

Urban Morphology Through the Lens of Saturation and Collapse: Applying Manafi's SEA Model

Raheleh Karimpour Omam¹, Svitlana Samoylenko²

¹ Macromedia University of Applied Sciences, Lecturer, rominaomam@gmail.com

² Manafi Institute for Saturation Studies, Researcher, svitlana.samoylenko@gmail.com

Abstract

Urban morphology provides a critical framework for understanding the spatial structure of cities and the processes through which urban form evolves over time. While traditional morphological schools have examined the persistence of town plans, the transformation of building types, and the configurational logic of spatial networks, fewer studies have interpreted these processes through a systemic model of urban thresholds and structural limits. Manafi's theory of saturation and the associated Collapse (SEA) model (Manafi, 2025, 2026) introduce such a perspective by conceptualizing urban systems as dynamic entities that move through phases of consolidation, saturation, and reorganization. Beyond a descriptive framework, the SEA model also functions as an analytical and predictive tool, proposing that collapse occur when the balance between stability, efficiency, and adaptability is disrupted. Because these three dimensions operate across multiple scales, the model has potential applications in diverse fields, including urban planning, infrastructure systems, environmental studies, and socio-spatial analysis.

This research investigates how the SEA model can be used as both a meta-framework and an interpretative tool for re-examining the principal schools of urban morphology. It aims to explore how the model helps identify moments at which urban structures reach their functional or spatial limits, and how it explains the mechanisms through which urban systems reorganize after these thresholds are reached. By applying the SEA perspective to established morphological traditions, the study seeks to demonstrate how saturation and collapse can be understood not only as crises but also as drivers of spatial transformation. Through this linkage between morphological theory and systemic urban dynamics, the research contributes to a more integrative understanding of urban change and highlights the relevance of SEA-informed analysis for contemporary planning and urban design practice.

Keywords: SEA model, Saturation, Urban Morphology, Collapse, Manafi

1. Introduction

Urban morphology plays a central role in understanding the physical structure of cities and the processes through which they evolve over time. By examining the relationships between streets, plots, buildings, and open spaces (Fleischmann *et al.*, 2022; de Oliveira, 2022), it provides a framework for interpreting how historical development, socio-economic forces, and planning decisions shape urban form. Beyond descriptive analysis, urban morphology offers tools for explaining continuity and change in the built environment, making it particularly valuable for urban design, planning, and regeneration research (Jhaldiyal *et al.*, 2018).

Over time, several major schools of thought have emerged within the field. The Conzenian tradition, associated with M. R. G. Conzen, emphasizes the historical persistence of town-plan elements and the layered evolution of urban structure (Conzen, 2004; Nurjannah *et al.*, 2025). The Italian typo-morphological approach, developed by Saverio Muratori and later expanded by Gianfranco Caniggia, focuses on the transformation of building types and urban tissue as the primary drivers of spatial change (Cataldai *et al.*, 2002; Xie, 2019). The French school highlights the interaction between urban form, land systems, and regulatory frameworks (Moudon, 1997; Mosharraf, 2023), while configurational approaches such as space syntax, pioneered by Bill Hillier at University College London, analyse how spatial networks influence movement, accessibility, and social interaction (Hillier *et al.*, 1976). Together, these perspectives demonstrate that urban form can be interpreted through historical, architectural, institutional, and spatial-configurational lenses.

Building on this body of knowledge, the present research introduces the theory of saturation and the collapse model as an interpretative framework for reading urban transformation across these traditions. It aims to investigate how the SEA model can be used to reinterpret different schools of urban morphology, identify moments when urban structures reach their limits, and explain the mechanisms through which spatial systems reorganize. By linking morphological theory with the dynamics of saturation and collapse, the study seeks to contribute to a more integrative understanding of urban change and its implications for contemporary planning and design.

