FROM EVIDENCE TO ETHICS: MAPPING THE EPISTEMIC TERRAIN OF EMERGENT URBAN RESILIENCE

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Abstract

Emergent urban resilience (EUR) develops within volatile and uneven crisis environments, where disrupted infrastructures, fragmented governance, unstable economies and shifting social practices interact in unpredictable ways. These dynamics make EUR analytically important yet empirically elusive. Evidence is often partial, rapidly outdated or entirely absent; many adaptive practices are short-lived and leave no stable trace. As a result, research tools designed for stable contexts struggle to capture how resilience takes shape during war and protracted disruption. This paper examines the conceptual, methodological and ethical challenges of studying EUR under such conditions. Drawing on a structural model of urban domains and a dynamic perspective on crisis temporalities, it shows why traditional assumptions about data, visibility and coherence do not hold. Rather than offering new methodological solutions, the paper outlines what researchers must consider when working with fragmented evidence and unstable field conditions, and highlights the interpretive and ethical responsibilities that accompany research in crisis-affected urban settings.

Key words: emergent urban resilience; methodological challenges; war-affected cities; war; Ukraine.

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ВІД ДОКАЗІВ ДО ЕТИКИ: ДОСЛІДЖЕННЯ ЕПІСТЕМІЧНОГО ПОЛЯ ВИНИКАЮЧОЇ МІСЬКОЇ РЕЗИЛЬЄНТНОСТІ

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Анотація

Виникаюча міська резильєнтність (ВМР) формується в умовах нестабільних і турбулентних кризових середовищ, де порушена інфраструктура, фрагментоване управління, нестабільна економіка та мінливі соціальні практики взаємодіють непередбачуваним чином. Ці процеси зумовлюють аналітичну важливість ВМР, але при цьому її важко зафіксувати емпірично. Дані часто неповні, швидко застарівають або зовсім відсутні, а багато адаптивних практик є короткочасними і не залишають помітних наслідків. Через це дослідницькі інструменти, розроблені для стабільної ситуації, не завжди здатні відобразити, як резильєнтність формується під час війни та тривалих порушень. Ця стаття розглядає концептуальні, методологічні та етичні виклики вивчення ВМР за таких умов. Спираючись на структурну модель функціонування міст та динамічний вимір кризових процесів, вона демонструє, чому традиційні підходи щодо збору і аналізу даних, спостережуваності та забезпечення логічної цілісності не спрацьовують. Стаття спрямована не на обґрунтування нових методологічних рішень, а окреслює ключові моменти, які дослідники повинні враховувати при роботі з фрагментарними даними в умовах нестабільності на місцях, а також акцентує увагу на інтерпретаційній та етичній відповідальності при проведенні дослідження міського середовища, постраждалого від кризи.

Ключові слова: виникаюча міська резильєнтність; методологічні виклики; міста, постраждалі від війни; війна; Україна.

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1. Introduction

Crises transform cities in abrupt and uneven ways, producing forms of adaptation that evolve far more quickly than the systems intended to capture them. Periods of war, occupation, infrastructural collapse or chronic disruption generate responses that arise spontaneously, reorganise themselves repeatedly and may disappear before they become visible outside the communities that enact them. While scholarship in urban studies, political geography, sociology and anthropology increasingly recognises the plurality of resilience processes, much of this work remains oriented toward institutional arrangements or long-term reconstruction. Far less attention has been paid to EUR: the improvised, distributed and often short-lived practices that sustain everyday life when established systems falter.

Existing research on crisis-affected cities has demonstrated that urban systems rarely fail uniformly. Governance, infrastructure, economic life and social practices respond at different speeds and intensities, producing uneven pressures that scholars find difficult to follow. Standard methodological expectations — stable institutions, accessible data, predictable observation conditions — are fundamentally incompatible with environments shaped by threat, damage and uncertainty. Tools designed for gradual transformations struggle to register phenomena that are irregular, fleeting or dispersed across multiple spatial and digital layers.

This mismatch generates a fundamental research problem. EUR is analytically significant, but yet empirically elusive. Adaptive practices emerge at the intersection of immediate needs, infrastructural breakdown and governance gaps, but they often leave no documentary trace and may not be recognised as “resilience knowledge” by those who enact them. Researchers face not only practical barriers of access and safety but also deeper epistemic constraints: inconsistent information flows, temporal gaps, selective visibility and rapid shifts in the units of analysis. By the time a researcher identifies an emergent practice, it may already have morphed into something else or vanished entirely.

At the same time, the difficulty of studying EUR does not diminish the importance of research in moments of extreme disruption. On the contrary, crises intensify the need for systematic, evidence-informed knowledge. Research makes it possible to understand rapidly evolving situations, identify emerging needs and prevent reliance on assumptions derived from previous or unrelated crises (Vickery et al., 2022). It provides essential insights for decisions related to aid distribution, risk communication and the allocation of scarce resources, while helping anticipate secondary consequences such as long-term economic strain, mental health impacts or environmental degradation. Transparent, empirically grounded analysis strengthens public trust and accountability — both for authorities and humanitarian actors. In contexts of war, research also serves a broader purpose: it maintains the visibility of affected societies in global knowledge production and ensures their experiences contribute to conceptual debates. For these reasons, reflecting on how research can remain robust, adaptive and ethically

grounded under crisis conditions becomes not merely a methodological, but necessary for the survival of an attacked community/society.

Set against this background, the aim of this paper is to examine what the structural and temporal characteristics of EUR imply for empirical research. Rather than proposing a ready-made methodology, we identify the conceptual, epistemic and ethical challenges that shape how EUR becomes observable and interpretable. We argue that understanding EUR requires attention to two interlinked dimensions: the structural landscape in which resilience emerges, and the dynamic temporalities through which adaptive processes unfold. These perspectives illuminate why and how evidence is inherently uneven and incomplete — and why methodological roadmaps for crisis research must prioritise flexibility, preparedness and context-sensitive adaptation over rigor of data quality and fixed procedures.

We intentionally avoid analysing specific cases to emphasise methodological and ethical considerations in a way that can be applied across diverse urban contexts. However, our study is informed by the authors' personal experience with Ukrainian cities, the outcomes of methodological workshops and thematic sessions at conferences organised by the authors, as well as recent publications on the resilience of Ukrainian cities under conditions of ongoing war.

