JOURNAL OF DESIGN FOR RESILIENCE IN ARCHITECTURE & PLANNING

Research Article
Online: www.drarch.org
Volume 7, Issue 2 (226-245), 2026
DOI: 10.47818/DRArch.2026.v7i2212

A morphological framework for delineating character areas in a coastal town: The case of Görele, Türkiye

Beyza Karadeniz*
Yelda Aydın Türk**

Abstract

Urban morphology has long sought to translate the historical, environmental, and built-form structure of settlements into legible units that planning can act on. In practice, however, the connection between morphological analysis and planning has remained limited, particularly in topographically differentiated small towns where standard density controls fail to fully address the distinct character of areas that are formed through topography, historical development, and built form. This paper develops a method for delineating character areas within a historico-geographical framework that is applicable to planning practice. The method synthesizes three groups of analysis: historical development, natural environmental structure, and built form and land use, to delineate different character areas of the urban landscape. The rural-to-urban transect was then applied as a secondary assessment to question the character area classification. The method is applied to Görele, a small coastal town in northeastern Türkiye, selected for its topography and traceable urban development history since the start of the Republican era in 1923. After the synthesis, nine character areas are defined in Görele, each shaped by a specific overlay of development history, natural setting, plot pattern, density, and building form. Non-parametric tests confirm that the areas differ significantly in plot area, ground space index, floor area ratio, and number of storeys. A Spearman rank correlation along the main rural-to-urban sequence shows that plot size decreases and density values increase toward the urban core, but areas with similar density values can differ substantially in plot pattern, street structure, and historical depth. The findings show that character area delineation provides a more differentiated basis for planning than density categories alone and identifies areas where high-density development has occurred without adequate integration with the urban context. In coastal towns shaped by constraining topography and historical development, this approach can guide density control toward more adaptive and contextual urban planning.

Keywords: character area delineation, historico-geographical approach, rural-to-urban transect, urban density

1. Introduction

Urban form is the physical structure of a settlement, made up of streets, plots, blocks, and buildings (Moudon, 1997). Among its different dimensions, the physical built form is the most evident and persistent reference: buildings, plots, and streets usually change more slowly than land use, ownership, and activity patterns, which makes them a relatively stable basis for understanding how a settlement has developed and how it may be guided in the future (Moudon, 1997; Kropf, 2009, 2011, 2013a). Morphological research has a long tradition of evaluating the historical, functional, and environmental information condensed in this physical structure within a single interpretive framework (Kropf, 2009). In planning, spatial heterogeneity must be translated into legible units, such as plots, blocks, fabrics, and areas, through which regulation, conservation, and design control can be applied (Birkhamshaw & Whitehand, 2012; Monteiro & Pinho, 2022).

Character areas are among the main units through which urban form is interpreted and used in planning. In the historico-geographical approach, character areas are not only descriptive units.

*(Corresponding author), Department of City and Regional Planning, Karadeniz Technical University, Türkiye bsenktu@gmail.com
**Department of City and Regional Planning, Karadeniz Technical University, Türkiye aydinturkyelda@gmail.com
Article history: Received 20 April 2026, Revised 06 July 2026, Accepted 16 July 2026, Published 30 August 2026

They also provide an explanatory basis for understanding the formation and transformation of urban landscapes. Thus, they can become practical tools to control urban growth and to inform planning decisions such as conservation, intensification, design control, or transformation. Yet, in practice, the connection between morphological research and planning has often been limited (Whitehand & Morton, 2004). This limitation is also evident in how character areas, as one of the central concepts in urban morphology, are defined and drawn (Oliveira & Yaygın, 2022).

In urban planning, boundaries are usually drawn along administrative borders, roads, or rivers, with little attention to urban form (Larkham & Morton, 2011). Detailed morphological analysis, on the other hand, is not equally useful at all planning scales. The problem, therefore, is not a lack of morphological knowledge, but how to turn this knowledge into boundaries that work both analytically and practically. This is more difficult in settlements that have a long history and are not fully consolidated (Oliveira & Yaygın, 2022). Defining boundaries is, thus a key step in studying character areas. The establishment of a character area boundary is not a simple process. A character area should show a clear order within its limits and distinct differences from surrounding areas. This determination cannot be based only on measurement; it also depends on the purpose, the scale, and the intended use of the results (Larkham & Morton, 2011). Built form is normally ambiguous, and the task is to handle this uncertainty in a structured way (Kropf, 2013b).

