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The *'peri-urban turn'*: A systems thinking approach for a paradigm shift in reconceptualising urban-rural futures in the global South

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A B S T R A C T

With the rapid pace of urbanization, urban sprawl has become a prevalent phenomenon, particularly in the global South, leading to the emergence of peri-urban spaces where rural-urban interfaces occur. These peri-urban areas exhibit dynamic and continuous interactions among social, economic, and environmental systems, offering valuable insights for fostering resilient futures. However, this aspect remains largely unexplored in current research due to a lack of innovative method-ological approaches that effectively capture the complementarities, potentialities, and contestations inherent in the dynamics of peri-urban areas. We contend that peri-urbanisation needs to be reconceptualized as an alternative socio-spatial framework that extends the predominantly Eurocentric discourse on counter-urbanisation, making it more inclusive of the emerging urban-rural transformations in the global South. By doing so, we can better understand and address the complex dynamics and challenges associated with peri-urban areas and develop strategies to foster resilience in these contexts.

1. Introduction

With rapid urbanisation, urban sprawl is a common phenomenon, particularly in the global South creating peri-urban spaces where rural-urban interfaces occur. Peri-urban spaces are generally rural spaces transformed, because of the growth of cities, relying on the resources of their surroundings. Butsch and Heinkel (2020) lack of planning and policy attention to peri-urban areas has exacerbated social, environ-mental, economic and health inequities. The dynamic and constant interaction of social, economic and environmental systems that occurs in the peri-urban areas can offer critical insights for enabling resilient fu-tures. However, this currently remains an under-explored area of research due to lack of innovative methodological approaches that effectively capture the complementarities, potentialities and contesta-tions embedded in the dynamics of peri-urban areas.

The limited and parochial understanding of peri-urban dynamics particularly of the Global South, has led to its neglect within the larger planning and urban design discourses globally which are mostly grounded in Eurocentric approaches and theories. Such (anti) "totality" (Brenner & Schmid, 2015) approach to urbanisation has been heavily

criticised by scholars who support the need to have a Southern theory to address/understand the specific conditions and differences in the southern cities (Goonewardena, 2018, Robinson, 2015; Roy, 2009). The peri-urban, we say, relatively suffers more in its misconception and lack of understanding of the embedded socio-spatial and political processes which in way shapes both the urban and the rural futures. Ravetz et al. (2022) point out peri-urban areas should be identified on the basis of being neither rural nor urban, presenting a unique urban rural dynamics which largely remain neglected. However, most of the existing research on peri-urban development is grounded in examining flows (e.g people, production, commodities, capital and information) and linkages (e.g. economic, social, political) that are physical and measurable; Such an approach often overlook the 'place' narratives which include the socio-spatial and cultural factors through which human agency is exercised and negotiated in cities and through which, we suggest, resilience is built.

The deployment of the peri-urban concept in this article, is not in the sense of engaging in the debate of its contestations. It is rather discussed for examining the diverse complexities and challenges accompanied with peri-urban planning, design and development which is more

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pressing and relevant to the emerging counter-urbanisation discourse particularly in the global South. First, we critically discuss the "global relevance" (Gkartzios & Halfacree, 2023) of counter-urbanisation and how its discourses are grounded in colonial thinking and knowledge production, which excludes the inherent, structural and systemic challenges in the global South with relevance to the Indian context in discussing the urbanity and rurality conceptions. Second, we examine the problematics lying in the existing framings of the 'peri-urban' which severely undermine the multi-dimensional factors which operate at individual, community and institutional level that can impact resilience. Thirdly, drawing upon a case study in peri-urban Chennai, in South India, we adopt a complex systems approach for understanding the urban and rural systems change, interactions and interdependencies in the peri-urban. By reframing peri-urban as 'place' and 'process' and using complex systems thinking approach, the paper presents a causal loop model to better understand the peri-urban dynamics.The model is developed based on yearlong primary qualitative research conducted between 2019 and 2020 (using focus groups with experts and residents, community mapping, semi-structured interviews with residents) in the peri-urban regions (St Thomas Mount Panchayat Union comprising of 15 villages) of Chennai city, India. The proposed causal loop model captures the urban-rural interactions and processes through a dual lens approach of 'flow' and 'place' narrative to include the socio-cultural, spatial, economic, environmental, temporal, technological and political parameters. The model describes peri-urbanization as a complex adaptive system (CAS) which operates as a dynamic network of agents acting in parallel, constantly reacting to what the other agents are doing, which in turn influences the network as a whole. The model identifies the interactions that can be influenced, nurtured, and exploited by a group of actors, providing critical insights for urban-rural dynamics which demands a potential shift in conceptualising counter urbanisation in the Global South.

2. Dialectics of counterurbanisation in/for global South

Counterurbanisation started as a new conceptualization which defined the trends in migration in America and Western Europe. Berry (1976) proclaimed that counter-urbanisation as a defining phase which marked the end of urbanisation in America. He stated that "A turning point has been reached in the American urban experience. Counter-urbanisation has replaced urbanization as the dominant force shaping the nation's settlement patterns." Even in the western context, counterurbanisations model as a concept was debated for being 'voluntarist', flattening the complexity of migration and not considering the inequality and inequity issues in choice of people moving from the urban and rural. However, Counterurbnaisation, in way also introduced a 'rural' turn within the planning and development discourse, as scholars called in for more a focussed approach towards rural perspective when discussing the urban-centred centrifugal shifts (Cloke, 1985).

Counterurbanisation as a concept and discourse had received much attention and have been discussed and debated (Berry (1976a), Berry (1976b); Fielding, 1982; Robert & Randolph, 1983; Dean et al., 1984; Vartiainen, 1989; Champion and Townsend (1990)). Referring counterurbanisation as 'chaotic concept' due its broad definition and problematics of scale within which it was defined in UK, US and Europe, Mitchell (2004) made a critical contribution to counterurbanisation narratives and discourse. She developed a more spatial approach to migration and settlement pattern to define the process more in detail through the three concepts: counter urban, counterurbanizing, and counterurbanization. Further explorations to understand the counter-migration trends has developed other models based on diverse factors including quality of life (Benson & O'Reilly, 2009), economic crisis(Remoundou et al., 2016, commerce (Bosworth & Bat Finke, 2020), scale (Bjarnason et al., 2021) and pandemics (Tamarru el al, 2023).

Numerous studies have engaged in a discourse on the definition and narratives surrounding counterurbanisation. These discussions underscore the importance of delving into and recognizing the manifold and diverse social, political, and environmental factors that contribute to the emergence of different forms, patterns, and trends in counterurbanisation (Šimon, 2014; Halliday & Coombes, 1995). Scholars have also argued for extending the scope of counterurbanisation to include emerging trends and reconceptualizing urbanity and rurality (Halfacree, 2001, 2022; Dilley et al., 2022; Ravetz et al., 2013). While we can still agree that counterurbanisation can serve as a useful heuristic concept (Vartiainen, 1989), beyond the debates on the scope and definition of counterurbanization. We argue here that it is crucial to acknowledge and comprehend the inherent and embedded Western approach to knowledge production (Said, 1978) concerning urbanity and rurality (Uzzell, 1979). This Eurocentric perspective presents issues because it prioritizes the importance of 'structure' over 'agency' and fails to consider its geographical implications. In this context, we aim to emphasize three main concerns regarding the theorization of counterurbanisation in the global South, specifically focusing on India (where our case study is located): 1) The inherent binary perspective on urban and rural development. 2)The impact of existing neoliberal policies on rural development.3) The lack of well-defined governance structures.

In the following section we elaborate on the above concerns. However, it is worth noting that our arguments are supported by diverse studies conducted in other global South countries as well.

