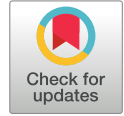


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## Mapping Urban Development of Giresun's Historical Core and Surrounding Areas through Morphological Regions



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### Abstract

This study employs a morphological perspective grounded in a historico-geographical approach to analyze the urban development process of the Giresun city center and its surrounding areas. Historical maps, urban plans, and written sources related to Giresun were evaluated within this framework. These data were integrated with Geographic Information Systems (GIS) to identify the city's morphological regions. The approach initially developed by M.R.G. Conzen examined changes and transformations in the physical form of the city, enabling detailed spatial inferences. The key morphological components, such as plot sizes, urban blocks, street networks, land use, and development periods, were analyzed using GIS-based datasets. As a result, formations up to the fourth morphological level were identified within the study area. The methodology employed in this research provides a foundation for developing an applicable model for historical urban settlement analysis that can be applied to various contexts. In terms of planning, the morphological regions identified here serve as a foundation for urban development strategies and planning decisions. The outcomes of this study aim to guide planning practices, ensuring that the city's growth aligns with its pre-existing urban layout and contributes to preserving its distinctive historical and morphological character.


### Keywords


Urban History · Urban Morphology · Urban Development Plans



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## Introduction

Urban areas are dynamic entities constantly evolving due to physical, social, economic, and cultural factors. These transformations shape the physical structure of cities and influence their function and adaptation over time. Urban morphology, a field that examines the spatial structure and evolution of urban areas, explores these patterns and transformations. By tracing the development of cities through historical and socio-cultural contexts, urban morphology provides a framework for understanding the complex interplay between human activities and the built environment. This framework enables scholars and practitioners to engage with cities in a deeper and more systematic manner (Whitehand, 2019).

Urban morphology, a discipline, emerged in the early 20th century, with notable contributions from the British, Italian, and French schools. Among these, the British school, led by M.R.G. Conzen, introduced the historico-geographical approach, a foundational methodology for analyzing urban form. Conzen's framework dissects the urban form into interconnected elements, including streets and their patterns, plots and plot systems, and building forms. It emphasizes the historical layering and hierarchical organization of these elements. Conzen's concept of morphological regions sheds light on how cities evolve through distinct historical periods, leaving behind residual forms that influence their present and future development (Whitehand, 2009).

This approach remains highly relevant in contemporary urban planning, providing tools to bridge the persistent gap between urban morphological research and planning practice (Ünlü, 2019). Scholars such as Barke (2019) and Birkhamshaw and Whitehand (2012) highlight the potential of urban morphology to inform urban development and effectively manage change. However, the integration of morphological insights into planning remains uneven, often hindered by technical complexities, insufficient training in planning education, and the dominance of rigid procedural frameworks (Samuels, 1990; Whitehand, 2009). This issue is particularly evident in the Turkish planning context, where statutory plans rarely incorporate morphological thinking beyond superficial formal elements. Despite the growing academic interest in urban morphology, as noted by Arat (2024) and Sınmaz & Özdemir (2016), it has yet to become a systematic part of planning decisions in Türkiye.

Further barriers to urban morphology include its fragmentation across disciplines, the lack of practical demonstrations for professionals, and the undervaluation of morphology in planning education (Samuels, 2019; Scheer,

2010). To address these challenges, a concerted effort is needed to develop accessible methods and frameworks that retain the depth and rigor of morphological analysis. A more nuanced understanding of the potential of urban morphology is crucial for guiding planning decisions in a contextual and historically informed manner (Oliveira, 2006).

Urban morphology provides important insights into the historical and cultural continuity of urban spaces, prompting planners to recognize cities as socially constructed phenomena. As Moudon (1997) emphasizes, urban forms are inherently historic and context-dependent, evolving through continuous processes that align with societal needs and value systems. By analyzing these forms at various scales, from street networks and open spaces to building patterns and materials, morphological analysis provides a comprehensive understanding of the urban environment.

Despite its potential, the application of urban morphology in planning is often hindered by normative planning practices that excessively rely on quantitative measures such as building heights, floor area ratios (FAR), and road widths. Ünlü (2019) argues that this approach overlooks the qualitative aspects of urban form, resulting in fragmented and homogeneous urban patterns. This disconnect between planning and morphology is further exacerbated by the emphasis on procedural compliance over the organic unity of cities, leading to a loss of identity and character in urban spaces.

However, various studies highlight the transformative potential of integrating morphological perspectives into planning. For instance, the planning of Porto, Portugal, between 2001 and 2006, is a notable case where morphological analysis informed contextual regulations, preserving the city's character while accommodating development pressures (Oliveira, 2006; Oliveira et al., 2013). Similarly, in St. Gervais-les-Bains, France, and Bath, England, planners employed morphological insights to guide the relationship between urban form elements, resulting in more responsive and sustainable interventions (Kropf, 1996; Hall, 2008). These cases underscore the importance of a form-based approach that prioritizes the interrelation of urban form elements over isolated, quantitative controls.

The incorporation of the morphological approach into planning requires a shift from rigid, explanatory methods to more flexible, exploratory approaches. While explanatory research focuses on describing existing urban patterns and their historical development, exploratory research seeks to ask new questions, generate hypotheses, and identify directions for future study (Çalışkan, 2024). This dual approach enables planners to engage with urban form not only as

a static artifact but also as a dynamic process open to adaptation and innovation.

Such a prospective aligns with Lynch's (1981) vision of the "good city," which maintains its structural continuity while allowing for progressive change. This vision necessitates a contextual planning paradigm, where decisions about streets, plots, and buildings are made with an understanding of their hierarchical and contextual relationships. As Conzen (1975) observes, the built environment reflects the cultural and historical development of societies, making it imperative for planners to consider these factors when managing urban change. One promising approach is the integration of traditional morphological methods with contemporary tools such as Geographic Information Systems (GIS). GIS enables researchers to analyze multi-layered urban data, incorporating variables such as land use, building density, and historical footprints into a cohesive framework. By combining the analytical precision of GIS with the contextual richness of Conzenian principles, planners can develop strategies that are both data-driven and context-related (Lo, 2007). This integration highlights the potential of urban morphology to address modern planning challenges, particularly through concepts such as morphological regions, which offer a systematic way to analyze urban form and guide development. In this context, understanding the conceptualization and operationalization of morphological regions is vital for planning practice. The concept of morphological regions has developed considerably and has been influenced by scholars in urban morphology. However, as Fleischmann et al. (2021) pointed out, inconsistencies in the use of core terms such as morphological region, urban tissue, and character areas hinder comparative analysis and diminish the operational clarity of morphological research in planning applications. A key distinction lies between morphological regions, analytically defined areas exhibiting formal coherence, and character areas, used in planning as perceptual zones yet often without a systematic definition. This distinction is particularly evident in Turkish practice, as noted by Arat (2024), and contributes to the conceptual gap between conservation efforts and practical implementation. Table 2 provides a concise overview of the evolution of key terms related to morphological regions, offering insights into their definitions and applications.

Morphological regions refer to areas of morphological unity defined by the interplay of urban form components such as streets, plots, and buildings. M.R.G. Conzen laid the groundwork for this concept with his study of Alnwick (1960), introducing plan units as combinations of urban elements with morphological homogeneity. The importance

of studying morphological regions lies in their potential to bridge the gap between research and practice. As evidenced by cases such as Porto (Oliveira, 2006) and Bath (Hall, 2008), integrating morphological perspectives into planning can guide contextual development while preserving the urban character. These cases underscore the need for a form based approach that prioritizes the interrelation of urban form elements over isolated quantitative controls. Understanding and applying the concept of morphological regions not only enriches urban morphology as a discipline but also highlights its transformative potential in planning practice. The following section outlines the objectives and structure of this study, focusing on the critical role of morphological regions in bridging theory and application.