The paper is structured as follows. Section 2 develops a conceptual framework for EUR. Section 3 analyses methodological and epistemic challenges. Section 4 examines ethical and safety concerns. Section 5 discusses interpretation and the use of knowledge gathered in emergency contexts. The conclusions reflect on the implications of these challenges for future research and its methodological foundations in crisis-affected urban contexts.

2. Conceptualisation and knowledge

Understanding EUR requires changing approaches from system-oriented interpretations towards alternative ways that can allow registering instable, rapid and fragmented socio-spatial transformations (Borsekova et al., 2018; González Castillo et al., 2022; Kaufmann, 2013). When shocks or hazards affect urban systems, urban resilience does not unfold solely through prevailing institutional structures and formal governance's preparedness. It also emerges in the form of spontaneous, diffuse and often temporary actions and practices shaped by uncertainty, infrastructure destruction and governance incapacity (DeVerteuil et al., 2021; Kaufmann, 2013; Soldak et al., 2024; Twigg & Mosel, 2017; Fig. 1).

This section discusses urban resilience as an emergent, multi-layered and dynamic phenomenon. It uses these two complementary perspectives as a gateway to examining the methodological approaches needed to study the phenomenon.

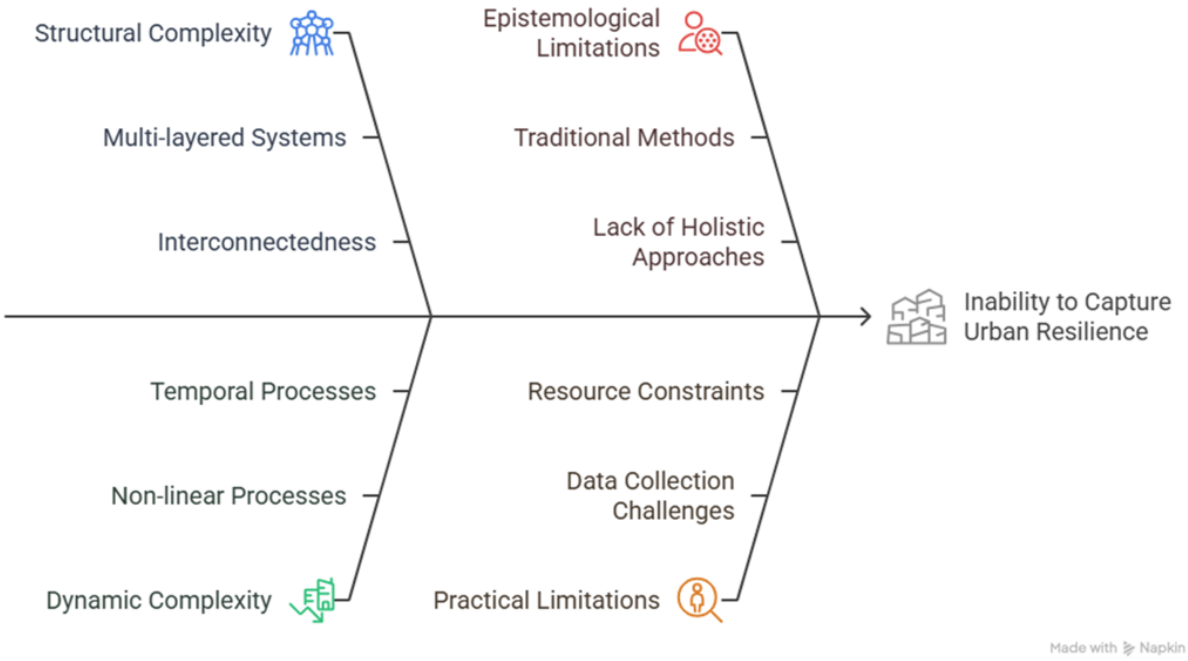

Figure 1. Challenges in studying EUR.

2.1. Urban resilience under extreme disruption

Resilience has become one of the central concepts for understanding the responses of complex systems to disturbances. Originated in ecology as a concept describing the capacity of ecosystems to absorb shocks preserving the core functions (Folke, 2006; Holling, 1973), it later was adapted to urban contexts to disclose how urban infrastructures, economies, governance and communities collaboratively address overlapping crises (Burayidi, 2020; Coaffee & Lee, 2016; Cutter et al., 2008; Meerow & Newell, 2019). From this point of view, urban resilience embraces not merely survival or recovery, but also learning, adaptation and transformation as a response to uncertainty (Folke, 2006; Meerow et al., 2016). This discussion becomes especially pronounced in cities affected by armed conflicts, where disruptions are extremely fast intense and frequent, and where urban resilience is challenged at both systemic and everyday levels (Lawrence et al., 2024; Pilav, 2012).

Broader literature distinguishes between formal and emergent resilience. Formal resilience refers to pre-established institutional arrangements, such as policies, plans or infrastructures developed to prevent and manage expected risks (Alexander, 2013; Pelling, 2010; Tierney, 2014). In war-affected cities these arrangements are inadequate or too slow to effectively respond. This gap creates a space where emergent urban resilience becomes central. Individuals, communities and informal networks acts spontaneously; they improvise when institutions are not able to provide timely support (Davoudi et al., 2012; MacKinnon & Derickson, 2013; Macrae, 2019; Norris et al., 2008).

Emergent urban resilience is not cohesive, it forms islands (Cariolet et al., 2019; Marzot, 2021) of fragmented, often non-coordinated practices (Twigg & Mosel, 2017) that collectively sustain a city's functioning during the period of extreme stress (Soldak et al., 2024). However, many of these practices do not emerge 'from nothing': they built on past experiences (González Castillo et al., 2022), local knowledge and networks, skills acquired during the previous crises and integrated into the local context (Douglas et al., 2018).

Understanding emergent urban resilience needs conceptual framework that would be able to encapsulate its multi-layered structure and temporal instability. The analytical models presented in the subsequent sections are based on these two dimensions.

