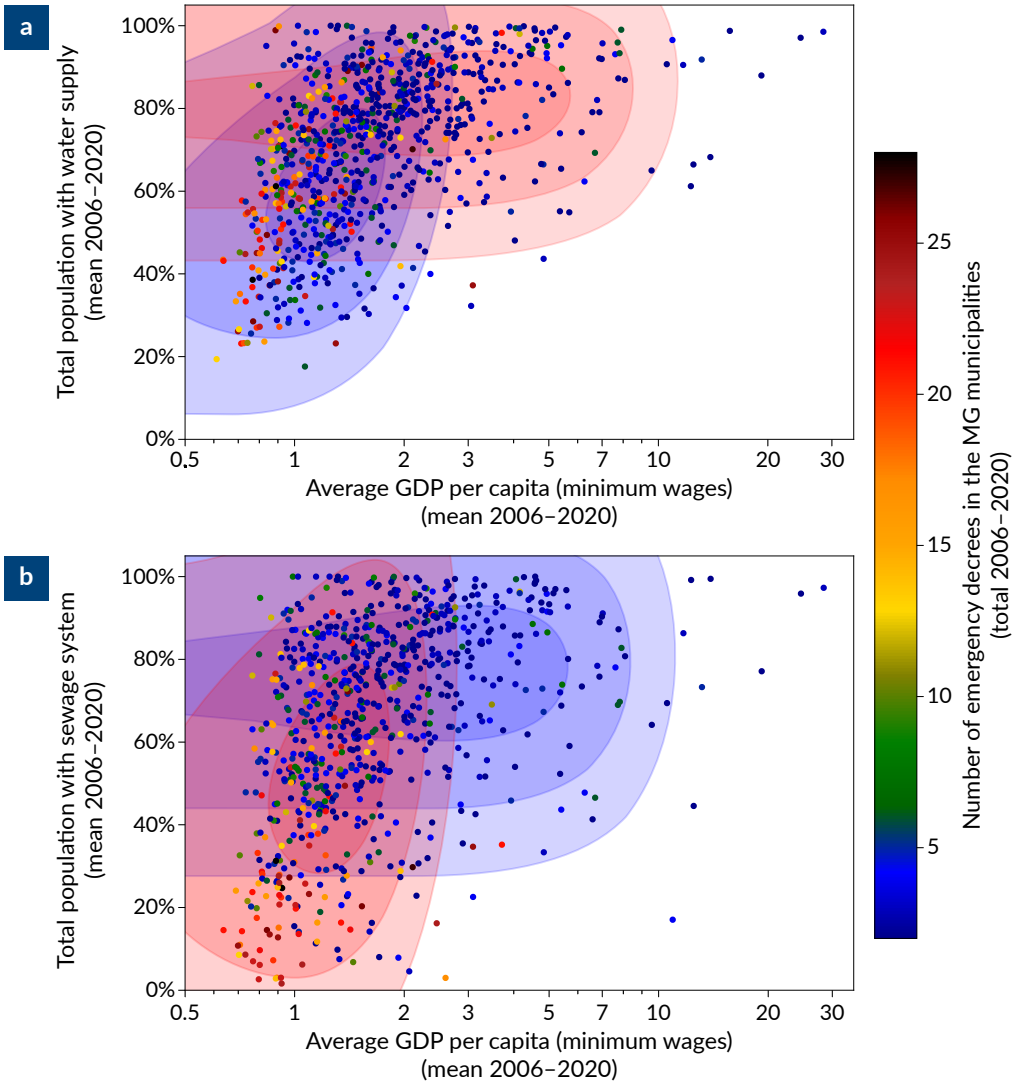


Figure 10. Scatter plots of (a) GDP per capita and public water supply coverage and (b) GDP per capita and public sewage system coverage, both colour-coded by the total number of emergency decrees in the municipality, 2020–2026. Note: The Gaussian mixture model method was applied to the three-variable data of the scatter plot, resulting in the identification of two clusters described by the blue shaded areas (low number of emergency decrees) and the red shaded areas (high number of emergency decrees). Source: Authors' work based on data from IBGE (2022), Integrated Disaster Information System (2023), and the National Sanitation Information System (2023).

with the red cluster being the one that primarily classifies the municipalities with a high number of emergency decrees and the blue cluster primarily classifying the municipalities with a low number of emergency decrees. The concentric rings in the clusters are a proportion of the variance the model considers. The centroid of the red cluster in the relation GDP–water–emergency (Figure 10a) is at [GDP per capita, total population with water, number emergency decrees] = [1.3, 61.5%, 8.9]. In contrast, the blue cluster has a centroid at [GDP per capita, total population with water, number emergency decrees] = [2.9, 81.2%, 2.7]. For the association GDP–sewage–emergency (Figure 10b), the red cluster centroid is at [GDP per capita, total population with water, number emergency decrees] = [1.3, 53.5%, 8.5] and the blue cluster centroid at [GDP per capita, total population with water, number emergency decrees] = [2.9, 76.7%, 2.8]. This means that a higher number of emergency decrees is associated with a lower GDP and a lower provision of public water and sewage collection infrastructure. In addition, the elongation of the red cluster along the y-axis and the blue cluster along the x-axis indicate that, while a higher number of emergency decreeing is more strongly associated with a lower GDP per capita, a lower number of emergency decreeing is more strongly associated with the provision of public water and sewage services. While two clusters with differing characteristics are observed, they superimpose in the low GDP and high water or sewage supply region. Such a combination has both municipalities with low and high emergency characteristics; distinguishing the groups is not trivial. Hence, the priorities of economics and infrastructure public policies should be combined.

The political-administrative borders represented by the MG state, the BH microregion, and its constituent municipalities are geographically well delimited, with territorial borders ensured by legal instruments, official cartography, and public institutional structures. Thus, they can be considered stable systems. Occasionally, there are territorial rearrangements. Contemporaneously, Brazil's and the MG state total areas have been stable, while the BH microregion has been malleable and attractive, tending to incorporate municipalities over the decades. Behind the state and microregional borders, there are environmental and economic *content forms* that operate as open systems, driven by trans-scale circuits related to the climate and the global market, delineating other borders and municipal sub-groups, such as between municipalities susceptible/resilient to disasters or prosperous/impoverished. Finally, water and sanitation infrastructures are material delimiters of the borders between urban and rural areas, but innovative technological and economic approaches could blur these edges in the future.

5. Conclusions

As public management normalises the disparities among sub-spaces across various scales—within municipalities, between urban and rural areas, between municipalities within the same metropolitan region, between microregions in the same state, and between states and the nation—urban borderlands are fortified against the promotion of collective well-being (Iossifova, 2013). This study examines whether variables related to economic dynamics, availability of drinking water and sewage infrastructure, and susceptibility to hazards delineate boundaries beyond territorial demarcations set by political-administrative structures. The conclusion is affirmative, as these variables, whether in isolation or combination, redefine municipalities and zones as spaces of exclusion and inclusion.

For economic dynamics (measured by GDP per capita and average salaries), a notable boundary emerges between the BH microregion (the state capital's location) and the rest of MG state. While significantly higher GDP levels in both areas indicate concentrated wealth and a more dynamic economy compared to surrounding

municipalities, higher salaries in these areas do not necessarily translate to better living conditions, given the elevated cost of living.

In terms of infrastructure, such as access to water and sewage systems, the observed boundary lies between urban and non-urban segments of municipalities, with rural populations often neglected in their right to access these services. Additionally, concerning susceptibility to hazards, distinctions arise based on municipal GDP levels (with lower GDP municipalities issuing more emergency decrees) and between the BH microregion (with fewer emergencies) and the rest of the state (with more emergencies). Examining these variables concurrently reaffirms the association between emergency decrees and GDP, while clarifying the inverse relationship with infrastructure; higher water and sewage supply levels correlate with fewer emergency decrees.

Therefore, essential public policies for disaster prevention should prioritise investments in universal water and sanitation infrastructure and services. This necessitates critical scrutiny of the prevailing government view that privatising this sector is advantageous. Given the inequities in wealth distribution across different scales, for-profit entities in this sector and the residents of these spaces often do not align, given the former's profit motives and the latter's rights. Even state-owned enterprises, like Copasa, are under policies that include permissions for tariff adjustments above inflation in order to incorporate economic-financial compensations and incentives (Regulatory Agency of Water Supply and Sewage Collection Services of Minas Gerais, 2022), aggravating residents' purchasing power decline if there are biases in the consumer payments calculation.

The composite analysis of these variables suggests a potentially vicious cycle for municipalities: Fragile economies hinder public policies' ability to create resilient spaces, especially in the face of known hazards, resulting in setbacks to local development aspirations when disasters occur. This translates to a multidimensional obstacle on the road to sustainable development.

These findings underscore the need to address three objectives—economic development with equitable wealth distribution, expanded provision of water and sewage services, and reduced susceptibility to hazards—through a convergence of policymakers' efforts. This requires a shift from sector-specific approaches to integrated public planning policies, transcending technical boundaries and power dynamics across operational levels (e.g., local administrations, microregions, states, or river basin committees). Synchronised commitments are necessary to achieve associated SDGs and elucidate their interconnections. Since access to water and sanitation is fundamental to dignified living (human right to water and sanitation), prioritising these rights should be the cornerstone of policy discussions, empowering river basin committees and fostering conciliation. Assessing the feasibility of this integrative effort warrants further investigation in future studies.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

Municipal population estimates were produced by IBGE (https://www.ibge.gov.br/estatisticas/sociais/populacao/9103-estimativas-de-populacao.html). GDP data were made available by IBGE in partnership with state statistical agencies and state government secretariats in its portal Cidades@ (https://cidades.ibge.gov.br). Average salaries data were also extracted from the IBGE Cidades@ portal, using the central business register (https://www.ibge.gov.br/estatisticas/economicas/comercio/9016-estatisticas-do-cadastro-central-de-empresas.html?=&t=downloads). Employment statistics data were extracted from the General Register of Employed and Unemployed of the Ministry of Labour (https://bi.mte.gov.br/bgcaged/caged_perfil_municipio/index.php). The national minimum wage historical dataset was compiled by the Inter-Union Department of Statistics and Socio-Economic Studies (https://www.dieese.org.br/analisecestabasica/salarioMinimo.html). The National Sanitation Information System, with municipal data on water and sanitation provision, is available at http://app4.mdr.gov.br/serieHistorica. The Integrated Disaster Information System, with the municipal records of emergency decrees, is available at https://s2id.mi.gov.br.

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ARTICLE

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Planned Socio-Spatial Fragmentation: The Normalisation of Gated Communities in Two Mexican Metropolises

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Abstract

Mexican metropolises, like many others in Latin America, are facing complex challenges connected to rapid urbanisation and population growth. Local governments struggle to provide the necessary infrastructure, housing, security, and basic services in a highly divided—socially and spatially—urban realm. Socio-spatial fragmentation in cities like Guadalajara and Puebla has existed since their foundations in the 16th century, as planning guidelines in the *Laws of the Indies* established differentiated rules for Spaniards and indigenous people. However, in recent decades, neoliberal planning and housing policy reforms, the consolidation of the real estate market, growing crime and violence, and socioeconomic disparities have contributed to more tangible forms of planned socio-spatial fragmentation, such as gated communities. This work discusses how policies and social practices have led to the normalisation of these fortified enclaves in the metropolises of Guadalajara and Puebla, whose capital cities are preparing to celebrate their 500th anniversaries in a context of conflict, loss of shared space, insecurity, and social inequalities. The work is based on a comprehensive review of national and local planning and housing policies, a historical and cartographic analysis of neighbourhood development, and qualitative research in Puebla over a decade, along with similar work in Guadalajara in the last couple of years. The relevance of this work lies in identifying the role of planning in the production of fragmented urban structures and visualising the possibilities for more inclusive solutions.

