

Strategies and sustainability in motion: An analysis of mobility and climate change policies in Greater London

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ABSTRACT

Urban mobility plays a central role in shaping metropolitan responses to climate change, yet the interaction between mobility systems and climate adaptation remains underexplored in large urban regions. This study examines how mitigation and adaptation strategies are integrated into the mobility system of Greater London by combining policy analysis with expert interviews to assess how climate concerns are translated into metropolitan planning and governance practices. Findings reveal tensions between strategic ambitions and uneven local implementation, socio-spatial disparities in access to sustainable modes, and limited integration of adaptation measures into mobility planning. By situating London's experience within wider international debates, the study demonstrates that these dynamics reflect global patterns identified in other metropolitan regions - particularly challenges related to multi-scalar governance, distributive justice, and the uneven operationalisation of adaptation. Methodologically, the study contributes by aligning qualitative insights with institutional frameworks, and conceptually by proposing an analytical lens that can be applied across metropolitan contexts. The results offer transferable insights for cities seeking to align sustainable mobility transitions with climate adaptation, advancing understanding of how metropolitan regions can address the intertwined demands of decarbonisation, resilience and social equity.

1. Introduction

The twentieth century is termed the “metropolitan century” (UN-Habitat, 2020) due to metropolises housing about 53% of the global population and contributing significantly to national economies (OECD, 2018). This rapid expansion necessitates research on urban growth, focusing on sustainable development and urban mobility (UN-Habitat, 2020). In contemporary urban scholarship, metropolitan regions are increasingly examined not only as localised systems but as strategic nodes in global transitions toward decarbonisation and climate resilience, a perspective reinforced by UN-Habitat (2020) and OECD (2018). Such a global viewpoint highlights both structural commonalities and governance disparities across cities worldwide.

Global efforts by the UN and OECD to standardize metropolis definitions often overlook the interplay between human activities and goods movement. Managing these areas requires tailored infrastructure, urban networks, and mobility solutions, addressing each metropolis's unique characteristics (Harrison & Growe, 2014; ITF, 2021; Jessop et al., 2008;

Moreno-Monroy et al., 2020; UN Habitat, 2020). Functional Urban Areas in Europe show the complexity of regional mobility, extending beyond municipal boundaries and complicating definition and analysis (Dijkstra et al., 2019). Similar governance complexities have been noted in metropolitan systems across Europe and Latin America, reflecting broader challenges in coordinating mobility and land-use planning under multi-level governance regimes (Jessop et al., 2008; (Harrison & Growe, 2014; UN-Habitat, 2020).

Academic research is crucial for understanding the complexities of urban development and the role of mobility in shaping cities. Studies by Brockmann et al. (2006), González et al. (2008), Cho et al. (2011), Guidotti et al. (2016), Zheng et al. (2019), Lim et al. (2019), Kulkarni et al. (2019) and Xue et al. (2022) highlight the reciprocal influence between urban planning and mobility, as well as the impact of sustainable mobility in metropolitan areas such as Greater London (Ribeiro & Fachinelli, 2024). Winston Churchill's 1944 quote, “First we shape our mobility system, and afterwards that mobility system shapes us,” encapsulates this dynamic Brömmelstroet and Verkade (2020).

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Comparable interactions between mobility systems and spatial development have been recognised in work by Santos (1979, 1985) on Brazilian metropolitan regions and by UN-Habitat (2020) on global urban mobility transformations.

Research into metropolitan mobility includes foundational and recent scholarly contributions from Santos (1979, 1985), Jessop et al. (2008), Harrison and Growe (2014), United Nations (2015), Lundqvist (2016), Sennett (2018), Maheshwari et al. (2020), UN-Habitat (2020), Goodspeed (2020), Barbera and De Rossi (2021), IPCC (2021a, 2021b), Abou Jaoude et al. (2022), and, providing a framework for understanding mobility in metropolitan contexts. Mobility significantly influences urban life, driving regional growth and diversifying urban experiences (UN-Habitat, 2020). It is closely linked to sustainability, with transportation contributing significantly to emissions (Vidović et al., 2019; IPCC, 2021a, 2021b¹; Meredith et al., 2021). Initiatives like the New Urban Agenda advocate for sustainable mobility to create resilient urban communities (UN-Habitat, 2020).

These global frameworks underscore why metropolitan mobility transitions whether in London, São Paulo, Sydney or Seoul - play a central role in shaping long-term climate mitigation pathways (IPCC, 2021a, 2021b; Maheshwari et al., 2020).

Addressing climate change in urban areas requires decarbonization, risk assessment, and urban transport policies (Boland et al., 2023; Drummond, 2021; Winkler et al., 2023). These efforts align with studies on decarbonization in shipping and intelligent transport systems (Larkin et al., 2017; Richter & Ruhl, 2013). Understanding urban dynamics, including governance and sustainable mobility, is crucial for effective planning (Contreras & Platania, 2019; Krukke et al., 2019). The emphasis on long-term urban development and sustainability as evolution of UK cities until 2065 (Office for Science, 2013), recognizing the need for a consensus on climate change's impact on mobility, (Ferris, 2020) underscores the importance of strategic planning and evidence-based policy-making for future urban landscapes. Similar concerns appear in metropolitan regions across Asia and Latin America, where adaptation challenges intersect with mobility inequalities (IPCC, 2021a, 2021b; UN-Habitat, 2020).

Against this international backdrop, London's experience functions as an analytical vantage point rather than a self-contained case. This study seeks to explore how metropolitan regions - specifically Greater London - confront the complexities of promoting sustainable mobility while adapting to emerging environmental imperatives. The central research question guiding this investigation is: How do urban mobility dynamics within the metropolitan context of London are influenced by climate change concerns?

The primary aim of this research is to investigate mobility within the metropolitan context, focusing on its interactions with strategies for mitigating climate impacts while adapting the environment to new climate regimes. It focuses on understanding the interrelations between mobility systems and climate adaptation efforts, with a view to identifying how such interactions can enhance metropolitan preparedness for future climate conditions. By positioning London within a wider international discussion on climate-responsive metropolitan governance, the study contributes to global debates on mobility transitions under climate constraints (IPCC, 2021a, 2021b; Maheshwari et al., 2020; UN-Habitat, 2020).

Adopting a multidisciplinary approach, the study examines existing mobility policies, infrastructure and planning practices while evaluating opportunities for innovation and systemic adaptation. Special attention

is given to how these strategies align with overarching climate policy objectives and the perspectives of key stakeholders. By situating London as a case study, this research contributes to the growing body of knowledge on climate-responsive urban planning and offers insights relevant to global sustainability agendas. Its originality lies in the integrated examination of mobility and climate resilience at a metropolitan scale—a perspective that remains underexplored in current literature. The framework adopted here offers international relevance by enabling comparative reflection across metropolitan regions facing similar climate-mobility tensions.

This paper is structured into four main sections: Theoretical Background, Methodology, Findings, and Concluding Remarks.

2. Theoretical background

2.1. Metropolitan phenomenon: Theoretical Foundations and contemporary urban challenges

The term “metropolis,” originally meaning “mother city” in Greek, now signifies power and prestige across various contexts. Modern definitions encompass metropolitan regions and urban agglomerations with distinct criteria (Celestino, 2021; UN-Habitat, 2020). Cities, shaped by historical contexts, require strategic planning to support mobility, which connects people, goods, and places, driving socioeconomic growth (Meredith et al., 2021; Vidović et al., 2019). Sustainable mobility balances environmental and economic factors, aligning with global policies and integrating mobility analyses into urban planning (Krukke et al., 2019; UN-Habitat, 2020).