2.2. Structural model: Multi-layered emergency

EUR develops through the interaction of urban infrastructures, governance settings and dynamics, economic processes and everyday social practices (Fig. 2). The physical and digital infrastructure of cities together form the material and digital foundation for the resilience of and within urban spaces (Cariolet et al., 2019; González Castillo et al., 2022; Meerow et al., 2016; Shah et al., 2019). Similarly, the destruction or damage of supply, transport, or communication infrastructure disrupts everyday urban life, while (im)possibility and unequal access to digital tools and devices, as well as to electricity and ultimately experience, determine who can coordinate attacks and respond quickly (Basheer & Elagib, 2024; Douglas et al., 2018; Kimhi et al., 2023; Libanova, 2025; Nate, 2025). All these infrastructures and characteristics influence the potential for new social practices that emerge spontaneously in cities (Ahmadivostakolaei et al., 2024; Douglas et al., 2018; Twigg & Mosel, 2017).

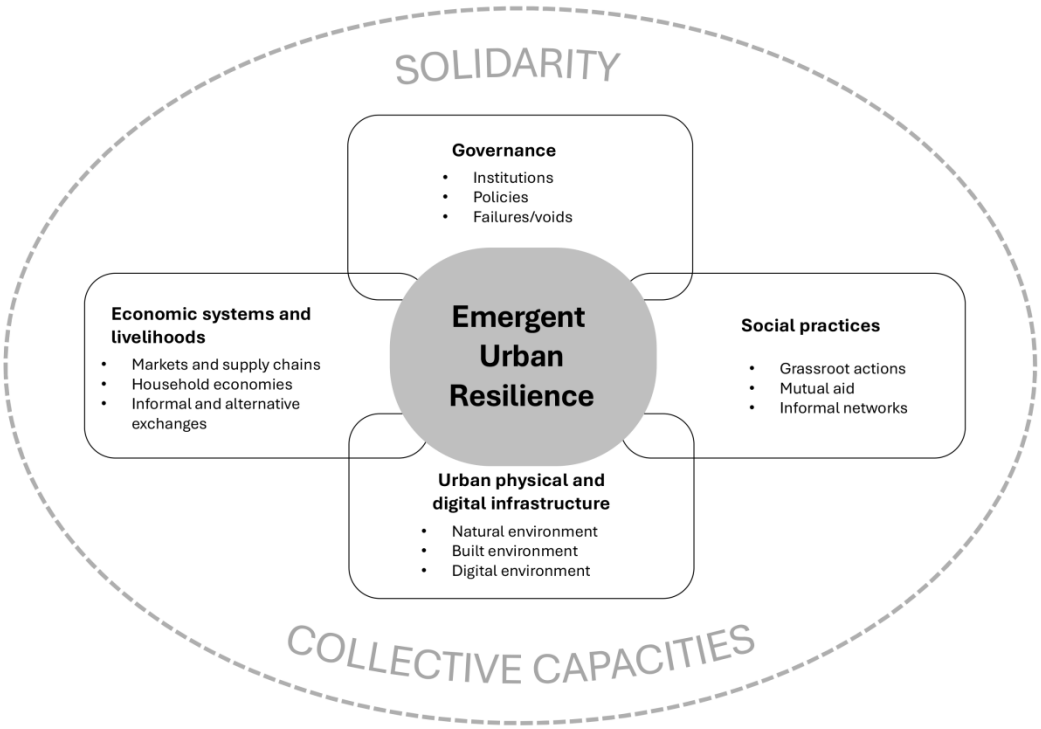

Figure 2. Constitutive Dimensions of EUR.

The dynamics of governance and urban governance, including the prevailing flat or rigid hierarchies, further influence potential outcomes (Twigg & Mosel, 2017). Wartime governance can be fragmented, overburdened, and often inconsistent (Grijalba Castro & Ramírez López, 2021; Nate, 2025; Rabinovych et al., 2024; Rosvold, 2023; Truppa et al., 2024). Local authorities can be both proactive and institutionally constrained (Rabinovych et al., 2024; Truppa et al., 2024). There is often a structural mismatch between formal procedures and the reality of crises: regulations, reporting requirements, and administrative bureaucracy are designed for peacetime and are often inflexible (rigid and top-down) (Reid & Botterill, 2013; Twigg & Mosel, 2017). This leads to institutional "slow zones" that stand in stark contrast to the rapid pace and evolving demands of an acute crisis (bottom-up and flexible) (Carstensen et al., 2021; Kaufmann, 2013; Twigg & Mosel, 2017).

Economic systems, the legal system, education, and other essential livelihoods constitute a key level of emerging urban resilience in a structural sense (Cariolet et al., 2019). Wars have disrupted labour markets, supply chains, school and university education, healthcare, household management, and local businesses, thereby altering both vulnerability and adaptability (Basheer & Elagib, 2024; Grijalba Castro & Ramírez López, 2021; Kimhi et al., 2023; Klein et al., 2024; Rabinovych et al., 2024). Communities need formal and informal economic activities to survive, but rising costs, resource and labour shortages, and logistical constraints limit available options (Carstensen et al., 2021; Grijalba Castro & Ramírez López, 2021). Thus, economic resilience impacts governance, urban institutions, and everyday social activities at various levels: from budgeting and self-sufficiency to local, regional, and national markets and financial infrastructures (Ahmadivostakolaei et al., 2024; Borsekova et al., 2018; Bozza et al., 2015; Nate, 2025). This also includes the natural environment and natural resources, which can be devastated or poisoned and no longer provide ecosystem services for the urban population (Cariolet et al., 2019; Meerow et al., 2016; Nate, 2025; Haase et al., 2014).

Social practices form the core of emergent urban resilience (Soldak et al., 2024; Twigg & Mosel, 2017). Examples include micro-coping, spontaneous volunteering, informal coordination, and everyday creativity and innovation (Ahmadivostakolaei et al., 2024; Carstensen et al., 2021; Twigg & Mosel, 2017). These practices are often unevenly distributed among the people of an urban society, irregularly available, and often invisible to monitoring or data-driven tracking: care, repair, solidarity, and adaptation maintain basic urban functions but leave only incomplete traces (Clark-Ginsberg et al., 2020; Douglas et al., 2018; Gray, 2023). The same applies to the return of urban nature after a fire or explosion, or its resistance/self-cleaning potential to the input of toxic heavy metals or organic compounds (through weapons or intense fires) into soils and water (Ahmadivostakolaei et al., 2024; Borsekova et al., 2018; von Döhren and Haase, 2015).