2. Urban Morphology

Urban morphology refers to the study of the physical form of cities and the processes that shape their structure over time (de Oliveira, 2022). It examines how streets, plots, buildings, and open spaces are arranged, how they relate to one another, and how they evolve in response to social, economic, cultural, and environmental forces (Conzen, 2004; Nurjannah *et al.*, 2025). Rather than focusing only on architecture or planning policy, urban morphology seeks to understand the city as a layered spatial system in which historical development, land subdivision, building typologies, and infrastructure networks interact (Cowan and Rogers, 2005; Ley, 2025). This perspective allows researchers to interpret the city not as a static object but as a dynamic product of continuous transformation. One of the most influential traditions in this field is the British or Conzenian school, developed through the work of Conzen. This approach emphasizes the historical analysis of town plans and proposes that urban form can be understood through four primary components: the street system, the plot pattern, and the building fabric, and open areas (Mobaraki & Vehbi, 2022; Fleischmann *et al.*, 2022). Conzenian analysis pays particular attention to the persistence of these elements over time, arguing

that plot boundaries and street alignments often survive multiple phases of redevelopment and therefore provide important evidence of urban evolution. The school also introduced concepts such as morphological regions and fringe belts, which help explain how cities expand and reorganize at different stages of growth (Oliveira & Yaygın, 2020; Arat & Topçu, 2026).

A second major tradition is the Italian typo-morphological school, initiated by Saverio Muratori and later developed by Gianfranco Caniggia. This perspective focuses on the relationship between building types and urban tissue, arguing that the city is formed through the gradual transformation of recurring architectural and spatial types. Instead of examining plots and streets primarily as historical artifacts, the Italian school treats them as part of a continuous design logic in which individual buildings, blocks, and neighborhoods evolve through adaptation and repetition (Cataldai et al., 2002; Xie, 2019; Mosharraf, 2023). Typo-morphological studies often trace how basic dwelling forms develop into more complex urban structures, linking architectural practice with broader urban processes and emphasizing the importance of sustainability in urban form (Khaznadar & Baper, 2023).

The French school of urban morphology, often associated with research traditions linked to planning institutions around Versailles, integrates geographical, architectural, and sociological perspectives (Moudon, 1997; Mosharraf, 2023). This approach places particular emphasis on urban tissue, understood as the coherent spatial structure produced by the interaction of parcel systems, built form, and social organization. French morphologists tend to interpret urban form not only as a physical configuration but also as an expression of social practices, property systems, and regulatory frameworks. As a result, their analyses frequently connect morphological change to governance, land management, and the production of public space, providing a bridge between spatial analysis and urban policy studies (Noaime, & Alnaim, 2025).

More recent developments in the field include configurational approaches such as space syntax, pioneered by Bill Hillier at University College London. This method shifts attention from historical form and building types to the spatial structure of street networks and their influence on movement patterns and social interaction. Space syntax research uses quantitative tools to measure connectivity, integration, and accessibility within urban layouts, proposing that spatial configuration plays a crucial role in shaping pedestrian flows, economic activity, and land-use distribution (Hillier *et al.*, 1976). While earlier schools often relied on historical interpretation and typological classification, this approach introduces analytical modelling techniques that allow morphological research to engage more directly with contemporary planning and design challenges (Fleischmann & Arribas-Bel, 2022; Mobaraki et al., 2025).

Together, these schools demonstrate that urban morphology is not a single method but a multidisciplinary field combining historical interpretation, architectural analysis, spatial theory, and quantitative modelling. Despite their differences, they share a common concern with identifying the fundamental components of urban form and explaining how these elements interact across time. This shared focus makes urban morphology a valuable framework for understanding both the inherited structure of cities and the implications of future urban transformation. See Table 1.

Table 1: Comparative Table of Major Urban Morphology Schools

School / Approach	Key Scholars	Main Focus	Core Components of Urban Form	Methodology	Strengths	Limitations
British (Conzenian) School	Conzen	Historical town-plan analysis and evolution of urban form	Street system, plot pattern, building fabric; morphological regions; fringe belts	Historical cartographic analysis, plan analysis, temporal layering	Strong for heritage studies, urban history, and conservation planning	Less emphasis on architectural design and social processes
Italian Typomorphological School	Saverio Muratori, Gianfranco Caniggia	Relationship between building types and urban tissue	Building typologies, block structure, urban tissue, evolutionary transformation of types	Typological analysis, architectural reading of fabric, diachronic studies	Connects architecture with urban form; useful for design practice and urban regeneration	Can be complex to apply; sometimes less quantitative or spatially analytical
French (Versailles) School	(Multiple institutional contributors)	Urban tissue as a product of spatial, social, and regulatory systems	Parcel systems, built fabric, land management structures, public space relationships	Interdisciplinary analysis combining geography, architecture, and sociology	Links morphology to governance, land use, and planning policy	Less standardized methodology; sometimes theoretically diffuse
Space Syntax Approach	Bill Hillier, University College London	Spatial configuration and movement patterns in cities	Street networks, connectivity, accessibility, integration, spatial hierarchy	Quantitative spatial modelling, network analysis, computational tools	Strong analytical power; widely used in transport planning and urban design	May underplay historical processes and architectural typology