Keywords

gated communities; Guadalajara; Mexico; planning; Puebla; socio-spatial fragmentation

1. Introduction

Discussions around socio-spatial segregation have persisted in Latin American urban studies since the 1970s (González, 1989; S. Jaramillo, 1979, 1996; Rolnik, 1994; Sabatini, 2006). Literature on gated communities emerged in the global north in the early 1990s, but in Latin America, Caldeira's book *City of Walls* (2000), which describes fear and segregation in São Paulo, Brazil, is one of the region's earliest and most relevant works. Since then, a growing body of literature has concentrated on the negative urban, social, and environmental impacts and the drivers behind these enclaves. However, the academic debate has not hindered the production of these fortified residences in the region. Some consider these spaces will be part of our urban landscape for a long time (Roitman, 2010); therefore, planners and policymakers can embrace the lessons that have come to light since their emergence and proliferation and use this knowledge to accomplish more inclusive and equitable cities.

This article explores the recent proliferation of gated communities in two of the most important metropolises in Mexico: Guadalajara and Puebla. Both cities were founded almost 500 years ago following social and spatial differentiation guidelines. In Mexico, socio-spatial fragmentation did not start with gated communities; fortified architecture, spatial segregation, and social differentiation have been central in the evolution of its cities and society. The accelerated urban sprawl of the last four decades has sharpened these distinctions, particularly around gated communities where physical barriers and social exclusionary practices are standard, while shared public spaces where different social groups could coexist in the past are almost extinct. These metropolises are economically, historically, and socially relevant to Mexico, but they face enormous governance and functionality challenges due to planned fragmented urban and housing solutions.

The article is organised into five sections. The first section presents a general conceptualisation of socio-spatial fragmentation. The second section describes the materials and methods used for this work. The third section is a historical review of the evolution from planned neighbourhoods to gated communities in the Mexican context. The fourth section analyses the origins and challenges of planned fragmentation and the normalisation of gated communities in Puebla and Guadalajara. The final section presents the conclusions and a brief policy recommendation.

2. Conceptualising Socio-Spatial Fragmentation

In recent years, many scholars in Mexico and other countries in Latin America have focused their work on various aspects of social segregation and urban exclusion (Caprón & Esquivel Hernández, 2016; Duhau, 2013; Monkkonen, 2012; Pérez-Campuzano, 2011). This work focuses on fragmentation instead of segregation because "segregation is intended to signal the division of different social classes, which are not necessarily circumscribed by some physical element that delimits them territorially" (Alvarado Rosas & Di Castro Stringher, 2013, p. 17). The research behind this article goes beyond separation by classes; it aims to understand the connections between planning policies and physical barriers, financial decisions, social practices, aspirations, legislation, and infrastructure. The fragmented city is shaped by multiple levels of segmentation, interaction, and differentiation (Harrison et al., 2003), as well as global and local articulations and disarticulations. Gated communities are examples of socio-spatial fragmentation because they encompass all these layers and convey multiple spatial challenges.

Massey anticipated in the mid-1990s that a "new age of extremes" was upon us and that in the future—talking about the 21st century—the affluent and the poor would live and interact only with others like themselves, and "the advantages and disadvantages of one's class position in society will be compounded and reinforced by a systematic process of geographic concentration" (Massey, 1996, p. 409). That vision proved correct, as pockets of wealth and poverty define modern urban arrangements; however, there are differences between regions. The Latin American urbanisation process in the last decades has been scattered and fragmented (Cabrales Barajas, 2004). In this region, urban space can be "socially mixed at a neighbourhood scale, but also more spatially and socially fragmented at the block and street level" (Thibert & Osorio, 2014, p. 1325). This means that there might be spatial proximity between neighbourhoods, yet socially and functionally separated. Thibert and Osorio (2014, p. 1325) claim that "there is evidence that income polarisation and urban restructuring may be associated with an increase in urban fragmentation"; wealthy residents might be spatially close to lower-income groups and still isolated from them.

Socio-spatial fragmentation in Latin American metropolises is also connected to formal and informal urbanisation processes in peripheral land. The informal settlements that appeared during the late 1970s in most Mexican cities' peripheries concentrated low-income families isolated from the benefits of the city. However, these same peripheries received in the 1990s middle- and high-income private developments supported by neoliberal economic policies such as the deregulation of planning and land tenure regulations, the liberalisation of the housing market, and the presence of global financial investments (Morales, 2016). Gated communities became a profitable option because there was a growing demand for a more exclusive lifestyle, but also because the new housing units were surrounded by contrasting urban and sometimes rural surroundings. The new developments provided isolation, privatised open spaces, and facilitated the use of personal automobiles to avoid the inconveniences of the immediate context.

The discussions about gated communities have thrived since the 1990s. Libertun de Duren (2022, p. 100) considers that "today, these walled and privately developed, managed, and policed low-density residential complexes are ubiquitous features of the sprawling metropolis of the region." However, these enclaves are not homogeneous; there are differences between countries and cities. For example, Kostenwein (2021) presents different types of gated communities, including high-density multi-storey buildings that are common in Bogotá, Colombia, while Cabrales Barajas (2004) and Borsdorf and Hidalgo (2010) present examples of low-density options outside the central urban areas, including megaprojects with transnational investment. The gating of modern cities is a symptom of a more complex phenomenon, as Low (2006) discusses in her framework of a "theory of urban fragmentation." The author compares 12 dimensions in three different regions and suggests that there might be differences between them; for example, in Latin America, the role of neoliberal policies, crime rates, and volatile environments are distinctive, but the logic of fragmentation is the same. The challenge is to address the conditions that create social and spatial connections and disconnections. Prévôt Schapira (2001) argues that fragmentation in the Latin American region is connected to the accelerated urban growth process shaped by market liberalisation, informality, unemployment, and urban poverty. However, the gating process in each city changes depending on the different incentives and limitations.

Spatial fragmentation is visible in sprawling cities because mega blocks affect permeability and connectivity and because the landscape is often shaped by gates and walls that protect residential compounds and privatised public spaces (Borsdorf & Hidalgo, 2010; Sobreira & Gomes, 2001; Zaninetti, 2010). The territory is built of "fragments" and "fissures" (Alvarado Rosas & Di Castro Stringher, 2013) that extend beyond the

walls. There are notable differences between housing quality, roads, urban furniture, facilities, and infrastructure in wealthy and poor neighbourhoods. Fragmentation is not limited to residential compounds; there are examples in transit, work, retail, and leisure (Janoschka, 2002). This shows that this fragmented urbanisation model is not an isolated effort; urban planning and policy implementation play a crucial role.

3. Materials and Methods

This work uses the cases of two Mexican metropolises—Puebla and Guadalajara—to explore how planning policies contribute to socio-spatial fragmentation, especially the normalisation of gated communities. It addresses questions such as: How is current socio-spatial fragmentation connected to the history of these cities? What is the connection between "planned" neighbourhoods and the fragmentation of the urban structure in both cases? Also, what are the main structural conditions that facilitated the emergence and normalisation of gated communities in these metro areas over the last decades?

The two capital cities in these metropolises will celebrate the 500 years of their foundation in the coming decades. In both cases, the cities come from a history of social and spatial differentiation but somehow managed to maintain shared spaces for public life. This article aims to identify the connections between this historical background, new policies and practices, and the metropolitan areas' current fragmented urban condition. The article combines the results from over a decade of the author's research in Puebla and recent work in Guadalajara in the last couple of years. The work is mainly qualitative, although some geostatistical information was analysed. The main methods were policy analysis to evaluate the background and outcomes of planning decisions, a thorough literature review to understand the evolution of urban development in both cases, semi-structured interviews to address the perceptions and experiences of different stakeholders, and multiple participant observation exercises in the past year to identify the main elements that contribute to socio-spatial fragmentation.

The comprehensive policy review in both cases included national, regional, metropolitan, and local housing and planning instruments, particularly those published in the last three decades. More than 20 semi-structured interviews were conducted with stakeholders, including city officials, policymakers, residents, and real estate agents, to understand the perceptions and experiences around gated communities. Documental analysis included a literature review of previous research on urban development in these cities and geostatistical information from the National Institute of Statistics and Geography (INEGI). Participant observation was conducted at different moments throughout the last year to observe changes and behaviours inside and around metropolitan gated communities in the municipalities of San Andrés Cholula and Ocoyucan in Puebla and Tlajomulco de Zúñiga and Zapopan around Guadalajara. The observation exercises also included visiting other central neighbourhoods with open street layouts to identify the differences. The observation was supported by photo documentation and notes describing specific social and spatial fragmentation examples and contrasted with historical cartography, satellite imagery, and geostatistical data.

4. Mexico's History of Planned Socio-Spatial Fragmentation

Physical borders, privatised open spaces, and fortified residential and commercial areas shape the urban landscape in most modern Mexican suburban neighbourhoods; however, spatial and social differentiation can be traced back to the foundation of most cities. For several decades, urban studies in Mexico focused on

irregular settlements and the relationship between the centre and peripheries. It was expected to read that lack of planning was the reason for such informality. However, Mexico has had planning guidelines since the 16th century. The *Laws of the Indies*, a compilation of laws by the Spanish Crown, included planning considerations for new settlements that regulated the territory and social and economic activities. Cities were seen as the "cultural transmission core" (Rojas Aguilera, 1977, p. 9); therefore, the Crown was eager to produce legislation to order and control the population (Rojas Aguilera, 1977). The most relevant planning guidelines come from the *Ordinances for the Discovery, New Settlements, and Pacification of the Indies*, issued by King Philip II of Spain in 1573. These ordinances assembled the thoughts of leading philosophers, architects, and humanists with some utopic Renaissance principles. The ordinances paid particular attention to the action of "populating," which shows that planning considered people and not just space, and the orthogonal urban grid that is common in most colonial Mexican cities can be seen as a technique to "domesticate" the territory (Rojas Aguilera, 1977).

Domestication of the territory has been at the root of planning policies that generate borders and urban fractures for centuries. For example, the Bourbon Reforms in the 18th century introduced new administrative measures that led to territorial control and neighbourhood differentiation (Delgadillo Guerrero & Hernández Ponce, 2019). Planned neighbourhoods or *colonias* developed during the Porfirian period in the late 19th century—a time of policies for progress and modernisation—aimed to satisfy the needs of the local bourgeoisie and newly arrived European and North American migrants. These neighbourhoods were used to upgrade cities to global standards by introducing infrastructure and services, including railroads, streetlights, sewerage, and elegant French-inspired buildings (Piccato, 1997). The Porfirian *colonias* were seen as spaces that would bring order and beauty to the city with the support of the private sector (see Figure 1); "private interests and public policies worked together in seeking to

Figure 1. Photographs of different types of *barrios*, *colonias*, and *fraccionamientos* in Puebla and Guadalajara: (a) Puebla's city centre (2023), (b) Fraccionamiento Jardines de San Manuel (2021), (c) Fraccionamiento Gran Reserva in Lomas de Angelópolis (2020), (d) Colonia Americana (2022), (e) Santa Teresita (2021), and (f) Club de Golf Santa Anita (2023). Photographs by the author.

preserve the spatial separation between classes" (Piccato, 1997, p. 80). The residential development during this period created a profitable real estate business, which benefited from creating differentiated urban solutions for the wealthiest population and facilitated the asymmetrical provision of infrastructure and services based on an urbanisation vision of order and hygiene, tools used to exclude the urban poor.

Residential fortification can be seen as the evolution of the planned neighbourhoods of the late 19th and early 20th centuries, as it responds to real estate market interests and enables spatial and social differentiation and segregation. The first affluent planned neighbourhoods did not have fences or gates to block access; however, they did have written and unwritten rules for social behaviour in public spaces as part of the civilised, hygienic, modern urban vision. The *colonias* of the early 20th century, with European and North American influence, were substituted by the *fraccionamientos* of the 1940s, in which the central government allowed developers to fraction land using functionalist planning principles and contribute to infrastructure investment. In essence, they are the same, privately led urbanisations, but in the latter case, the state overlooked that the developers delivered the basic infrastructure and social facilities for diverse socio-economic groups. Some of these *fraccionamientos*, particularly after the 1960s, introduced shopping malls and private leisure and sports clubs into their developments. The emergence of gated communities in the late 1960s was more noticeable in cities like Guadalajara, with local and foreign businesspersons and real estate investors attracted to the North American lifestyle and the taste for golf courses and country clubs. Since then, these enclaves are no longer exclusive to the wealthiest population; the changes in housing policies in the 1990s that facilitated mass housing construction in peripheral land and adjacent municipalities made gated communities accessible to all.