Beyond these four structural domains, emergent urban resilience is also shaped by a cross-cutting societal dimension: shared dispositions, collective awareness and the capacity of

communities to mobilise solidarity under extreme pressure. Research on post-disaster and crisis-affected communities shows that the willingness to support others, assume personal risk, share scarce resources and uphold mutual responsibility can significantly influence how quickly and effectively local systems respond to disruption (Fotaki, 2022; Libal & Kashwan, 2023; Wallaschek, 2019). These societal capacities often remain analytically undervalued because they operate informally and leave few durable traces, yet they play a decisive role in sustaining basic functions during acute shocks and in laying foundations for longer-term collective recovery (Aldrich, 2017). Importantly, such dispositions are not a separate structural layer but an enabling condition that interacts with governance, infrastructures, economic systems and social practices alike, shaping the extent to which emergent forms of resilience can materialise and be maintained.

Together, these levels form a structural convergence zone in which planned infrastructures and institutions, as well as unplanned, emergent aspects of everyday life, generate urban resilience. This complexity is why research on urban resilience requires multimodal, cross-site and scalar methods that address the structural and emergent dimensions of resilience. In order to understand why emerging urban resilience is difficult to capture empirically and to identify the epistemic barriers to its study, its complexity must be acknowledged.

2.3. Dynamic model: Temporalities of crisis and emergence

The structural model in Fig. 2 alone does not explain the pace, volatility, or instability of newly emerging and flexibly developing resilience, nor its decline (Cariolet et al., 2019). Rapid or even sudden changes destabilise, modify, and adapt various systems — in our case, urban spaces — partially at different speeds. Sudden shocks can trigger immediate failures and unexpected reactions that occur too quickly to be comprehensively documented scientifically or according to the standards of a monitoring methodology — one of the major challenges of the concept of emergent resilience (Soldak et al., 2024). These systemic properties of emergent resilience, which are difficult to grasp with existing methods or, better yet, methodologies, lead to phases of profound opacity in which (urban) communities, institutions, and researchers have only limited insight.

Reactions spread and diversify across locations, networks, and scales as internal, system-inherent conditions change, as do external, non-system-inherent shocks (Borsekova et al., 2018; Cariolet et al., 2019; Twigg & Mosel, 2017). Adaptation becomes diffuse and multilocal, yet simultaneously multi-layered and flexible: different practices emerge concurrently in physical and digital environments and continuously adapt (e.g., transport routes change almost hourly depending on the level of danger; team compositions change; patterns of safe places change daily, etc.). That is, they fluctuate with changing internal and external conditions and are often short-lived, but constant in their existence (Carstensen et al., 2021; Kaufmann, 2013; Twigg & Mosel, 2017). Groups form, reorganise, and disappear; resource availability changes

unpredictably, making it difficult to study the process in real time unless it is directly recorded on-site or transmitted (to a regional or global network). Over time, some practices become routines, habitual adjustments, or even locally institutionalised solutions because they are recognised as superior to existing ones, while others disappear entirely. What researchers observe often reflects this stable subset of actions, settings, and patterns, while the more volatile and innovative elements of resilience leave only minimal traces (Cariolet et al., 2019; Carstensen et al., 2021).

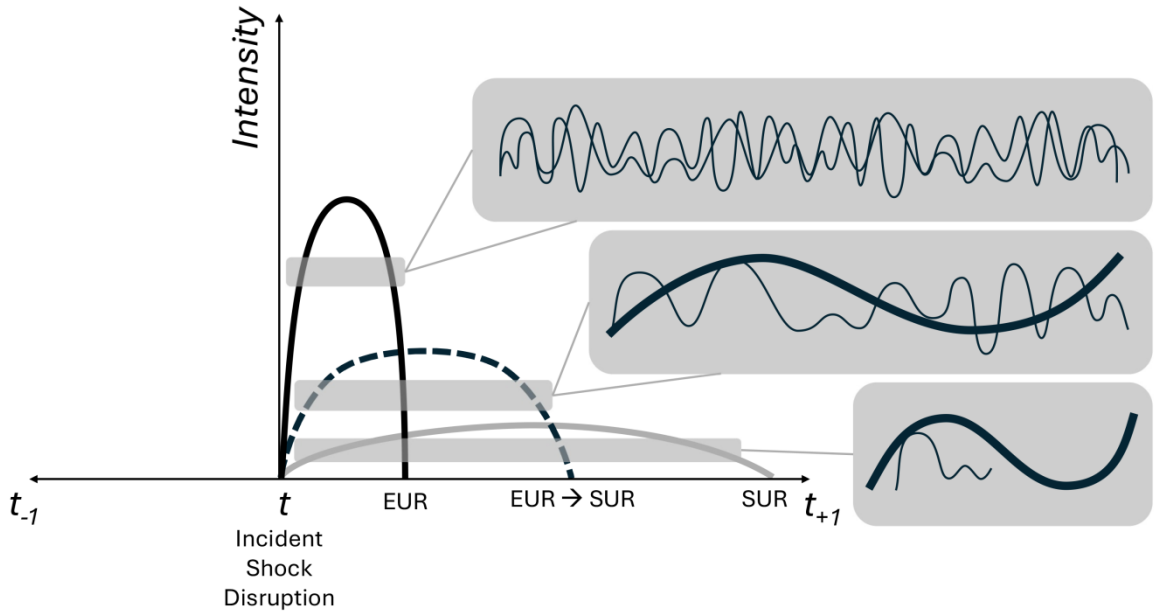

Figure 3. Illustration of the temporal dynamics of emergent urban resilience (EUR) compared to structural resilience (SUR) at various points in time: before the shock (t-1), during and shortly after the shock (t), and after the shock (t+1). The small grey time windows in the figure also show how volatile and discontinuous EUR is compared to the "established" SUR, and therefore more difficult to detect and continuously measure.

Sudden disruptions coincide with gradual, persistent imbalances, stresses, and crises such as economic booms or booms, demographic decline, ecological destruction, but also renewal, displacement or settlement, or the decay or modernisation/renewal of infrastructure, to name only the most important dimensions (Ahmadivostakolaei et al., 2024; Clark-Ginsberg et al., 2020). The intertwining of temporal processes with diverse dynamics makes the development of urban resilience so complex and sometimes perplexing for outsiders, including researchers (Borsekova et al., 2018; Cariolet et al., 2019; Kaufmann, 2013; Kimhi et al., 2023).