A further problem is that character area studies tend to give more emphasis to the built components of urban form, while natural characteristics are not always treated as a separate analytical layer. However, urban form does not develop independently of place. It is shaped by topography, the natural environment, and historical processes that influence settlements over time. Natural characteristics may become major determinants of urban form, especially in small and topographically differentiated settlements. It is important to comprehend the morphological dimension in the urban planning process. Areas with different historical, natural, and physical attributes should be considered when making decisions. It is evident in Türkiye, where urban space has increasingly been shaped by neoliberal policies and large-scale projects (Şengül, 2009) since the early 2000s, in line with contemporary neoliberal urban planning applications (Peck & Brenner, 2009). Tekeli (1994) states that planning cannot be considered separately from the processes through which urban space is produced. In practice, however, development has largely been controlled through density rights, with limited direct consideration of urban form and character. The Condominium Law No. 634, enacted in 1965, legally enabled the division of ownership within apartment buildings by allowing multiple independent units on a single plot. This arrangement made coordinated intervention at the area scale more difficult and allowed redevelopment to proceed on a plot-by-plot basis (Balamir, 1975). From the 2000s onwards, construction of high-density housing projects became the dominant type of building. In cities of different scale and/or historical background, this process resulted in increasingly similar forms of development despite the local context of the site (Ünlü, 2026).

This concern is directly related to current planning processes and regulations that have no strict rules regarding areas differing in their historical, natural, and physical characteristics. Adopting a character area methodology can make such contextual differences apparent through interpreting the urban landscape via its historical development, topography, and change patterns. With no methodology like this, densification could potentially weaken distinctions that shape urban form. Identifying such differences is of paramount importance for planning responding to local conditions, instead of treating urban land primarily as a future developmental area. In order to resolve this issue, the present study 1) builds a method for delineating character areas and 2) discusses its relevance regarding planning practice, and 3) suggests three analysis groups: development history, nature and environment, together with built form and land use.

2. Theoretical Framework

Urban morphology has been developing around ongoing intellectual knowledge, and the Conzenian School emerges as one of the most influential schools of thought for understanding the

historical formation of urban form. With its foundation in historico-geographical analysis, this tradition examines the urban landscape through the interaction of town planning, building fabric, and land use (Conzen, 1988). Each component has spatial information of successive periods of development. While early Conzenian work focused on morphological regions as units of analysis (Conzen, 1969), the concept of the character area has since gained importance for urban planning practices. A character area can simply identify and articulate the distinctive physical qualities of urban landscape. This shift becomes evident with cases such as Porto in Portugal (Oliveira, 2006) and Bath in England (Hall, 2008) to translate morphological knowledge into tools applicable to urban planning and design practice. On this basis, a character area can be understood as spatial units that represents internal coherence. This vocabulary translates the underlying Conzenian logic into a form more readily usable in planning and public discussion (Birkhamshaw & Whitehand, 2012; An & Gu, 2018). Character areas should not be solely used as descriptive units, but also as an explanatory basis for planning (Conzen, 1988). They therefore connect the analytical reading of urban form with planning questions such as conservation, intensification, design control, and transformation. Character area study cases such as Alnwick (England), Ludlow (England), Stratford-upon-Avon (England), Shanghai (China) together with Porto and Bath (Oliveira & Yaygın, 2022), represent its applicability. These studies show that character areas are not static or simply administrative units. Yet, they are interpretive units defined through the combination of historical development, town-plan structure (Streets, plots, and buildings), land use, and the degree of morphological coherence within an area, meaning that character area analysis depends on careful articulation of multiple sources of data.

Any type of morphological analysis generally requires (1) data that are not always ready for use, (2) extensive fieldwork, and (3) archival research due to the level of detail needed with respect to the related size increase when the analysis covers, for example, an entire town (instead of a historic core or a single neighborhood). Whitehand (2005) notes that the purpose and scope of a morphological study should be determined by its scale, resolution, and level of detail. The takeaway is that morphology can inform urban planning but methodological adaptations must also account for the context of the planning within which urban space is produced, regulated, and transformed.