## MATERIALS AND METHODS

### Objectives and Structure of the Study

The primary objective of this study was to demonstrate the importance of urban morphological analysis as a tool for understanding and managing urban development. By applying Conzen's historico-geographical approach to Giresun, the study aims to highlight the potential of morphological insights in guiding urban planning process. This approach involves a detailed examination of the urban form elements, emphasizing their hierarchical nesting and interrelations. Through this analysis, the study seeks to address the following questions: How can morphological analysis bridge the gap between research and planning practice? What insights can be drawn from Giresun's historical evolution to inform its future development? Furthermore, how can planners move from normative planning to a more contextual approach that values cultural and historical continuity? By answering these questions, this study contributes to the broader discourse on integrating urban morphology into planning practice. It advocates for a shift toward a morphological perspective that respects the historical contexts of cities while accommodating progressive change. In doing so, it underscores the relevance of urban morphology not only as an explanatory tool but also as a framework for exploratory, contextual perspective to urban planning.

As discussed in the literature over recent decades, the historico-geographical approach has been established as one of the principal morphological frameworks for describing, explaining, and prescribing the physical form of cities. This approach provides an important insight to understand how the urban form is continuously shaped by various agents and processes over time. Within this framework, the concept of the morphological region stands out as a critical tool

**Table 1**  
*Key Terms and Descriptions in the Study of Morphological Regions*

Term	Description	Reference
<b>Morphological Regions</b>	Defined as areas of morphological unity characterized by the interplay of systematic form complexes. Regions include streets, plots, and buildings, categorized hierarchically. The concept emphasizes historical stratification and urban landscape evolution.	Conzen, 1988; Oliveira & Yaygin, 2022
<b>Plan Units</b>	Initially defined by Conzen as individualized combinations of streets, plots, and block-plans. Plan units focus on the town plan and its hierarchical structure, which provides a framework for further analyses.	Conzen, 1960; Oliveira & Yaygin, 2022
<b>Townscape Units</b>	Term introduced by Whitehand, emphasizing townscape management and conservation. Focuses on regions within the urban landscape for practical planning and preservation.	Whitehand, 1989; Oliveira & Yaygin, 2022
<b>Townscape Regions</b>	Similar to townscape units, but emphasized on the regional aspects of urban morphology. Used interchangeably with morphological regions in some contexts.	Conzen, 1975; Barrett, 1996
<b>Urban Tissue</b>	Defined as a synthesis of the town plan and building fabric. Kropf adapted the concept into planning practice, integrating historical and morphological elements.	Kropf, 1996; Oliveira & Yaygin, 2022
<b>Urban Landscape Region</b>	Developed to integrate conservation efforts and management. Focuses on combining the town plan, building form, and land use into coherent units.	Barke, 2003; Zhang, 2003; Oliveira & Yaygin, 2022
<b>Urban Landscape Unit</b>	Used for conservation and planning, often involving hierarchical structuring. Includes elements such as building forms, land use, and vegetation.	Whitehand, 2009; Larkham & Morton, 2011
<b>Character Areas</b>	Regions identified to guide planning and conservation. Character areas provide a more accessible framework for nonspecialists.	Bienstman, 2007; Whitehand, 2009

for identifying and interpreting the historico-geographical structure of urban development. Studies are often applied in contexts involving historic environments and conservation areas, a focus that has directly informed both the selection and sequencing of our study area.

In addition to its explanatory aspect, this study proposes an operational morphological analysis that adapts the Conzenian approach to contemporary GIS-based analysis. This model enables planners to identify areas of morphological regions by examining plot structures, building heights, and spatial density. These components were digitally mapped and analyzed to support contextual development control, the integration of conservation areas into urban planning processes, and the contribution of urban form-based regulatory frameworks. Given its structure, the model is applicable to other cities with similar historical and geographical characteristics. It also contributes a grounded and applicable methodology for bridging urban morphological analysis with urban planning practice.

## Giresun as a Case Study

Historical and morphological development of Giresun provides an opportunity to explore the application of morphological principles in a Turkish context. The city's development, shaped by its role as a military and trade hub, reflects the interaction between natural geography and human settlement patterns. The peninsula's protective bays facilitated maritime activities, while the hilltop castle marked the city's early urban core. Over time, Giresun's urban fabric

evolved through distinct morphological periods, leaving relict forms that continue to shape its present character.

Analyzing Giresun's urban form involves integrating conventional morphological methods with Geographic Information Systems (GIS). This combination allows for a multi-layered examination of the morphogenetic structure: town plan (plan units), building fabric (building form units), and land utilization areas as described by M.R.G. Conzen. The resulting analysis not only illuminates the city's past but also informs planning strategies that consider its cultural and historical continuity.

## Steps of the Study

In line with the research objectives and questions, the study was carried out in three stages: collecting spatial data related to the study area, creating a geodatabase in ArcGIS, conducting analyses, and finally, identifying morphological regions based on these analyses and the subsequent interpretations. As Conzen (1960) argues, it is possible to identify distinct sub-regions within an urban area through the analysis of key components such as the town plan, building fabric, and land use. These elements also facilitate the examination of cultural periods and spatial character, forming the basis for defining morphological regions.

## Creation of the digital database in ArcGIS and preliminary analyses

First, archives and literature are examined. In this context, a literature review focusing on the history of the city and

the Black Sea coastal towns was conducted, and traces of historical structures in the city were spatially mapped. In addition, through these readings, old visuals and aerial photographs, and base maps of the city, as well as zoning plans from different years (1933, 1964, 1998, 2008, and 2016), were georeferenced to define the *general pattern of growth* of the city Figure 2. Thus, to examine the spatial transformations, spatial organizations, urban dynamics, and changes in the social and built environment that have occurred throughout the city's history, the morphological regions were used as a foundation to identify the turning points and historical periods related to the city. Second, data collected through fieldwork, another crucial component in defining morphological regions, was converted into a digital format. Following the approaches outlined in Conzen's (1975) and Barrett's (1996) systematizations, particularly the examples of Birmingham and Bristol, the city was analyzed in terms of plan units, building form units, land use units, and the resulting combination of these three maps, urban townscape units. As this combination also forms a fundamental part of this study, the analyses created within this research are grounded in Barrett's *units* framework. In this context: At the *Plan Units level*: by using base maps, the transformation degree of plots (preserved, enlarged or reduced through land consolidation or subdivision, newly formed plots after the planned development period), their formation periods, and their transformations over time were defined. In addition, streets (including their formation periods, those with historical continuity, new roads opened and widened during the Republican period), as well as the neighborhoods and plan units formed during these times, were identified. At the *Building Form Unit level*: period of origins was defined, particularly in the historical area of the city containing registered buildings, including construction periods, building-plot relationships, and original functions. For the planned period (post-19th century), parameters such as building size, ownership status, density values, number of floors, year of construction, and building-plot relationships were specified. At the *Land Utilization level*: land use was identified on a plot basis at a 1:1000 scale, and a geodatabase was created with analytical layers showing plots that had undergone functional changes.