Metropolitan areas must address mobility and climate change through adaptation strategies. Research highlights the importance of community-driven initiatives and sustainable transport in reducing emissions (Creutzig et al., 2012; Sudhakara Reddy & Balachandra, 2012). Policy tools such as the Urban Adaptation Index (UAI) and Sustainable Urban Mobility Plans (SUMP) balance climate objectives with accessibility (Arsenio et al., 2016; Neder et al., 2021). This study evaluates urban resilience and mobility strategies, using theoretical frameworks to inform sustainable policymaking.

The study is grounded in Walter Christaller's Central Place Theory (1966) and François Perroux's Growth Pole Theory (1955a,b), which provide a foundational understanding of metropolitan organization. Ribeiro and Fachinelli (2021, 2024) identify key overlapping concepts, including territory, scale, functional hierarchy, and mobility, emphasizing their role in structuring urban networks. These theories highlight the necessity of physical and non-physical conditions in shaping metropolitan development, particularly in the context of climate-responsive urban planning.

In the 21st century, urbanisation and climate change present new and complex challenges to cities. Scholars such as Benko (2002) and Harrison and Growe (2014) argue that globalisation has reinforced the concentration of economic power in urban centres, thereby transforming urban spatial dynamics. The emergence of the sharing economy and its potential contributions to sustainability and mobility are examined by Mi and Coffman (2019), while Barbera and De Rossi (2021), Sennett (2018) and Ellin (2006) introduce the notion of the “open city” - a concept that advocates for porosity and spatial integration as guiding principles in urban design.

Furthermore, the United Nations UN-Habitat (2020) underscores the central role of cities in achieving the Sustainable Development Goals (SDGs), with sustainable mobility identified as a key lever. Climate policy, as emphasised by the IPCC (2021a, 2021b), Maheshwari et al. (2020) and Lundqvist (2016), has become increasingly embedded in contemporary urban planning agendas. Scenario planning, recognised as a tool to enhance adaptive capacity and institutional resilience, is explored by Abou Jaoude et al. (2022) and Goodspeed (2020).

Building on these contributions, Ribeiro and Fachinelli (2021) propose an integrative framework for understanding metropolitan

¹ The latest IPCC report demonstrated forecasts temperature increases of 1.5 °C from 2021 to 2040 and 1.6 °C from 2041 to 2060 under the SSP1 scenario, highlighting the critical need to integrate mobility into worldwide sustainability initiatives. Given that automobiles contribute to 80% of greenhouse gas emissions, there is an imperative for systemic shifts toward sustainable transportation alternatives.

phenomena. Their approach suggests that comprehensive analysis requires engagement with a wide array of dimensions, including territory, scale, place, networks (Jessop et al., 2008), urbanisation (Harrison & Groux, 2014) urban economy, (Benko, 2002) culture and identity, (Barbera & De Rossi, 2021; Sennett, 2018) innovation, (UN, 2015, 2020) climate change, (IPCC, 2021a, 2021b; Lundqvist, 2016; Maheshwari et al., 2020) and foresight (Abou Jaoude et al., 2022; Goodspeed, 2020) as summarised in the Table 1- Appendix I.

2.2. Climate change context

This study examines the intersection of climate change literature and urban mobility, focusing on a critical aspect. It aims to deliver a detailed examination adhering to scholarly norms for specificity and relevance, facilitating insightful analysis within an academic framework.

In 2022, the global energy transition accelerated amid the energy crisis and post-pandemic recovery, (IPCC, 2021a, 2021b) with record investments of USD 1.3 trillion. Despite progress, global CO2 emissions rose by 1%, against the needed 6% reduction. Renewables deployment must triple by 2030. Over 90% of clean energy investments occurred in advanced economies and China, leaving developing countries with 15%. Solar investment is projected to surpass oil in 2023, yet fossil fuel investment remains high (IEA, 2023).

Recent climate research emphasizes model evaluation and weighting, refining projections of future uncertainties. These techniques are crucial for assessing scenarios beyond the Paris Agreement's goals and understanding global emissions' long-term effects. Regional climate projections, key for risk assessments and policy decisions, show increased hot extremes and decreased cold extremes since the AR5 report. While global studies do not attribute agricultural and ecological droughts, regional studies like [Matsumoto et al. \(2017\)](#) on Tokyo, reveal notable temperature increases by [IPCC \(2021a, 2021b\)](#).

2.2.1. London's evolving agenda: From initiating response to strategizing sustainability in the London environment strategy

London has made significant environmental progress in recent decades, shifting from industrial pollution control to comprehensive climate mitigation and adaptation. Improvements in air and water quality, reductions in greenhouse gas emissions, and strengthened flood-defence systems illustrate this transition. Yet, major sustainability challenges persist, requiring coordinated, multi-sector strategies to

maintain long-term resilience (GLA, 2018).

Current policies prioritise urban regeneration, decarbonisation, and quality-of-life improvements through cleaner air, expanded green infrastructure, and climate-aligned development. The London Environment Strategy evaluates carbon-reduction trajectories, renewable-energy uptake, waste-management performance, and pollution-control measures, reinforcing the city's commitment to a low-carbon and resource-efficient urban model. Such priorities echo approaches seen in other global metropolitan regions, where integrated governance and cross-sector collaboration underpin climate adaptation and sustainability agendas.

Fig. 1 summarises the strategy's main components, emphasizing governance as a structuring element in environmental management. Terms such as “support,” “development,” “green,” “air,” and “energy” reflect the centrality of sustainable infrastructure, while references to “reduce,” “emissions,” “carbon,” and “waste” highlight mitigation priorities. Rather than relying solely on frequency patterns, these elements should be interpreted within the broader policy context, which stresses coordinated action across agencies and stakeholders.

Overall, London's evolving environmental agenda constitutes a comprehensive and adaptive framework that links governance, infrastructure, and climate policy. Its strategic orientation aligns with global urban sustainability trends, reinforcing the need for metropolitan regions to integrate mitigation, adaptation, and equity considerations within long-term environmental planning.

3. Method

3.1. Case study

The research strategy adopted through the case study method is widely utilized by various authors across different topics related to metropolises as urban mobility (Melikov et al., 2021) levels of information mobilization for citizens (Uppal, 2021); the phenomenon of reurbanisation (Duarte Alonso et al., 2018); collaborative planning (Deyle & Wiedenman, 2014); the perspective of elderly customers in delivery service (Byrne et al., 2012); case study understanding (Flyvbjerg, 2011); metropolitan planning organization (Fu et al., 2007). The study conducted by Eisenhardt (1989) synthesizes a broad body of prior methodological research and proposes a comprehensive analytical framework for case study development and analysis.



Fig. 1. Word cloud generated from the 2018 London Environment Strategy.

To address the analytical focus of the study, a multi-method qualitative approach was adopted. This included a comprehensive review of academic literature, policy documents, and strategic frameworks, as well as the collection and analysis of empirical data. Sources were drawn from academic databases, including peer-reviewed journals and scholarly books, to trace the evolution of key concepts and practices relevant to the metropolitan context under investigation. Particular emphasis was placed on the analysis of contemporary climate policies in the Greater London area and their implications for urban mobility systems. Additionally, qualitative interviews with subject-matter experts were conducted to capture informed perspectives on the interactions between mobility and climate adaptation strategies. This methodological framework enabled a robust and nuanced understanding of the complex dynamics involved, thereby underpinning the development of evidence-based interpretations and conclusions.