2.1. Delineation of Character Areas

Recent morphological research in the body of literature studies the delineation of character areas generally in two different ways. The first case aims at a greater degree of transparency in the delineation process by using explicit criteria. For example, Arat (2023) identifies (1) town plans, (2) building fabrics, and (3) land use as separate criteria, while applying them in a structured sequence: Town plans are examined first, and followed by building fabrics and land use. Arat notes that clearly stating and ordering the criteria can reduce ambiguity in interpretation (as objectivity cannot be fully achieved). In a similar way, Oliveira and Yaygın (2022) observe that regionalization studies often do not illustrate their procedural steps in sufficient detail; steps that include (1) selection of criteria, (2) establishment of a hierarchy, (3) identification of form complexes, and 4) preparation of a map. Those authors note that these procedures should be stated explicitly, in order to prevent the method from functioning as a “black box”. Evidently, morphological analysis requires substantial fieldwork and archival material, and these requirements become more demanding when the analysis covers a whole town (rather than the aforementioned historical core or single neighborhood).

Regarding the aforementioned study of Whitehand (2005), comparative studies show that the three main approaches in urban morphology, the historico-geographical, process typological, and configurational, can be combined in a structured way. Combining these approaches allows for a more definitive analysis of the stable elements of urban form, such as the street network and plot pattern. It also allows for variation in the analysis of elements that are less resistant to change, such as buildings and their uses (Monteiro & Pinho, 2022). These studies show that methodological

integration does not require the abandonment of interpretive reading; rather, it depends on making the logic of combination more explicit.

The second approach is represented by quantitative and computational studies. Recent work has expanded the capacity of urban morphology to classify urban form systematically and at scale, developing scalable, data-driven approaches that support comparative analysis and typological interpretation using large datasets (Fleischmann et al., 2022; Vartholomaios, 2025; Fan et al., 2025). More recent machine-learning approaches detect urban form types where multidimensional datasets make manual classification difficult, with increasing attention to interpretability and spatial context. Part of this work has also returned to the cadastral plot as an analytical unit because of its continuing relevance to the historical and regulatory logic of urban form (Vartholomaios, 2025; Fan et al., 2025).

These strengths, however, are oriented primarily toward large-scale typological detection. They also depend on the availability of comprehensive datasets, which may be limited in small-sized settlements. The appropriate method of character area delineation depends on the study's scope and aim. Data-driven classification may not capture the distinctions relevant to planning decisions and may reduce complex character to density measures (Kropf, 2013b; Birkhamshaw & Whitehand, 2012). Thus, a mediating position is needed: analytical steps that are open to validation, combined with an interpretive, planning-informative reading of urban form.

2.2. Natural Setting and the Rural-to-Urban Transect

Natural characteristics, such as topography, have not usually been treated as a separate analytical layer in the historico-geographical tradition. However, where they are major determinants of urban form, they can be incorporated alongside historical development and current built form (Kropf, 2009). This is especially important in settlements where terrain, coastline, slope, drainage, and elevation thresholds shape the location, direction, and intensity of urban development. In such contexts, the natural environment is not only a background condition, but a fundamental dimension of morphological differentiation.

A parallel line of planning thought has approached the rural-urban relationship as a gradient rather than a binary. Formalized within the SmartCode tradition, the rural-urban transect arranges settlement zones along an ordered sequence, from natural and rural edges through suburban and general urban fabrics to centre and core conditions and links each position to corresponding built-form expectations (Duany & Plater-Zyberk, 2003). In this sense, the transect operates as both a descriptive and a prescriptive framework (Talen, 2002).

More recent studies propose that transect thinking can be used analytically rather than only as a regulatory code (Han, 2021; Musard, 2023; Talen, 2023). Quantitative research has also shown that transect zones can be operationalized to describe graded urban structure and morphologically differentiated urban areas, while studies in historical environments indicate that transect thinking can also be adapted to typo-morphological analysis and decision support (Jachimowicz, 2022; Boyko et al., 2021; Aydin et al., 2024).

In this wider context, character area analysis may also be effective in resilience adaptations in urban planning, because it helps distinguish parts of the settlement with different physical conditions, development histories, and spatial constraints. Such distinctions can inform more contextual planning and urban management. Yet the present study does not adopt the transect as a primary method of delineation. Character areas are instead derived through historical development, natural-environmental conditions, and built form and land use analyses. The transect is used here as a secondary evaluative perspective through which the resulting character areas can be interpreted. In topographically differentiated settlements, where transitions between rural and urban environments are often gradual, uneven, and shaped by terrain, the transect provides an additional way of assessing whether the delineated character areas form a legible sequence across the settlement.