The central challenges of empirical research into urban emergent resilience are illustrated by two perspectives: structural and dynamic. These will be explained in more detail in Section 3 below.

3. Methodology including data sources

This section examines how the structural and dynamic complexity of EUR shapes researchers' capacity to study the phenomenon and inability or deficiency of traditional research methods to capture both the emergence and the evolution of urban resilience in crisis-affected cities. It focuses on identifying the epistemological and practical limitations due to EUR's multi-layered and non-linear character.

3.1. Epistemic barriers across urban layers

Urban physical and digital infrastructure have a significant impact on knowledge production (Nate, 2025). When provision of electricity, heating, and communication is constantly interrupted, and the transportation networks are disconnected, the possibility of systematic observations and research reduces or may even become impossible (Klein et al., 2024).

Access to the field is difficult or impractical. There is little possibility to reconstruct temporal sequence of events, and infrastructure-related data is a regular, incomplete or contradictory, for example, damage reports, usage records or sensor-generated information (Cariolet et al., 2019; Soldak et al., 2024). Digital data, seemingly more accessible, heavily depends on connectivity and power availability (Douglas et al., 2018; Nate, 2025). Different sources providing information on outages or alerts represent just snapshots of constantly changing conditions, leaving little room for verification of the spatial and temporal accuracy of information (Shah et al., 2019).

Governance systems and mechanisms are difficult to trace empirically during crises. National, regional and local authorities operate under enormous pressure, when their capacities to document and communicate their decisions is very limited (Cariolet et al., 2019; Klein et al., 2024). Moreover, the communication of decisions might be minimalised due to security issues (Clark, 2024; Rickard et al., 2025). Regulations and standard institutional procedures remain designed for peacetime, which provokes delayed reporting and gaps in institutional memory (Nate, 2025; Twigg & Mosel, 2017). Moments of governance creativity and improvisation, such as fast decisions, informal negotiations, rules changes, leave almost no documentary traces (Twigg & Mosel, 2017). At the same time, official documents might provide simplified strategic visions that have little to do with the reality. As a result, selected visibility, partiality and temporal discrepancy characterise evidence related to governance process (Douglas et al., 2018; Gray, 2023).

Economic dimension of urban resilience is equally challenging to document. Wartime economy transforms rapidly: existing formal enterprises close or relocate, informal markets grow, prices fluctuate daily, ad supply chains reorganise through informal channels that do not leave any available for research data (Basheer & Elagib, 2024; Carstensen et al., 2021; Nate, 2025). Traditional economic indicators and research do not consider many appearing practices,

such as barter, borrowing, or local resource pooling. Publicly available data quickly becomes obsolete (Nate, 2025; Soldak et al., 2024). Economic changes at the level of households are almost impossible to observe directly and even more difficult to verify. As a result, high volatility and limited formal documentation characterise data on economic performance.

Social practices constitute the most immediate manifestation of emergent urban resilience, being at the same time the least accessible empirically (Soldak et al., 2024). Numerous such practices are spontaneous, short-term, informal or even illegal, intimate, private. They are integrated into routines of care, mobility, or communication. Groups and networks appear and dissolve quickly, initiatives often change their location and form, and many of such activities do not identify them as 'resilience' at all (Carstensen et al., 2021; Twigg & Mosel, 2017). Interview-based approaches mainly should deal with retrospective and selected information (Sereda & Mikheieva, 2025). Application of observational approaches is difficult since emergence rarely happens in predictable and publicly observable settings.

Across discussed domains, structural complexity produces fragmented and uneven evidence. Each layer generates different forms of incompleteness, inconsistencies and blind spots. Together they form a knowledge puzzle that is difficult to integrate due to its fragmentation and instability. Layers generate incomplete traces which do not align temporally or geographically. This fragmentation creates a fundamental methodological obstacle that does not allow to comprehend emergent urban resilience as something more than scattered specifically for the separate domains representations which are difficult to synthesise.

3.2. Temporal discrepancy and instability of evidence

Already at the very beginning of the crisis, moments of profound opacity appear. When infrastructures fail and governance systems are overloaded, events unfold too quickly and chaotically to be documented through interviews, surveys or observations (Wolbers et al., 2021). Digital communication might be unavailable, and people operate in a survival mode. Thus, the stable gaps in empirical reconstructions persist due to the absence of any relevant data, and earlier adaptive strategies and actions remain unknown or available later through reflections within memorial or institutional narratives (Koricheva and Kulinskaya, 2019).

As crisis evolves, responses in physical and digital spaces start multiplying. However, this adaptive phase is instable: practices change, networks reorganise, and resources flows fluctuate. Units of analysis, individuals, groups or initiatives) are not durable, making longitudinal documentation difficult. Digital traces, even abundant, are episodical and are often not contextualised. Channels appear and disappear, message histories are deleted, algorithms impact and reshape content. These dynamics create 'moving objectives' that traditional research methods cannot easily follow (Fleischer, 2013).

Once some practices stabilise, they become easier to document. However, those stabilised practices represent only fragments of earlier, more diverse and adaptive processes. What

remained for observations, is supported through institutionalisation, resource allocation and community consolidation, while more ephemeral and experimental practices disappear non leaving traces. Documentary sources may formalise selected narratives overlooking fluidity and improvisation of the earlier phases. Thus, evidence reflects results of resilience but not resilience's appearance (Fleischer, 2013).

Crisis conditions promote overlapping temporalities: severe shocks coexist with slow infrastructural deterioration, economic decline or ecological degradation. Institutional processes follow slower bureaucratic paths. This temporal misalignment leads to incompatibility of produced datasets which are difficult to compare and integrate. Asynchronous timelines create serious challenges for reconstruction of sequences, identifying causalities or tracing practices' evolution.

3.3. Working with fragmented, unstable and partial evidence

The combination of structural and dynamic complexity of resilience creates conditions in which data is initially incomplete and often contradictory. The methodology for conducting research is complicated by the fact that data verification is hampered by inconsistencies in sources, irregular access to updates, and the absence of any markers that would allow for re-calibration. Indicators developed for stable systems do not reflect the phenomena that arise during a crisis. They often overlook informal, short-term, or micro-scale adaptations and place too much emphasis on institutional or infrastructural responses. Another problem is setting priorities. Deciding which practices to consider 'resilience' and, therefore, to document, risk emphasizing formalised, visible or stabilised actions, leaving hidden daily improvisations which sustain city functioning during a crisis. Digital traces, while very valuable, require careful interpretation. Access to them is often uneven, and their representation is uncertain. The temporal context is often unclear. Moreover, digital platforms often reorganise information in ways that distort the sequence. The diversity and heterogeneity of practices make it difficult to establish classifications, identify typical cases, or define boundaries for units of analysis. As a result, methodological work on EUR is less focused on capturing complete processes but rather on interpreting fragments, understanding their boundaries, and identifying the conditions under which they become visible or remain hidden.