3.1.1. Initiating London's official response to climate change

In 1997, the UK Government launched the UK Climate Impacts Program (UKCIP) to support decision-makers with climate scenarios from the Hadley and Tyndall Centres. The 2002 UKCIP report on Greater London offered four scenarios, highlighting environmental, social, and economic impacts, emphasizing local response strategies (UKCIP, 2002).

Significant climate trends since the 1900s include a + 0.6 °C rise in annual average temperature, fewer 'cold' days, an extended frost-free season, decreased summer rainfall, increased winter rainfall, diminished snowfall, and frequent severe gales in the 1990s. Evaporation rates have risen, summer relative humidity has decreased, and Thames high tide levels are rising by 6 mm/year. Air quality often fails to meet standards, and biodiversity faces pressures, though the salmon population is recovering (UKCIP, 2002).

UKCIP02 scenarios forecast significant temperature increases, altered precipitation patterns, and impacts on urban and natural environments by the 2080s, stressing the urgency for adaptation and mitigation strategies (UKCIP, 2002). Key issues include increased temperatures, flooding, water resources, health, biodiversity, built environment, transport, insurance, finance, tourism, leisure, emergency planning, and energy. Comprehensive strategies are crucial for sustainable urban development and resilience. Recommendations include reviewing monitoring and public engagement strategies to enhance emergency preparedness (UKCIP, 2002).

3.2. Qualitative phase of research

This qualitative study, based on Denzin (2006) and Creswell and Plano Clarrk (2018), examines urban and metropolitan issues in Greater London through five phases: researcher perspective, theoretical framework, research strategy, data collection and analysis, and result interpretation. It begins with defining research questions and ethical paradigms, followed by literature review and methodology application. Data collection involves in-depth interviews with stakeholders from government, academia, and business sectors. The analysis phase integrates qualitative data with theoretical frameworks.

The Fig. 2 outlines a conceptual framework for Mobility in Metropolitan Areas, organised into four hierarchical levels: basis, macro category, category, and subcategory to articulate planning and operational strategies for metropolitan mobility. The framework is anchored in metropolitan mobility and structured through the macro category of planning and operational strategy. Four categories define the core dimensions: Legislation, addressing regulatory structures; Urban, concerning spatial development and economic organization; Sustainable, emphasizing cultural identity, innovation, and network integration; and Resilience, focused on climate adaptation and future-oriented planning. Each category is subdivided into specific thematic elements, including territorial scale within legislation, urbanisation and economic dynamics within the urban dimension, cultural and identity factors within sustainability, and climate change and foresight under resilience. Collectively, the framework illustrates the interdependent factors shaping metropolitan mobility planning and highlights the roles of governance, sustainability, and adaptive capacity in responding to contemporary urban challenges. (See Fig. 3.)

The questions were structured according to subcategories aligned with theoretical frameworks or references to recent studies exhibited in Table 2 - Appendix I. They aimed to gather information that connects directly with the specific documents analysed.

3.3. Data collection

The selection of interviewees for this qualitative study followed a two-stage process to ensure the inclusion of experts across multiple sectors indicated in Table 3 - Appendix I. First, an in-depth document analysis of London's policy and planning frameworks identified key stakeholders and their potential contributions. Second, based on these

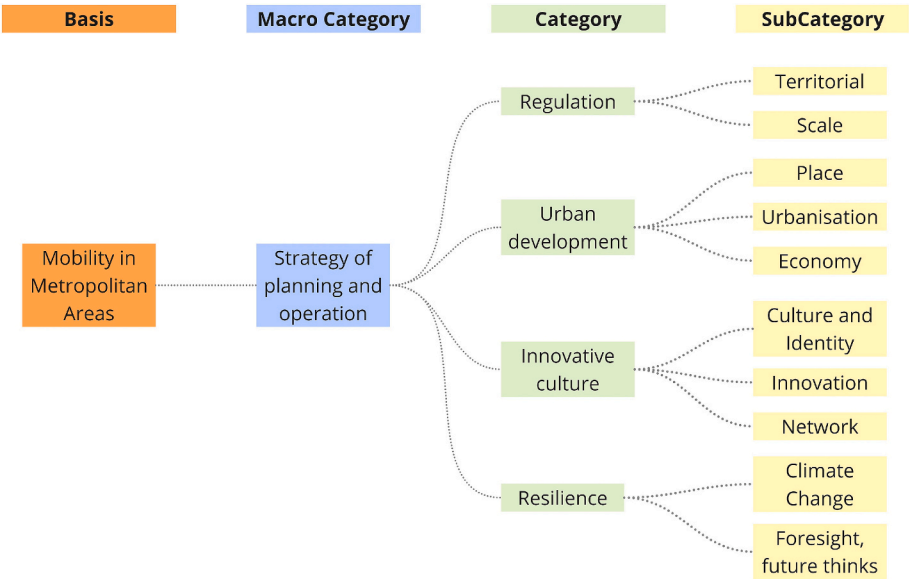


Fig. 2. The method employed follows a structured analysis framework. Note: Adapted from Ribeiro and Fachinelli, 2024. Copyright 2024.