2.3. Conceptual Framework of the Study

To address this issue, four concepts are used to develop the analytical framework. First, urban form refers to the arrangement of plots, streets, blocks, and buildings as it evolves over time, and provides the basis on which regulation, conservation, and design control operate (Moudon, 1997; Kropf, 2009). Second, character area refers to a morphologically coherent part of this form that is internally consistent and externally distinct, and thus defines a scale at which planning decisions can be specified (Birkhamshaw & Whitehand, 2012). Third, the natural-environmental and topographical layer, which includes terrain, coastline, slope, drainage, and elevation thresholds, is analyzed as a fundamental dimension of morphological differentiation alongside town plan, building fabric, and land use (Kropf, 2009). Fourth, the rural-to-urban transect is understood as an ordered gradient from rural to urban conditions (Duany & Plater-Zyberk, 2003) and is applied here to situate and evaluate the delineated character areas in planning terms.

This conceptual framework therefore combines the historico-geographical reading of urban form with an explicit concern for natural setting and planning interpretation. It aims to make the process of character area delineation more transparent without reducing it to a purely quantitative classification. In this respect, the study follows the interpretive logic of urban morphology, but organizes the analysis through clearly defined layers and evaluative steps. This provides a basis for examining whether character areas can operate not only as descriptive units of urban form, but also as practical units for planning decisions in small-sized and topographically differentiated settlements.

3. Aim and Scope

The aim of this study is to develop a methodology for delineating character areas within a historico-geographical framework and to examine its applicability to planning practice. The methodology is based on three lines of analysis: historical development, natural-environmental structure, and built form and land use. These analyses are synthesized to delineate character areas within the study area. In this way, the resulting areas are understood as reflecting town plan units, building fabric, and land use in relation to topographic factors and phases of historical development. Within this scope, the study focuses on three objectives: (1) to identify distinct character areas through the proposed framework, (2) to examine whether these areas can also be interpreted along a rural-to-urban gradient, and (3) to assess whether density variables on their own are sufficient to explain the resulting pattern.

For assessing the internal coherence of the delineated areas and the differences between them, statistical tests are used; the results of which are interpreted from historico-geographical and planning perspectives.

The method is applied to Görele (a small coastal town in Giresun Province, northeastern Türkiye), which was selected as an illustrative case of coastal settlements beside the Eastern Black Sea, where urban development has been shaped by the relationship between coast, river valleys, and steep topography (Emecen, 2020). Initially, Görele was built on the eastern side of a river valley and later expanded westward across the valley plain, and the town also has a history of continuous urban development, while its built environment mirrors successive planning periods after the establishment of the Republic of Türkiye.

4. Methodology

The method proposed in this paper has seven steps: (1) define study boundary and data, (2) analyze historical development, (3) analyze natural-environmental, (4) analyze built form and land use analysis, (5) delineate three-layer synthesis, (6) interpret statistical evaluation and transect, and (7) interpret planning. Historical, environmental, and built form analyses that can identify character

areas across the planned area are the preliminary set of analyses in line with historico-geographical analysis (Figure 1).