2.1. The urban-rural dichotomy

In the pre-colonial era, India traditional economy has always been rural-agricultural. Like most of the villages in the eastern societies, Indian villages thrived through self-sufficiency and alongside supporting cities and towns with their surplus production (Liu et al., 2010; Ray, 1977). Archaeological evidences show that the indigenous cities and the villages were very not much different in the physical character, except for more roads, and more house which are well aligned(Ray, 1977). Under the British rule, the introduction of new land and taxation policies aimed at supporting feudal exploitation of the Indian peasantry had a detrimental impact on the agricultural economy of the country. Additionally, the British commercial policy hindered efforts towards industrial development in India (Lewandowski, 1975). The earliest Indian cities were predominantly established by the British with the primary purpose of serving the colonial economy (Spodek, 2013; Roy, 2009; Roy,). Ray's seminal work on Rural Dichotomy in Indian Tradition and History (1977) delves into the consequences of colonial rule on the agricultural economy and the spatial organization of cities. It reflects on how the colonial influence shaped the urban landscape and impacted the relationship between rural and urban areas in India.

"… But if tradition and history have any indication to offer to contemporary India of our times, it is that the most and fundamental fact of our economy being agricultural, India can afford to rear up industrial megalopolises like Bombay and Calcutta and Madras on foreign models, at her own peril alone. What the grains of the Indian tradition would bear the strain of, naturally and consistently, is the rearing up of intelligently planned townships and satellite towns that could accommodate centres of industrial production and distribution and absorb with advantage the tensions of accelerated industrial growth in an ever-creative agricultural life" (Ray, 1977, p. 892)

In India, the legacies of the British colonial history persist in the ways urban-rural dichotomy is represented, lived in, researched, managed, and examined today. While, agriculture playing a critical role in countries economy, in the contemporary India, unfortunately, the urban largely is viewed as 'modern' and 'progressive' and rural as 'traditional' and 'backward' (Chapman and Wanmali, 1984). The strong urban-rural divide reflects not just in the planning, design and policy making but also in perception of the people. Hence, for city dwellers, the attractive option would be more to more further away from cities, rather than to be closer to villages. Within such a socio-cultural context, it is important to recognize that counterurbanisation, even when occurring in small areas,

possesses urban characteristics (Gottlieb, 2006; Halfacree, 2002; Geyer & Geyer, 2017; Sandow and Lundholm, 2020). As a result, the dichotomous approach that underlies counterurbanisation narratives tends to oversimplify and distort the complexities of social, spatial structures, values, and aspirations within society. It fails to acknowledge the intricate interplay between urban and rural elements in the context of counterurbanisation, thereby obscuring the realities of these dynamics (Cobbinah et al., 2015; Kombe, 2005).

2.2. Neoliberal planning and policy making

Based on the 2011 Census data, India has over 600,000 villages and approximately 7000 towns and urban centres. Out of the total population of 1.21 billion people, around 69% reside in rural areas, while the remaining 31% live in urban areas. Unfortunately, the planning process in cities is still influenced by the colonial legacy and is driven by neoliberal economic policies. Cities are now viewed as catalysts for economic growth, aiming to attract national and global businesses and investments that can contribute to the overall economic development of the country (Mitra & Mehta, 2011; Siddiqui, 2014). Urban policies and initiatives in India, such as the Jawaharlal Nehru National Urban Renewal Mission, Smart City Mission, and Atal Mission for Rejuvenation and Urban Transformation Scheme, have predominantly favoured metropolitan areas, leading to a pattern of 'polarized growth' (Shaw & Das, 2017). On the other hand, previous national rural redevelopment schemes like Providing Urban Amenities to Rural Areas (PURA) have achieved limited success. There is a noticeable lack of focus on improving infrastructure and development in rural villages. The attention, thorough analysis, and publicity given to urban redevelopment plans, such as the Smart City scheme, are not extended to rural redevelopment initiatives. As a result, rural areas continue to face neglect in terms of comprehensive development efforts.

In the midst of agrarian distress, increasing unemployment, natural resource degradation, and farmer suicides in rural India (Gopalakrishnan & Thorat, 2015; Narasimha Reddy & Mishra, 2010), the Rurban Mission has emerged as an initiative to improve the living conditions in rural areas. The mission aims to establish 300 rural growth clusters across the country with the primary goal of bridging the gap between rural and urban areas concerning infrastructure and services. Additionally, it seeks to promote regional development and attract investments to rural regions (Ministry of Rural Development, 2017). However, when we critically examine the Rurban mission's vision statement, the focus is more on creating clusters of rurban villages, which reflects 'rural soul and urban amenities'. Singh and Rahman (2018) provide a comprehensive analysis of the shortcomings of the Rurban Mission and highlight how the initiative has overlooked the underlying causes of persistent discontent in rural areas. They point out that the program fails to address structural drivers such as perverse policy regimes (Gupta, 1998), the issue of shrinking landholdings, caste-based divisions, and unequal political agency, among other factors. These factors play a crucial role in perpetuating rural challenges and discontent. By neglecting these fundamental issues, the Rurban Mission falls short in effectively addressing the root causes of rural distress and fails to bring about comprehensive and sustainable development in rural areas, as highlighted by Singh and Rahman (2018). The disparity in urban -rural development is also reflected in the lack of social and health policies in the rural regions (Kumar et al., 2022).

2.3. Urban -rural ambiguity

The 2011 census of India defines urban areas as settlements with a minimum population of 5000 people, where at least 75% of the male working population is engaged in non-agricultural work, and the population density is at least 400 persons per square kilometre. This includes "statutory towns" that are administered by a municipality, corporation, cantonment board, or notified town area committee, as well as "census towns" that exhibit urban characteristics but are not officially designated as towns. Further, the 2011 census considers urban agglomeration as completed 'urban' even with outgrowths which exhibit rural characteristics. All other areas are classified as rural. According to the 2011 census data, there was a higher increase in the urban population between 2001 and 2011, indicating a faster rate of urbanization in India. However, despite this urbanisation trend, 68.84% of India's population is still classified as rural. Moreover, a significant portion of the rural population, estimated to be around 80–140 million people, lives in settlements that fall in the 'grey zone', displaying both urban-like and rural-like characteristics (Singh & Rahman, 2018). Here, it is important to highlight the significant contrast in the western context, such as in the UK, where planning efforts have been directed towards maintaining a distinct urban-rural divide.

Apart from the lack of clarity in urban-rural classification in India, ambiguity also persists in the process of transformation and development of urban and rural areas and the resultant typologies of peri-urban regions; urban village (Oostrum & Dovey, 2022); "desakota" (meaning village-town) (McGee, 1991); Predominantly Urban, Semi-Urban and Potential Urban areas (Budiyantini & Pratiwi, 2016).

Urban expansion in India typically occurs through land conversion and the incorporation of surrounding villages. Land conversion can happen through formal or informal means. While formal conversion is tightly regulated by higher-level governments, data on informal conversion is not publicly available. In addition, due to the incessant urban outgrowth, jurisdictional urban-rural boundary too shifts constantly (Maheshwari et al., 2016) and as Buxton and Low-Choy (2007) have mentioned, on occasions, even the clearly urban or rural areas might also be mistakenly perceived as peri-urban. The ambiguity surrounding the actual demarcation of urban and rural areas (Mortoja et al., 2020), combined with the complexities of local governance structures, creates challenges when using the counterurbanisation model to understand trends and patterns in India.

3. Problematics of the Peri-urban framing

The concerns and issues raised above section shed light on the structural and systemic challenges underlying urban and rural development in India, which significantly influence people's aspirations, opportunities, challenges, and the need to migrate. Moreover, we emphasize the intricate socio-cultural and political factors that demand a re-imagining of the 'counter-urbanization' concept to accommodate emerging futures. In this context, we argue that peri-urbanisation, a more organic and ambiguous yet compelling global phenomenon, particularly in the global South, can provide a localised Southern lens to better understand the dynamics between urban and rural areas. By examining peri-urbanization, we can gain a contextual understanding of the socio-spatial processes that shape both urban and rural futures. This approach acknowledges the complexities and nuances of the urban-rural interface, allowing for a more nuanced and comprehensive exploration of the development dynamics in India and other similar regions.