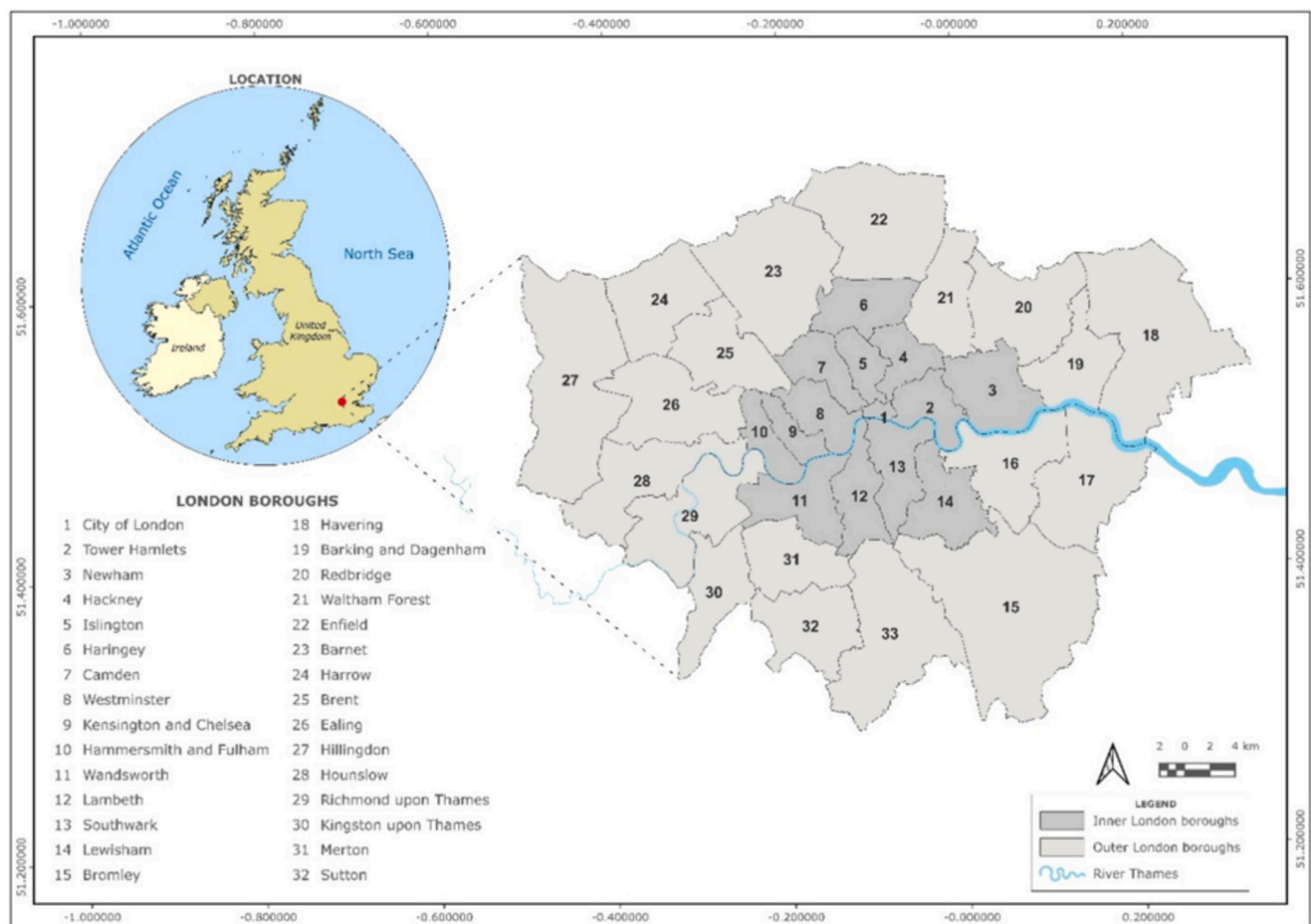


Fig. 3. London Region: London boroughs.

Note: official data available in shapefile files from dataset by data.gov.uk website. (Source: Elaborated by the author (2024).)

findings, a snowball sampling method was employed, where initial participants recommended additional experts within their networks with significant expertise and influence. This approach ensured a diverse representation across community, academia, the third sector, private, and public spheres, selecting individuals in positions to provide informed perspectives.

From November 2023 to January 2024, individual interviews were conducted via Zoom, focusing on climate change within a broad research scope. Sessions were recorded with participants' consent, transcribed using noota.ai, and reviewed for accuracy.

4. Findings

The findings derive from a triangulated analysis of Greater London's key policy frameworks and expert interviews, revealing consistent patterns across institutional strategies and practitioner perspectives. This integration highlights how formal planning objectives intersect with on-the-ground understandings of governance and mobility, offering a nuanced view of London's ongoing urban transformations under mounting environmental pressures.

4.1. Greater London

The term *Metropolis* was formally adopted in 1855, extending London's administrative reach beyond the City of London and laying the foundation for the Metropolitan Region established in 1888, when

governance reforms replaced parish councils with the Metropolitan Board. This historical evolution shaped the multi-layered institutional structure that characterises Greater London today. Greater London is one of the world's most complex metropolitan regions, marked by high population density, significant economic activity and a diversified mobility network. Its governance structure – centred on the Greater London Authority (GLA) and complemented by 32 boroughs and the City of London - illustrates the multi-level arrangements typical of large metropolitan areas (GLA, 2018). Such institutional configurations mirror those found in other major cities, where the interplay between centralised strategic planning and decentralised local responsibilities shapes the capacity to implement climate and mobility policies.

As a global hub, London faces pressures common to other metropolitan regions: rapid urbanisation, uneven socio-spatial development, rising transport demand, and increasing exposure to climate risks such as flooding and extreme heat (Boyd et al., 2024). These shared challenges position London not as an exceptional case, but as part of a broader international pattern in which mobility systems must adapt to demographic growth, environmental pressures and evolving sustainability agendas.

The city's transport system – integrating heavy rail, Underground lines, buses, cycling corridors and an expanding low-emission vehicle network - reflects long-term investments in multimodal mobility. However, similar to other metropolitan regions, the benefits of these systems are unevenly distributed, with persistent accessibility gaps across boroughs, underscoring the interdependence of transport equity

and climate adaptation.

London's environmental and mobility strategies therefore provide a relevant lens for examining how metropolitan regions navigate decarbonisation, resilience and governance fragmentation. By situating London within this broader comparative landscape, the analysis contributes insights applicable to other global cities grappling with similar transitions.

4.2. Interview findings

The analytical approach adopted in this study combines qualitative content analysis with structured comparison against key policy frameworks. Interviews were transcribed and analysed in NVivo, enabling the systematic identification of dominant and emerging themes. Responses were initially organised around the four thematic dimensions guiding



Fig. 4. NVivo-generated word clouds illustrate the alignment between stakeholder perspectives and policy objectives.

this study – Legislation, Urban, Sustainability and Resilience - allowing for a multi-scalar interpretation of how experts perceive the interaction between climate change and mobility in Greater London.

In addition to the visual representation provided by word clouds, which were used solely as a heuristic device to illustrate lexical salience, the qualitative analysis followed a multi-step coding strategy to ensure analytical robustness. Open coding was conducted to capture recurring semantic elements, generating an initial set of codes that reflected expert narratives. These codes were subsequently synthesised through axial coding to identify higher-order thematic relationships across interviews.

To deepen interpretative validity, co-occurrence queries were employed to examine how key concepts – particularly governance, adaptation, inequality and infrastructure - appeared in relation to one another. This technique highlighted the interdependence between governance capacity and climate adaptation, underscoring patterns that were not immediately observable through lexical frequency alone. Cluster analysis further supported the identification of two broad thematic configurations across the dataset: (1) governance and institutional capacity, and (2) behavioural, cultural and equity-related concerns.

The qualitative findings were then triangulated with relevant policy frameworks, especially the London Environment Strategy (GLA, 2018) and the London Climate Resilience Review (Boyd et al., 2024). This comparison enabled the assessment of alignment and divergence between expert perspectives and institutional agendas, providing an analytical bridge between empirical narratives and policy commitments.

NVivo-generated word clouds were incorporated as supplementary visualisations to illustrate the prominence of specific terms across interview transcripts, but they did not constitute the primary analytical method. Their use served to complement coding results by offering a high-level depiction of discursive emphasis. Interpretation relied primarily on the coded structure, co-occurrence patterns, and triangulated thematic synthesis rather than on lexical frequency alone.

This combination of coding, query-based analysis, clustering and policy triangulation strengthens the reliability of the study's qualitative insights, providing a more comprehensive understanding of the complex relationships between climate change, mobility systems and metropolitan governance.

4.2.1. Analysis of expert perceptions on mobility, governance, and climate adaptation in Greater London

The analysis systematically integrates expert perspectives with London's key policy frameworks. Interviews were examined through open and axial coding in NVivo (Fig. 4 e Fig. 5), complemented by co-occurrence and cluster analysis. These procedures enabled the

identification of thematic relationships across governance, mobility, sustainability, and resilience, while triangulation with the London Environment Strategy (GLA, 2018) and the London Climate Resilience Review (Howard Boyd et al., 2024) highlighted points of alignment and policy gaps.

The qualitative findings reveal how experts interpret the interactions between mobility, climate adaptation, and socio-economic dynamics in the metropolitan context.

4.2.1.1. Governance and regional coordination. Multi-level governance emerged as a central concern. Experts highlighted persistent fragmentation between the Greater London Authority and boroughs, noting disparities in investment, implementation capacity, and strategic cohesion. While some valued borough autonomy, most emphasised the need for stronger coordination mechanisms to deliver equitable mobility and climate adaptation outcomes.

4.2.1.2. Mobility, infrastructure, and sustainability. Respondents acknowledged progress in cycling infrastructure, active mobility, and public transport expansion but underscored uneven spatial distribution and affordability barriers. Micromobility and emerging transport modes were viewed as promising yet constrained by infrastructure gaps and regulatory uncertainty.