3. Linking the Saturation–Collapse (SEA) Model to Urban Morphology Traditions

The theory of saturation and the collapse model, collectively referred to as the SEA framework, provide a systemic lens for interpreting urban change as a cyclical process rather than a linear evolution. Drawing on the work of Manafi (2025, 2026), the theory proposes that urban systems move through phases in which spatial structures gradually consolidate, reach functional or structural limits, and subsequently undergo reorganization. Saturation, in this sense, refers to the stage at which an urban structure can no longer accommodate new demands without internal stress, while collapse does not necessarily imply destruction but rather the breakdown of an existing spatial logic that opens the way for transformation. When applied to urban morphology, the SEA framework offers a useful comparative tool for interpreting how different schools understand persistence, adaptation, and structural change. Although traditions such as the Conzenian, typomorphological, French, and configurational approaches were developed independently of SEA theory, each implicitly identifies moments when urban form stabilizes, becomes constrained, and is reconfigured. Using SEA as an interpretative bridge therefore allows these otherwise distinct morphological traditions to be read within a shared analytical framework focused on thresholds, limits, and mechanisms of spatial transformation.

The Saturation and Collapse (SEA) model interprets urban systems as dynamic structures that evolve through phases of growth, consolidation, overload, and restructuring. When applied to urban morphology, the model provides a useful interpretative lens for understanding how different schools conceptualize stability, limits of development, and spatial transformation. Although the classical morphology traditions do not explicitly employ SEA terminology, their analytical frameworks implicitly describe processes that correspond to saturation and collapse at different spatial scales.

Within the Conzenian tradition associated with Conzen, saturation can be understood as the stage at which the fundamental town-plan elements — streets, plots, and building fabric — reach structural stability. Once the street network and parcel framework become fixed, urban change tends to occur through intensification rather than structural reorganization. What might be interpreted as collapse in the SEA model is read here as a slower process of morphological adjustment, visible in plot amalgamation, land-use conversion, or the transformation of fringe belts. The Conzenian approach therefore frames collapse not as rupture but as part of a long-term evolutionary layering of urban form.

The Italian typomorphological school, developed by Saverio Muratori and later expanded by Gianfranco Caniggia, shifts the focus of SEA interpretation from plan structure to building types. In this perspective, saturation occurs when an established architectural type and its associated urban tissue reach the limits of functional adaptability. Collapse emerges when these types no longer correspond to social needs, economic structures, or technological conditions. Rather than producing abrupt spatial discontinuity, this collapse leads to typological mutation, where new building forms gradually replace or transform older ones. From this viewpoint, the SEA cycle operates through the continuous evolution of architectural logic rather than through changes in street or parcel structure.

The French school, often linked to institutional research traditions around Versailles, interprets urban form as the product of interactions between spatial structure, property systems, and governance frameworks. From this standpoint, saturation corresponds to the stage at which parcel organization, regulatory systems, and public-space arrangements constrain further adaptation. Collapse is therefore understood less as a purely spatial phenomenon and more as a socio-spatial crisis, often triggered by institutional rigidity, infrastructural obsolescence, or shifts in land management systems. Transformation in SEA terms involves not only physical restructuring but also regulatory reform and changes in land-use organization, highlighting the dependence of morphological evolution on political and economic processes.