The proliferation of gated communities in Mexico is connected to urban sprawl and metropolisation. Metropolisation is a common concept in Latin American urban literature but not so much in Anglo literature. Cardoso and Meijers (2021) consider that the concept helps understand policymaking in contemporary urbanisation. The authors present the concept of extensive urbanisation as "diffuse, multicentric, undirected, and fragmented, and evolves by pervasively colonising existing infrastructure and functional clusters rather than sequential expansion" (Cardoso & Meijers, 2021, p. 3); the problem with the concept is that "urban versus non-urban oppositions become barriers to policymaking" (p. 4). Instead, they propose using metropolisation. They define it as "a series of events through which institutionally, functionally, and spatially fragmented urbanised regions become integrated along various dimensions and emerge as connected systems at a higher spatial scale" (Cardoso & Meijers, 2021, p. 4). The gating phenomenon in Mexican metropolitan areas since the 1990s is the result of a combination of structural factors: a national housing policy that facilitated housing provision in peripheral disconnected land without adequate infrastructure and services, a debilitated planning system that facilitated private urban development, a global financial model that enabled new investment and debt-fuelled housing production, growing insecurity and violence, and changes in lifestyles and local efforts to join the global economy (Morales, 2019). This article does not argue there was one specific planned strategy to fragment and gate Mexican cities but that the structural conditions facilitated the gating process in an already fragmented urban reality.

The metropolisation process of the 1970s and 1980s was relatively organic as cities continued growing over adjacent municipalities and irregular settlements, and new social mass housing projects appeared in the peripheries. However, things changed in the 1990s with specific state-led actions such as the constitutional amendment of Article 27, which enabled private urban development over former social agricultural land or

ejidos. Access to cheap land and incentives to private developers in the housing sector facilitated the creation of large-scale isolated residential areas that needed protection from the surroundings. Developers found a "planned solution" in gated communities to respond to new dwellers' concerns about insecurity, infrastructure, and services. The peripheral gated communities in Mexican metropolitan areas are examples of a new urban order of natural, built, and perceived borders. Iossifova (2013) argues that borderlands are spaces of exclusion, and humans create borders and boundaries to differentiate. Mexican modern gated communities represent not only a physical boundary that creates less permeable urban structures and isolates social groups by socioeconomic strata, but it also produces different rules of access and engagement benefiting the wealthiest population, which have spatial preferential use, while the lowest income groups face more obstacles.

Gated communities are not only urban borderlands; they can also be seen as "urban borderlines" (Jalili, 2022) because it is not only the in-betweenness of the physical space but the perceptual boundaries that limit people's actions and interactions. The borders—natural or built—create differentiation and exclusion. For example, access to infrastructure and services can also create functional boundaries. On the other hand, imaginary borders created by social and cultural prejudice can incite exclusion. In Mexico, one of the most impenetrable boundaries is connected to income, education level, and occupation. Gated communities contribute to those physical and imaginary borders, as most of the elite and middle-income enclaves limit public access and include constant surveillance of outsiders while inside. Although Mexican social housing from the 1970s to the 1980s was organised in multi-storey tower blocks, housing production between the 1990s and 2000s, including that aimed at low-income groups, was low-density single-family residential areas. Many of these mass housing estates have been gated for defensive reasons. These peri-urban fortified enclaves contributed to fragmentation due to the impenetrable urban structure and lack of adequate transport systems in these sprawling developments. Metropolitan fragmentation in Mexico is, then, shaped by not only physical boundaries of gated communities and large private commercial areas but also institutional fragmentation, as municipalities are unable to deal with the urban and environmental problems that emerge from the current urbanisation model, as they do not have the resources or planning capacity to provide adequate transport, infrastructure, and public services.

5. The Production of the Fragmented Metropolises of Puebla and Guadalajara

The discussion starts with a historical analysis of how political interests, conflict, and planning have directly or indirectly contributed to socio-spatial fragmentation in both metropolises and finishes with an evaluation of how recent policies have contributed to a fragmented urban life. Puebla and Guadalajara, two cities about to celebrate the 500th anniversary of their foundation—the former in 1531 and the latter in 1542—are examples of settlements created under principles of spatial and social differentiation. Both cities have the same type of urban layout in their city centres; they have experienced social and institutional fragmentation due to religious, political, and military conflicts and power relations. For example, both cities have a strong history of Catholic influence in spatial and social arrangements through powerful religious figures such as the bishops Juan de Palafox y Mendoza in Puebla in the 17th century and Fray Antonio Alcalde in Guadalajara in the 18th century, who promoted the construction of outstanding architectural landmarks and established moral and social standards. The two cities have been the stage for conflicts such as the fight between conservative and liberal groups in the 19th century and the Cristero War in the 1920s, in which a group of armed Catholics fought the government over religious convictions. Both areas have emerged from

conflict and chaos to become investment poles for industry, commerce, and education, with national and international reach.

The two metropolitan areas have different scales but face the same pressing issues: urban sprawl, population growth, crime-related violence, complex inter-municipal governance, and pressure from the real estate industry (see Table 1). The sociodemographic data and the policy analysis conducted during this research show that it has not been easy to accommodate the growing population and strengthen planning instruments and institutions to improve urbanisation processes. There have been valuable attempts, especially in Guadalajara, with its inter-municipal collaboration schemes and the actions emerging from their metropolitan planning institute, IMEPLAN. However, this has not been enough to provide equitable and just planning solutions. In both cases, partial and municipal urban development programs have been blocked or delayed due to a lack of consideration of the current population's needs or because they were designed to fit special market interests. One clear example is the urban development program of San Andrés Cholula in Puebla, which is still under review following several failed attempts since 2018.

5.1. Puebla: From an Angelic-Inspired Urban Grid to a Gated Dystopia

According to popular legend, angels inspired the layout of Puebla's street grid. Puebla (City) of Angels, the settlement's original name, recognises the role of these divine creatures. The angelic-inspired grid was a uniform reticular layout around a central square that predominated in Latin American settlements (see Figure 2). The city was founded in 1531 by the Spanish Crown for peninsular settlers. The reticular grid

Table 1. Basic socio-demographic data on the metropolitan areas of Puebla and Guadalajara.

	Metropolitan Zone of Puebla	Metropolitan Zone of Guadalajara
Capital city	Heroica Puebla de Zaragoza (previously Puebla de los Ángeles)	Guadalajara
Municipalities in the metropolitan zone	38 municipalities in two states (Puebla and Tlaxcala)	10 municipalities
Total population in 2000	2,269,995	3,696,136
Total population in 2020	3,199,530	5,268,642
Number of housing units in 2020	859,413	1,484,581
Population born in another state/country	13.60%	13.7%
Average residents per housing unit in 2020	4.1	3.6
Surface (2010) in km^2	2,392.40	2,727.50
Urban density (pop/ha)	76.60	124.40
Average monthly salary in pesos (MXN)	$7,097	$10,274
Criminal incidence (cases)	Three main crimes: Robbery (131,913) Domestic violence (30,749) Assaults (21,137)	Three main crimes: Robbery (365,805) Other common law crimes (59,996) Domestic violence (55,042)

Sources: Gobierno del Estado de Jalisco (n.d.), SEMARNAT (2016), and SMADSOT (n.d.).

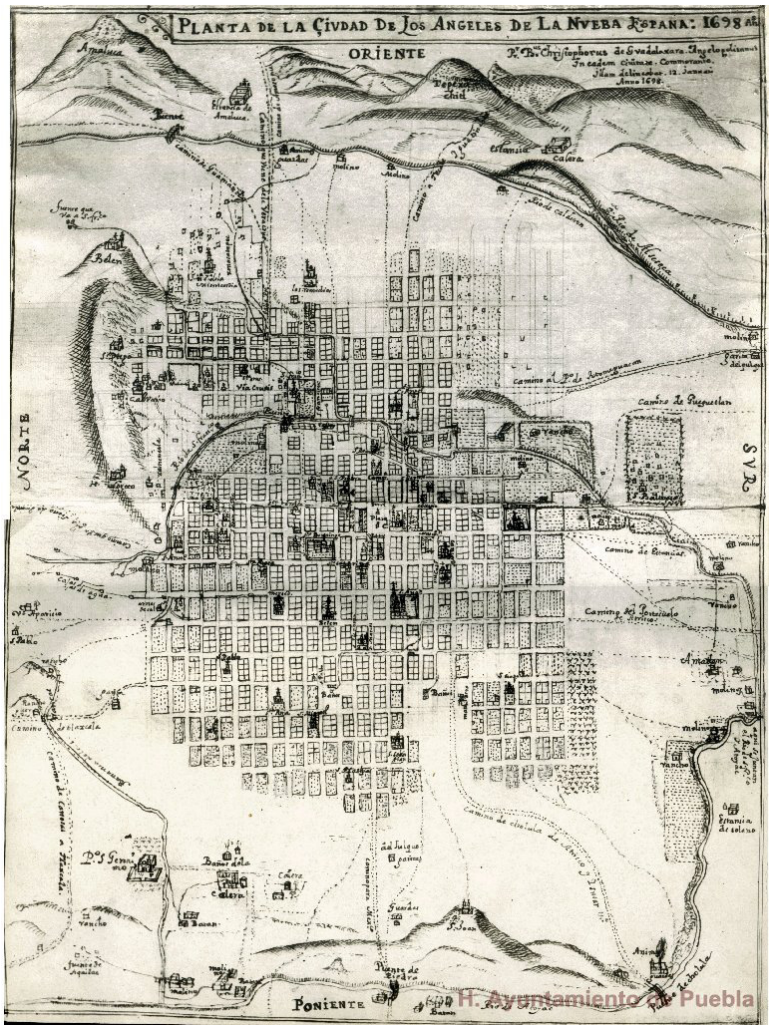

Figure 2. Map of the City of Puebla (de los Ángeles), 1698. Source: Ayuntamiento de Puebla (n.d.).

prevailed during the 17th and 18th centuries, accompanied by abundantly ornamental architecture (Terán Bonilla, 2021). The urban structure continued the original grid until the first decades of the 20th century when some new neighbourhoods introduced innovative street and block patterns. The city's grid is one of the most valued assets, as the historic centre was recognised as a national cultural heritage monument in 1977 due to its harmonic architecture and urban structure (Terán Bonilla, 2021, p. 8). It was later included in UNESCO's list of Humanity's Cultural World Heritage sites in 1987. Both recognitions boosted conservation strategies, tourism investment, and the restoration of listed buildings. However, some claim that the focus on the city centre's conservation of architectural heritage distracted the attention from what was happening in the rest of the city, where fragmentation became a key characteristic of the metropolisation process.

Puebla has a history of divisions and fractions; the first urban border was the San Francisco River (see Figure 2), a fundamental water body for the foundation of the settlement, which also served to separate the indigenous population living on the east bank from the Spanish-descent population on the west bank. This river was transformed into a road in the late 1960s and became one of the neighbourhoods' main functional borders when it became a high-speed road. The city grew moderately during the first 400 years, and the most significant urban structure transformations happened during the second half of the 19th century.

The newly planned neighbourhoods for Europeans and wealthy families, along with the introduction of new infrastructure, such as the train, modified the size of blocks and produced new streets (Labastida Claudio, 2019). A defining element of the 19th century was the redistribution of large portions of land that belonged to different religious orders. Many of these plots were used for municipal projects such as public markets after the Reform Laws promoted by the liberals, but others enabled speculation and enrichment of small sections of society. Social fragmentation was present during the Porfirian era at the end of the 19th century, as the ideas of modernity brought better infrastructure for the newly planned neighbourhoods for elite groups, for example, streetlights, sewerage, parks, and pavements.