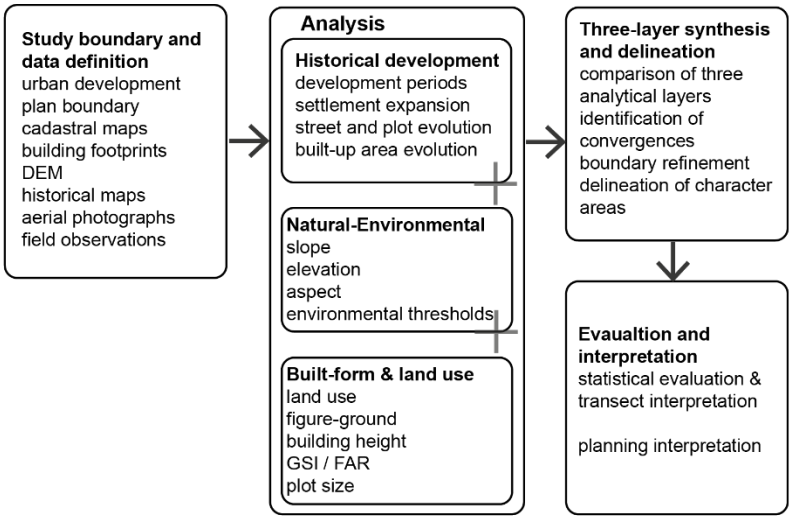

Figure 1 Steps of the proposed framework

4.1. Study Area

Görele is a small town located in the Eastern Black Sea region of Türkiye, as aforementioned, with a population of 18,238 (Turkish Statistical Institute [TurkStat], 2025). It is located approximately midway between the two main regional centers, 62 km east of Giresun and 70 km west of Trabzon (Figure 2). The town is formed along a narrow coastal plain created by the alluvial deltas of the Görele and Çömlekçi streams. The landscape is characterized by steep ridges and valleys, as is typical of coastal towns and cities in the Black Sea region (Emecen, 2020).

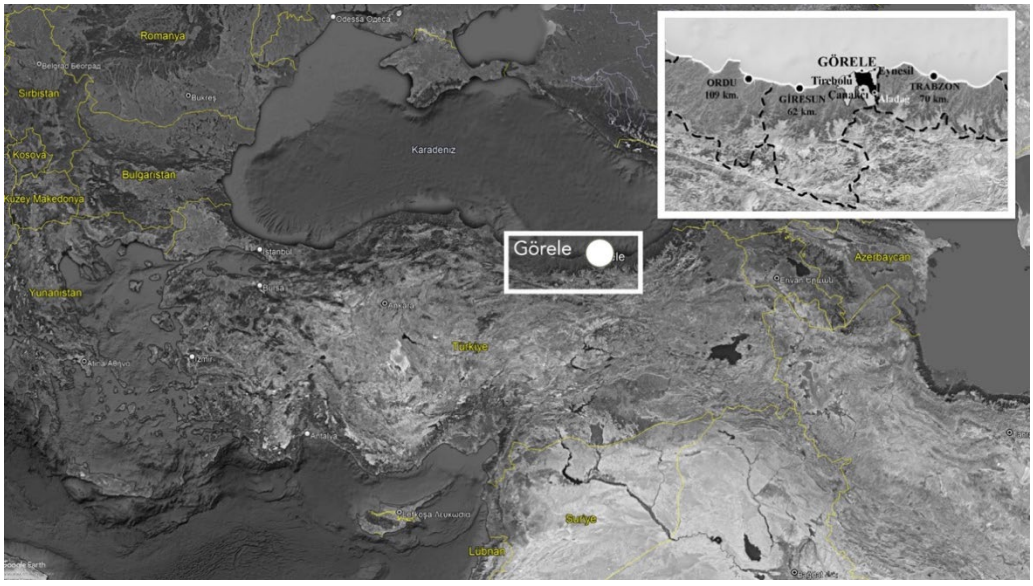

Figure 2 Location of Görele

The case study town of Görele was selected for several reasons: (1) it is representative of many coastal settlements in the region, (2) both archival and current digital data are available, (3) its urban history can still be deciphered through clear periods of growth, with areas representing these periods remaining visible. Görele's character is evident in its historical continuity, topographic constraints, and recent planned urban expansion within a clearly defined development plan perimeter. These conditions have impacted urban growth along the east–west coastal axis, while the sloping areas to the south have maintained their rural characteristics (Figure 3). In this way, Görele provides an illustrative case for examining the interactions of historical development,

environmental structure, and built form in the outline of character areas designated for urban planning.