4.2.1.3. Climate change adaptation and mitigation. Interviewees expressed awareness of transport vulnerabilities linked to extreme heat, flooding, and network disruptions. While decarbonisation policies such as low-emission zones received broad support, participants noted that adaptation measures—improved drainage, heat-resistant materials, nature-based solutions—remain insufficiently integrated into mobility planning.

4.2.1.4. Economic and social dimensions of mobility. Experts emphasised that socio-economic inequalities shape access to sustainable mobility. Lower-income communities face higher barriers to adopting new mobility modes, while redevelopment linked to transport investment may intensify gentrification pressures. Cultural diversity was viewed both as a planning asset and as a challenge for designing inclusive mobility policies.

4.2.1.5. Future prospects and technological innovation. Electrification, automation, and data-driven planning were widely recognised as opportunities to advance sustainability. However, concerns persisted regarding uneven distribution of technological benefits and the risk of reinforcing existing spatial inequalities if innovation clusters concentrate in already advantaged districts.

Overall, expert perceptions reflect strong support for climate-aligned mobility transitions but highlight governance fragmentation, spatial disparities, and underdeveloped adaptation strategies as persistent structural constraints. These insights reinforce the need for coordinated, equity-oriented governance capable of linking mitigation, adaptation, and inclusive access across the metropolitan region.

4.2.2. Qualitative analysis of metropolitan mobility in Greater London

1. Legislation: Strengths and Fragmentation in Metropolitan Governance

Experts consistently recognised the strategic clarity of London's climate and mobility policies under the Greater London Authority (GLA). However, they emphasised implementation asymmetries between boroughs, especially in areas lacking institutional or financial capacity. These concerns echo broader patterns observed in metropolitan regions with complex multi-level governance structures.

Co-occurrence analysis revealed that references to “governance



Fig. 5. Key factors shaping urban mobility and climate adaptation in Greater London.

capacity”, “implementation gaps” and “adaptation responsibility” frequently appeared together, indicating that experts perceive adaptation as highly dependent on multi-scalar coordination. This pattern reinforces concerns about borough-level fragmentation, which contrasts with the centralised ambitions outlined in the London Environment Strategy (GLA, 2018).

Cluster analysis also showed that governance-related concerns formed one of the strongest thematic groupings across participants, underscoring expert consensus on the need for structural coordination mechanisms.

2. Urban Dimension: Infrastructure, Regeneration and Socio-Spatial Inequalities

Interviewees recognised the transformative potential of major infrastructure investments, including the Elizabeth Line, in promoting modal shift and economic vitality. Nonetheless, concerns were raised about unintended socio-spatial consequences.

Axial coding demonstrated that discussions of major mobility infrastructure consistently clustered with concepts such as “equity”, “gentrification” and “displacement”. This reveals that experts do not view infrastructural expansion as neutral: rather, they interpret it as an intervention that may reinforce or redistribute socio-spatial disadvantage.

Stakeholders also highlighted the uneven distribution of public transport accessibility and the growing tensions between increasingly dense urban development and the capacity of mobility systems to absorb new demands.

Triangulation with policy documents confirmed that while London's strategic plans acknowledge socio-spatial inequality, the operational translation of these principles remains uneven across boroughs, particularly in rapidly densifying areas.

3. Sustainability: Decarbonisation, Active Mobility and Cultural Inclusivity

Experts characterised London's sustainability agenda as ambitious, with growing investment in cycling infrastructure, electrification and micromobility. However, they also noted that technological progress alone is insufficient to deliver socially just mobility transitions.

Co-occurrence queries highlighted strong semantic linkages between “micromobility”, “electrification”, “behavioural change” and “safety”. Experts emphasised that uptake of sustainable modes is inseparable from cultural and behavioural factors, suggesting that communities must be engaged for technological innovations to translate into equitable outcomes.

This aligns with international research indicating that mobility transitions can exacerbate inequalities if cultural and social dimensions are overlooked.

Additional coding indicated recurring references to the need for “community participation” and “local ownership” of sustainability initiatives, signalling a desire for stronger community-oriented planning approaches.

4. Resilience: Climate Adaptation, Anticipatory Planning and Implementation Gaps

Interviews revealed a strong awareness of climate-related risks, especially flooding, extreme heat and the need for nature-based solutions. Experts acknowledged the presence of adaptation strategies in policy frameworks but stressed that actual implementation remains inconsistent.

Cluster analysis grouped references to “flood risk”, “heatwaves”, “nature-based solutions”, “funding constraints” and “implementation delays”, indicating that while adaptation concepts are well embedded in the policy discourse, structural limitations undermine

operationalisation.

Participants repeatedly stressed the need for anticipatory, long-term investment strategies that integrate climate risks into mobility planning. Several also noted that adaptation measures often remain siloed from transport decision-making.

Triangulation with the London Climate Resilience Review (Boydt et al., 2024) confirmed this gap: while policies articulate adaptation priorities, experts perceive a lack of mechanisms to translate them into coordinated, borough-level action.

5. Cross-Cutting Synthesis: Interdependence of Governance, Equity and Adaptation

Findings across all four dimensions demonstrate that London's climate-mobility agenda is progressing but remains constrained by governance fragmentation, uneven resource distribution and socio-spatial inequalities.

Co-occurrence patterns across the entire dataset showed that terms related to governance (“capacity”, “coordination”, “strategy”), equity (“access”, “inclusion”, “disparity”) and adaptation (“flooding”, “risk”, “nature-based solutions”) intersect repeatedly, suggesting that expert perceptions are structured around the interdependence of these three domains.

This cross-dimensional pattern reflects international trends noted in global policy literature, reinforcing the relevance of London's experience for broader metropolitan debates on climate adaptation, sustainability and mobility transitions.

The qualitative analysis highlights the diverse nature of metropolitan mobility in Greater London, demonstrating the interconnected roles of governance, urban planning, sustainability, and resilience. The findings suggest that while London has made significant progress in promoting sustainable mobility, challenges remain in integrating adaptation strategies, addressing regional disparities, and ensuring inclusive policy-making. The results reinforce the necessity of a holistic, multi-stakeholder approach to urban mobility, aligning with the 2018 London Environment Strategy to achieve a resilient and sustainable metropolitan future.

The provided (Table 5 - Appendix I) serves as an academic tool, mapping the alignment between key interviewees' insights and the 2018 London Environment Strategy. Each column represents thematic areas such as Transforming Environment, Urban Development, and Air Quality, marked to denote the relevance of interviewees' contributions. This facilitates a nuanced understanding of London's urban and environmental dynamics. For example, markings under “Urban Development” reflect engagement with sustainable urban planning, while “Air Quality” highlights initiatives to improve atmospheric conditions. The table also covers green infrastructure, climate strategies, waste management, and transitioning to a low-carbon economy, offering a comprehensive view of sustainable urban development. It guides policymakers and academics in deriving actionable insights and fostering interdisciplinary synergies for a sustainable London.

The 2018 London Environment Strategy Objectives were analysed using NVivo software to discern connections with interviewee data. The word cloud (Fig. 6) generated indicates a focus on urban planning, the interplay between climate change, metropolitan dynamics, and mobility in London. Terms like “people,” “city,” and “transport” highlight the city's urban planning emphasis. “Diversity,” “cultures,” and “boroughs” underscore social complexity, whereas “cycling,” “walking,” and “public transport” denote commitment to sustainable mobility. “London” anchors the focus, tying it to government planning and infrastructure investment, demonstrating a clear need for policies that integrate social diversity, environmental sustainability, and adaptive transport in the city's development and climate strategy.