Peri-urban is a loosely used term particularly in the planning literature. While there is no consensus definition, it broadly refers to spaces at the periphery of cities whose resources such as land and water are appropriated to support urban expansion (Narain & Nischal, 2007). It is a space in transition, where rural and urban land uses, activities, and institutions co-exist (Allen, 2003). It refers to spaces that are being engulfed in the process of urbanisation, while not having completely lost their rural character. This resonates with the concept of Desakota (McGee, 1991) used in the context of East Asia, where "desa" mean village, and "kota" means town. Thus, periurban represents a meeting ground for the rural and the urban. Given the pattern of urbanization in many cities of the Global South, a definition of peri-urban as the periphery of a city loses its relevance. Cities grow along a continuum, with contiguous boundaries. This co-existence of the rural and the urban can be found to exist within the heart of a city, and not just at its periphery

(Singh & Narain, 2020). Thus, the definition of the peri-urban as a spatial zone loses its significance.

The peri-urban concept is increasingly defined and conceptualised across both the geographical and disciplinary contexts. Arguments behind the multiple conceptions of the peri-urban include lack of scientific definition (Forsyth, 2012), diversity of engaged disciplinary perspectives (Thuo, 2013), the difficulties associated with delimiting the spatial extent of this dynamic region (Brook et al., 2001) and the equivocation of the concept itself. Notably, scholars increasingly argue that rural, peri-urban and urban environments operate as a system rather than independent entities (Allen et al., 2006; Wandl and Magoni, 2017; Potts, 2022). At the same time, the peri-urban area is increasingly claimed to constitute the intersection point between urban and rural areas (Birkmann et al., 2010; Olujimi & Gbadamosi, 2007). In a nutshell, there are many converging understandings within academia on the lived reality of the diverse and context laden definitions of the peri-urban concept (Salem, 2015). Another converging understanding linked to peri-urban is the co-existence of urban and rural features within the city limits and beyond (Allen et al., 2006; Salem, 2015). Situating the peri-urban concept is therefore largely a challenging endeavour. This owes to its increasingly contested milieu by both scholars and development practitioners (Forsyth, 2012; Thuo, 2013).

While the term 'peri-urban' usually refers to areas which is neither rural nor urban witnessing constant transformations, scholars have rightly argued to shift the focus towards understanding them as a process. Hence, for Allen (2003) and Singh and Narain (2020), peri-urbanisation is the relationship between rural and urban areas and the transforming flows of goods, services and resources between villages and urban centres. Often the contested spaces, peri-urban areas witness multiple claims over its natural resources including land, water among others with significant impact on the livelihoods of its communities. As urban cores run out of space, peri-urbanisation provide the scope for this expansion. Thus, ecological footprint from such expansion spills over into the peripheries resulting in these areas becoming the supplier of natural resources to serve the demand of the city's utilities and infrastructure services. This, in turn, forces labour from the peripheries who were hitherto the beneficiaries of these resources, augment their livelihood loss by seeking employment in the urban cores. Hence, more than just being the physical peripheries, these areas are important centres with changing flows of people and natural resources. This is why it is important to focus on peri-urbanization as a process moving away from the rural—urban dichotomy which largely unpins the counter-urbanisation model of the west. Understanding peri-urban as a critical process within planning discourses, will bring to the forefront the implicit and embedded nature of relationships between the social, environmental, ecological and economic factors of development. Further, such an approach would inform us how the dynamic relationship between these factors can be utilised for effective planning, design and development interventions.

4. Peri-urbanisation in India

In India's neoliberal economic policies, cities are considered as 'engines of growth' capable ofwhich could attracting national and global business, and investment that could contribute to the larger economic growth of the country (Mitra & Mehta, 2011; Siddiqui, 2014). Concomitantly, Cities are fast expanding with stringent regulations on urban development densities pushing businesses and people out of urban cores. In India, peri-urban areas have witnessed significant changes due to various factors. One of the primary drivers is population growth, which leads to the expansion of urban areas and the encroachment of urban activities into nearby rural regions. Rapid industrialisation, commercialisation, and the establishment of infrastructure projects also contribute to periurbanisation.The outward expansion of large cities has meant increasing and more complex interactions with the surrounding rural areas and gradual changes in their

land uses and occupations, transforming them into peri-urban areas, where urban and rural activities and or institutions are juxtaposed. Unfortunately, due to a lack of adequate planning and policy attention to peri-urban areas, they suffer from poor infrastructure, wide spatial disparities and poor access to amenities resulting in severe social, economic and environmental problems (Marshal & Randhawa, 2017; Saxena & Sharma, 2015). In recent years, although peri-urban transitional zones have found some attention at the national level, through contemporary India's urban policies and programmes such as Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and of more recent ones like Smart City Mission and Atal Mission for Rejuvenation and Urban Transformation (AMRUT) Scheme, have largely supported metropolitan based 'polarized growth'(Shaw and Das, 2017). Even with a more focussed initiative like the National Rurban Mission (NRuM), there is still lack of a cohesive policy framework especially for peri-urban development. While studies argue that the peri-urban interface, and its marginalised inhabitants, need be recognized as a key frontier in addressing the challenges of sustainable urbanization (Marshall & Dolley, 2019) peri-urban areas have largely been neglected in policy and practice. Unfortunately, still the 'planning for the urban' remains as a dominant approach to policy and governance, creating severe socio-economic conflicts, and marginalisation of rural communities.

5. Case study of Chennai, Tamil Nadu

In India, Tamil Nadu has emerged as the state with the highest level of urbanization. According to the study conducted by Aithal and Ramachandra (2016), Chennai, the capital city of Tamil Nadu, lost more than one-fifth of its greenery in 20 years and has the least open space at 2.09%. is predicted to convert 36% of its total area into urban areas by 2026. Chennai has an intensely developed urban core, in addition, the urban sprawl of sub-urban and peri-urban development has resulted in poor infrastructure, quality of life challenges and a low level of economic activities. Chennai city is located on the southeastern coast of India, on the coast of Bay of Bengal. The Metropolitan Area is comprised of the Chennai City Corporation (CCC), 16 municipalities, 20 Special Grade Village Panchayats and 214 villages (Chennai Metropolitical
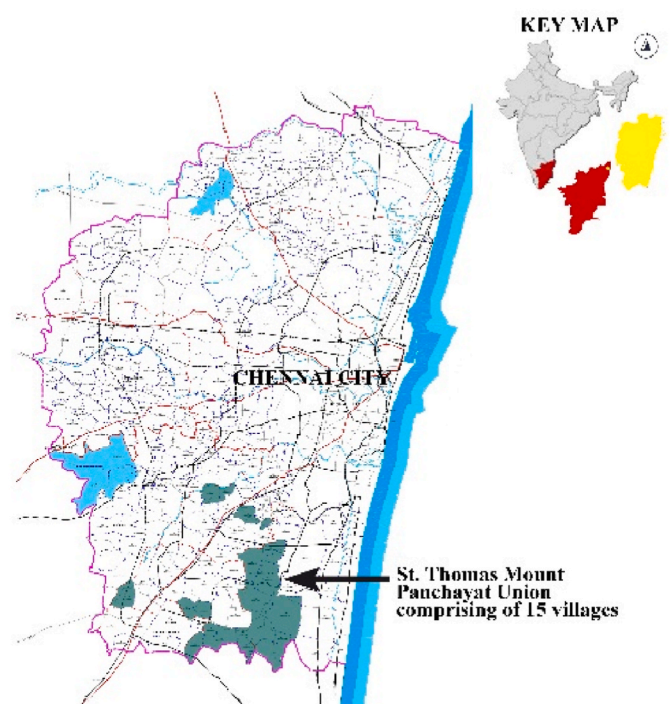

Fig. 1. Key Map Showing case study location in Chennai.