## Identification of Morphological Regions Using the Four-Layered Hierarchical Mapping Method

By 1975 and 1988, Conzen expanded this into *morphological regions*, emphasizing the three systematic form complexes: *town plan (plan units)*, *building fabric (building form units)*,

and *land utilization areas* (Whitehand, 2009). His *four-layered hierarchical mapping method* provided a comprehensive framework for analyzing morphological regions (Conzen, 1960, 1975, 1988). A *morphological region* represents homogeneous urban forms defined by plans, buildings, and land use. It is a distinct area with a unity that differentiates it from adjacent regions, although the sharpness of boundaries may vary (Whitehand, 2001). These four hierarchical levels of *morphological regions* can be summarized as follows Figure 1 *First-order regions* include the historical core of a town, which may also encompass *fringe belts* or settlement areas. *Second-order regions* consist of major *plan units*, such as urban quarters, districts, or neighborhoods. *Third-order regions* are intermediate plan units, including *street units* or clusters of streets, buildings, and plots within a neighborhood. *Fourth-order regions* are the smallest plan units, such as cells of *building fabric* or *morphotopes* (Conzen, 1960; Küçük and Kubat, 2015; Ünlü, 2019; Oliveira and Yaygin, 2022).

Conzen's four-tier hierarchical framework remains influential, with the *first-order regions* including the historical core of a town or *fringe belts*, and subsequent levels encompassing urban quarters, street clusters, and *morphotopes* (Barrett, 1996). The exact delimitation of units, particularly the lower-order ones, is ultimately subjective, demanding considerable knowledge of socio-economic, architectural, and planning history (Larkham, 1990; Barrett, 1996).

Figure 1

Urban landscape units in part of central Birmingham, England in 1970. Adapted from Barrett (1996). Source: Whitehand (2009).



## Methodological Rationalization and Limitations

Urban morphology, an evolving discipline, has developed through strong traditions in geographies with extensive archival resources, particularly in Northern Europe and East

Asia. These contexts have allowed scholars to establish systematic methodologies grounded in well-preserved data. In contrast, many Anatolian cities such as Giresun, despite their long and layered histories, face the challenge of working with fragmented or limited historical data. Moreover, recent decades have seen the implementation of highly progressive planning strategies, which have accelerated the transformation of traditional urban forms and eroded the original settlement structures.

This study embraces these constraints by adapting the Conzenian approach to a limited dataset. It integrates diverse archival materials (e.g., zoning plans, cadastral data, historic maps, and written sources) with field observations and GIS-based analysis to construct a morphogenetic interpretation of Giresun's urban form. Rather than depending on fixed chronologies, the study emphasizes historically grounded tendencies and spatial patterns, which can be interpreted despite gaps in documentary precision.

The approach focuses on three interrelated elements “plots, building forms, and land use” and tracks their transformation across different planning periods. These transformations are interpreted in terms of both urban dynamics and regulatory impacts, offering a coherent framework for analyzing change even when exact temporal data are lacking. As such, this study advances methodological discussions in urban morphology by demonstrating how historically informed morphological analysis can still yield important planning insights in contexts of limited documentation.

## RESULTS

### Historical Development of Giresun

Giresun has continued its role as a port city throughout its history, largely due to the two natural bays located to the east and west of the peninsula that extends northward into the Black Sea [Figure 2](#). These bays have provided suitable conditions for harbor use since the city's foundation (Özcan, 2016). The opportunities and limitations presented by Giresun's coastal geography have played a decisive role in shaping its settlement structure, spatial organization, and, consequently, its urban identity. However, in different historical periods, the degree of dependence on the sea, as well as the prevailing socio-cultural and economic structures, have significantly influenced the city's spatial form (Özcan, 2016).

Geographically, Giresun is situated between the Aksu and Batlama Valleys on a small basaltic peninsula that extends into the sea at an elevation of approximately 140–150 m. The city is densely concentrated along the isthmus connecting the

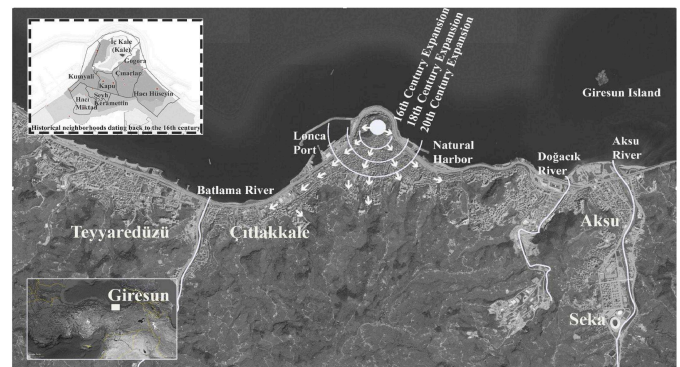
peninsula to the mainland [Figure 2](#). This strategic location was chosen not only for its natural advantages for harbor and settlement but also because it served as the coastal endpoint of an ancient natural trade route. This route connected the mineral-rich regions of Şebinkarahisar and the Kelkit Valley, already known for their metal resources since the Neolithic period, to the shoreline (Özcan, 2016).

Based on the historical literature and archival analyses conducted in this study, six main periods in the development of Giresun have been identified. These periods reflect the city transformation in relation to shifting political regimes, economic activities, and spatial reorganization [Figure 2](#). A summary of these phases is provided in [Table 2](#), which outlines the major socio-economic dynamics and corresponding spatial developments across different historical eras.

This structured overview highlights how each period contributed uniquely to the formation of Giresun's urban fabric, from its early foundation on the peninsula to its current linear coastal expansion. While this section briefly summarizes the historical development based on a literature review and written documents, all findings derived from these readings have been systematically transferred into the spatial analysis phase to support the morphological evaluation of the city.

#### Figure 2

*Formation of the Settlement Core of Giresun (Until 2nd-Century CE) Historical development layers superimposed on a 2024 Google Earth image, showing the evolution of the urban nucleus from antiquity. (Generated by the authors)*



### Town Plan Analysis Process

In the second stage of the study, data obtained from fieldwork were transferred into the database in ArcGIS. The analyses conducted for the city and its surrounding areas form the basis for defining homogeneous areas. Within this context, the sub-analyses required for Conzen's four-layered hierarchical method were carried out, leading to the identification of

**Table 2**  
*Historical Development of Giresun*

Period	Major Socio-Economic and Political Events	Major Spatial Developments and References
<b>Formation of the Settlement Core (Until 2nd-Century CE)</b>	Establishment of Giresun (Kerasus) as a trade port, controlled by the Pontic, Roman, and Byzantine empires (Aydın, 2002; Özcan, 2016).	Giresun Castle as the urban core; settlements along the peninsula; fortifications and port at Giresun Island (Shaw, 1972; Özcan, 2016).
<b>Port Hinterland Trade and Ethno-Religious Neighborhood Formation (Until the 16th Century)</b>	Integration into the Empire of Trebizond (1204), Ottoman conquest (1461), and Genoese trade influence (Emecen, 2020; Özcan, 2016).	Expansion beyond castle walls; neighborhoods like Hacı Hüseyin and Kapu emerged; mosques and civic structures introduced (Özcan, 2016).
<b>Ottoman Classical Period (the 16th Century)</b>	Rise in maritime trade and agricultural economy; balanced Muslim-Christian demographic (Aydın, 2002).	Expansion to eastern slopes (Kokaru, Lonca, Uğrukapı); key mosques like Hacı Hüseyin (1594) shaped the urban form (Özcan, 2016).
<b>Muslim Concentration (the 17th Century)</b>	Transformation into a predominantly Muslim city; trade and military importance strengthened (Özcan, 2016).	Expansion southward and westward; key religious landmarks: Şeyh Keramettin (1613) and Hacı Miktad (1661) mosques (Özcan, 2016).
<b>Spatial Segregation and Westernization (18th–19th Centuries)</b>	Christian neighborhoods (Gogora/Zeytinlik) thrived in commerce; Western influence in architecture (Demirkan & Karabrahimoğlu, 2019).	Trade centered around İskele Street and Gazi Paşa Avenue; modern buildings coexisting with Ottoman architecture (Özcan, 2016).
<b>Republican Reconstruction (Until 1950s)</b>	Population exchange (1923) altered demographics; modernization efforts continued (Aydın, 2002).	Expansion along the coastline; urban planning began in 1933; key structures: Millet Bahçesi, government mansion.
<b>Spatial Expansion (1950–1980)</b>	Industrialization spurred urban growth; the population surged from 12,507 (1950) to 19,902 (1960) (Gülşen, 2014).	New neighborhoods (Aksu, Çıtlakkale); Giresun Port (1959), coastal highway (1964); economic shift toward hazelnut industry (Özcan, 2016).
<b>Integrated Conservation and Linear Expansion (Post-1980s)</b>	Heritage conservation efforts (2008, 2015 plans) alongside urbanization and environmental challenges (Özcan, 2016).	Expansion along coastal zones; industrial zones in Aksu; historic districts (Zeytinlik, Kale) preserved (Bekdemir, Ertürk & Güner, 2000; Yücel, 2017).