Policy and document review during this study shows that planning has contributed to social and spatial differentiation at various moments since the late 19th century. For example, the planned neighbourhoods or *colonias* created for the wealthiest population during the Porfirian period changed the size of streets and blocks and introduced modern architectural styles. On the other hand, the laws and regulations for more functionalist planned neighbourhoods or *fraccionamientos* in the 1940s provided new differentiated urban layouts for different market segments, and the law in the 1970s facilitated private investment to supply basic infrastructure (Melé, 1989, p. 288). The second example exemplifies how municipal authorities incentivise the participation of private developers because the state cannot provide infrastructure in a fast-growing city.

These examples demonstrate how the state facilitated private actors' participation in developing "planned neighbourhoods" in the 19th and 20th centuries. However, the emergence of hundreds of gated communities in recent decades is connected to the ambitious housing and planning policy changes in the 1990s, which aimed to increase market-oriented urban development and private-led housing production. A cartographic analysis of the metro area shows that most gated communities emerged in the late 1990s and early 2000s in peripheral municipalities in areas with deficient infrastructure, public services, and transport (see Figure 3). Urban sprawl emerged due to population growth and conurbation to adjacent municipalities such as San Pedro Cholula, San Andrés Cholula, Amozoc, and Cuautlancingo (Cabrera & Delgado, 2019). However, gated communities have appeared in scattered locations in the whole area. This fragmented urbanisation has brought conflicts with residents from the small pre-existing towns, particularly in San Andrés Cholula, who feel directly affected by the new developments, as these threaten their agricultural land, livelihoods, access to water, and cost of living. Workshops and dialogues with members of these local communities conducted during 2019 showed that community members were generally discontent with the new residential fortresses and opposed the urbanisation model (Durán et al., 2021). They felt that planning instruments were designed for real estate developers' interests and public officials were complicit.

The research conducted in this area in the last decade shows that planning policies have been fundamental in developing peripheral large-scale gated developments. However, interviews conducted in the earliest phase of this research show that people moved to the new gated neighbourhoods because they felt that the central city was losing its liveability. Some interviewees reported the poor state of the streets, growing insecurity, lack of maintenance of public parks and gardens, and inadequate public services (Morales, 2016). This also results from "planning" decisions, as the state no longer invests in these old neighbourhoods and is not interested in creating the conditions for people to stay. Media and the presence of organised crime have played a crucial role in this voluntary displacement because fearmongering was present in most accounts by public officials, residents, and developers during their interviews. Fear is a powerful tool real-estate agents and developers

use to promote gated communities (Atkinson & Blandy, 2016; Low, 2001), taking advantage of the national security crisis. Fear has fomented a whole industry to protect citizens from the dangers of the city.

Planned neighbourhoods were supposed to bring order and quality infrastructure into the city of Puebla. Unfortunately, the gated communities that have emerged in the last decades on the west side of the metropolitan area (see Figure 3) have affected the functionality of the original towns in the peripheries, extinguished the possibility of social interaction, and increased inequalities. Gated communities, particularly cases such as Lomas de Angelópolis, an enclave for elite residents with over 21,000 housing units and La Vista Country Club, provide exclusive amenities such as gyms, pools, country clubs, green areas, and other advantages, enhancing socioeconomic disparities. On the other hand, the areas surrounding gated communities in San Pedro and San Andrés Cholula, Cuautlancingo, and Coronango have unpaved roads, deficient public transport, and limited connectivity due to the streets with extensive fencing, no shade, and no active frontages. This has created tensions that municipal governments have not adequately addressed.

The planned city of the 16th century presented different conditions for social groups. Nonetheless, the city that continued that planning tradition still provided spaces for social interaction. The work conducted in the past decade around gated communities shows that planning is no longer inclusive, and regional and local planning instruments have directly benefited developers of this sort of fortified enclave. In almost 500 years, the angelic-inspired urban grid was replaced by a dystopian collection of islands in a gated network, no longer limited to residential areas but also shopping malls, parks, hospitals, and universities.

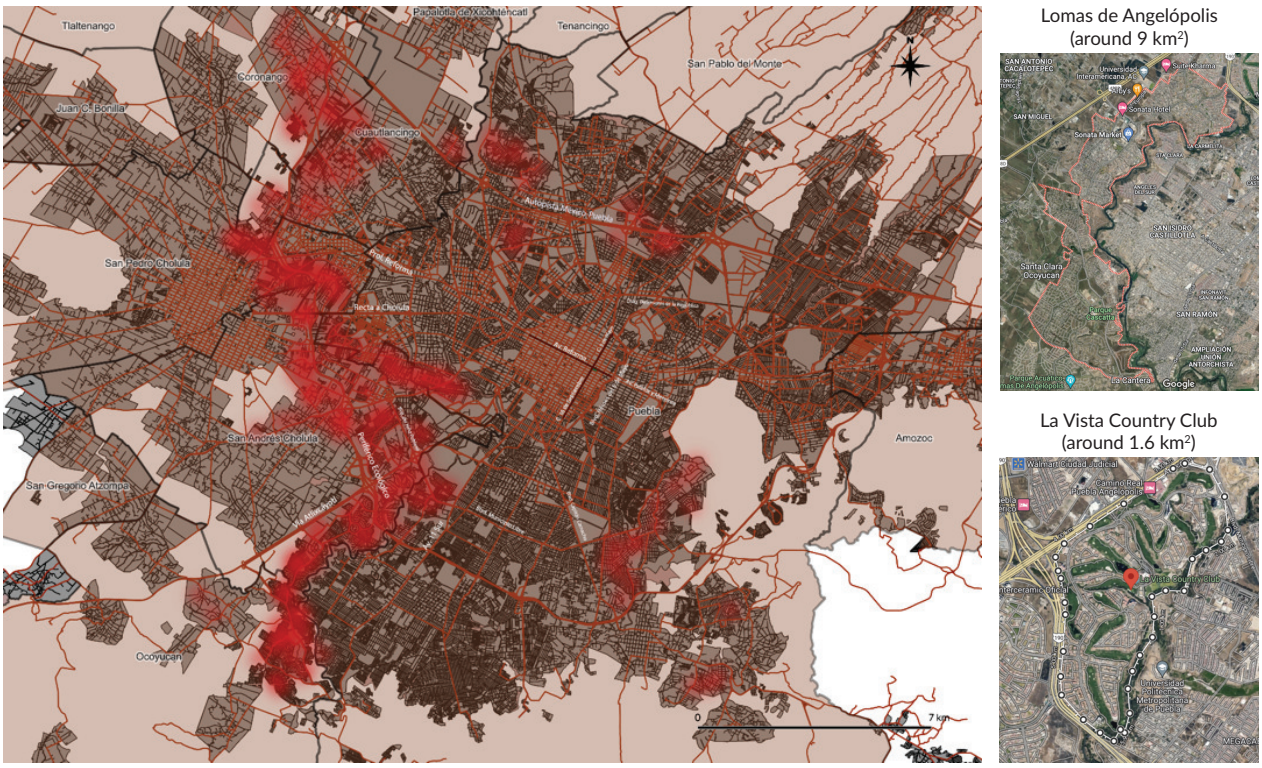

Figure 3. Concentration of gated communities in Puebla's metropolitan area and examples of scale and configuration. Source: Author using information from INEGI and Google Maps, 2023.

5.2. Guadalajara: The Rise of the Defensive Shell of the "Pearl of the West"

Guadalajara was founded in 1542, only a decade after Puebla. The history of the foundation of this city was less "angelic," as there were several failed attempts before the Spanish Crown authorised the location. Spanish ordinances also defined this settlement's street layout and block configuration, but the size of blocks and orientation differed from Puebla's. A notable similarity was that space was organised with a "centre-periphery gradation of social hierarchies" (López Moreno, 2001, p. 21). The new city separated *gente de razón* (reasoning people) from the indigenous population. There was a belief that natives did not have the same mental faculties as Spaniards and were, therefore, incapable of logical reasoning, in contrast with Spanish or Catholics (Pilatowsky Goñi, 2011). The San Juan de Dios River played a double purpose in the new city; on the one hand, it fulfilled the royal requirement of water availability for new settlements (see Figure 4), but it also represented a natural north-south border that segregated social groups: *gente de razón* lived on the west bank and the indigenous population lived on the east bank (Secretaría de Cultura, 2007). The symbolic and spatial differentiation between east and west Guadalajara prevails today; the wealthiest population lives on the west side, and the poorest population lives on the east (M. Jaramillo & Saucedo, 2016).

Government agencies and business chambers portray Guadalajara as a thriving city with high-quality architecture and infrastructure, ideal for investment, technological development, and innovation. The city is known as the "Pearl of the West," and although there is no consensus on where the name comes from,

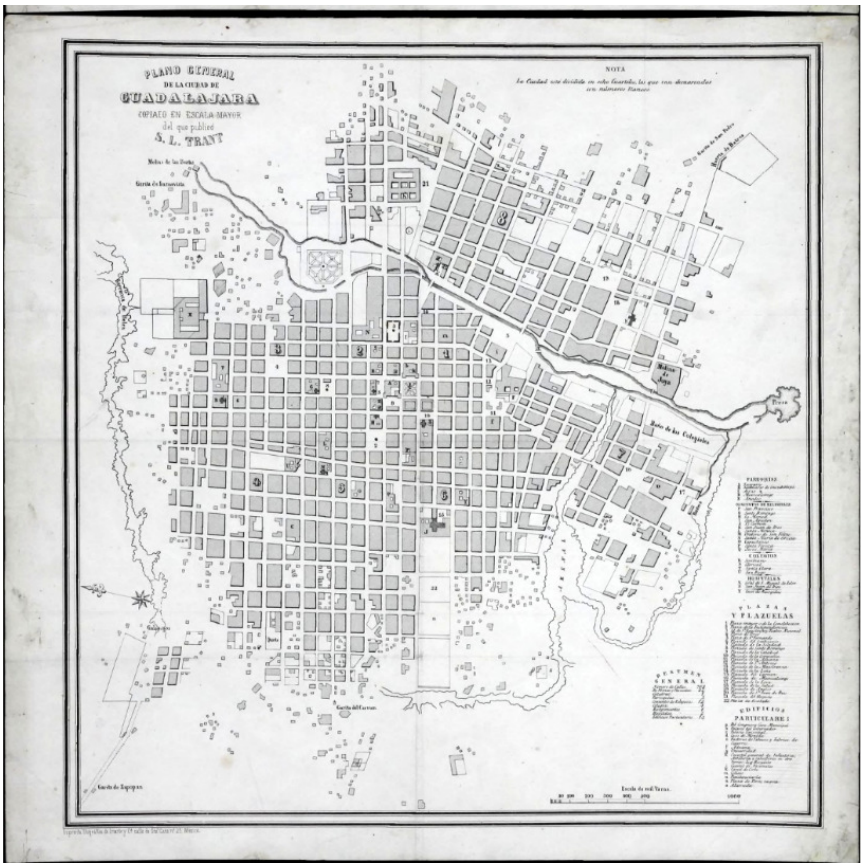

Figure 4. Map of the City of Guadalajara, circa 1800. Source: Mediateca INAH (n.d.).

during recent interviews, residents and scholars agree that it is connected to its splendour, beauty, and uniqueness. However, the city's early years did not stand out for grandeur or beauty. Architecture during the colonial period was discreet and modest because economic resources were limited. Nonetheless, conditions changed in the 18th century as the city became a potent commercial hub. New settlers motivated the "beautification" of the city and the creation of new parks and promenades (López Moreno, 2001). Since the 19th century, the city has become a powerful regional development pole, and it is now the venue of relevant international cultural and sports events, such as the Feria Internacional del Libro (International Book Fair).