CHENGALPATTU DISTRICT
ST.THOMAS MOUNT PANCHAYAT UNION
ST. THOMAS MOUNT PANCHAYAT UNION WARD DELIMITATION MAP
PANCHAYAT UNION WARD 1 to 11

	INDEX	
1.	PANCHAYAT UNION BOUNDARY	
2.	PANCHAYAT UNION WARD BOUNDARY	
3.	TOWN PANCHAYAT & MUNICIPALITY BOUNDARY	
4.	CORPORATION BOUNDARY	

Panchayat Union Ward No	Name of Village Panchayat(s) in the Panchayat Union Ward	2011 Population in the Proposed Panchayat Union Ward
1	Polichalur Panchayat	21906
2	Cowlbazaar Panchayat & Triusulam Panchayat	16870
3	Mudichur Panchayat	15438
4	Moovarasampettu Panchayat & Kovilambakkam Panchayat Ward 1,2,3	17719
5	Kovilambakkam Panchayat Ward 4, 5, 6, 7, 8, 9, 10, 11, 12	19327
6	Nanmangalam Panchayat	18567
7	Medavakkam Panchayat Ward 1, 2, 3, 4, 5, 6, 7, 12	20011
8	Medavakkam Panchayat Ward 8,9,10,11 & Vengavasal Panchayat Ward 1, 2, 3, 4, 5, 6, 7, 9, 10	19450
9	Vengaivasal Panchayat Ward 8, 11, 12 & Sithalapakkam Panchayat	17462
10	Perumbakkam Panchayat	18890
11	Thiruvancheri Panchayat, Agaramthen Panchayat, Madurapakkam Panchayat & Ottiyambakkam Panchayat	18558
	Total	204198

Fig 2 St Thomas Mount Union showing 15 villages (Source Chennai Metropolitan Development Authority)
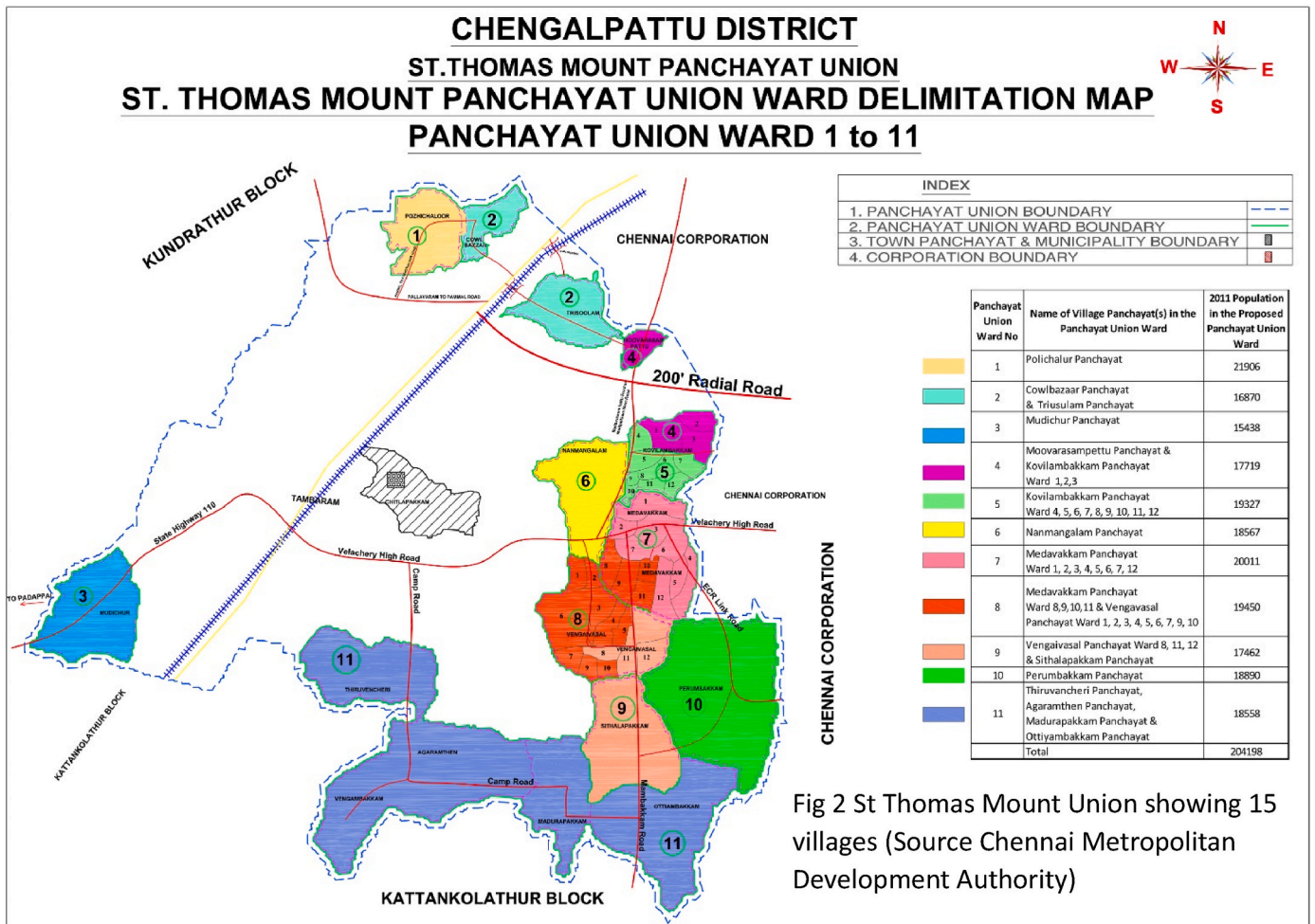
Fig. 2. St Thomas Mount Union showing 15 villages (Source Chennai Metropolitan Development Authority).

Authority Database). Rapid urbanisation in Chennai, the fourth largest metropolitan city in India, has resulted in extensive change in the land use patterns, unregulated growth and shrinkage of the water bodies and other resources. Almost 99% of the green cover has been replaced by non-vegetative developments resulting in the reduction of groundwater level to 33% between the years 1997–2001 (Gupta & Nair, 2011). National Institute for Transforming India (NITI) Aayog's Composite Water Management Index (CWMI)2019, report identified Chennai as one of the 14 cities presently facing an acute water crisis. The core of the paper revolves around a case study of the peri-urban area known as Saint Thomas Panchayat Union, which consists of 15 villages located in the southern part of Chennai city. The selection of this area was based on population, land-use, and occupation criteria supported by the detailed study of local project lead on peri-urbanisation in Chennai(refer to Figs. 1 and 2). The core of the paper revolves around a detailed case study conducted in the peri-urban area known as Saint Thomas Panchayat Union. This region comprises 15 villages situated in the southern part of Chennai city. The selection of Saint Thomas Panchayat Union as the focal area for investigation was based on specific criteria, including population density, land-use patterns, and occupational activities. These criteria were informed and substantiated by an in-depth study conducted by the local project lead focusing on peri-urbanisation in Chennai, as illustrated in Figs. 1 and 2.

St. Thomas Mount stands out as a highly sought-after region for extensive commercial, residential, and institutional development. This attractiveness is primarily attributed to presence of main train station facilitating intercity and interstate connectivity. The case study area is

Fig. 3. Arasnkalani

characterised by fragmented development, presenting challenges associated with inadequate infrastructure and planning (Refer below Figs. 3 and 4,5, 6, 7) The significance of this case study lies in its potential to shed light on the complexities of peri-urbanisation dynamics, especially in regions experiencing rapid urban expansion.