Configurational approaches such as space syntax, pioneered by Bill Hillier at University College London, interpret the SEA model through the logic of spatial networks. In this framework, saturation appears when the existing street configuration limits accessibility, movement efficiency, or spatial integration. Collapse becomes visible in reduced flows, spatial segregation, or the marginalization of certain urban areas within the network. Urban transformation then occurs through the reconfiguration of routes, hierarchies, and connections that restore spatial performance. This reading shifts the focus of SEA from physical fabric to configurational logic, presenting collapse as a problem of network inefficiency rather than typological or institutional breakdown.

Taken together, these interpretations demonstrate that the SEA model can function as a comparative framework linking otherwise distinct morphological traditions. While the Conzenian school emphasizes structural persistence, the Italian school highlights typological evolution, the French approach foregrounds institutional dynamics, and space syntax focuses on configurational performance. Applying SEA across these perspectives reveals that saturation and collapse are not singular events but multi-scalar processes that operate simultaneously in plan structure, architectural types, governance systems, and spatial networks. See Table 2.

Table 2: Comparative Interpretation of Urban Morphology Schools through the Saturation–Collapse (SEA) Model

Morphological School	Interpretation of Saturation	Interpretation of Collapse	Mechanism of Transformation in SEA Terms	Analytical Scale Emphasized
Conzenian (British) School – linked to Conzen	Stabilization of the town-plan structure; persistence of street network and parcel framework limits structural change	Gradual restructuring of fringe belts, plot amalgamation, and functional shifts rather than abrupt spatial failure	Incremental historical layering within inherited plan units; adaptive intensification of existing structure	Town plan level (streets, plots, morphological regions)
Italian Typomorphological School – developed by Saverio Muratori and Gianfranco Caniggia	Exhaustion of dominant building types and limits of their functional adaptability within the urban tissue	Obsolescence of established architectural types leading to substitution or mutation of building forms	Evolution of types, hybridization of tissues, and gradual replacement of outdated architectural logic	Building and block level (types, fabric, tissue continuity)
French School (Versailles tradition)	Rigidity of parcel systems, regulatory frameworks, and public-space organization constrains further adaptation	Socio-spatial crisis linked to governance structures, property systems, or infrastructural limits	Institutional reform, land readjustment, and restructuring of spatial organization and public realm	Urban tissue and land-management scale
Space Syntax / Configurational Approach – associated with Bill Hillier and University College London	Network reaches limits of accessibility or integration; spatial configuration reduces efficiency of movement and interaction	Decline in flows, increased segregation, and reduced spatial performance within the network	Reconfiguration of routes, introduction of new connections, and rebalancing of spatial hierarchy	Street network and configurational system

4. Conclusion

This study has examined how the theory of saturation and the Collapse (SEA) model can serve as a meta-framework for interpreting the principal schools of urban morphology. By reading the Conzenian, typomorphological, French, and configurational traditions through the lens of saturation, limits, and restructuring, the research demonstrates that urban form is not only shaped by historical continuity or design logic but also by systemic thresholds that condition transformation. The SEA framework helps reveal that moments of urban change often emerge when spatial structures lose their balance between stability, efficiency, and adaptability. In this sense, collapse should not be understood solely as failure, but as a critical phase within the broader cycle of urban reorganization.

The findings suggest that applying SEA to urban morphology allows for a more integrated interpretation of urban evolution across multiple scales, from building types and parcel systems to street networks and governance structures. By linking morphological analysis to systemic dynamics, the study contributes to bridging descriptive urban form research with predictive and analytical approaches relevant to contemporary planning and design challenges.

Future research could expand this framework in several directions. Empirical case studies are needed to test the SEA model in specific urban contexts and to identify measurable indicators of saturation and collapse within real urban fabrics. Comparative cross-city analyses could further clarify how different planning cultures or development histories influence the timing and form of structural thresholds. In addition, integrating SEA with quantitative spatial tools, simulation models, or GIS-based morphology analysis may help operationalize the framework for planning practice. Finally, further work could explore how the stability–efficiency–adaptability triad can inform resilience-oriented urban design strategies, particularly in rapidly urbanizing regions where spatial systems face accelerating environmental, social, and infrastructural pressures.

AI Disclosure

The authors used generative AI tools (ChatGPT and Grok) solely to improve language clarity and grammar. These tools were not used for data analysis, interpretation, theory development, or generating original scientific content. All ideas, analyses, and conclusions are the authors' own.

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