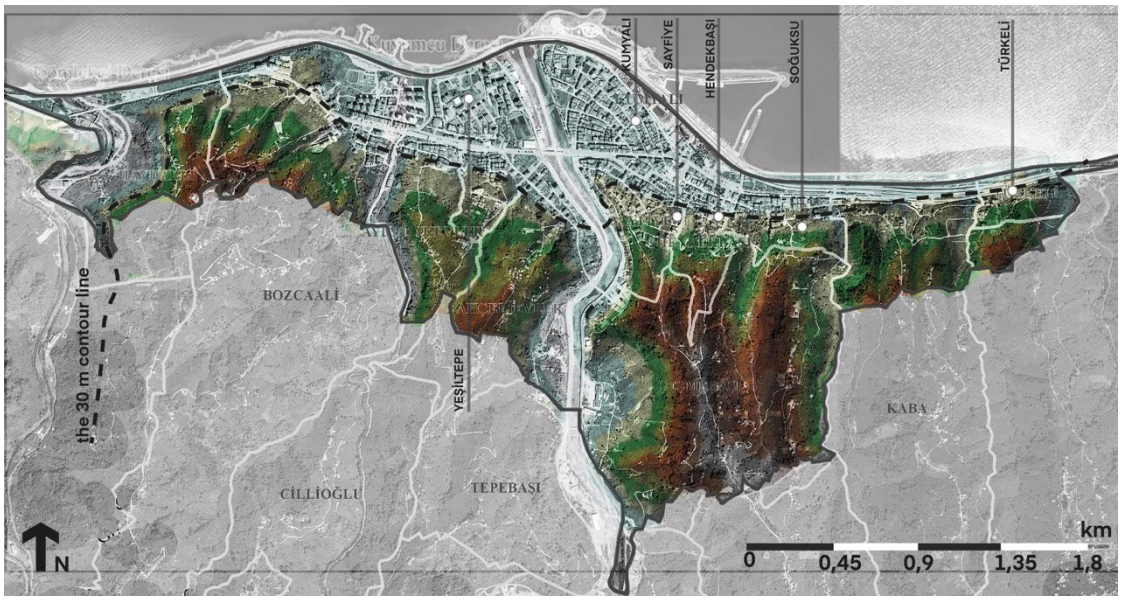

Figure 3 Hillshade and elevation profile of Görele

All analyses were effected within the perimeter of Görele's current urban development plan (hereinafter termed the study area), so that the identified character areas corresponded to the scale of any planning decisions. Neighborhood perimeters were used solely for orientation. The historical transformation of Görele is examined in the findings section of this paper, and includes its compact coastal form before the Republican Period and its later expansion through infrastructure investments, planning decisions, migration, construction of the state highway, construction of the Black Sea Coastal Road, sea-fill reclamation, and the opening of publicly-owned land for development.

The main data sources were: (a) municipal cadastral maps containing 6,755 plot polygons; (b) building footprints digitized from orthophotographs and checked against municipal building records (n = 2,607 buildings); (c) a 5 m resolution digital elevation model (DEM) that was generated from base and contour data using Topo to Raster tool in ArcGIS Spatial Analyst; and (d) georeferenced aerial photographs and historical maps from years 1946, 1955, 1975, 2009, and 2020. All vector data were projected in ITRF96 / TM30 (EPSG:5254). The number of storeys in a building, construction year of a building, and land use of each building were attached to its plot polygon.

4.2. Analysis

Historical development

The historical development analysis of the settlement was the first analytical component, from the first available cartographic phases up to the present day. Historical maps, aerial photographs, plans, cadastral records, and written sources were used to (1) split up urban development into appropriate time periods and (2) trace changes in the built-up area, such as growth direction, street and plot structure, and the general expansion pattern. For each time period, the built-up area, the main building types, plot subdivision, street hierarchy, major public investments, and planning regulations were recorded. Thus, the historical layer used in the synthesis was created.

Natural-environment

The environmental structure that has shaped settlement form and spatial expansion provided the second analytical component that was examined. Slope, elevation, and aspect were derived from the DEM and reclassified for comparative analysis. The three raster layers were combined

using the Weighted Overlay function with equal weights. The resulting composite raster was converted into polygonal units and refined using plot perimeters and road center lines as Snap References. This step produced the natural-environmental layer used later in the synthesis.

Built form and land use

The third analytical component was the built form and land use analysis, applied at the plot scale. Land use, figure-ground relations, building height, GSI (Ground Space ındex), FAR (Floor Area Ratio), and plot size were recorded and classified on the basis of cadastral data, building footprints, and municipal building records. Unbuilt and underdeveloped plots were also noted to identify incomplete consolidation. All layers were compared spatially in ArcGIS. In the final step, plot attributes were combined through a composite mapping procedure using land use, FAR class, GSI class, building height class, and plot size class. This produced the built form and land use layer used in the three-layer synthesis.