5.1. Methodology

The aim of our case study was to understand the challenges and potential of peri-urban Chennai, particularly in St. Thomas Mount, from

Fig. 4. Cowl Bazaar.

both a development perspective and through lived experiences. Our objective was to reconceptualise peri-urban dynamics within planning, design, and development discourses. As part of our data collection, we conducted two focus groups with key stakeholders, including representatives from planning, urban design, non-governmental organizations, resident communities, academia, and research. To comprehend the everyday life of people and their lived experiences in the peri-urban area, we carried out fifteen semi-structured interviews with residents. These interviews involved mapping their everyday routes and sketching places of interest. We also documented everyday urban spaces through photography. In both instances, our main focus was to understand the peri-urban in terms of development, potential challenges, opportunities and the lived experiences of the residents.

The interview findings were cross-checked with additional quantitative and qualitative data, as well as literature studies. Addressing the methodological and theoretical challenge and gap in examining the peri-urban dynamics, and by adopting a complex systems approach to peri-urbanisation we delineate the complexities and uncertainties inherent in urban-rural dynamics. This will help to identify and analyse the non-linear relationships, their interdependencies, feedback loops, and self-organising processes that shape urban and rural systems. We discuss below the Causal Loop Diagram (CLD) developed from the case study data analysis and findings. In this context, Causal Loop Diagrams (CLDs) are highly beneficial when you seek to depict and visualise the variables and their interconnectedness derived from data analysis. CLDs simplify the representation to two essential elements: variables, denoted by their names, and causal links, denoted by arrows. The positive or negative signs on the causal links indicate the [supporting (+) or opposing (-)] nature of the relationships between variables.

5.2. Key findings

Some of the key findings which emerged include.

Fig. 5. Mudichur

Fig. 6. Ottiyambakkam

a. Speculative Development: The defining characteristics of peri-urban areas revolve around the affordability of land, which shape the overall dynamics, encompassing both positive and negative aspects. As a result, the government tends to target peri-urban regions for projects that require extensive land acquisitions, such as waste disposal sites, sewage treatment plants, and slum resettlement colonies. Additionally, peri-urban areas are witnessing significant industrial development, while the private sector takes advantage of the inexpensive land primarily for speculative purposes. This aspect truly characterizes peri-urban regions, where speculative land development completely transforms the notion of progress (Goldman, 2011). Consequently, land is bought and sold for profit, with less focus on its utilitarian value or potential for settlement. The rapid buying and selling of large parcels of land by farmers, land assembly, land consolidation, and purchases all contribute to what can be termed as 'real estate urbanism' (Participant A). Although some settlements do occur, the primary land transactions in this area are speculative in nature, resulting in numerous challenges. The speculative nature of these transactions becomes the primary source of difficulties, as infrastructure does not accompany or precede real estate development. Consequently, the establishment of desirable neighbourhoods does not coincide with these developments. The construction of roads, infrastructure, water supply systems, and a grid of roads does not precede the creation of marketed neighbourhoods. Instead, land sales occur rapidly, often before any infrastructure development takes place. This situation encapsulates both the possibilities and challenges inherent in peri-urban areas.

b. Sense of Place: By examining the everyday life of residents through participatory methods, the various interviews with residents revealed that peri-urban areas are perceived more as a 'place' with rich sensorial and lived experiences. The place also offers qualities and opportunities for transactional and meaningful engagement with the physical and social settings. Several participants described their everyday life in the peri-urban areas as intrinsically linked to the physical (natural and built) settings.

My favourite place is the bakery. After college when I get down from the bus, the smell from the bakery drags me. I satisfy my hunger pangs at the bakery. I know the baker man very well too ! Then I go to the barber shop. The haircut and styling hardly take 15 min and since I know him well, we usually have 30 min of chat after that. (Participant 1A, College Student, 22 years)

Fig. 7. Agaramthen
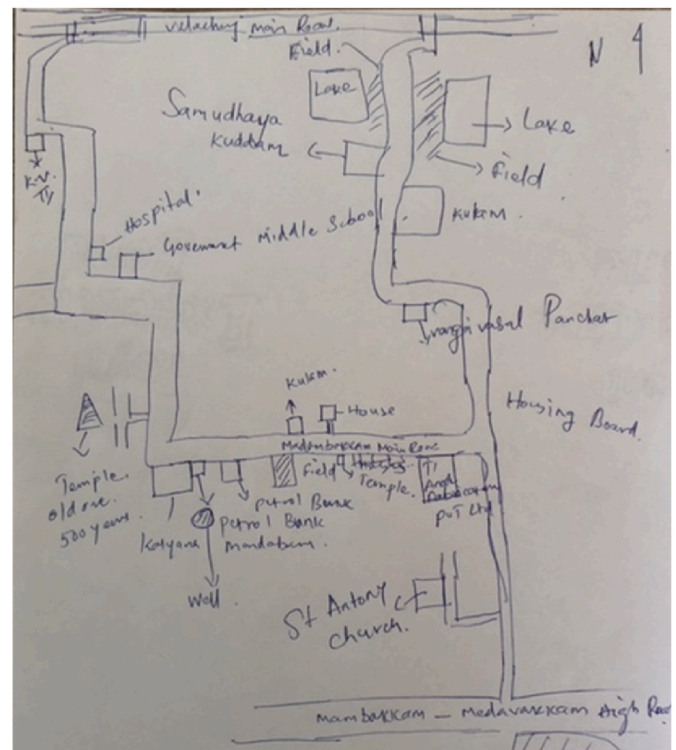
Fig. 8. Participant 1B everyday route mapping.

Contrary to the prevailing literature that conceptualizes peri-urban areas as transition zones (as discussed in section 3), participants in our study described the place as a container of rich memories. Ref Figs. 8 and 9.

During my childhood I used to catch fish in this pond along with my friends. They are good memories. Lots of palm trees lined up these lakes' shores in those days. I often use to climb those trees with my friends to pluck and eat the fruits. Along with my friends I go to this well to swim. We enjoy swimming in that well for about an hour or so most often. During my school days, we go to school only after praying to the God at this temple (Resident Participant 1B, Builder, 54 years)

c. Ecosystem Services: The peri-urban regions are primarily recognized for their unfavourable environmental conditions and inadequate hygiene and sanitation provisions. The low-quality environment is also aggravated by insufficient environmental practices and a lack of community cooperation in the upkeep of public spaces, including streets. This was expounded upon by one of the residents who participated in the interview.

If we give ₹15 (equivalent to 0.18$) to the garbage collector, he will clean up the garbage. However, people often don't do that. As a result, dogs rummage through the garbage thrown out by people, leading to messy and unhygienic streets (Participant 1B).

Despite the unfavourable environmental conditions, certain peri-urban regions provide satisfactory ecosystem services for their residents.

There is no pollution here. The water quality is good, and we have uninterrupted electricity supply. The people are sociable and attached to one another. There is no fighting among the residents. In fact, people actively participate in their neighbours' functions along with their families. The local culture is very positive. In contrast, cities are plagued with pollution, including the noise generated by trains and buses. Now, take a look at my home. Is there any settled dust?

(Interviewer: No)

The environment here is very clean, unlike cities where houses accumulate a lot of dust due to air pollution. Life here is fantastic!

d. Mobility/Access: The ability or inability to access amenities and services significantly influences the overall quality of life for people in

Fig. 9. Participant 1A everyday route mapping.

peri-urban areas. The ease of mobility and access varies in different locations within the peri-urban region, depending on the residents' proximity to their desired destinations and the connectivity of local and state-level transportation routes. While accessing amenities was relatively easier, significant challenges were faced when it came to accessing workplaces located in the city.