4. Ethics and safety

Conducting research in war zones poses significant ethical and safety challenges, primarily centering on the principle of 'do no harm' to participants, researchers and communities, while operating in unstable, highly politicised environments. Crisis conditions heavily impact ethical considerations in researching urban resilience. Ethical questions mirror the multi-layered instability present in different urban domains. The rapidly changing nature of crises complicates ethical decision-making and safety. What is feasible and safe in one moment during

a disaster can become inappropriate and dangerous in the next. Recognizing these dynamics is essential for conducting responsible research in such conditions.

4.1. Ethical implications across structural domains

In times of war and natural or man-made disasters, the destruction of urban infrastructure can be crucial in determining how research is conducted. Infrastructure destruction can lead to power shortages, mobile network disruptions and other communication problems (Basheer & Elagib, 2024; Douglas et al., 2018; Klein et al., 2024; Rabinovych et al., 2024). In such circumstances, people require additional resources to participate in research, such as energy, data or transport connections. In the harsh conditions of war, populations simply cannot afford to waste these resources (Klein et al., 2024; Libanova, 2025). Interacting with research participants via digital communication methods may endanger participants by revealing their location, while meeting with participants in person may pose physical risks (Klein et al., 2024; Sereda & Mikheieva, 2025; Shah et al., 2019). Therefore, such research conditions raise questions about the requirements imposed on respondents and whether it is reasonable to expect their availability during periods of infrastructure overload (Jędraszczyk, 2025; Sereda & Mikheieva, 2025). Thus, research ethics must adapt to the rhythms of infrastructure and not assume stable access conditions.

In times of widespread crisis, governance becomes a sensitive area, subject to increased political scrutiny, politicised communication, and selective transparency (Basheer & Elagib, 2024; Klein et al., 2024; Truppa et al., 2024). In such circumstances, discussing interactions with authorities, describing informal networks and communication channels, or outlining strategies to overcome problems can endanger individuals if their views diverge significantly from official government positions and their accounts are perceived as politically sensitive (Klein et al., 2024; Libanova, 2025; Rickard et al., 2025; Sereda & Mikheieva, 2025). Even basic data, such as household composition, could be exploited by perpetrators of violence to target individuals or groups (Sereda & Mikheieva, 2025; Shah et al., 2019). In wartime, formal reporting systems break down, and the boundaries between administrative structures and security agencies become blurred (Klein et al., 2024). In such circumstances, standard assumptions about confidentiality cannot be taken for granted, and researchers should consider how information may be disseminated beyond the research contact, as well as what people say (Jędraszczyk, 2025; Sereda & Mikheieva, 2025). It is paramount to ensure the anonymity of respondents and secure data storage to prevent harm (Klein et al., 2024; Sereda & Mikheieva, 2025).

Economic instability can result in reduced household incomes, increased resource needs and reliance on the informal economy (Basheer & Elagib, 2024; González Castillo et al., 2022; Gray, 2023; Klein et al., 2024). In these circumstances, finding time for interviews alongside the main task of securing a livelihood can be challenging (Carstensen et al., 2021; Klein et al.,

2024). Therefore, researchers should avoid burdening participants with additional responsibilities or taking away the time and emotional energy, they need to cope with their difficulties (Nate, 2025). Engaging a person affected by a crisis in research is like asking someone climbing a slippery slope to stop, turn around, and describe the way they have just completed. They may be able to do so, but every moment they dedicate themselves to describing their struggle is a moment taken away from survival tasks. The line between these states is quite thin and involves issues related to empathy and psychology (Jędraszczyk, 2025; Otrishchenko & Wylegała, 2025; Rickard et al., 2025; Sereda & Mikheieva, 2025).

Social networks form the main infrastructure of emergent urban resilience. However, in the event of a severe crisis, these networks become highly vulnerable (Cariolet et al., 2019; Douglas et al., 2018; Rosvold, 2023; Soldak et al., 2024; Truppa et al., 2024; Twigg & Mosel, 2017). Emotional tension, exhaustion and trauma can affect people's willingness to participate in research of any kind. Furthermore, discussing their specific experiences can cause additional stress or retraumatise individuals (Klein et al., 2024; Nate, 2025; Sereda & Mikheieva, 2025). Research interventions can provoke tensions within social networks and families. In such crisis conditions, trust is distributed unevenly, and participation in research can affect established relationships between people. Therefore, an ethical approach requires sensitivity to emotional engagement, emotional labour, relational risks, and the uneven distribution of vulnerability across social groups (Jędraszczyk, 2025; Nate, 2025; Sereda & Mikheieva, 2025).

4.2. Ethical tensions across dynamic crisis temporalities

In the initial, most acute phase of a crisis, it may be impossible to conduct ethical research. At such times, human safety is paramount (Klein et al., 2024; Otrishchenko & Wylegała, 2025). The situation can develop so rapidly that it becomes difficult to obtain informed consent, process data securely or even gain access to the field (Jędralska, 2025; Klein et al., 2024; Sereda & Mikheieva, 2025). This can lead to blind spots. Here, these blind spots represent not only a lack of evidence, but also times when attempting to collect data and conduct research could cause more harm than good, interfering with people's survival strategies (Rickard et al., 2025; Sereda & Mikheieva, 2025). Therefore, ethical research practice requires an understanding of when non-interference is the only responsible choice (Jędraszczyk, 2025).