morphological regions in the fourth step. These stages and their respective findings are presented in detail below. In the identification of the morphological regions, the initial focus was on delineating the *plan units*. To this end, historical aerial photographs and base maps from earlier years were examined, applying Conzen's *threefold division* wherever possible. However, because the study area encompasses the city center and its multi-layered surroundings, certain limitations emerged. As Conzen (1962) notes, in a complex urban area such as a city center, it is often impossible to track the development of individual plots in detail. Therefore, this study concentrated primarily on the analysis of the street system and plot patterns. The *plot-building relationships* were evaluated in terms of density parameters to provide input for planning considerations. The *street system analysis* relied on historical records, street names, and road widths to determine the periods of construction and subsequent modifications, particularly during the planned development phase. This included identifying interventions such as street widening, the opening of formerly dead-end streets, and the construction of new planned roads such as the coastal highway. Additionally, while interpreting *the plan units* at different levels, the absence of cadastral ownership data in the aerial photographs and the 1964 zoning plans limited the temporal

depth of the analysis, resulting in a more regional-level generalization. As Conzen (1988) emphasizes, generalization is necessary in such contexts, as metrological analysis of plots becomes difficult in areas lacking sufficiently accurate historical boundaries, and existing large-scale maps often do not allow for precise measurement. This section includes six sub-analyses, which together synthesize the basis for identifying the *plan units*, *building form units*, and *land use units*.

## Plan Units

At the *plan unit* level, base maps were used to examine the degree of transformation of plots, including preserved plots, those altered through *joins* or subdivision, and newly formed plots from the post-planning period. In the *ethno-religious neighborhoods*, particularly to the east, west, and south of the castle, plot sizes tend to decrease in scale, with a predominance of plots ranging between 0–200 m<sup>2</sup> and 200–400 m<sup>2</sup>. Conversely, in the *mercantile neighborhoods*, especially around the castle and its slopes, plot sizes are generally larger, with a concentration of plots in the 200–400 m<sup>2</sup> and 400–700 m<sup>2</sup> range (Figure 3). In addition to the plot size analysis, the periods in which these plots were formed and their transformation over time were examined Figure 3. This

included identifying streets with historical continuity, those that expanded or opened during the Republican era, and the neighborhoods or *plan units* that emerged in relation to these interventions. For instance, changes in the street layout and new road openings were mapped as indicators of the evolving spatial organization.

In the *street system analysis*, several historically significant streets dating back to the 16th century such as Zeytinlik Sokak, Dik ve Düz Sokak, Merdiven Sokak, and Kurtuluş Sokak were identified within the *Kale*, *Kapu*, and *Gogora* neighborhoods, which still exhibit an *organic street pattern*. The 18th-century FevziPaşa Street, known to have undergone widening, and the 19th-century Gazi Street, recognized as the city's first formally planned linear trade axis, are major elements shaping the city's structural framework *Figure 3*. The present-day city center has expanded along major corridors such as the Black Sea Coastal Highway, İnönü Avenue, and Gazi Avenue, forming *linear street patterns* parallel to the coastline. In the areas where the east-west expansion is more pronounced, grid-patterned plots have been observed, likely influenced by topographical conditions.

Moreover, the spatial distribution of *registered historical buildings* and *layered urban structures* has played a defining role in identifying urban expansion zones. These areas, due to their stratified character and preserved urban memory, continue to be of particular importance in understanding the morphological evolution of the city (*Figure 3, 3b*).

The *traditional trade center* of Giresun, despite widespread building redevelopment throughout the 20th century, maintains a high degree of morphological complexity and a distinct character, which sets it apart from the rest of the

contemporary city center. It represents a crucial historical layer within the town's urban form.

## Building form units

At the *building form unit* level, the *period of origins* was examined in relation to the historical area of the city where *registered buildings* are located *Figure 4*. The construction periods, building-plot relationships, and original functions were identified. The findings show that, particularly in the vicinity of the castle, various cultural building types from the 16th century to the present are evident (*Figure 4*). For the *planned period* (post-19th century), buildings were evaluated in terms of their size, ownership status, density values, number of floors, year of construction, and plot-building relationships. Overall, the traditional fabric around the castle and its slopes is characterized by 1–3 story houses (with front facades aligned to the street, garden spaces at the rear, and building density values (*Ground Space Index-GSI*) ranging between 0.25 and 0.70 *Figure 4*).

In contrast, along main roads, modern apartment buildings of 6 stories, constructed in an attached layout, fully occupy their plots (*GSI: 1*) (*Figure 4*). These represent the second dominant building form in the city.

A third distinct building type is observed in the rural periphery, where 10–12 story point-type high-density apartment blocks have emerged since the 1980s, indicating a pattern of over-urbanization. In these areas, the building density develops around a *GSI* value of approximately 0.50 *Figure 4*.

As part of the *building form units* analysis, one of the four fundamental unit types, a *building footprint analysis* was conducted, along with an assessment of the *conservation zones* and examples of *civil and monumental architecture*

**Figure 3**

*Plan Unit Analysis of Giresun's Historical Core a) Relationship between plot dimensions and historical stratification; b) Plot transformations illustrating morphogenetic phases over time. (Generated by the authors)*