I don't go to T. Nagar in the city anymore .Saravana stores,Max, Reliance and many more brands of showrooms have sprung up in the Velachery main road itself .We have the Tambaram Junction which is a major travel and commercial hub and the new Kilambakkam bus terminus which eases accessibility and reduces travel time and waiting in long traffic jams that we experience in the city (Participant 1B)

Getting to my workplace was a major challenge. I had to use my own vehicle to reach Tambaram Railway station, where I would park my vehicle in their parking facility. From there, I would catch a train to Beach Railway Station in the city. Finally, I would take a shared auto or bus from Beach Railway Station to reach my office at Royapuram. The one-way distance I travelled to reach my office was 45 km, which was extremely exhausting and became a monotonous routine. I would take the same route to return home. Having my own two-wheeler made my commute a bit easier. On my way back home, I would often do some shopping in neighbouring areas like Mahalakshmi Nagar or here in Vengaivaasal itself (Participant 1C).

e.Urban-Rural Coexistence: As one of the participants explained, the emergence of peri-urban areas presents new challenges that demand a fresh perspective on the rural-urban dichotomy. Instead of viewing them as separate entities, there is a need to perceive them as a continuum. This transformation in understanding the peri-urban has evolved over the years.

When I started my career in research, I used to think the peri urban as the periphery of the city, right. But then the way you say that it's a ' rural urban interface ', it where we find the rural and urban coming together. If you look at how cities in the global south are doing now, especially, perhaps Chennai, and other parts of India, like Bangalore, Gurgaon.., the way the city expands is that, what is the periphery of the city becomes very difficult to identify. It's like a continuum. This coexistence of the rural and the urban can exist also in the heart of the city (FG Participant A, Researcher)

f.Social and Spatial Innovation: Peri-urban regions were perceived as spaces that could provide breathing space for the city, where affordable housing options for the poor and reasonably priced luxury

housing for the middle classes could be found. One of focus group participant explained this as,

Even the middle class can buy a good flat up there which they cannot, in the city. I think that the fundamental strength of the peri urban is that , it allows affordability, it allows a bit of expansion, it allows green field opportunities to create new kinds of urban landscapes (FG Participant A, Researcher)

Peri-urban spaces enable the emergence of a rurban economy and lifestyle, incorporating practices such as urban agriculture and associated urban forms. This, in turn, creates unique socio-spatial opportunities for diverse building typologies, including residential schools, retreat centres, and resorts. However, the realization of such opportunities remains distant due to the lack of planning and policy attention given to peri-urban areas. Additionally, an expert participant (FG Participant C) emphasized how peri-urban regions can facilitate the integration of traditional forms of governance with emerging new forms of governance at the local and *trans*-local levels. This widens opportunities for community-level activists, organisers, and larger groups to play a role. A representative from an NGO highlighted various ways of engaging with local bodies in the peri-urban areas.

In the city, the development rules are very stringent, and we need to go through a difficult process. Whereas in the peri urban areas, it is emerging, the local bodies are so considerate, so that we can bring in any kind of a development with the local bodies and also with the people. People can easily access local bodies, whereas in the city it is a big process. So, the potential is that we can bring in development in the peri urban areas by working with the people as well as with the government (FG Participant B, NGO).

5.3. Visualizing the peri-urban dynamics through CLD

The aforementioned key discussion points provide a range of perspectives on the peri-urban areas, encompassing their challenges, potential, and lived experiences they bring forth. The process of peri-urbanisation results in an uneven distribution of benefits among its residents (Mondal & Banerjee, 2021). Emphasising the critical nature of the peri-urban challenge, it is essential to address the key issues surrounding natural resources and agricultural lands, particularly the threats faced by the commons (Narain & Vij, 2016). The encroachment

around ponds near Chennai serves as evidence of this concern (Jose & Milton, 2016). The government has been increasingly strained for a prolonged period, resulting in reduced access to these common resources. These resources hold immense importance for livelihoods, especially for small farmers and landless households. Much of the research on peri-urban areas comes from geographers, urban planners and architects who aim to expand their understanding beyond the city limits which completely ignores the dynamics of the urban-rural systems and interactions. Consequently, it is assumed that incorporating peri-urban spaces into the common planning framework would resolve the problem. However, the peri-urban landscape is highly diverse, making non-statutory resource allocation complex and necessitating the involvement of non-state actors, such as civil society organizations, NGOs, and academics.

In order to enhance the comprehension of the crucial networks, actors, and relationships and their potential within the peri-urban context, we propose the development of a conceptual causal loop diagram. This diagram aims to visually illustrate the dynamics of the peri-urban areas, taking into account the findings of our case study as well as existing literature on the subject. In this work we are analysing the complex interactions in the peri-urban space through the use of qualitative causal-loop diagrams (CLD) to gain insights about the complex relationships and interdependencies and use it as a framework for evolving our analysis and understanding of the dynamics in peri-urban areas. The

CLD presents interactions and interrelationships of diverse variables thematically linked to five key domains drawn from the case study findings: Demographics, Governance, Economy, Health and Place. The inclusion of various variables linked these five domains in our study emanates from a meticulous analysis of the data and key findings, wherein participants have actively focused on these key variables (refer to sec 5.3).

CLDs are a useful tool to explore the interactions of components in a system, the feedback loops, the delays embedded in the feedback and the interdependence with adjacent elements that may not be clear at first instance. CLDs are mainly thinking tools, means to gain insights, enablers for analysis, especially when reflecting on systems that are complex (Meadows, 2008). They are a good tool, among many, when attempting to deal with complexity effectively. Adjacent systems and context may contain key leverage points or have the potential to provide enough balancing influence for policy making and future thinking (Sterman, 2000). We are also using the CLD as a basis to understand resilience in the context of urban dynamics, as the interdependencies in the system can be used to provide supporting elements to the human system. In a CLD, the base of an arrow is the 'cause' and the point is the 'effect', and the sign at the tip relates to a qualitative effect. Positive means cause and effect follow the same direction (a supporting relationship). Negative means the effect is in the opposite direction to the cause (an inverse relationship). In Fig. 10 we have also identified four
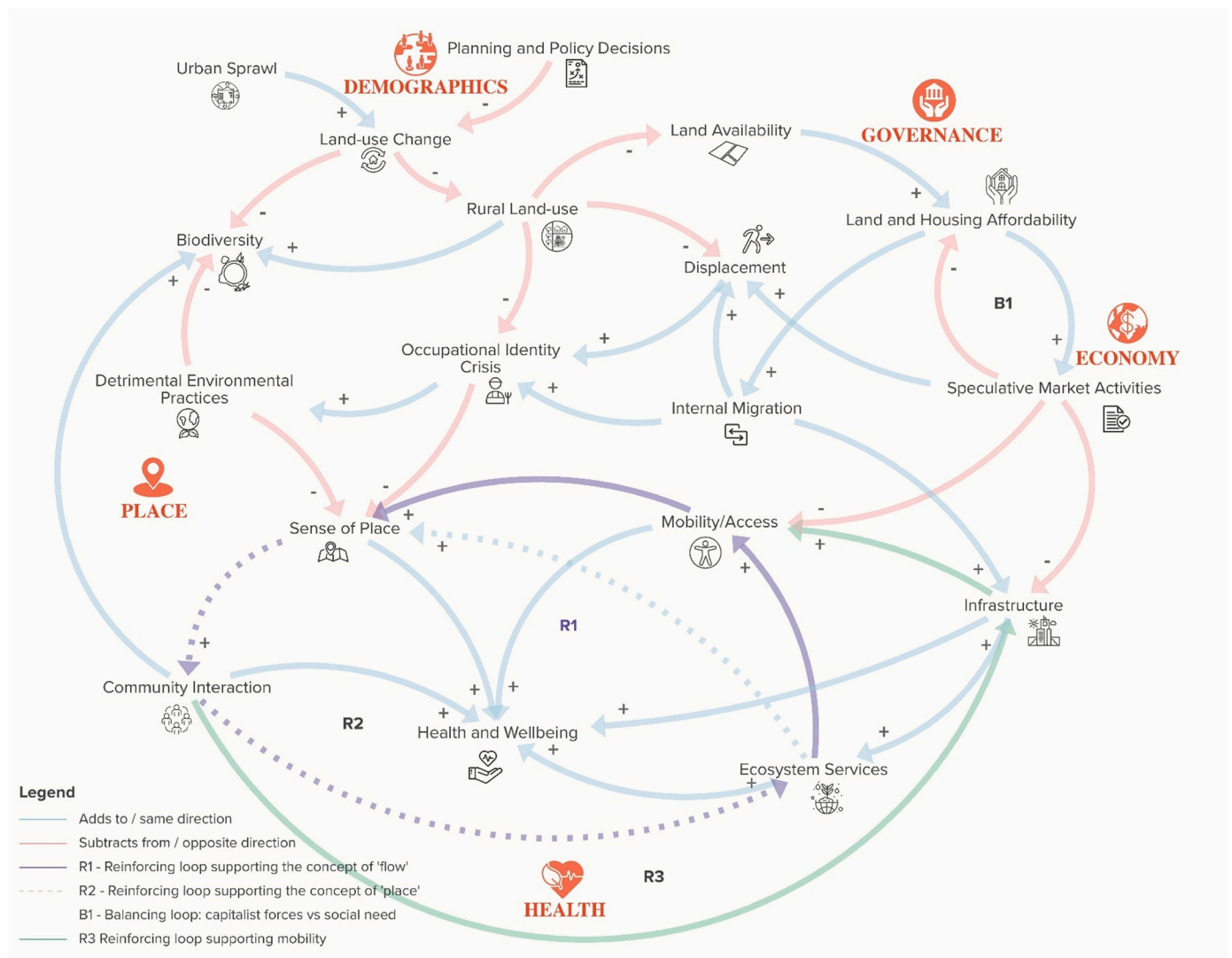