The city's original orthogonal street grid (see Figure 4) enabled urban growth in an orderly way for centuries. The newly planned neighbourhoods or *colonias* in the late 19th and early 20th century were driven by increased industrial and commercial activities and the growing demands of new fortunes. The early decades of the 20th century were defined by post-revolutionary reorganisation, industrial development, and entrepreneurial activities, which financed new higher education institutions, roads, infrastructure, and new residential areas. The planned neighbourhoods were an opportunity to create a name in architecture and style. New extravagant civil and residential architecture inspired by European castles and chalets became popular then. This was also an opportunity to create a local style, a regional *tapatío* architecture inspired by local construction methods, the Mexican landscape, and foreign influence from European and northern African gardens and patios. The new neighbourhoods in west Guadalajara aimed at middle- and high-income populations, and the segregation of the poor in east Guadalajara continued. In 1942, with the 400th anniversary of the city's foundation, a series of projects were created to show the city's new vision of grandeur and progress. Some of these projects enhanced socio-spatial configurations that contributed to distinction and differentiation. Architects from the "illustrated bourgeoisie," like Ignacio Díaz Morales, designed important public space interventions (Secretaría de Cultura, 2007), but also one of the new suburban residential areas, Las Fuentes, inspired by the garden city that allowed people to escape from the noise, traffic, and chaos of the central city.

Fractures and fractions are part of the city's history. One of the most critical fractures in the city is Calzada Independencia, a road built over the San Juan de Dios River that runs from north to south, connecting the municipalities of Zapopan, Guadalajara, and Tlaquepaque (see Figure 4). As in Puebla, this road splits the city in two, creating different life experiences in the west and east. Guadalajara can also be understood according to fragments; the city had an urban organisation connected to parishes until the 18th century, when, inspired by the Enlightenment, authorities divided the city into *cuarteles*, a territorial distribution created under the Bourbonic Reforms to manage justice, police, public administration, hygiene, and public order that included several neighbourhoods. These *cuarteles* made it easier to bring order and improve social conduct between the "decent" people and the *plebes* or peasants. The "decent" people of the time, mainly the European descendants that dominated the civil, religious, and civil spheres, were interested in promoting "modern" behaviour patterns (Delgadillo Guerrero & Hernández Ponce, 2019). In the late 18th and 19th centuries, Guadalajara's territorial management changed three times: the first in 1790, in which streets were named and plots were given numeric values; the second division came with the creation of the big four *cuarteles*, which originated in the main square; and the third division was in 1809 when the city was divided into 24 areas. The trend to manage the city in fractions continues. The most recent example is the creation of seven "urban districts" in 1995 (Gobierno de Guadalajara, 2017). The district's core is the *Centro Metropolitano*, which includes the original city up to the mid-20th century.

Roads are useful in understanding the city's modern physical and symbolic fragmentation. For example, the streets Prolongación República/Miguel Hidalgo y Costilla and Prolongación Javier Mina/Benito Juárez/Ignacio L. Vallarta organise urban life in the north and the south. The city's urban structure was modified with the introduction of train tracks and industrial parks. The fragmented nature of Guadalajara was enhanced after the 1960s, with the creation of the first American-style gated community Fraccionamiento Santa Anita in 1967 and the first shopping mall in Mexico, Plaza del Sol, in 1969. These two projects produced the first generation of "consumer citizens" fascinated with exclusivity, the private automobile, and shopping. In recent interviews and a workshop conducted in the summer of 2023 in two of the old traditional neighbourhoods in Guadalajara, participants declared their predilection for gated or securitised urban spaces. The state of Jalisco has a strong presence of drug cartels and reports of criminal activity and disappearances are standard in news outlets. Therefore, unlike Puebla, people are not only leaving the central city because they are interested in moving to peripheral gated communities; residents in some central neighbourhoods would like to retro-gate their surroundings.

Gated communities and shopping malls became the symbols of the new Guadalajara and attracted real estate investment along the Avenida López Mateos, a regional highway converted into an urban road. This street probably shaped the most profound fracture of the urban fabric, as it created a new, larger, more tangible urban border separating the east from the west. Pedestrian activity on the west side of this border is practically non-existent. Residential projects along this road produced an exclusionary urban structure shaped by larger blocks and a few streets. The fractured system provoked a deficient public transport service, leading to personal vehicle dependency, congestion, and pollution. Guadalajara's urban development after the 1960s can be better understood through "splintering urbanism," in which infrastructure can fracture the experience of the city (Graham & Marvin, 2001). Urban life is not only about buildings and streets; some interactions depend on networks, including transport, telecommunications, water, and energy supply. Modern Guadalajara can be seen as an "autocity of motorised roadscapes" (Graham & Marvin, 2001, p. 8) that segregates and excludes instead of integrating and creating networks. This road interconnects residents from gated communities to the city's main work, leisure, education, and shopping areas while limiting mobility and access to those without a car. This power imbalance creates flows for the few and barriers for the many. Urban infrastructure can exponentiate inequalities, as those who can afford access to private mobility options are more connected than others (Kozak, 2018). During fieldwork in 2023, the author joined a group of activists for a walk to identify how difficult it was for pedestrians to move in this car-oriented environment.

As in Puebla, gated communities have increased in adjacent municipalities as part of the metropolisation process. Recent cartographic and photographic analysis shows that most gated communities were developed in the municipalities of Zapopan and Tlajomulco. Although planning instruments existed in the 1970s, such as the *Esquema Director 71*, which aimed to order development in a system of cities, development in these municipalities has been arbitrary and highly beneficial to real estate developers. Between 2001 and 2005, over 100 gated communities were built in Tlajomulco (Núñez Miranda, 2007, p. 127). On the other hand, Zapopan has embraced the arrival of elite and global capital since the early 2000s, with examples such as the high-end shopping mall Andares and the exclusive gated community for the ultra-rich Puerta de Hierro (Iron Door). Observation exercises in these shopping malls and gated communities have proved more difficult than in Puebla, as there is a higher presence of highly armed private security forces, access control, and surveillance systems.

Guadalajara's gated communities have been normalised in recent decades, mainly due to the fear of drug-related organised crime. Ortiz Alvis and Díaz Núñez (2021) consider that the "urban enclosure" phenomenon in residential development in Mexico is connected to the current security crisis. They argue that there is a sort of "urban agoraphobia" in which residents in gated communities seek an "imaginary shield" to protect them from the open city's insecurity while only coexisting among people similar to themselves (Ortiz Alvis & Díaz Núñez, 2021, p. 69). Gated communities in Guadalajara are called *cotos*, a Latin root word that refers to defended or protected. These authors identified three types of gated communities in Guadalajara: "suburban country clubs" built between 1967 and 1985 for the wealthiest; "intra-urban *cotos*" constructed between 1986 and 1999 for middle- and high-income families; and "diversified urban enclosures" since 2000, characterised by the diversity of socio-economic levels. The most relevant real estate projects since 2014 have also been types of gated communities, including high-end vertical condominiums. Some researchers have identified that up to 20% of the territory is occupied by enclosed areas—almost 3,000 gated developments (Pfannenstein et al., 2019). The "Pearl of the West" is now shielded, and the metropolis is surrounded by a belt of gated communities (see Figure 5).

5.3. Main Findings

The two metropolises—Puebla and Guadalajara—share the same Spanish heritage and benefited from investment and private participation in planned neighbourhoods during the 19th and 20th centuries. However, the market-driven planning policies of the last decades, which contributed to the emergence and normalisation of gated communities, have created tensions and social inequalities. The interviews and workshops conducted in Puebla in the past decade show that perceptions of insecurity and distrust in the

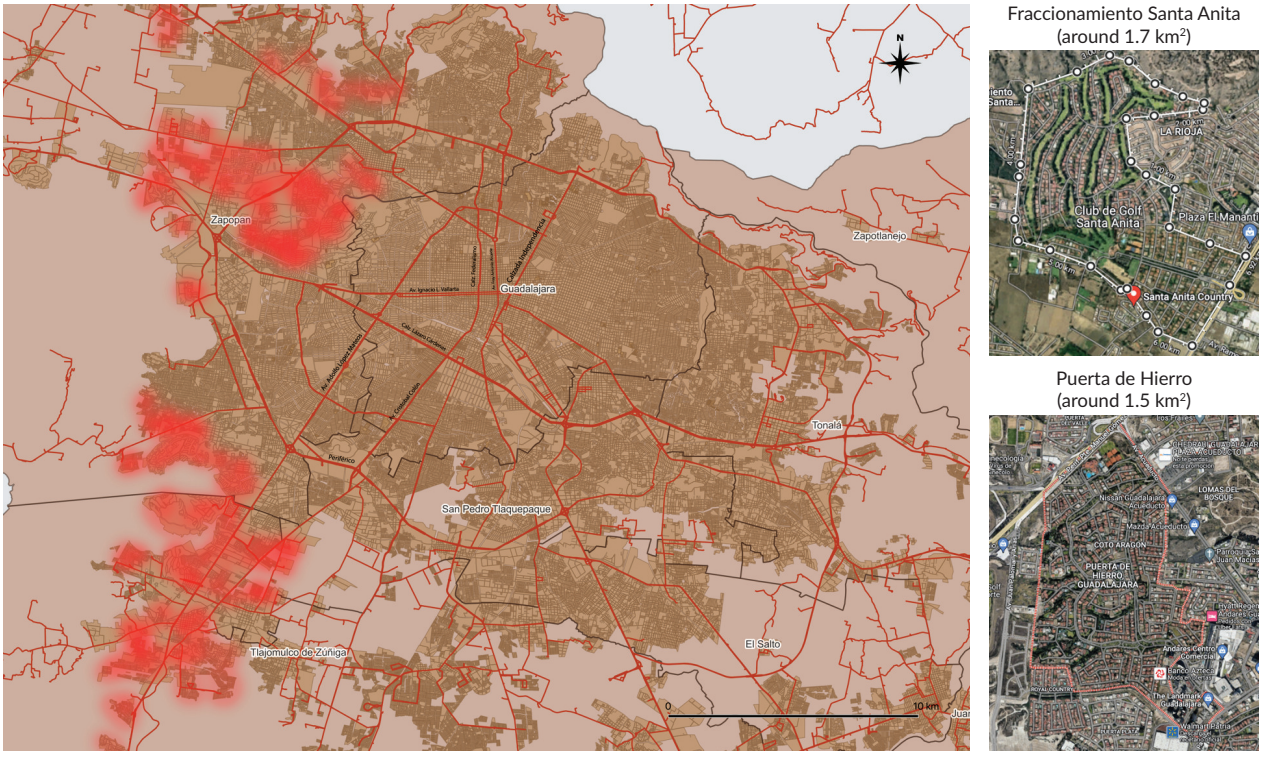

Figure 5. Concentration of gated communities in Guadalajara's metropolitan area and examples of scale and configuration. Source: Author using information from INEGI and Google Maps, 2023.

capacity of the state to manage the cities' problems have increased. The new planning instruments do not include measures to produce more inclusive urban areas, and developers are not interested in investing in social housing. The socio-spatial fragmentation in Guadalajara proves more complicated, as it is not only the large number of gated communities that emerged in the recent decades but the incapacity to address the severe mobility and infrastructure deficiencies that come with the sudden appearance of back-to-back fortified enclaves. Urban planners are facing opposition to promoting more inclusive planning strategies because residents, public officials, and real estate developers consider conditions unsuitable for that kind of development, mainly because some are afraid of the possible connections between real estate development and organised crime.

6. Conclusions and Policy Recommendations

Market-oriented planning policies since the 1990s and limited state capacity have helped to normalise gated communities in these two metropolises. The economic interests behind these fortified spaces leave municipalities unprepared to deal with the impacts of these enclaves. This suggests a need to rethink policymaking and policy implementation in adjacent municipalities, as they usually do not have the technical or financial resources to prioritise projects for their benefit. These local governments' challenges require a long-term vision but mostly a solid budget to contain real estate pressure and provide adequate services and infrastructure. The two cases presented show the connections between policies and social and spatial fragmentation. First, in both cases, authorities could not respond to the demands for security, basic public services, reliable transport, quality public spaces, and infrastructure; this motivated thousands of families to move out of the central city and rely on private administrators in gated communities. Second, both metropolises have not accomplished metropolitan instruments that prioritise habitability and inclusion; Guadalajara has been better at this, with the creation of IMEPLAN, but unfortunately, both cities have not been able to contain this sort of exclusionary fragmented urban model. Third, in both cases, the distance between the poor and the rich has increased dramatically, and the presence of organised crime in real estate has brought governance problems as municipal authorities fear implementing tighter urban policies. Finally, this sprawling and fragmented gated model takes valuable land crucial for climate adaptation and ecosystem conservation. Deregulation and liberalisation made it easier for developers to "gate" the city, but they now also suffer from the traffic, polarisation, and conflict that came with it. Therefore, the same incentives that made these fortified enclaves possible can be used to promote more inclusive and open urban environments.