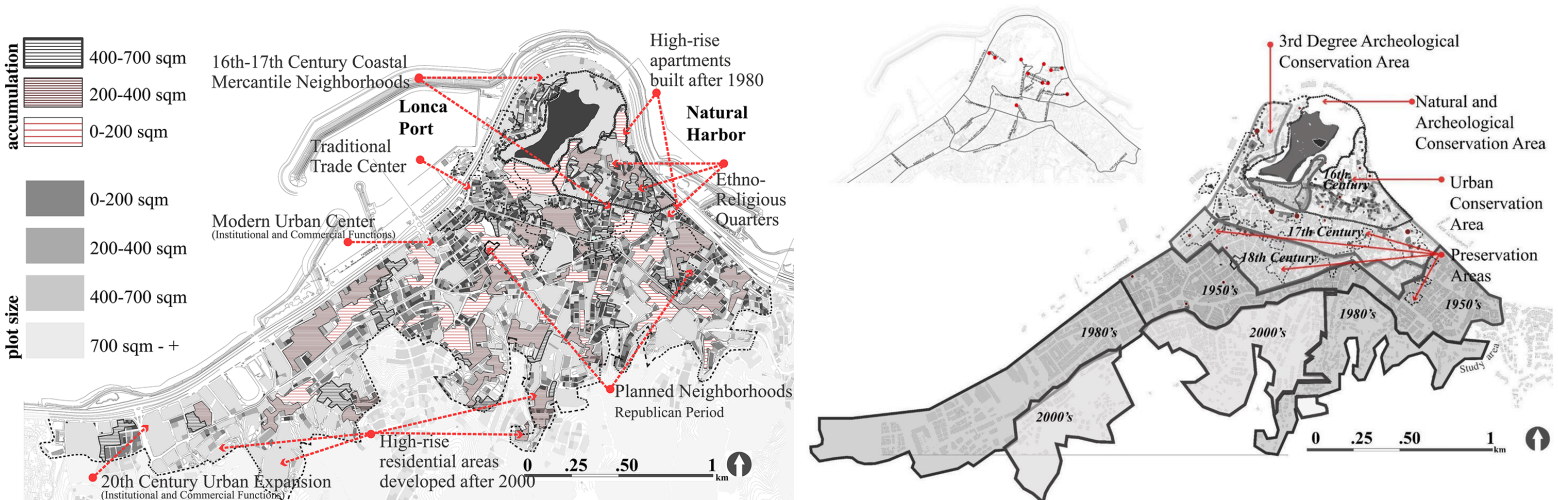


Figure 4. These structures are largely concentrated in the city's core, particularly around the castle and its slopes, showing a clear clustering pattern.

### Land use units

Within the scope of the *land use unit* analysis, the study includes an evaluation of land use in Giresun, identifying key structures that have supported the city's spatial expansion from the 16th century to the present. A *geodatabase* was created using 1:1000 scale, plot-based land use data, incorporating multiple analytical layers focused on plots that have undergone functional change.

A chronological assessment was carried out, ranging from the city's oldest historical buildings to contemporary structures Figure 5. As part of this process, *obsolescence* evaluations were conducted. These revealed not only physical transformations in many *civil buildings* but also functional (e.g., *house to retail*) and economic transitions (e.g., *house to vacant*). Additionally, several monumental buildings with civic use, such as churches, have been adaptively reused for modern functions, including libraries and youth centers Figure 5.

As noted in the plan unit analysis, Gazi Street functions as the primary retail axis of the traditional urban center. This linear street extends from the Lonca Port to the natural harbor on the eastern side of the peninsula. This continuity is clearly observable in the distribution of land use types derived from the plot-based land use analysis. Based on this analysis, three main categories of land use were defined: Central Business District (CBD), Mixed Use, and Housing and Institutional Area (Figure 5). Although the use of function as a basis for defining morphological areas has been debated

in the theoretical discourse of urban morphology (Kropf, 1993), its inclusion within townscape analysis and townscape management strategies remains essential for supporting urban planning and decision-making processes.

### Townscape Units of Giresun

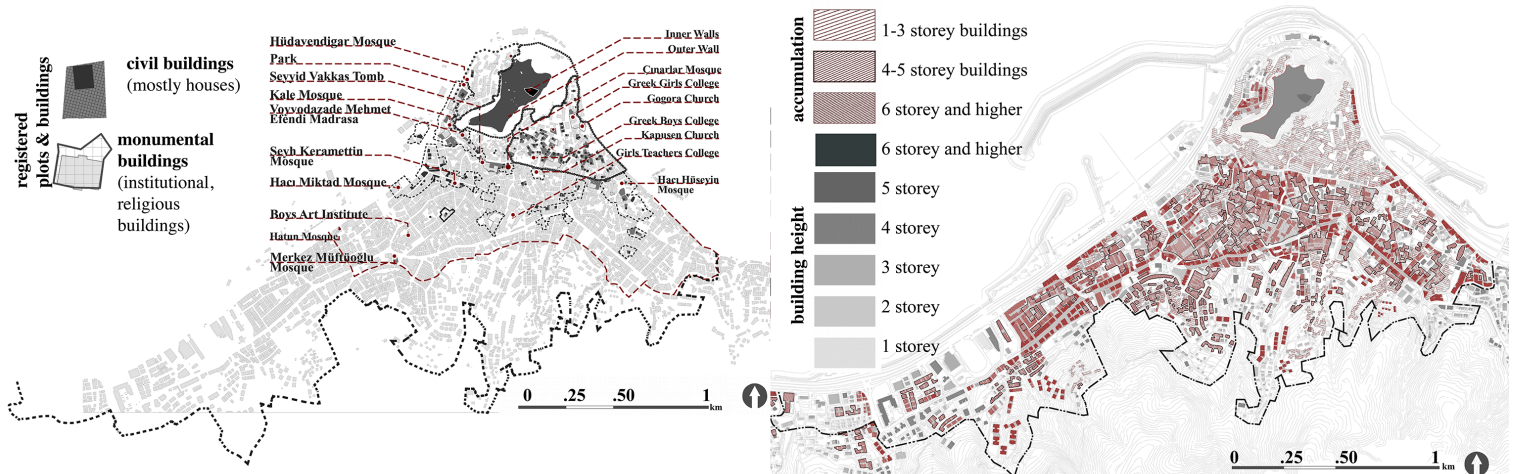
Based on the analyses and evaluations carried out within the framework of morphological analysis, formations up to the fourth-order level were identified for Giresun's city center and its surrounding areas. The study was structured around the integration of three core analytical layers: *plan units*, *building form units*, and *land use units*, each forming the basis for the final delineation of *townscape units* (Figure 6).

The *plan unit* analysis relied on plot-based evaluations, mapping both radical transformations and minimal interventions at the plot level. Sub-regions were defined by examining the continuity and patterns of change in the plot structure. The *building form units* were categorized through an assessment of physical and functional changes, capturing architectural typologies and vertical development characteristics. The *land use unit* analysis, based on plot-scale data, produced three hierarchical levels, reflecting transformations in function and land-use intensity over time.

These three layers were then synthesized to define the final set of *townscape units*. Each of the analytical layers also demonstrates a gradation in resilience to change: *land use* emerged as the most flexible and frequently altered, while *plan units*, due to their structural permanence, exhibited the greatest resistance to transformation. Given the scope and data constraints of the study area, Conzen's *tripartite relationship*, plot, building, and street, could not be fully explored in direct correlation with specific historical phases

Figure 4

Building Form Unit Analysis a) Registered historical buildings and conservation area boundaries; b) Building sizes, heights, and density clusters reflecting morphological divergence. (Generated by the authors)



(Figure 6).

In the final classification, the 1st-order townscape units correspond to the most consolidated and stratified core of the city, particularly the area surrounding the castle, which is characterized by a deeply rooted, layered urban fabric. The 2nd-order units include the earliest neighborhood formations and spatial zones with distinct historical street patterns. The 3rd-order units represent areas marked by socio-economic stratification and divergent architectural or planning decisions. Finally, the 4th-order units correspond to the newest and most peripheral urban expansions, often defined by recent construction and conventional planning approaches (Figure 6).

The 1st and 2nd-order formations represent the most resistant urban components, embodying the historical nucleus and earliest phases of Giresun's spatial organization. In contrast, the 3rd and 4th-order formations reflect more flexible and transformable zones where adaptation, redevelopment, and contemporary interventions are more common.

In line with Conzen's theoretical framework, this study reaffirms the relevance of key morphological principles such as *socio-political context*, *continuity of urban form*, *historical differentiation*, and the *distinction between core and periphery*. As emphasized by Whitehand (1992), Conzen's contributions allow for the interpretation of urban morphology through nested, hierarchically layered morphogenetic regions. Furthermore, his approach enables a detailed analysis of transportation infrastructure, macroform, spatial patterns, land ownership, and the urban-rural interface, all of which contribute to a deeper understanding of Giresun's urban development through the lens of morphological transformation and spatial stratification.