Fig. 10. Qualitative Casual Loop Diagram (CLD) delineating the peri-urban dynamics.

'loops'. Loops are circular connections that have either a reinforcing effect or a balancing effect. In our case all variables have been derived from interviews and focus groups and we have done a sanity check with supporting literature [Narain, 2014; Mondal & Banerjee, 2021; Shaw, 2005; Rauws & Roo, 2011]. From interviews and the direct expressions of the subjects we created a series of CLD diagrams that have been successively refined and validated with literature. Our first insight is the confirmation of links and dependencies to adjacent systems: the health and well-being of the people in Saint Thomas Mount is intrinsically associated with Governance decisions, Economic policy, Urban policy and the surrounding ecosystems. In our diagram R1 is a reinforcing loop that promotes well-being indirectly. It represents the connections that people make among them, with their place of living and with the natural environment. It is an uplifting set of relationships that supports communities, belonging and health. R2 is a similar set of relationships that seems to indicate that the 'Sense of Place' might be enough for an important impact on their well-being. Any improvement in any variable of any of the reinforcing loops will increase the direct and indirect benefits of the system. R3 is another reinforcing loop connecting the variables 'Mobility/Access', 'Sense of Place', 'Community Interaction', 'Infrastructure' and back to 'Mobility/Access'. This loop incorporates infrastructure as a declared essential element in the conceptualization of a community's health and well-being, as the diagram shows. Any one of the components of the loop that is strengthened will have an impact in well-being and will contribute to increasing societal resilience. The challenges on those reinforcing loops are the 'opposing forces', which, in the diagram are three direct variables: Speculative Market Activities, Occupational Identity Crisis and Detrimental Environmental Practices. Another clear loop is a balancing one that simply states the well-known tension between capitalist market forces and the human social need for housing. The balancing loop reflects the tension, it's push and pull relationship.

The CLD (Causal Loop Diagram) allows for a meaningful representation of the various issues and possibilities present in peri-urban areas. By integrating the notion of place into peri-urban dynamics, the CLD supports progressive discussions on urbanisation and counterurbanisation, fostering more active and involved dialogues in the realms of planning, design, and development related to peri-urban areas. CLDs support and enriched debate by bringing to the surface interdependencies that might not be initially obvious and present opportunities for thinking of alternatives for hypotheses generation and potential social improvement.

6. Towards a 'Peri-urban turn'

Peri-urban areas are largely framed and examined as 'in-between spaces', occurring at the interface of urban and rural zones; 'transitional spaces', undergoing a change from rural to urban, manifested in changing types of development, and as 'spaces of flows'; of goods, people, knowledge, capital, resources (Abramovay & Sachs, 1996; Douglass, 1998; Firman, 1996; Friedmann, 1996; Sit & Yang, 1997). Most of the existing research on peri-urban development is grounded in examining flows (e.g people, production, commodities, capital and information) and linkages (e.g. economic, social, political) that are physical and measurable; there is limited analysis of peri-urban processes in any depth (Rakodi, 1999).

We argue that the problematics of the existing framings lie essentially in characterising the peri-urban areas as an 'amorphous and mobile *site*' (Allen, 2010) for the interaction of various social, economic and cultural processes and interlinkages between the rural and the urban. While the flow-based conceptualization captures the economic, environmental and infrastructural issues and sectoral interactions (for e.g Urban agriculture, rural manufacturing and services) (Tacoli, 1998), such framings fail to take into account the everyday life and place narratives of the people who live in peri-urban areas. These narratives can provide critical insights for building micro-level social, political,

cultural and economic institutions through which human agency is exercised in cities, and through which, we suggest, resilience is built. Hence it important to understand peri-urban areas as an emerging *settlement* typology and not just transitional, with all the social, material, organizational, spiritual, and cultural elements that sustain it (Živković, 2019). Such revisioning of peri-urban geographies can potentially play a vital role in decentralizing the urban core and enabling inclusive and integrated development and understanding of urban and rural areas. We advocate for a 'peri-urban turn' in planning and design discourse that inherently incorporates the social, spatial, and political systems and structures, acknowledging the reality of organic urban growth (Kombe, 2005)This approach seeks to better comprehend the emerging urban and rural futures offering a more inclusive and progressive alternative to the counterurbanisation model.

In this process, we also tackle the significant existing gap in the methodological approach to studying peri-urban regions, aiming to facilitate the reimagining of peri-urban development in India and the global South. With the CLD, we suggest a multi-dimensional approach to analyse peri-urban spaces, utilizing a dual lens methodology that combines 'flow-based' and 'place-based' network conceptualizations (refer to Fig. 11).The peri-urban as a phenomenon is illustrated as (shaded in blue) emerges as a dynamic assemblage of the urban and rural.Several dynamic interactions and flows of/between the urban and rural systems in peri-urban regions make them strategic and also vulnerable. The flow-based conceptualizations from one side emphasize interactions, connections, and networks, focusing on the processes that define various flows between places and spaces (Batty & Cheshire, 2011).