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Conflict of Interests

The author declares no conflict of interests.

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ARTICLE

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An Empirical Test of Pedestrian Activity Theories Within Informal Settlements

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Abstract

Pedestrian activity is often measured in the formal parts of cities, yet it has rarely been studied in informal settlements, although they are typically adjacent to formal areas and residents participate in formal urban life. Route optimization and space syntax are two pedestrian activity theories that can be applied to predict path usage in urban areas. These theories have been tested in formal cities, but are they applicable in understudied informal settings? Using motion sensors, we measure pedestrian activity in a Cape Town informal settlement in the early morning and evening hours and test which theory best explains the sensor measurements. Route optimization is weakly correlated with average pedestrian activity, while space syntax performs even more poorly in predicting pedestrian activity. The predictive power of both theoretical calculations further varies by time of day. We find that both theories perform worst at the entrances/exits of the informal settlement—that is, the border between informal and formal. These results indicate that daily movement patterns in informal settlements may differ from formal areas and that the connection between the formal and informal city requires further study to better understand how pedestrian activity links these two types of areas. A new theory of route selection based on such an understanding, which also better incorporates the specific characteristics of informal urban settlements—such as high density, narrow, and constantly changing streets primarily used by residents—may be necessary to understand the needs of pedestrians within informal settlements as compared to formal areas.

Keywords

informal settlement; nighttime activity; pedestrian; route optimization; sensor; space syntax

1. Introduction

Pedestrian mobility in cities is well-studied, but the focus is almost always on the formal parts of cities. Little is known about differences in pedestrian life between formal and informal areas (Anciaes et al., 2017; Cutini et al., 2020; Hillier et al., 2000; Mehta, 2008; Salon & Gulyani, 2010; Sletto & Palmer, 2017) and even fewer studies quantitatively analyze pedestrian motion inside informal settlements (Hidayati et al., 2020; Hillier et al., 2000; Mohamed, 2016). Meanwhile, more than a billion people, every seventh person, live in informal settlements worldwide (Dodman et al., 2018). In many low- and middle-income countries, these neighborhoods are increasingly the urban norm, not the exception (Simone & Pieterse, 2017), as they expand in size and number. Extreme density, unpaved roads, reliance on shared infrastructure, vulnerability to crime, frequent house fires, and natural disasters, as well as the need for easier connection to the formal economy together suggest that understanding how pedestrians navigate in informal settlements can inform efforts to address these issues and improve well-being (Mutyambizi et al., 2020; Samper & Liao, 2023; Walls et al., 2018).

We address this knowledge gap using pedestrian motion sensors installed throughout the path network in one informal settlement in Cape Town, South Africa. We measured pedestrian activity in the evenings and early mornings from October to November 2019. Using motion data and the network structure, we analyze movement patterns in the context of two prevailing theories about pedestrian route choice based on network characteristics—derived from and tested with movement patterns in high-income, formal cities—to understand how well they explain the empirical data.

The first theory—route optimization—posits that pedestrians optimize for a goal, such as the shortest or fastest route (Willis et al., 2004). This theory is operationalized by calculating the shortest metric or time-distance route. The shortest path is the dominant heuristic because it theoretically maximizes pedestrian utility (Zhu & Levinson, 2015). As critics argue, however, the theory assumes pedestrians optimize accurately (Law & Traunmueller, 2018; Salazar Miranda et al., 2021). The second theory—space syntax—asserts that the urban network configuration is a core determinant of pedestrian activity and that measures derived from the network's topology and geometry can explain pedestrian route choice (Hillier, 2007; Hillier & Iida, 2005; van Nes & Yamu, 2021; Willis et al., 2004; Yamu et al., 2021). Hillier called this phenomenon the law of natural movement, arguing that these parameters apply in nearly any urban space, from cities to buildings (Hillier, 2007; Hillier et al., 1993).

There is an ongoing academic debate about which theory better explains pedestrian motion (Shatu et al., 2019). Various studies empirically test these theories in formal cities, mainly in the Northern Hemisphere (Bongiorno et al., 2021; Hillier & Iida, 2005; Sharmin & Kamruzzaman, 2018; Shatu et al., 2019), but few empirically study whether they apply in dense, oft-changing informal neighborhoods (Hidayati et al., 2020; Hillier et al., 2000; Mohamed, 2016).

While generalizing differences between informal and formal areas is a source of academic debate (Samper & Liao, 2023), there are several reasons why movement in informal settlements might be different in many cases. First, the path network is not formally planned, emerging from individual (e.g., where to build houses) and community-level decisions (e.g., to block throughways to enhance safety; Samper & Liao, 2023). As a result, the network constantly evolves. Second, activities considered private in most formal areas (e.g., accessing

shared sanitation) often require informal settlement residents to enter public space. For example, Mutyambizi et al. (2020) conducted a representative survey of informal settlements in South Africa, finding 50% share a toilet with other households. Informal settlement paths can be described as "spaces in between" (Cutini et al., 2020) or "liminal" (Sletto & Palmer, 2017) because expectations about what is public vs. private space differ from formal areas. Third, informal settlements tend to be extremely dense (Visagie & Turok, 2020), making it difficult to assess distances or other route characteristics by sight alone. Fourth, informal settlements are often not well integrated into the broader formal urban network, creating a de facto border between the two types of spaces and limiting who enters and uses informal spaces (Karimi & Parham, 2012). Hence, most pedestrians are likely to be residents. Finally, informal settlements tend to have minimal/no streetlighting, radically changing the experience of navigation at night (Kretzer, 2020).

We first empirically measure movement between 6:00 pm and 8:00 am with sensors. Second, we apply a shortest path analysis from route optimization and a space syntax analysis of choice to the informal settlement path network to theoretically predict movement patterns. From the empirical data, we find activity is highest in the evening and early morning, and that there is more movement on weekends compared to weekdays. Correlating path usage from the two theory-based predictions with empirical data, we find the shortest path (route optimization) prediction weakly correlates with observed evening, but not early morning, activity. It performs equally well on weekdays and weekends. In contrast, we find no significant correlation between space syntax choice predictions and empirically measured activity.

This article makes three contributions. First, we test how well two theories about pedestrian route choice derived from formal cities in high-income countries predict pedestrian movement in low-income informal settlements. The second is the testing of pedestrian motion sensors for studying informal settlement route network usage. To our knowledge, this method has never been used before in this context, though it is frequently used to study path usage in formal areas. Third, we measure pedestrian activity in informal settlements at high granularity in the early mornings and evenings when paths are used most, which can shape our understanding of path usage in informal settlements.

2. Context

In Cape Town, South Africa, there are more than 600 informal settlements (City of Cape Town, 2019). We study an approximately 30-year-old informal settlement that is about 38,200 square meters (Ndifuna Ukwasi et al., n.d.), located in Khayelitsha, on the outskirts of Cape Town. Known as a "pocket informal settlement," the neighborhood is surrounded by formal houses and streets, creating a porous border between the formal and informal experience. We began studying this site as part of a broader project on public lighting in informal settlements because the community leadership was open to collaborating on transdisciplinary research.

Like many informal settlements (Kamalipour & Dovey, 2019), the path network was previously unmapped. To map it, we started with a 2018 satellite image of the informal settlement (City of Cape Town, 2018) and worked with local leaders to draw all of the network features. Figure 1 shows the informal settlement map in August 2019, just before installing sensors.

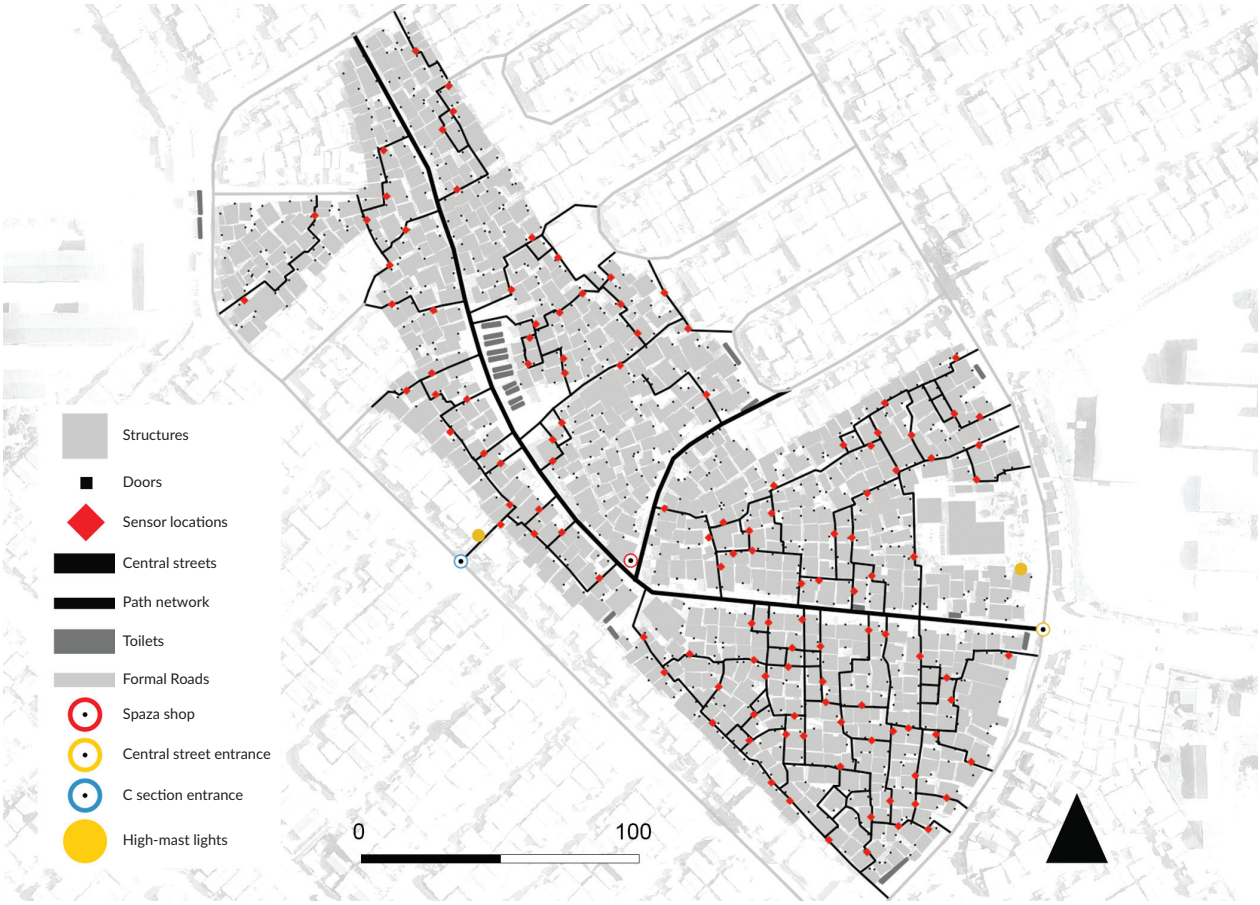

Figure 1. Study area and path network map.

We classify the path network into three categories:

1. *Central streets* (bold black lines) bisect the neighborhood. They are sand covered, but passable with a vehicle. These streets are included in the theory-based calculations because they are major connection points to formal areas, which could influence movement within the settlement, but they were not monitored with sensors because vehicles would have biased sensor measurements.
2. *Formal streets* (gray lines) are paved and surround the neighborhood. They have both vehicular and pedestrian traffic. They link the neighborhood to the surrounding economy and are included in the theory-based calculations because they influence movement within the settlement. Formal streets were not included in the sensor study because they are outside the informal settlement. Furthermore, the sensors were not designed to accurately measure wide, formal streets and vehicles using these streets would also have biased sensor measurements.
3. *Paths* (thin black lines) are pedestrian walkways. Sensors were only placed in paths. Our empirical analysis of pedestrian activity and the comparison between empirical data and theoretical predictions are based on path movement only.