The research situates its analytical focus within the broader landscape of sustainable mobility policies in global metropolitan contexts, using London as a case study to examine the convergence between



Fig. 6. 2018 London environment strategy objectives.

climate-oriented planning and mobility governance. It identifies and evaluates key strategies that reflect the integration of mobility and environmental policy, with particular reference to the 2018 London Environment Strategy. Initiatives such as the expansion of cycling infrastructure and the implementation of Ultra Low Emission Zones (ULEZ) are recognised for their tangible contributions to reducing traffic congestion, improving air quality, and advancing broader environmental objectives.

Building upon this foundation, the London Climate Resilience Review (2024) by (Boyd et al., 2024) provides a comprehensive analysis of the challenges and strategies related to climate change adaptation in the urban mobility sector. As London faces increasing climate threats, including extreme heat, flooding, and air pollution, the report highlights the urgent need for adaptive transport policies, resilient infrastructure, and innovative mobility solutions to ensure long-term sustainability and urban resilience. It underscores the necessity of policy frameworks that facilitate the transition to low-emission transportation and enhance climate resilience in urban mobility systems. Among the key policies discussed, the expansion of ULEZ is presented as a critical initiative to reduce air pollution and promote healthier urban environments. Additionally, the report emphasizes investment in resilient public transport systems, ensuring that railway and road infrastructure can withstand extreme weather events, alongside the promotion of active transport modes such as cycling and walking, which help to reduce reliance on carbon-intensive mobility solutions.

Beyond policy considerations, the report examines the practical implementation of mobility adaptation strategies, highlighting several ongoing initiatives to integrate climate resilience into London's transport network. Among these efforts is the establishment of a Transport Adaptation Steering Group, which collaborates with global cities to exchange best practices for transport resilience. Furthermore, the expansion of cycling and micromobility infrastructure is positioned as a crucial element in fostering sustainable and climate-resilient travel modes. Complementing these efforts, the document outlines the development of climate-responsive public transport adaptation plans, designed to ensure the continuity of bus and underground services during heatwaves and extreme rainfall.

A critical emphasis is placed on the role of adaptive infrastructure in mitigating the operational disruptions caused by weather extremes. Measures such as integrated urban drainage systems, heat-resistant materials in transport design, and nature-based solutions – including green spaces and rooftop vegetation - are presented as essential to enhancing thermal comfort, managing stormwater, and ensuring the long-term functionality of transport hubs.

Technological innovations are presented as a fundamental component of London's climate adaptation strategy. The report highlights the growing role of intelligent traffic management systems, which utilize real-time data to optimize traffic flow and mitigate congestion during extreme weather conditions. The electrification of public transport, with a particular emphasis on expanding the fleet of electric buses and developing charging infrastructure, is positioned as another essential step in reducing emissions while ensuring mobility continuity. Digital platforms for adaptive mobility, which provide real-time weather and transport updates, are also discussed as an emerging tool for supporting climate-resilient travel decisions.

Taken together, these policies, infrastructure investments, and technological innovations underscore the interdependence of mitigation and adaptation strategies in London's efforts to build a transport network that is both low-carbon and resilient to climate-induced disruptions.

4.2.3. Mobility policies, practices, infrastructures, and innovations for climate change adaptation

This topic explores how London's urban mobility policies, practices, and infrastructure adapt to climate change mitigation demands. It evaluates the effectiveness of existing strategies and potential innovative solutions, aligning them with broader city policies and stakeholder perspectives (Fig. 7).

I4 emphasised diversity's positive impact but did not discuss specific climate policies. I5 addressed the ULEZ expansion and low-traffic neighborhoods. I3 highlighted neighborhood inequality and taxation policies. I2 focused on collaborative governance but had limited climate policy focus. I8 stressed robust policies like the ULEZ for air quality. I1 analysed London's complex governance, particularly within the City of

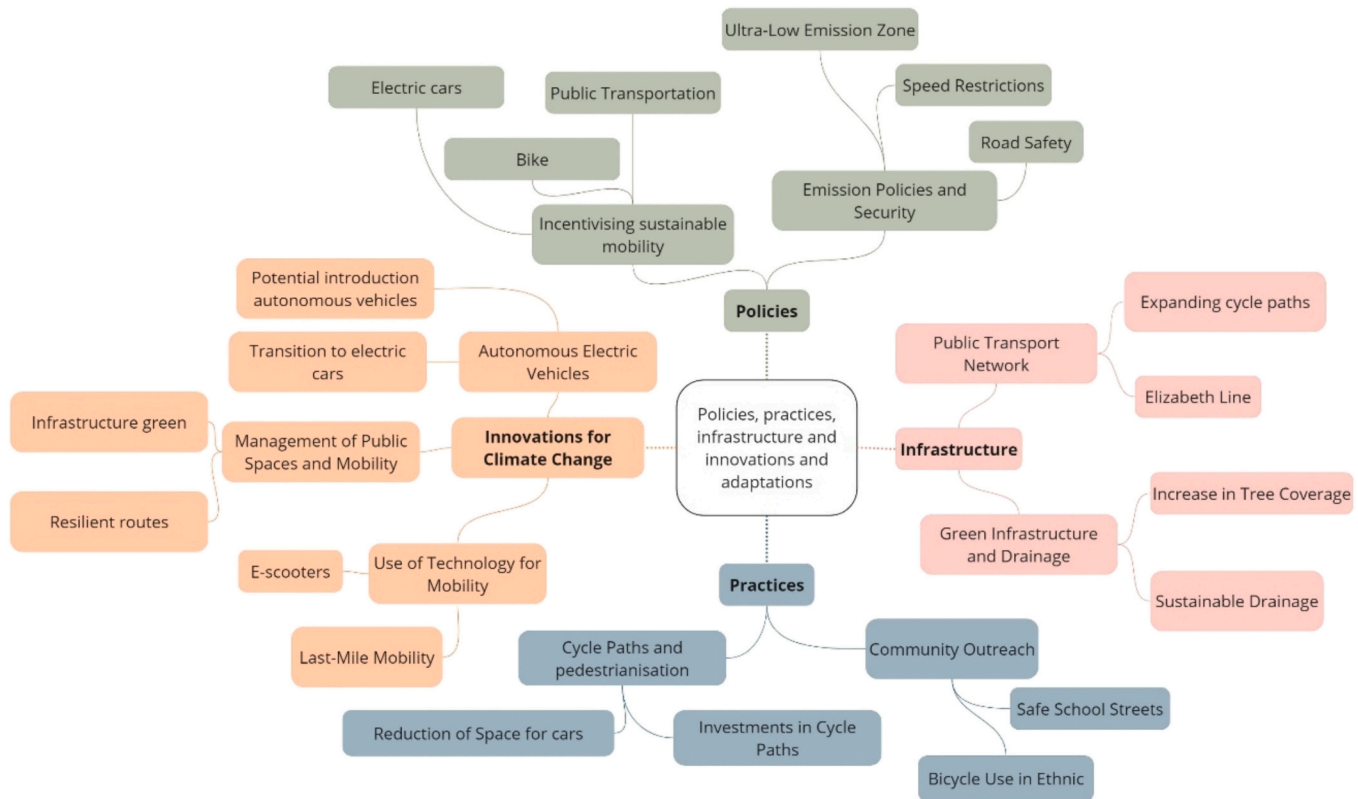


Fig. 7. Comprehensive analysis of responses on policies, practices, and infrastructure.

London. I7 discussed transport power devolution to the mayor and borough collaboration. I6 mentioned policies like Congestion Charging and ULEZ to reduce emissions.