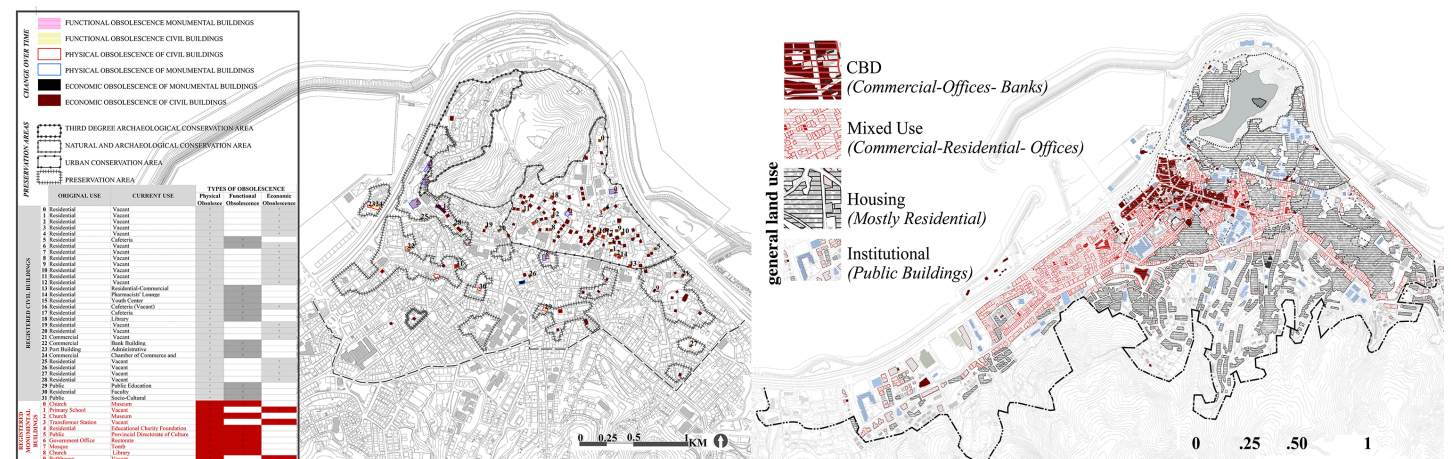
## DISCUSSION

Building on Conzenian approach, this study employs a methodology that demonstrates how detailed morphological regions and character areas can be achieved even in cities with limited historical documentation. Unlike many European case studies that rely heavily on extensive archival data, Giresun presents a challenge. In this context, multiple sources had to be synthesized, including base maps, cadastral changes, and on-site observations. This adaptation enriches the international application of morphological theory by expanding its operational framework to include cities with fragmented data within current urban planning systems.

The morphological analysis of Giresun's city center and its surroundings identified six main character areas, composed of 16 sub-regions and a total of 35 townscape units organized across up to four hierarchical levels (Figure 7). The earliest settlement core centered around the castle encompasses the area designated as a natural, archeological, and urban conservation zone, dating to the pre-16th century. This region includes the *Inner Castle and Palace Zone*, *Ethno-religious Neighborhoods* on the southern slopes, and *Inner Harbor Areas*. While the castle zone features monumental and religious buildings, low-rise, detached buildings with gardens that are in the southern slopes, shaped around organic street networks. Today, these areas face rising development pressure, especially along the coastline (Figure 7. a), b), c)). From the 17th century, the city expanded along commercial axes like *Gazi Street* and areas such as *Hacıhüseyin Neighborhood*. These zones reflect the early Ottoman urban morphology, where linear trade corridors and public focal points emerged (Figure 7. d), e), f)). By the late 19th century, the *Kapu Neighborhood* and the evolving *Central Business District (CBD)* marked a shift toward denser, multi-story commercial

Figure 5

Land Utilization Unit Analysis a) Conservation plots and conservation areas; b) Functional land use intensities and spatial distribution of land use in the study area. (Generated by authors)



development, replacing former detached garden housing with compact, high-rise structures (Figure 7. h), i)).

The Early Republican Period up to the 1950s introduced planned growth, particularly westward. New administrative and residential areas developed along grid-patterned streets with detached houses, later transitioning into denser, multi-story blocks (Figure 7. j), k)). Between 1950 and 1980, urban sprawl extended westward and into southern hillsides, where informal settlements and zoning amnesties reshaped formerly rural, low-density areas into dense urban zones (Figure 7. l), m), n)).

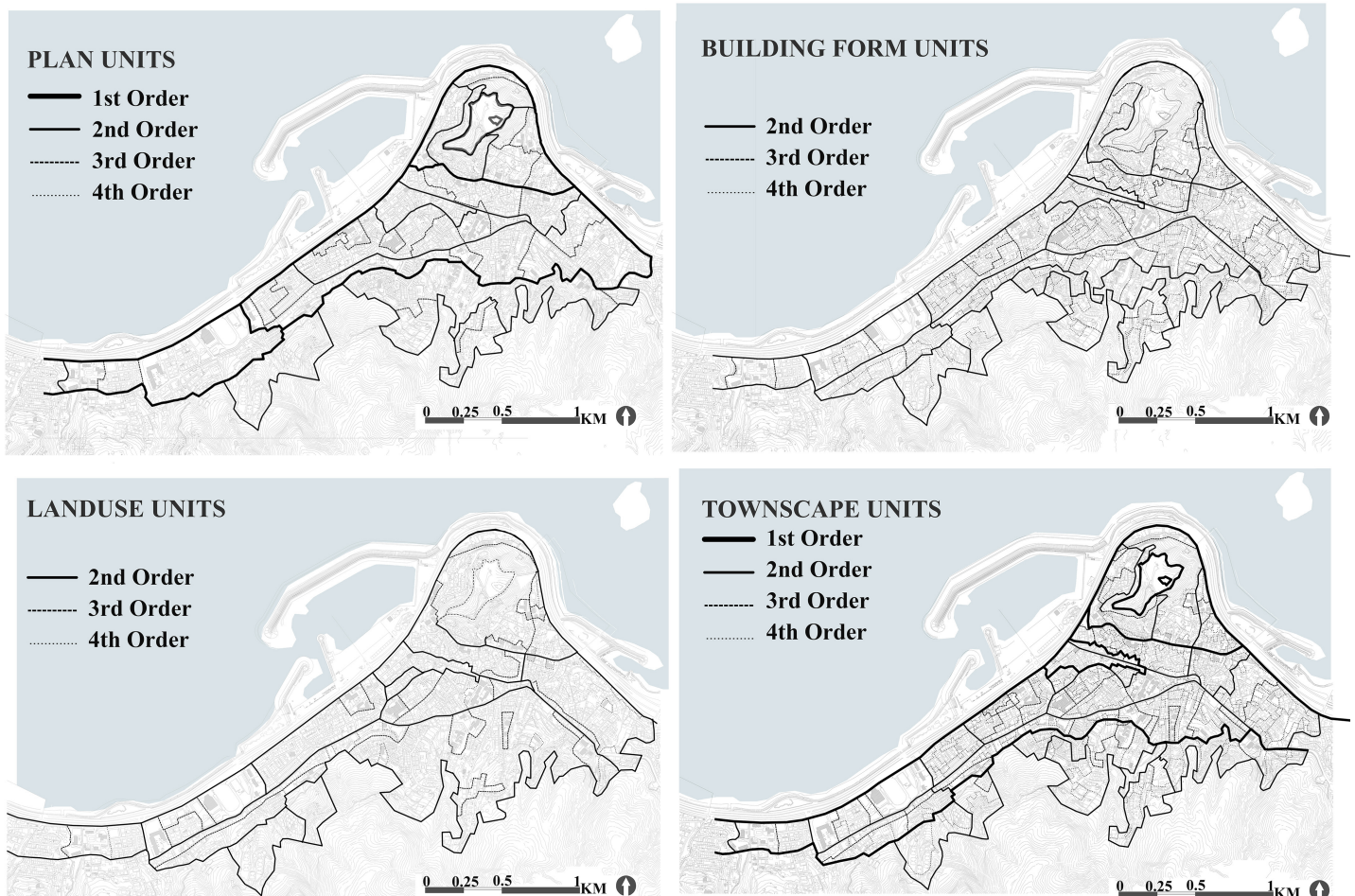
Post-1980, a dual development pattern emerged: on the one hand, low-density rural housing persisted in the south; on the other hand, large-scale residential complexes of up to 16 stories formed in former agricultural zones. These areas also absorbed key public functions, integrating administrative and social services into the expanding city fabric (Figure 7. o), p), q)). The comparison between these morphological formations and Giresun's planning practices reveals a partial alignment.