As practices spread, adapt and reorganise in physical and digital spaces, ethical issues shift from impossibility of conducting research to instability (Klein et al., 2024; Rabinovych et al., 2024; Soldak et al., 2024). Social groups form and disintegrate quickly at this stage (Sereda & Mikheieva, 2025; Twigg & Mosel, 2017). Communication channels emerge and vanish, and connections evolve and transform (Kaufmann, 2013). This is where confidentiality issues arise because identities, contexts, and relationships are unstable. Often, participants themselves may not fully understand the risks associated with sharing information (Otrishchenko & Wylegała, 2025; Sereda & Mikheieva, 2025). Therefore, ethical approaches must be highly flexible and

context dependent. Researchers must consider the possibility of situations deteriorating and conditions changing. They must also understand that what seems harmless now may become deadly dangerous in the future (Gray, 2023; Sereda & Mikheieva, 2025).

As conditions stabilise, people have more opportunities and time to share their experiences (Jędraszczyk, 2025; Klein et al., 2024). However, such retrospective narratives are shaped by emotions, social norms and evolving institutional narratives. Participants choose what to highlight or exclude from their narrative based on the changing socio-political context (Jędraszczyk, 2025; Klein et al., 2024; Nate, 2025). During this stage, researchers must exercise caution when interpreting such narratives, avoiding the romanticisation or oversimplification of experiences and the inadvertent disclosure of practices that communities would prefer to remain informal or hidden (Clark, 2024; Jędraszczyk, 2025; Rickard et al., 2025; Sereda & Mikheieva, 2025).

4.3. Unequal risks, positionality and responsibilities of research

Under crisis and war conditions researchers face very different risks unevenly distributed. The Ukrainian scholars work under the direct threats: their lives and health are in danger, their work is constantly interrupted by shelling, power shortages and stress (Klein et al., 2024; Sereda & Mikheieva, 2025). External international scholars are protected from those threats, but their capabilities are highly dependent on remote access to the field, data and people (Kimhi et al., 2023; Sereda & Mikheieva, 2025). There are also other groups of scholars, for example those researchers from countries with complex political environments and tensions. They may find themselves under surveillance or pressure from their authorities (Klein et al., 2024). All this creates uneven conditions for research and inherent power imbalances between external, often well-resourced, researchers and local researchers in the emergency context (Otrishchenko & Wylegała, 2025; Sereda & Mikheieva, 2025). There is a risk of raising false hopes or inadvertently exploiting local scientists', partners' or participants' desperation for financial gain or access to resources (Klein et al., 2024; Sereda & Mikheieva, 2025). The aspect mentioned impacts on who can collect data and how it will be subsequently interpreted. Therefore, it is important to honestly acknowledge asymmetrical relationships and positions and design work in a way that it is not exploitative or increase vulnerability of local participants and partners.

In such conditions, careful management of data is especially important. Any information, even seemingly impersonal data, can become potentially dangerous when connected to contextual details. For example, screenshots, timestamps and metadata can accidentally reveal a person's location, the routes they take or the groups they belong to. Therefore, data should be collected sparingly, stored securely and deleted promptly. Sometimes it should not be collected at all if there is a risk that it will cause harm in the future.

The most important thing is for researchers to accept that it is impossible to gather a complete picture of what is going on. Some stories cannot be recorded, some practices cannot be

described, and some materials cannot be preserved. This is not a flaw in the research, but a necessary measure to protect people. Acknowledging this incompleteness is a way to conduct research responsibly and avoid harming those living in dangerous situations whose experiences and adaptation strategies we are trying to understand.

5. Aspects of interpretation

As discussed in the previous chapters, interpreting results in studying emergent urban resilience requires acknowledging its structural and temporal complexity. Due to the fragmented and uneven distribution of evidence across urban domains and asynchronous temporalities, interpreting the results involves piecing together incomplete and sometimes conflicting information. This section discusses the aspects to consider when interpreting research results in these conditions, the necessary interpretive approaches, and the potential relevance of the produced knowledge.

EUR interpretation should begin with the acknowledgement that the evidence does not accurately reflect a linear, coherent phenomenon. As discussed in the chapter on the structural model, each urban domain exhibits different levels of visibility and invisibility, and the addition of temporality introduces further complexity. Under such conditions, interpretations cannot rely on assumptions about representativeness or coherence. They must also consider absence as well as presence, recognizing that what is visible reflects only a narrow aspect of EUR dynamics.

5.1. Ethical implications across structural domains

Studying the malfunctioning and destruction of urban infrastructure during crises such as water shortages, power and heating failures, and communication interruptions provides important contextual information for understanding emergent urban resilience (Borsekova et al., 2018; Bozza et al., 2015; Cariolet et al., 2019; Douglas et al., 2018; Kaufmann, 2013; Soldak et al., 2024). However, when interpreting this data, it is important to consider its incompleteness and temporal instability. Reports, alerts, and outage maps provide snapshots rather than a continuous narrative (Borsekova et al., 2018; Cariolet et al., 2019; Douglas et al., 2018; Gonzalez Castillo et al., 2022; Sereda & Mikheieva, 2025; Sun et al., 2024). This necessitates careful interpretation, focusing on identifying patterns rather than precise chronology (Ahmadivostakolaei et al., 2024; Kimhi et al., 2023; Meerow et al., 2016; Meerow & Newell, 2019). The most suitable issues to focus on during research are where disruptions arise, where they concentrate within a city (Borsekova et al., 2018; González Castillo et al., 2022), and how people and institutions adapt to such changing circumstances (DeVerteuil et al., 2021; Kaufmann, 2013; Rabinovych et al., 2024; Soldak et al., 2024).

Non-transparency, selective transparency and delays or slow responses in governance processes (Borsekova et al., 2018; Douglas et al., 2018; Sereda & Mikheieva, 2025) should prompt researchers to shift their focus from interpretation to distinguishing between

governance discourses and actions (Clark, 2024; DeVerteuil et al., 2021; Meerow & Newell, 2019). Inconsistencies, contradictions, and institutional silence can be important indicators of institutional capacity, pressure, or fragmentation (González Castillo et al., 2022; Kaufmann, 2013; Soldak et al., 2024; Truppa et al., 2024).

As previously mentioned, traditional economic indicators are ineffective in interpreting wartime economic processes as they fail to capture economic dynamics during crises or informal, household-based economic relationships (Ahmadivostakolaei et al., 2024; Cariolet et al., 2019; Carstensen et al., 2021; Klein et al., 2024; Libanova, 2025; Nate, 2025; Rabinovych et al., 2024; Reid & Botterill, 2013). Therefore, interpreting economic processes requires situating economic signals within their context. What does shortage mean for supply chains? How do price fluctuations reflect a shortage of resources? How do informal exchanges and barter reflect adaptive resource flows? (Carstensen et al., 2021; Grijalba Castro & Ramírez López, 2021; Kaufmann, 2013; Nate, 2025). The absence of formal economic indicators can itself be key to interpreting the restructuring of economic life (Ghaffarian et al., 2018; Libanova, 2025; Sereda & Mikheieva, 2025).