In practice, I4 emphasised inclusive mobility and accessibility for wheelchair users. I5 focused on bike lanes and speed limits. I3 discussed gentrification but not climate adaptation practices. I2 analysed urbanisation and migration. I8 explored programs for road safety and promoting cycling among minorities. I1 cited the implementation of a 350 km cycling network and the world's largest low emission zone. I6 advocated for sustainable transport modes and travel choice management.

Regarding infrastructure, I4 criticized inadequate maintenance. I5 mentioned the Elizabeth Line. I2 highlighted transit-oriented development and e-micromobility. I8 stressed land use planning for a dense, transit-accessible city. I1 noted investments in pedestrianization and bike lanes. I7 discussed adaptive mobility strategies. I6 emphasised investments in bus electrification and EV charging stations.

On climate change adaptation, I4 advocated for better transportation system integration. I5 suggested focusing on public transportation and active mobility. I3 emphasised a shift to electric vehicles. I2 discussed the upcoming ban on gasoline and diesel cars. I8 focused on decarbonizing London by 2050. I1 proposed enhancing transportation efficiency. I7 underscored reducing private car usage and adapting infrastructure to climate impacts. I6 explored autonomous vehicles and the use of technology and data for travel management, highlighting the need to prepare for extreme climate impacts.

This exploration of London's urban policies, practices, and infrastructure provides crucial insights for sustainable development. Policy discussions highlight the importance of inclusive mobility and robust air quality improvement measures. Practical initiatives, like a 350 km cycling network and the world's largest low emission zone, demonstrate tangible progress in sustainable urban development. Infrastructure discussions reveal the complexities of maintaining and enhancing transportation systems in a dynamic urban landscape. Innovations for climate

change adaptation include promoting public transportation and embracing technologies like autonomous vehicles. These insights emphasize the need for integrated and forward-thinking urban planning to address climate change challenges and foster inclusive, resilient, and sustainable cities.

4.2.4. Discussion: Comparing official discourse and expert perceptions on mobility policies, practices, infrastructure, and innovation for climate change adaptation in London

The London Climate Resilience Review (Boyd et al., 2024) articulates an official narrative centred on a strategic and integrated response to climate change in urban mobility. It highlights investments in adaptive infrastructure, the expansion of ULEZ, and the promotion of technological innovation as key pillars of a climate-resilient transport agenda. However, the qualitative insights derived from expert interviews reveal both convergences and tensions between this institutional discourse and the situated experiences of professionals engaged in mobility governance and planning across Greater London.

While the report portrays London's governance structure as a model of multi-level coordination, the interviews expose ongoing challenges of fragmentation and asymmetry in decision-making. Several stakeholders underscored the need for improved vertical and horizontal alignment between the Greater London Authority and individual boroughs. These observations point to inconsistencies in the territorial application of climate and mobility strategies, especially in underserved areas. This misalignment resonates with global findings on multi-scalar governance challenges in metropolitan regions, reinforcing that London's implementation gaps reflect broader structural patterns identified internationally.

Economically, the official review presents major infrastructure projects, such as the Elizabeth Line and low-traffic neighborhoods, as mechanisms to support sustainable growth and modal shift. Interviewees acknowledged the benefits of these investments but expressed concerns over spatial inequalities and potential displacement

effects. Axial coding in the qualitative analysis showed that references to large-scale infrastructure frequently co-occurred with concerns about gentrification and uneven access, suggesting that adaptation-oriented investments may unintentionally reinforce socio-spatial disparities if distributive justice is not explicitly embedded in planning frameworks.

Technological innovation, particularly electrification and e-mobility, is also central to the official strategy. While many interviewees recognised its role in advancing decarbonisation, others advocated for stronger emphasis on community-based sustainability practices and social inclusion. Co-occurrence analysis revealed that “electrification” and “micromobility” appeared repeatedly alongside “behavioural change” and “community participation,” indicating that experts view technological solutions as inseparable from cultural and social factors. This aligns with international debates on the limitations of technology-centric transitions in producing equitable mobility futures.

In relation to climate adaptation, the Review outlines comprehensive responses to extreme weather, including flood-resilient infrastructure and heat-mitigating materials. Interviewees affirmed the urgency of such measures yet questioned their territorial effectiveness. Cluster analysis identified a thematic grouping that linked “flood risk,” “heat-waves,” “nature-based solutions,” and “funding constraints,” highlighting that adaptation measures remain unevenly integrated into mobility planning. This echoes global assessments that adaptation tends to lag behind mitigation in metropolitan policy agendas.

A contested issue concerns the reduction of private car use. Regulatory instruments such as ULEZ expansion and congestion pricing are framed as essential to both climate objectives and mobility decarbonisation. While some experts endorsed these measures, others cautioned against socio-economic impacts on lower-income residents lacking viable alternatives. These concerns reflect a broader tension between climate ambition and mobility justice, frequently noted in international literature on sustainable transport transitions.

Overall, the comparison between official discourse and expert perceptions reveals that London's metropolitan climate-mobility agenda is conceptually robust but operationally constrained by governance fragmentation, uneven capacity across boroughs, socio-spatial inequalities, and the limited integration of adaptation within mobility planning. These findings align with global patterns in metropolitan regions navigating similar transitions, suggesting that London's challenges are not isolated but symptomatic of wider systemic tensions inherent in climate-responsive urban governance.

This reinforces the importance of embedding multi-scalar coordination, distributive justice, and long-term adaptation into mobility strategies—not only for London but for metropolitan regions worldwide seeking to align climate resilience with equitable, sustainable mobility.

5. Concluding remarks

This study examined how metropolitan mobility and climate adaptation interact in Greater London, analysing how mitigation and adaptation strategies are translated into planning practices across governance scales. By combining policy analysis with expert interviews, the research highlighted the interplay between institutional capacities, socio-spatial inequalities and the operational dimensions of climate-oriented mobility transitions.

Across the four analytical dimensions – Legislation, Urban, Sustainability and Resilience – the findings show measurable progress alongside persistent structural constraints. From a governance perspective, London benefits from a coherent strategic framework under the Greater London Authority. However, interview evidence reveals ongoing vertical fragmentation and uneven implementation at the borough level, a pattern also observed in other metropolitan regions facing coordination challenges, such as Paris and Frankfurt (Coombes, 2014; Harrison & Growe, 2014).

The urban dimension exposed tensions between large-scale transport investments and socio-spatial equity. While projects such as the

Elizabeth Line support modal shift and economic regeneration, they may inadvertently reinforce long-standing disparities, mirroring trends identified in Australian metropolitan regions shaped by climate pressures and uneven development (Maheshwari et al., 2020). The sustainability findings further demonstrate that decarbonisation efforts through electrification, cycling and micromobility – must be embedded within socially inclusive and culturally sensitive planning, consistent with international evidence on uneven mobility transitions (Benko, 2002; Santos, 1985; UN-Habitat, 2020).

The resilience dimension underscores the gap between stated adaptation goals and their practical implementation. Despite advances in flood management, heat mitigation and nature-based solutions, long-term investments remain unevenly distributed. Similar implementation gaps have been documented in cities across Europe, Asia and Latin America, where adaptation often lags behind mitigation (IPCC, 2021a, 2021b; Neder et al., 2021).

These findings offer an integrated understanding of how mobility, climate policy and governance intersect within a complex metropolitan setting. More importantly, they generate insights with relevance beyond Greater London. The tensions observed – between strategy and implementation, innovation and equity, mitigation and adaptation – reflect conditions present in diverse metropolitan areas, including New York, São Paulo and Tokyo. The multi-scalar analytical framework developed here contributes to the international literature by providing a transferable lens for examining climate-mobility governance in metropolitan regions (Creutzig et al., 2012; ITF, 2021).