In particular, the castle slopes and historic neighborhoods showcase planning decisions that reflect some of the morphological character of the city. However, further from the core, demographic and economic shifts have led to more fragmented development. Notably, areas historically shaped by port-related functions now house Giresun's modern CBD, demonstrating continuity in spatial use. Overall, the city's expansion follows a layered structure radiating from the castle, largely aligning with a scattered development pattern toward the southern slopes.

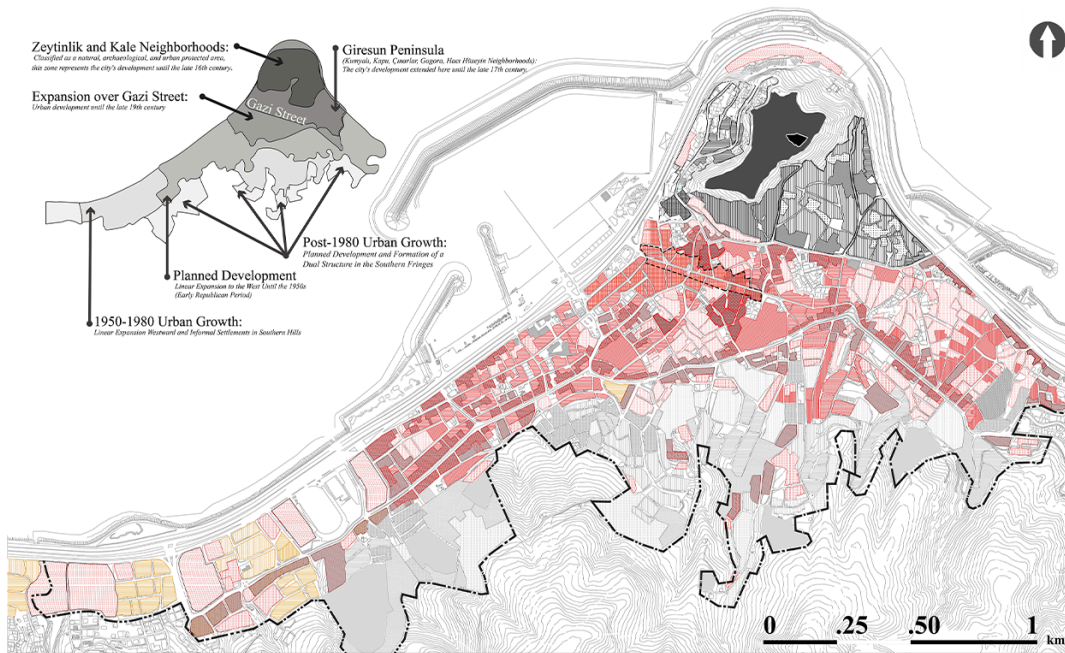
Another significant outcome of the study is that while the spatial plans regarding density, land-use, building codes, and the morphological regions identified through the study's historico-geographical approach differ, several overlaps also emerge. This highlights the importance of integrating urban morphology into contemporary planning to gain a comprehensive understanding and effectively manage the city's physical layers. Thus, the study enhances the applicability of urban morphological analysis across

Figure 6

Urban Townscape Units in Giresun Combination of plan, building, and land-use analysis to identify townscape units. (Generated by authors)



**Figure 7** Mapping Urban Development of Giresun's Historical Core and Surrounding Areas through Morphological Regions | Karadeniz & Aktaş, 2025  
*Morphological Regions of Giresun Morphological regions identified through the hierarchical mapping of spatial structure, reflecting the stages of historical growth. (Generated by the authors)*



**Zeytinlik and Kale Neighborhoods:**

*Classified as a natural, archaeological, and urban protected area, this zone represents the city's development until the late 16th century.*

**a) Inner Fringe-Belt (Castle and Palace Area)**

- i) Initial settlement core with the castle, palace, church, caves
  - ii) Tourism and preservation areas
- b) Southern Slopes of the Castle (Ethno-Religious Neighborhoods)**
- i) Low-rise traditional residential areas with gardens
  - ii) Low-rise houses sits on large plots (above 500 sqm)
  - iii) Historical religious and educational areas
  - iv) High-density residential and commercial areas along the east coast

**c) Port Hinterland Areas**

- i) Port-related commercial functions
- ii) New public spaces added along the west coast

**Giresun Peninsula**

*(Kumyalı, Kapu, Çınarlar, Gogora, Hacı Hüseyin Neighborhoods): The city's development extended here until the late 17th century.*

**d) Port Hinterland Areas**

- i) Linear commercial areas extending along the northwest side of the castle
- ii) Public spaces and focal points

**e) Giresun Peninsula and Formation of Hacı Hüseyin Neighborhood**

- i) Ottoman neighborhood center, Mosque and Bath
- ii) Low-rise traditional houses with gardens
- iii) High-rise attached apartment with commercial uses along the main roads

**f) The First Commercial Axis (Gazi Street)**

- i) Early formation with warehouses and artisan workshops (Arasta Bazaar, Çapulcular Kazancılar Slope)
- ii) Intensifying development, new structures increasing commercial diversity, and three-story buildings

**Expansion over Gazi Street:**

*Urban development until the late 19th century*

**g) Traditional Trade Area and Central Business District (CBD)**

- i) Developed as large warehouses and depots due to integration with the global Ottoman economy (3-story buildings)
- ii) New large-scale commercial buildings (arcades, passages), high-density, attached multi-story structures

**h) Western Slope of the Castle (Kapu Neighborhood)**

- i) Low-rise residential houses with gardens on sloped terrain
- ii) Increasing density with multi-story development

**Planned Development**

*Linear Expansion to the West Until the 1950s (Early Republican Period)*

**i) Administrative and Public Areas**

- i) Linear grid form in the west (influenced by the coastal road), mixed-use commercial-residential areas
- ii) Large scale public institutions (high schools, green spaces)
- iii) Mixed-type (land use) urban fabric
- iv) Increasing density along major streets, forming 6-7 story high-density, attached buildings

**j) Planned Residential Areas**

- i) 2-3 story residential areas with gardens and a grid street layout
- ii) Fully built-up plots with 5-6 story highly urbanized structures

**1950-1980 Urban Growth:**

*Linear Expansion Westward and Informal Settlements in Southern Hills*

**k) Development of Informal Areas**

- i) Low-density Housing by rural migrants in valley and hillside areas
- ii) Low Density mixed-type (attached and detached) housing areas
- ii) Transformation into high-density urban areas through zoning amnesty

**l) Planned Administrative and Public Focus**

- i) Emergence of large point type apartments with commercial uses on ground floor
- ii) New types of large-scale commercial centers (malls, modern business centers)

**m) Transition of Low Density Residential Areas into Planned Housing**

- i) 2-3 story detached houses in a grid street layout
- ii) Increasing density along block type residential buildings

**Post-1980 Urban Growth:**

*Planned Development and Formation of a Dual Structure in the Southern Fringes*

**n) Expansion of Planned Administrative and Public Focus**

- i) Main development axis with administrative and social buildings (governor's office, stadium)

**o) Low-Rise Rural-Style Houses on Southern Slopes**

- i) Low-density rural housing with gardens engaged in agricultural activities, integrated with the urban fabric

**p) High-Density Housing Projects on Southern Slopes**

- i) Large-scale urban design projects on big parcels surrounded by greenfields, with 12-16 story high-rise buildings



diverse geographical and historical contexts, particularly in Anatolian coastal cities where modernization, conservation, and informal growth patterns coexist.