3. Data and Method

3.1. Sensor Data

Many technologies can be used to measure pedestrian activity. Each approach has pros and cons. For our setting, a few criteria narrowed the options. Manual counting was unsafe during dark hours. Video surveillance was rejected to protect privacy. Although mobile phones are an increasingly common source of mobility data worldwide, a GPS tracking pilot we conducted in March 2019 showed it would not work in an informal settlement for several reasons. First, a household survey we conducted revealed not all residents own a smart phone and only 37% of respondents carry one after sunset for fear of theft, leading to sample selection bias (for more about the household survey see Supplementary File). Second, 50% of residents with a smart phone and willingness to enroll in the pilot did not have enough storage space for the tracking application. Third, GPS is inaccurate within a few meters, which is problematic when paths are narrow and houses are small, as they are in this informal settlement, because it would be difficult to determine which paths were used. Moreover, some building materials used in informal settlements reportedly interfere with GPS.

We installed 122 pedestrian motion sensors on paths in September 2019. We only use data between 6:00 pm–8:00 am because the sensor's sensitivity prevents it from accurately measuring daytime motion, which is when thermal radiation from local building materials can cause false triggers. To verify data quality, we conducted manual counts between 5:00–7:00 pm, when people are outside and it is safe to work, then compared the human-observed counts to the data from the same period. During the study, some sensors were stolen/vandalized and some malfunctioned (e.g., discharged battery). To adjust for attrition, we drop data from sensors that did not function throughout the entire study. To allow for minor, random data loss caused by Bluetooth connectivity issues, we include all sensors that had data on at least 54 days (out of 60) as long as missing days are not clumped at the end of the study period. In total, 78 sensors functioned for the entire period from October 1–November 30, 2019. Our dataset consists of 787,121 five-minute observations between 6:00 pm–8:00 am and contains the number of individuals passing the sensor in each five-minute period. The ETH Zurich Ethics Commission approved the sensor data collection (EK 2019-N-19). For more about the sensors, see Supplementary File.

We compare the sensor data with predictions from two theories. We focus on route optimization using shortest path analysis and space syntax using the choice measure because our data contain no personal or environmental characteristics.

3.2. Shortest Path Analysis

Shortest path analysis is the simplest application of route optimization theory and is frequently operationalized using Dijkstra's shortest path algorithm (Golledge, 1995; Law & Traunmueller, 2018), which calculates the shortest distance between any two nodes (origin-destination pairs) in a network using street length as edge weights (Dijkstra, 1959).

First, we chose origin-destination pairs relevant to most residents in the community, which we know based on our household survey. All the mapped doors on each structure are considered origins ($N = 869$) and three

sites within the informal settlement are considered destinations: (1) the largest Spaza shop (convenience store) in the center of the settlement (near a large block of public toilets); (2) an entrance/exit near the western high-mast public light (one of two 30–40m tall sodium vapor flood lights) that residents use to access shopping and transportation in the formal area; and (3) the main eastern entrance/exit, which connects to a formal road with shops, minibus drop-off points, and a high school (see Figure 1).

We use the QGIS Shortest Path algorithm (version 3.10) to calculate the shortest path between each origin and destination in the network. We then compute the number of times each segment is part of the shortest path for each origin-destination pair to determine the most frequently used path segments for each scenario then sum the three scenarios (Figure 1 in Supplementary File) to come up with our calculation (Law & Traunmueller, 2018).

3.3. Space Syntax (NACH)

Space syntax techniques for analyzing human activity assume that "what happens in any individual space…is fundamentally influenced by the relationships between that space and the network of spaces to which it is connected" (UCL Space Syntax, 2021). The two main measures used to describe the relationship between the spatial network and pedestrian activity are *integration* and *choice*. We focus on choice because it is most comparable to the shortest path analysis (see 3.2). Space syntax choice is a measure of the frequency with which a segment is on the shortest path between all path segments within a prespecified distance, called the *radius* (*r*). Here, the "shortest path" is not the metric shortest path, but rather the path with least angular deviation. The measure can be calculated at different radii, with higher values capturing global movement flows along major arteries and smaller radii capturing local ones (van Nes & Yamu, 2021). When the *r* equals *n*, the entire study area is taken into account—the global measure.

We calculate the space syntax measure of normalized choice (NACH) to enable comparability with other studies (van Nes & Yamu, 2021). We use depthmapX (0.35b), developed by the Space Syntax Group at the University College London, to run an angular segment analysis on the informal settlement route network, plus the immediately surrounding formal roads. Angular segment analysis accounts for curved streets and other irregularities by assuming pedestrians are influenced both by network connectivity and by angles in the network and that they choose routes that minimize direction changes (angular deviation; Dalton, 2003; van Nes & Yamu, 2021). These assumptions are particularly relevant in an informal settlement, where angular deviations can be common, but unintentional.

While studies often report NACH at several radii, we focus on radii informed by our local knowledge and by the empirical data we gathered. The intent is to avoid spurious correlations by testing many radii and finding a correlation by chance—a critique of the space syntax literature (Ericson et al., 2021). First, we know from extensive observation and discussions with residents that relatively few people who do not live in this informal settlement use the smaller path segments. Therefore, to focus on movement within the settlement, we aimed to define a radius that would encompass the neighborhood. Since half the length of the horizontal central street is approximately 150 m, we use this as a heuristic to select a radius of 150 m (and therefore a diameter that captures the widest part of the area), hypothesizing that this radius will best represent "local" movement. Second, we also learned from residents that the formal streets included in our study area just outside the informal settlement are also used by residents because (a) some shared sanitation is located just

outside the settlement and (b) these streets are sometimes used as an alternative to the smaller paths because some residents feel they are safer. Therefore, we also use the global measure, $r = n$, based on the notion that n radius captures movement crossing the "border" onto formal streets and helps identify edge effects (Gil, 2015).

4. Results

4.1. Sensor-Measured Path Usage

Over the study period, average five-minute motion between 6:00 pm and 8:00 am is 1.99 triggers, i.e., passers-by, or about 23.9 triggers per hour (minimum: 0.09; maximum: 7.36). Averages in the evening (6:00–9:00 pm) with 55.4 triggers and the morning (5:00–8:00 am) with 28.3 triggers per hour are higher. Movement on weekends is higher than on weekdays (Table 1).

Table 1. Summary statistics.

Statistic	Mean	St. Dev.	Min	Max	Hourly Mean
Sensor					
Avg. 5-min Motion	1.99	1.15	0.09	7.36	23.95
Avg. Evening 5-min Motion (6–9 pm)	4.62	2.06	0.16	9.99	55.42
Avg. Morning 5-min Motion (5–8 am)	2.36	1.79	0.16	8.10	28.30
Avg. Weekday 5-min Motion (Mon–Fri)	1.92	1.17	0.09	7.83	23.00
Avg. Weekend 5-min Motion (Sat/Sun)	2.20	1.19	0.10	6.11	26.39

Note: $N = 78$ sensors/path segments.

Figure 2 maps the path-level five-minute averages for each time interval: all hours (6:00 pm–8:00 am), evening (6:00–9:00 pm), morning (5:00–8:00 am), weekdays (Mon–Fri), and weekends (Sat/Sun). Since the theory-driven calculations are not directly translatable to our empirical measures, for all maps we split the data into tertiles—low (blue), medium (yellow), and high (red)—each with an equal number of path segments. Path segments without a sensor are black if they are within the informal settlement and gray if they are in the formal area.

The highest-activity paths vary across time intervals. Morning and evening high-use paths are noticeably different, not just because there are fewer in the morning, but also because several paths that are high use in the morning are not in the evening, possibly because different activities take place. For example, social activities may cause more night triggers and work-related movements more morning triggers. When we calculate the correlation coefficient between morning and evening activity, we find a correlation coefficient of only 0.42 ($p < 0.01$, $R^2 = 0.17$). Weekday and weekend activity are not hugely different. There is a strong correlation between weekend and weekday path usage (correlation coefficient: 0.92; $p < 0.01$, $R^2 = 0.84$), however, there are more high-use paths on the weekend since more people are home. Entrances to the informal settlement seem to always be in high use, reflecting interaction between this neighborhood and its formal surrounds.

Figure 2. Path usage by time period. For all five maps, the data is split into tertiles—low use (blue), medium use (yellow), and high use (red)—each with an equal number of path segments.

4.2. Path Usage Predictions From Shortest Path and Space Syntax (NACH) Analysis

Figure 3 compares the empirical data (Panel 1) with the theory-derived predictions (Panels 2, 3, and 4). Comparing the shortest path analysis (Panel 2) to the sensor measurements (Panel 1), the predictions are reasonably close to the sensor data in sections A and B, where the network is complicated, but slightly underpredict activity in C and D sections, where the network is sparse. The space syntax NACH calculation (r = 150 m, Panel 3), however, overpredicts activity in A and B and underpredicts in D section. Both theory-driven calculations fall short at the entrances, which are the gateways to the formal area. All entrances into the informal settlement from the formal areas are either medium (yellow) or high (red) usage according to sensor measurements, but neither theory-driven calculation predicts these path segments to be high use. In Panel 4, the NACH ($r = n$) map does predict high usage for all entrances, but

overestimates usage at several entrances, likely contributing to the fact that space syntax NACH ($r = n$) is also not correlated with the empirical data.

Figure 3 maps the two theory-driven predictions, but excludes unmonitored paths for which we have no sensor data. For the predictions including all paths see Figure 1 in Supplementary File and for summary statistics of model predictions see Table 1 in Supplementary File.

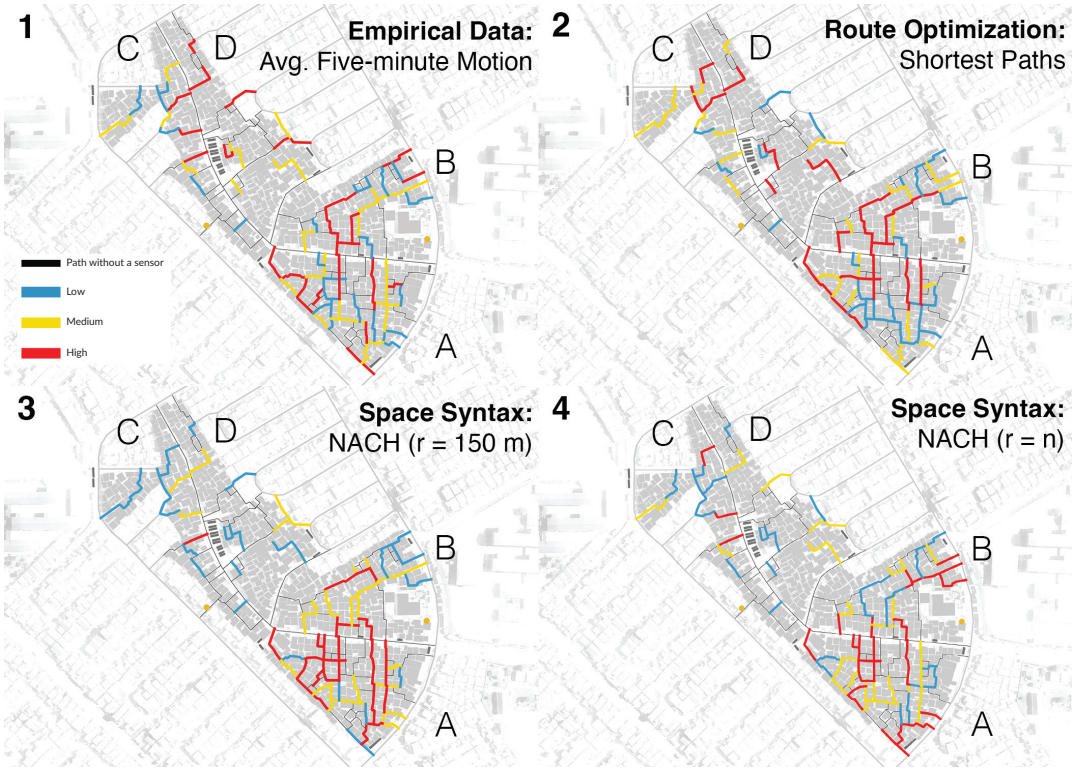

Figure 3. Visual comparison between sensor-measured path usage and theoretical predictions.