Our aim here is to capture the dynamics of integrations or summations of flows that take place between various origins and destinations, connecting/disconnecting peri-urban areas to the urban core and rural hinterland, and vice-versa. Furthermore, the inflow of people of different age-group, culture, ethnicity cosmopolitanize the place narrative too quickly before the incoming population can adopt with the cultural affinity of the concerned peri-urban region. Consequently, the social network and friendly neighborhood turn into individual space confined within family and friend. We hypothesize that the social and community resiliency is affected due to such rapid physical transformation. Hence complementary to the flow-based conceptulaisation, incorporation of a place-based conceptualization on the other side simultaneously, allow peri-urban areas to be explored as a dynamic matrix providing the necessary ground for everyday life, sense of identity and belonging, interactions and lived experiences the people and communities. Here, we consider two "simultaneous realities": *the quotidian* which characterizes the repetitive practices and behaviour of people, and *the modern* which comprises of the new and constantly changing habits shaped by technology (Lefebvre, 2014). By employing a place-based conceptualization lens, we can explore how these two realities—urban and rural—impact people's connections to place, their perceptions, socio-spatial networks, and lived experiences within peri-urban areas. This dual lens approach facilitates a deeper understanding of the challenges and potential for effective planning, governance, and community development, while also promoting the creation of livable and inclusive peri-urban spaces. We argue that this approach should form the foundation for developing strategies and discourse concerning the emerging futures of urban, peri-urban, and rural areas. By understanding the localised dynamics of peri-urban regions and their interactions with economic trends, socio-spatial practices, political structures, and environmental values/practices, we can work towards creating equitable and inclusive environments. Furthermore, this approach enables us to go beyond the binary notion of the urban-rural model in counterurbanisation, placing emphasis on the significance of processes over mere forms. This, in turn, empowers planners, designers, and policymakers to pursue comprehensive and integrated solutions for the future.
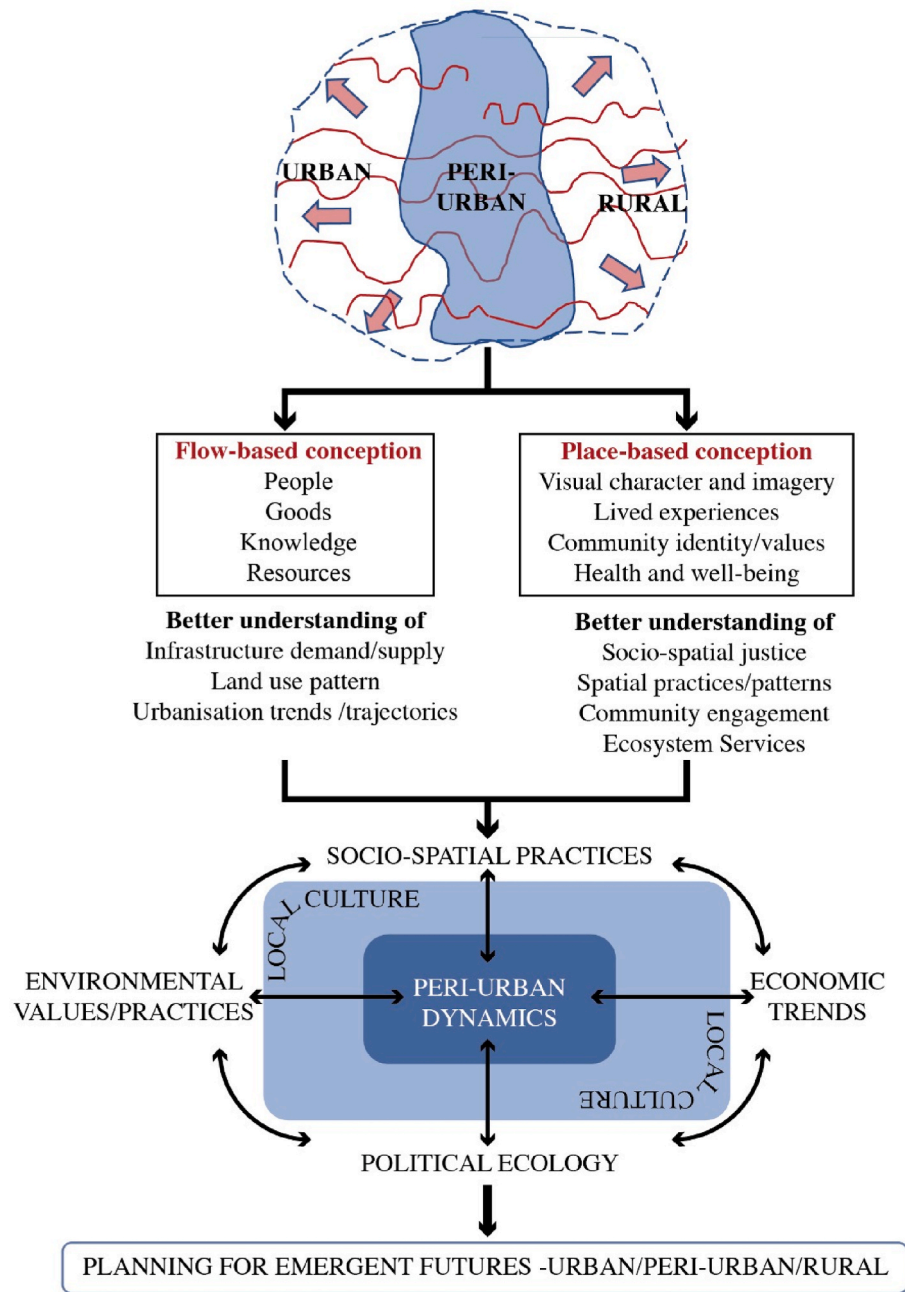
Fig. 11. Proposed dual lens approach for understanding peri-urban dynamics and its implications.

7. Conclusion

In drawing attention to the overlooked peri-urban phenomenon, our study prompts exploration beyond the confines of the counter-urbanisation model and its critical assessment in the global South, particularly in India. While acknowledging existing studies that attempt to analyse the social and cultural context within the counterurbanisation model, we recognize their confinement to the Eurocentric discourse (Gkartzios, 2013; Grimsrud, 2011; Halfacree, 2008). This realization emphasises the imperative to delve deeper into the unique context of the global South.

Our paper not only addresses this gap but also acknowledges methodological and theoretical challenges related to the intricate interactions among various actors, networks, and agents. By adopting a complex system thinking approach, we aim to recognize the interconnected nature of urban and rural dynamics. The development of a qualitative

Causal Loop Diagram (CLD) allows us to move beyond linear cause-and-effect relationships, embracing a more systemic perspective in visualizing peri-urban dynamics.

However, it is crucial to acknowledge the limitation inherent in our India case study. While our findings offer valuable insights into the peri-urban dynamics of India, the extent to which these findings can be generalised to the entire global South may be influenced by the unique characteristics of the Indian context. Our study, therefore, calls for caution in directly extrapolating our conclusions to other regions within the global South.

In advocating for a dual lens approach to studying peri-urban dynamics, encompassing both flow-based and place-based conceptualisations, we propose a 'peri-urban turn' in planning, development, and design discourses. This paradigm shift can provide a more relevant, localised, and creative perspective for understanding and engaging with the dynamics between urban and rural areas, shaping the emergence of

organic, bottom-up future scenarios.

Author declaration

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed.

We further confirm that the order of authors listed in the manuscript has been approved by all of us. We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

We further confirm that any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

We understand that the Corresponding Author* (Lakshmi Rajendran) is the sole contact for the Editorial process.

She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

We confirm that we have provided a current, correct email address which is accessible by the Corresponding Author.

CRediT authorship contribution statement

Lakshmi Priya Rajendran: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Leal Raúl:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis. **Mingze Chen:** Visualization, Software, Methodology, Formal analysis. **Juan Carlos Guerrero Andrade:** Visualization, Methodology, Formal analysis. **Rakib Akhtar:** Writing – review & editing. **Lazaro Eliyah Mngumi:** Writing – original draft. **Sheeba Chander:** Supervision, Resources, Investigation, Data curation. **Sudhan Srinivas:** Visualization, Formal analysis, Data curation. **Maria Rinya Roy:** Visualization, Formal analysis, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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