Interpreting social actions and practices often involves making sense of memories, fragmented reports or digital traces (Borsekova et al., 2018; DeVerteuil et al., 2021; Douglas et al., 2018; González Castillo et al., 2022; Sereda & Mikheieva, 2025; Shah et al., 2019). These traces should be read as indicators of a wider adaptive logic rather than as isolated episodes (DeVerteuil et al., 2021; Faulkner et al., 2018; González Castillo et al., 2022). The aim should be to reveal the relational patterns, needs and limitations that shaped social improvisation (Cariolet et al., 2019; González Castillo et al., 2022; Zamora-Moncayo et al., 2021). However, the reconstruction of complete narratives may be impossible (Clark-Ginsberg et al., 2020; Kimhi et al., 2023; Sereda & Mikheieva, 2025).

5.2. Interpreting EUR across crisis temporalities

In the initial stages of a crisis, researchers should consider the lack of empirical data as an integral characteristic of emergent urban resilience (Douglas et al., 2018; Sereda & Mikheieva, 2025). Recognizing that not all knowledge gaps can be filled and that some adaptive practices will remain unknown can positively impact the quality of research by reducing overconfidence when interpreting results (Clark, 2024; Kaufmann, 2013; Soldak et al., 2024; Twigg & Mosel, 2017).

During the subsequent phase of adaptation, when practices are fragmented and changing rapidly, the focus of interpretation should shift towards processes of transformation and movement rather than stability (Cariolet et al., 2019; Clark-Ginsberg et al., 2020; Meerow et al., 2016; Oviedo et al., 2022; Truppa et al., 2024). In these circumstances, researchers focus on how practices and networks evolve and adapt, and how these changes disseminate across various urban areas (Bozza et al., 2015; Cariolet et al., 2019; Kaufmann, 2013; Soldak et al.,

2024). In this interpretation, fragmentation ceases to be an obstacle and becomes part of the research landscape (DeVerteuil et al., 2021; González Castillo et al., 2022; Oviedo et al., 2022; Twigg & Mosel, 2017).

During the stabilisation and formalisation of social practices, these practices become more visible and accessible for study (Carstensen et al., 2021; Clark-Ginsberg et al., 2020; Douglas et al., 2018; Soldak et al., 2024). However, when interpreting such practices, it is important to remember that they echo a broader, more diverse field of social innovation that emerged during the acute phase of the crisis (Soldak et al., 2024; Twigg & Mosel, 2017). These practices do not necessarily reflect the most effective or widespread approaches in the early stages. They may result from support from communities or institutions. The interpretation error at this stage may lie in equating the observed results with the entire spectrum of previous practices (Carstensen et al., 2021; DeVerteuil et al., 2021; Gray, 2023; Reid & Botterill, 2013).

5.3. Interpretive guidelines for the analysis of emergent resilience

When studying emergent urban resilience during crises, the main approach should not be to structure the results according to strict typologies, as this would be impossible in circumstances that are diverse, extremely fast-changing and context-dependent. A more useful approach would be to identify general patterns, such as the obstacles that impact actions (e.g. destroyed infrastructure, financial issues or governance failures), the adaptive mechanisms used (e.g. improvisation, support from neighbors and family, or small digital networks) and the 'trigger moments' that prompt changes (e.g. power outages, increasing threats or water shortages). This approach can help us to understand the essence of different processes without forcing them into rigid categories.

At the same time, it is important to understand who the results are for, who can use them, and how. Authorities can use the research results to improve governance or prevent disruption to functioning schemes by gaining an understanding of hidden, unreported practices. Humanitarian organisations need knowledge of informal economics and everyday survival strategies. Local people need their experiences to be recognised. Scholars require this knowledge in order to develop theories about how cities adapt to shocks and crises. However, the objective of EUR research is to improve understanding of how urban resilience emerges and can be studied, rather than making predictions.

Conclusions

In this paper, we discuss why researching emergent urban resilience under conditions of war and other destructive disasters is so complicated yet crucial. We argue that the complexity lies not only in practical issues such as access, risk and communication breakdowns, but also in the very nature of the research context itself. Resilience manifests in various urban domains and elements that react differently to crises: sometimes slowly, sometimes quickly and sometimes

invisibly. This is why the data collected will always be incomplete. Research results are often fragmented, appear with a delay, quickly become obsolete or only reflect what was formalised and institutionalised during the next, calmer phase of the crisis. Destroyed infrastructure creates obstacles to observation and data gathering; authorities provide only selective and inconsistent information; economic activities move into the grey and black markets; and social practices emerge at the micro level and disappear so quickly that they are difficult to record. Furthermore, emergency situations increase the likelihood of misuse, falsification or instrumentalisation of knowledge. Crises also create different 'time speeds', whereby one process evolves instantly while another drags on for months, making it impossible to observe and record both simultaneously. Consequently, it is difficult to conduct research into emergent urban resilience using traditional methods, which require stability, duration and data availability. Conversely, we must accept that gaps, inconsistencies and missing information are natural elements of EUR research. Such data must be interpreted carefully, with an understanding of limitations, and with a focus on identifying general patterns that attempt to reconstruct a comprehensive picture. Recognising these as inherent aspects of urban resilience itself — rather than mere obstacles — helps to clarify how they actively influence interpretation and analytical conclusions, offering insights that can guide future studies.

Finally, it is important to consider ethical and organisational issues, bearing in mind the effect of politics, infrastructure and social processes on researchers' capabilities and safety. These factors together require flexible, attentive and reflective approaches to studying emergent urban resilience in situations of profound upheaval. Despite the challenges involved, we consider this to be an indispensable part of responding to and/or resisting it.

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Declaration of generative AI and AI-assisted technologies in the writing process

In the proofreading phase, the authors used GPT 5.1 to enhance language and clarity. After utilising these tools, we meticulously examined and refined the language, as required. Consequently, we assume full accountability for the content.

Conflict of interest

No potential conflict of interest was reported by the author(s).

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