## CONCLUSION

This study examined the physical evolution of Giresun's urban form through the historico-geographical approach, drawing on historical maps, plans, and written records. Using criteria such as the number of storeys, plot sizes, block patterns, street networks, land use, and key transformation points, Giresun's spatial development was analyzed in detail. The morphological regions identified, particularly the castle and its surroundings, have retained their original urban character to a large extent, while areas extending east, west, and later southward have experienced increasing spatial, social, and economic differentiation. The historical port and trade areas continue to serve as the city's commercial core, yet beyond the castle slopes, the spatial structure has shifted significantly.

The urban development plans, particularly the urban development plans and implementation plans, were evaluated considering the morphological interpretations (Figure 8.). The study reveals that protected areas are often treated as isolated zones and excluded from the broader planning framework. Conservation plans are developed independently from urban development plans, leading to a fragmented and inconsistent approach. This disconnection is partly rooted in the legal and institutional framework defined by the Law on the Conservation of Cultural and Natural Assets (Law No. 2863), which regulates conservation areas through procedures largely detached from mainstream urban development legislation. Recognizing this legal separation, the study emphasizes that integrating morphological analysis into planning practices offers a bridge between conservation

areas and comprehensive urban planning strategies. Integrating *morphological regions* into planning processes could support a more coherent application of principles such as density transition and functional zoning (Figure 8).

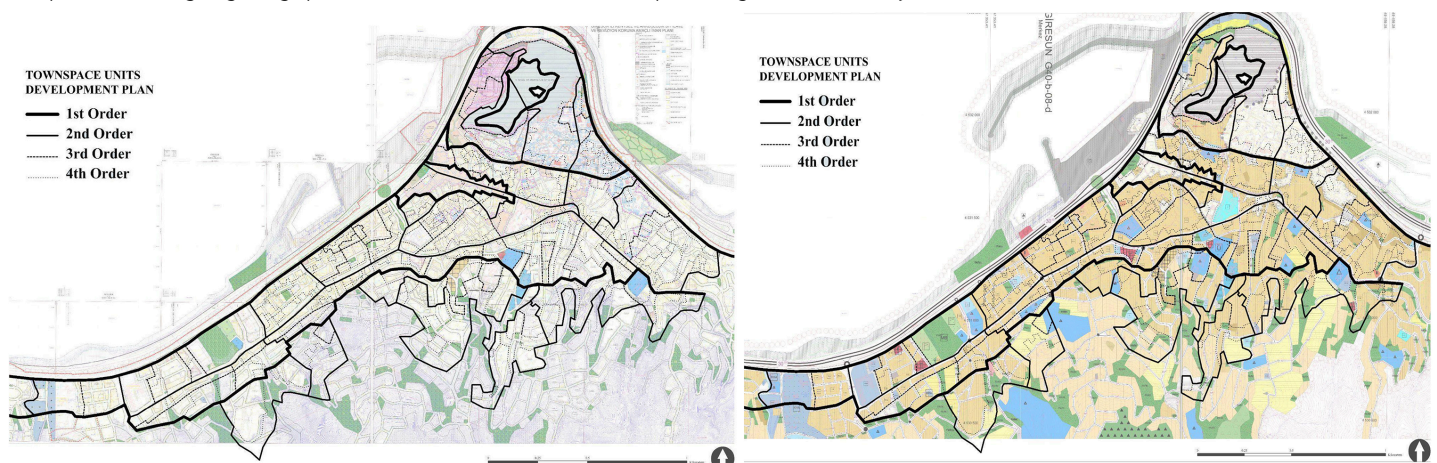
Despite the identification of six main morphological regions and 35 detailed townscape units, the current plan assigns almost uniform land use (primarily *TICK*: residential-commercial) and generalized density values across the city (Figure 8). This oversimplification disregards the city's historical layering and morphological complexity. For instance, *the Kapu Neighborhood*, designated a risky area despite its origins as an 18th-century traditional district, has undergone densification comparable to modern fabric, compromising its original character.

Overall, the study underscores the need to consider morphological structures, especially those formed in different historical periods in urban planning decisions. The diverse typologies of plots and building densities identified in this research provide a foundation for enhancing the variety of zoning codes and guiding planning with a more context-related and historically informed approach. Without this, discrepancies in form, scale, and identity between protected areas and adjacent zones will likely persist, undermining the spatial coherence of the city.

This study addresses a critical disconnect in planning practice: the fragmentation between general development plans and conservation plans. Master zoning plans often overlook conservation areas, leaving them undefined or excluded from zoning and functional decisions. In contrast, conservation plans are typically prepared in isolation, disconnected from the broader urban structure. This lack of integration leads to inconsistent approaches and undermines the coherent management of historic environments.

Figure 8

Physical Planning Frameworks in Giresun (2021) a) Urban Development Master Plan b) Implementation Plan Overlaid with morphological interpretations highlights gaps in land use and conservation planning. (Generated by authors)



To address this gap, the proposed model introduces a systematic, layered analysis for identifying morphological regions and character areas. This spatial framework enables conservation zones to be defined not as isolated exceptions but as integral elements of the city's overall form. By incorporating this approach into planning processes, historical continuity and form-based design can be achieved. This approach facilitates nuanced density transitions, compatible land-use decisions, and effective conservation strategies.

The model serves as a practical tool to support normative planning despite the complexities of urban development within historical contexts. This is particularly pertinent in contemporary Türkiye, where numerous historic cities are undergoing rapid transformation. The framework promotes a more integrated approach to urban planning and conservation.

## NOTES

1. In the morphological analysis, the historical maps and regional boundaries of the outer castle of the inner fringe were approximated based on the remains of the fortification walls. Today, the castle is situated within a first-degree natural and archeological protected area.
2. During the formation of the plan units, inquiries were made regarding the development of the fringe belts in Giresun. However, due to the scope of the study being limited to the identification of morphological regions, the analysis of the formation and transformation processes of the fringe belts was limited. Nevertheless, when the study area is evaluated from this perspective, the castle and its immediate surroundings, which correspond to today's 1st-degree natural and archeological site and 3rd-degree archeological site boundaries, can be interpreted as the inner fringe belt. Due to the city's topographic structure and compact urban growth, a clearly defined middle fringe belt was not observed. In contrast, the large-scale residential areas currently forming on the foothills, developed under similar density regulations and forming a continuous and distinguishable area, can be considered part of the outer fringe belt.
3. In this study, spatial segregation refers to the growing functional and morphological differentiation between historical cores and recent urban extensions. This differentiation is often evident in fragmented approaches in planning practices.



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