In sum, this research reinforces the need for metropolitan planning approaches that address both climate and social objectives. Strengthening governance capacity, reducing spatial inequalities and embedding adaptation into mobility planning are essential steps toward climate-resilient metropolitan futures. Comparative studies and quantitative assessments across different metropolitan contexts represent promising avenues for advancing global understanding of how cities can navigate the intertwined challenges of decarbonisation and climate adaptation.

CRediT authorship contribution statement

Vinicius de Tomasi Ribeiro: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Ana Cristina Fachinelli:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Giulio Verdini:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Rafael Perini:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Vinicius De Tomasi Ribeiro reports financial support was provided by Coordination for the improvement of Higher Education Personnel. Vinicius De Tomasi Ribeiro reports a relationship with Coordination for the improvement of Higher Education Personnel that includes: funding grants. There is no information regarding this topic. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix I. Tables

Table 1

Relationship between the announced common concepts of Theories and recent concepts.

Concepts announced by Theories	Classification	Condition	Concept aligned with recent studies	Linkage with Classical Theories	Theories Study Reference
Study of the Territory	Physical	Locality	Territorial	Christaller (1966) Perroux (1955a,b)	Jessop et al. (2008)
Functional Hierarchy	Physical	Scale	Scale	Christaller (1966) Perroux (1955a,b)	Jessop et al. (2008)
Region	Physical	Scope	Place	Christaller (1966) Perroux (1955a,b)	Jessop et al. (2008)
Road Linkage and Dependency	Physical	Urban and rural mobility	Net	Christaller (1966) Perroux (1955a,b)	Jessop et al. (2008)
Urban Networks	Physical	Mobility between urban networks	Net	Christaller (1966) Perroux (1955a,b)	Jessop et al. (2008)
Urbanisation Process	Non-physical	Phenomenon	Urbanisation	Christaller (1966) Perroux (1955a,b)	Santos (1979, 1985); Benko (2002) and Harrison and Growe (2014)
Concentration of Investments	Non-physical	Economic Context	Urban Economy	Christaller (1966) Perroux (1955a,b)	Santos (1979, 1985); Mi and Coffman (2019)
Culture and Identity	Non-physical	Unique, each object is unique	–	–	Sennett (2018); Barbera and De Rossi (2021)
Innovation	Physical	Environment	–	–	SDG 11 – UN (2015, 2020)
Climate Change	Physical	Environment	–	–	IPCC (2021a, 2021b); Maheshwari et al. (2020) and Lundqvist (2016)
Foresight, Future Thinks	Physical	Future Studies	–	–	Abou Jaoude et al. (2022); IPCC (2021a, 2021b) and Goodspeed (2020)

Note: Adapted from Ribeiro & Fachinelli, 2021. Copyright 2021

Table 2

Questions and expert panel profile - subcategories and questions.

Category	Sub Category	Questions
Regulation	Territorial	Q1. What is your connection or relationship with the Greater London, whether it be historical, emotional, or professional? Please share some insights regarding this connection
Regulation	Scale	Q2. What is your perspective on the relationship between the boroughs within the Greater London and how these boroughs collaborate with the Greater London Authority in terms of regional governance?
Urban Development	Place	Q3. What are the most distinctive characteristics that make the Greater London unique and diverse?
Urban Development	Urbanisation	Q4. In what ways do the interactions among urbanisation, population concentration, migratory movements, and the dynamics between the urban center and rural periphery affect mobility and management within the Greater London?
Urban Development	Economy	Q5. In your perspective, how does London's diversified economic concentration, representing nearly a quarter of the total UK GDP, positively or negatively impact the region?
Innovative Culture	Culture and Identity	Q6. Does London's cosmopolitan character, as one of the most diverse metropolitan regions globally, contribute to the loss or enrichment of cultures and identities within the region?
Innovative Culture	Innovation	Q7. What are the most recent and innovative initiatives implemented within the Greater London to enhance mobility?
Innovative Culture	Network	Q8. How do you perceive the strategy of the mobility network within the Greater London, especially concerning integration and management?
Resilience	Climate Change	Q9. What are the primary challenges arising from climate change in relation to mobility within the Greater London, and what measures are being taken to address them?
Resilience	Foresight, future thinks	Q10. What are the future prospects for mobility within the Greater London, considering current trends and technological innovations? Q10.1. How can you envision the Greater London area in the year 2050?

Table 3
Expert panel profile and sector affiliation.

Interviewee	Profession/Graduate Degree	Experts linked
(11)	Editor/Philosophy, Politics and Economics	Community
(12)	Lecture/ Transport (Infrastructure) and city Planning/ PHD	Academy
(13)	Curator, educator/Architect	Third Sector
(14)	Politics and International Relations/ Marketing	Community
(15)	Urban Mobility Planner – Chartered Transport Engineer / Civil Engineering	Private Sector
(16)	Lecture/ Head of Economics at Company	Academy/Private Sector
(17)	Commissioner/ Social Anthropology/PHD	Public Sector
(18)	Chief Office / Human Sciences BSc	Public Sector

Table 4
Perception from expert interviewers according to London Environment Strategy (2018) and London Climate Resilience Review (2024).

Thematic Area	Expert Perceptions (I1–I8)	Policy Alignment (LES 2018)	Policy Alignment (LCR 2024)	Observed Gap / Opportunity
Transport & modal shift	High emphasis on “transport”, “cycling”, “public transport”, “walkability”; resistance to car dependency	Strong focus on ultra-low emission, active mobility and modal integration	Emphasizes resilience of transport infrastructure to climate risk	Communication and behavioural transition strategies understressed
Urban governance	Recurrent use of “government”, “councils”, “corporate responsibility”, “equity”	Governance is addressed via devolved powers and cross-borough coordination	Emphasizes systemic adaptive governance and risk-informed planning	Need for integrated multi-actor accountability and co-production
Behavioural change & culture	Concepts like “habits”, “diversity”, “cultures”, “beliefs”, “values” emerge strongly	Cultural change recognised but operationalised indirectly	Explicitly framed through social-psychological adaptation pathways	Lack of structured behavioural programmes & incentives
Green urban systems	“Trees”, “nature”, “cooling”, “green areas” seen as equity levers	Green infrastructure central pillar	Recognised as heat-risk mitigation strategy	Need measurable spatial justice indicators
Socio-spatial equity	Emphasis on “people”, “inequalities”, “borough characteristics”	References deprivation but not as core metric	Recognises vulnerability mapping	Opportunity for a new <i>resilience-equity index</i>

Table 5
Strategic alignment matrix: Synthesizing interviewee insights with the 2018 London environment strategy objectives.

Interviewee/ Topics	Transforming Environment	Urban Development	Air Quality	Green Infrastructure	Climate Change Mitigation	Waste Management	Climate Change Adaptation	Ambient Noise	Low Carbon Economy
(11)		✓	✓	✓				✓	✓
(12)		✓	✓	✓	✓				✓
(13)		✓		✓			✓		✓
(14)		✓	✓		✓				✓
(15)		✓	✓	✓	✓				✓
(16)		✓	✓	✓			✓		✓
(17)	✓	✓	✓	✓	✓				✓
(18)		✓	✓	✓	✓		✓		✓

Note: The tick mark “✓” indicates that the interviewee’s insights align with the document.

Data availability

We can share our names and affiliations according to the file on the title page. There is not problem about it

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