4.3. Correlation Between Predictions and Observed Path Usage

Van Nes and Yamu (2021, p. 62) argue the space syntax literature demonstrates that angular segment analysis appears to be the best predictor of pedestrian movement, while "[m]etric distance is a distant third." We test this hypothesis by comparing one element of angular segment analysis, normalized choice, and metric distance (via shortest path analysis) in the informal settlement with sensor data by calculating a Pearson pairwise correlation coefficient and the R^2, since the latter is sometimes reported in the space syntax literature and commonly used across social science disciplines. Although existing pedestrian movement theories do not differentiate between times of the day/week, we compare the theoretical predictions of pedestrian activity to the overall average (6:00 pm–8:00 am), as well as the evenings (6:00–9:00 pm), early mornings (5:00–8:00 am), weekdays (Mon–Fri), and weekends (Sat/Sun) separately, to check whether time plays a role in the theoretical predictive power.

The correlation coefficients in Table 2 confirm the impressions from Figure 3. There is generally low correlation between theory-predicted and sensor-measured usage patterns. The highest correlation is

between the shortest path calculation and evening (6:00–9:00 pm) average motion ($R = 0.39$, $p < 0.01$). The correlations between the shortest path calculation and overall average motion (6:00 pm–8:00 am), weekday motion (Mon–Fri), and weekend motion (Sat/Sun) are all smaller. We find no statistically significant correlation between either space syntax NACH calculation ($r = 150$ and $r = n$) and the empirical data for any time.

Table 2. Correlation between average five-minute motion in different time intervals and theory-driven calculations.

	Avg. 5-Min Motion				
	All (1)	Evening (2)	Morning (3)	Weekday (4)	Weekend (5)
Shortest Paths					
Avg. Count	0.25/0.06 (0.03)	0.39/0.15 (0.00)	0.15/0.02 (0.20)	0.23/0.05 (0.04)	0.29/0.08 (0.01)
Space Syntax					
Norm. Avg. Choice ($r = 150$ m)	0.01/0.00 (0.92)	0.16/0.03 (0.15)	−0.05/0.00 (0.63)	−0.01/0.00 (0.93)	0.07/0.00 (0.57)
Norm. Avg. Choice ($r = n$)	−0.08/0.01 (0.50)	0.05/0.00 (0.69)	−0.11/0.01 (0.34)	−0.08/0.01 (0.48)	−0.06/0.00 (0.59)

Notes: The table reports Pearson pairwise correlation coefficient (R) on the left of the slash and the R^2 on the right; p-value in parentheses. Statistical significance is 0.05 or less.

5. Discussion

The few papers on pedestrian activity in informal settlements have used space syntax (not route optimization) to predict pedestrian flows (Hidayati et al., 2020; Mohamed, 2016). However, we find the space syntax (normalized) choice measure is not a good predictor of pedestrian activity in informal settlements. Comparing choice measures (150-m and n radii) and a shortest (metric) path prediction of most frequently used path segments to empirical data, we find the shortest path prediction explains more of the variation observed with sensors. Moreover, the visual comparison of the shortest path predications and sensor averages reveals that the predictions perform better in areas of the informal settlement with more complicated route configurations compared to simpler ones. Furthermore, the theory-driven measures poorly predict the level of activity recorded at the entrances of the settlement, which are important connection points at the de facto border between informal and formal urban spaces.

Our study is one of three to find weak correlations between choice predictions and empirical measures in informal settlements (see Hidayati et al., 2020; Mohamed, 2016). In formal cities, the correlation coefficient between space syntax and manual pedestrian counts has been extensively studied, but also varies (Ericson et al., 2021). While a meta-analysis of 14 studies using various space syntax measures to study pedestrian movement confirms that on average it predicts pedestrian movement in neighborhoods of high-income countries well (Sharmin & Kamruzzaman, 2018), the correlation coefficient between space syntax choice and counted pedestrian movement varied between $R = -0.141$ (Sodermalm, Stockholm) and $R = 0.885$ (Bakirköy, Istanbul).

The notion that informal settlements, or unplanned settlements, as scholars in the space syntax literature also refer to them, have unique characteristics (e.g., irregularity) that might mediate the relationship between the network and pedestrian activity has already been acknowledged in the space syntax literature (Karimi & Parham, 2010, 2012). Our study points to an important insight: space syntax's choice measure may be predictive when compared to observed data from cities that *include* informal settlements, i.e., encompass the boundary between the formal and the informal, but it may lose predictive power when studying a local informal network that is influenced by the porous, but poorly understood border between formal and informal—thus, performing even worse than shortest paths analysis. To our knowledge, no previous study has compared shortest path predictions and space syntax's choice measure with empirical data in informal settlements. In the informal settlement we studied, six possible explanations come to mind why space syntax, in particular, performs poorly in predicting empirically measured pedestrian activity.

First, is the issue of extreme density in many informal settlements (Visagie & Turok, 2020). The space syntax choice measure does not account for path width, however, some path segments are so narrow that a pedestrian must turn sideways to pass. Therefore, although a segment may appear geometrically, topologically, and metrically ideal, few pedestrians may use it. Ignoring path width also explains some shortcomings of the shortest path analysis. The ability to fit through a path is not an issue in formal cities, but it is important in this context in these inherently unplanned and emergent neighborhoods.

Second, Hillier et al. (1993, p. 31) write that "configuration may affect movement, but configurational parameters cannot be affected by it." In informal settlements, that assumption is invalid. For example, as we learned through the mapping process, the residents in the informal settlement we study frequently create new cul-de-sacs, called compounds, by blockading a path to limit through-traffic and enhance their sense of safety, demonstrating that movement *can* affect configuration.

Third, the residents living in our study site seem to rely on a mental map of landmarks to navigate. Our community team reported that residents try to reach a central street or formal road as quickly as possible. This strategy makes sense if a pedestrian wants to avoid narrow paths, feels fearful in smaller paths, and/or if smaller paths are darker at night—all legitimate possibilities in the area we study. This strategy to quickly reach main arteries may counterbalance the lack of distance information, making shortest route distances a better predictor of pedestrian mobility. It could also explain why entrance paths (see Figure 3) are used more than both theories predict and highlights the complexity of pedestrian behavior at the interaction between formal and informal areas. That said, we cannot rule out that poor prediction at entrances/exits is linked to the study area size (Gil, 2015).

A fourth explanation why shortest path analysis might be more predictive could be that residents report that they typically only know the immediate area where they live and rarely use paths in other parts of the settlement. Hence, the critique that residents lack the information necessary to optimize route choice might be misplaced in this context, as most pedestrians know their immediate surroundings well. Furthermore, it may be that the majority of motion we measure is generated by those that have sufficient experience to recognize the shortest path, compared to areas in which many pedestrians lack familiarity with network (common in formal cities).

Fifth, the presence of shared essential infrastructure, as well as the differences in perceptions about the use of public and private space in informal vs. formal areas (Cutini et al., 2020; Sletto & Palmer, 2017), also may substantially shift the motion patterns measured by the sensors in ways that are not accounted for in either space syntax or shortest path analysis. Since space syntax so heavily emphasizes network configuration, this may lead to even more serious mis-estimation of pedestrian motion.

A final reason lies in the assumptions behind the calculations. Angular segment analysis accounts for direction change, whereas the shortest path analysis measures the shortest metric distance between origin-destination pairs. While emphasizing directional change makes sense in formal cities, where such features are usually intentional, in this network paths often have superfluous bends (e.g., caused by a house with ingress into the pathway) wherein a pedestrian might not perceive a meaningful direction change, but angular deviation in the network is captured in the calculation (see Figure 1). Therefore, some segments may be unduly penalized when using such a predictive approach in an informal settlement. Like Karimi's (2002) study of Iranian "organic cities," adjustments to the space syntax methodology might be necessary to be more predictive in informal settlements.

Furthermore, by comparing the theory-driven measures to average motion in the evening and morning, we highlight what might be an important variable these theories do not address: time. Correlation coefficients were highest for the evening average and lowest for the morning average, indicating that the distribution of activity is not similar. One explanation could be that evening activity in informal settlements is representative of a broader range of activities, including evening commuting, shopping, using shared sanitation, and socializing in public space (Cutini et al., 2019, 2020; Kamalipour, 2020), while morning activity may be limited in ways that create differential patterns, as people are starting their day (e.g., using the toilet, commuting, but perhaps not socializing as much).

We caveat our findings by pointing out that we do not have sensor data for all path segments, whereas the theory-driven calculations are based on the entire network no matter whether we monitored the segment or not. Although we addressed this by only including path-segment level observations from the shortest path and choice calculations for which we also have sensor data, we cannot rule out that the missing sensor data would not change correlation coefficients. Furthermore, the sensors inaccurately measure pedestrian motion during peak daylight hours, meaning we do not measure all of the time windows space syntax methodology recommends for manual measurement (van Nes & Yamu, 2021). However, since this informal settlement is primarily residential, evenings and mornings are when most people are around. In addition, we only use three scenarios to construct the shortest paths calculation, thus it is possible that considering more scenarios would affect correlation coefficients. Finally, other space syntax studies frequently analyze larger study areas. We selected this area since we focus only on pedestrian, not vehicular activity, however, it is possible that this impacts the results, since we cannot say how much activity outside the settlement influences what we measure inside.

6. Conclusion

Using pedestrian motion sensors to measure activity in the evenings and early mornings, we analyzed mobility patterns in an informal settlement and tested how two common, and in formal cities frequently tested, theory-driven approaches to predicting pedestrian route choice perform in comparison. The sensor

data allow us to analyze, at high granularity over a longer period, the extent to which previous findings about these theories hold in an informal settlement. We find that space syntax choice measures are not correlated with pedestrian activity in the informal settlement we study. Route optimization theory seems to perform better. Interestingly, to our knowledge, no previous study has used route optimization to predict pedestrian activities in informal settlements. When we analyze the sensor data alone, we find evening and morning average motion are different, whereas weekend and weekday average motion are strongly correlated, though weekend activity is more intensive.

These findings open important considerations for future work to understand what drives pedestrian activity and route choice in informal settlements. Empirically-measured pedestrian activity may deviate from existing theories that only account for route network characteristics for several reasons, including extreme density and narrow path width, constantly changing network configuration, pedestrian reliance on mental maps absent formal ones, measured activity may be dominated by residential activity rather than through-traffic, the need to go outside to access shared sanitation services, and finally time-related differences in activities. Therefore, there may be a limit to the explanatory power of network-focused theories, compared to formal areas, necessitating theories that directly consider the nature of pedestrian behavior in informal neighborhoods and how formal areas influence it.

Informal settlements are a large and growing share of the urban environment throughout Africa, Asia, and Latin America. Thus, understanding pedestrian activity dynamics can provide insights to improve public service accessibility. For example, fires are a common danger. With more information about pedestrian activity, communities may be better equipped to improve access and escape routes. For city officials, understanding pedestrian patterns could enable more informed upgrading decisions, such as where to site sanitation facilities or streetlights as well as where to pave pathways.

Our study also shows that sensors are a minimally invasive method for collecting high-frequency, long-term pedestrian activity data, especially at night or in dense areas where movement data cannot be collected with mobile phones. Despite the challenges we encountered deploying this technology in an informal settlement for the first time, we gathered detailed data about nighttime pedestrian activity. Future research could improve pedestrian motion sensors to more effectively find ways to improve service delivery, disaster response, and quality of life in informal settlements.

Finally, our work reveals that the de facto border between the formal and the informal in urban areas exists not only in physical reality, but also in research. Sensors have been used to measure pedestrian activity in formal areas, but until now, not in informal ones; route optimization has been tested in formal parts of cities, but not in informal settlements. This research highlights the need for a new or modified theory of route selection based on a more nuanced understanding of this physical and abstract border that also better incorporates the specific characteristics of informal urban settlements along with the characteristics of formal areas.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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