4.3. Synthesis and Delineation

Character areas were delineated through the combined reading of the three analytical layers: historical development, natural-environmental structure, and built form and land use patterns. Rather than functioning as a basic GIS overlay, the synthesis was used to identify character areas of internal coherence and external difference. Boundaries were drawn where changes occurred in at least two of the three layers.

The delineation was carried out at a single resolution level relevant to zoning and density decisions across the entire planned area. The natural-environmental layer was used as the initial spatial framework. Within this framework, the built form and land use layer was used to distinguish different built-up patterns. The historical layer was then used to compare these distinctions with the broader sequence of settlement development. For the character area delineation, plot boundaries and road centre lines were used in built-up areas, while ridges, valleys, stream corridors, and other natural thresholds were used in the rural parts of the study area. The output of this step was the final map of character areas.

4.4. Statistical Evaluation and Transect Interpretation

Statistical tests were used to compare plot-level variables across the delineated character areas. Normality was assessed with the Shapiro-Wilk test. Because most variables did not meet parametric assumptions, non-parametric methods were used throughout. Plot area, GSI, FAR, and number of storeys were compared between areas with the Kruskal-Wallis H test. Statistical tests were applied to built-up plots (n = 1,832).

To test the rural-to-urban gradient, the six character areas forming the main transect sequence were arranged in ordinal form, and their association with the plot-level variables was assessed with Spearman's rank correlation. Consistent with the framework in Section 2.3, the transect was used as an evaluative perspective, not as a delineation criterion. All statistical analyses were performed in Python using SciPy, on Google Colab.

4.5. Planning Interpretation

Following the statistical evaluation and transect interpretation, the resulting character areas were interpreted from a planning perspective. This step examined how the delineated areas could inform decisions related to conservation, intensification, design control, transformation, and development management. The planning interpretation considered the relationship between density variables, built form, historical development, and natural-environmental constraints. In this way, the character areas were treated as practical units for differentiating planning decisions across the study area.

5. Findings

The findings are presented in three stages. First, the three analytical layers, namely historical development, natural-environmental structure, and built form and land use, are analyzed individually to identify the main dimensions of differentiation across the study area. These layers are then combined in the synthesis step to define character areas. Finally, the delineated areas are evaluated through statistical analysis, transect and planning interpretations.

5.1. Formation and Historical Development of Görele

The historical development of Görele is interpreted through five periods defined by major changes in settlement form, infrastructure, and planning decisions. In this first part of the findings, the historical development of Görele is examined through the spatial references of 1946, 1955, 1975, 2004, and 2020. Archival and written sources are used to understand the main stages of urban growth, the changing directions of expansion, and the transformation of the town's spatial structure. Görele's urban form (see Figure 4) has transformed from a concentrated coastal municipality into an extended urban development with a form that was shaped over time by infrastructural enhancements, planning interventions, and topographic restrictions.

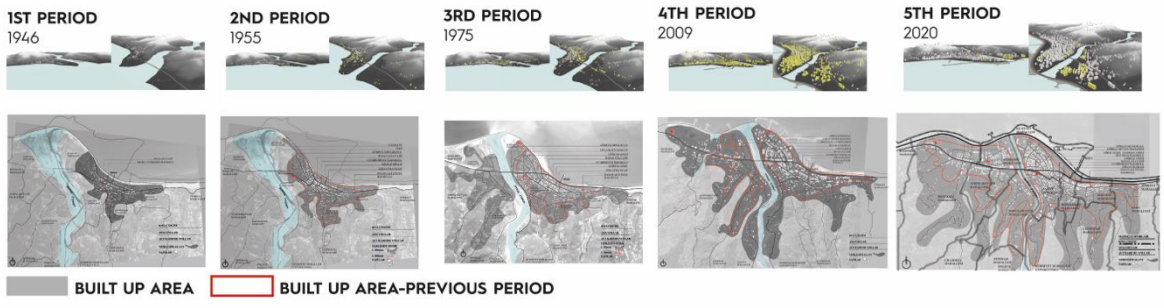

Figure 4 Görele's urban growth, 1946–2020

One of the earliest spatial sources used in the present study is an aerial photograph taken in 1946. Görele was founded as a compact coastal town with municipal administrative functions and served as a market place for the surrounding villages. Its built-up area was 30 ha, and the center approximately15 ha (Figure 5). Before the Republican period, land connections were limited, and the town was more connected by the sea than by roads (Emecen et al., 2019).

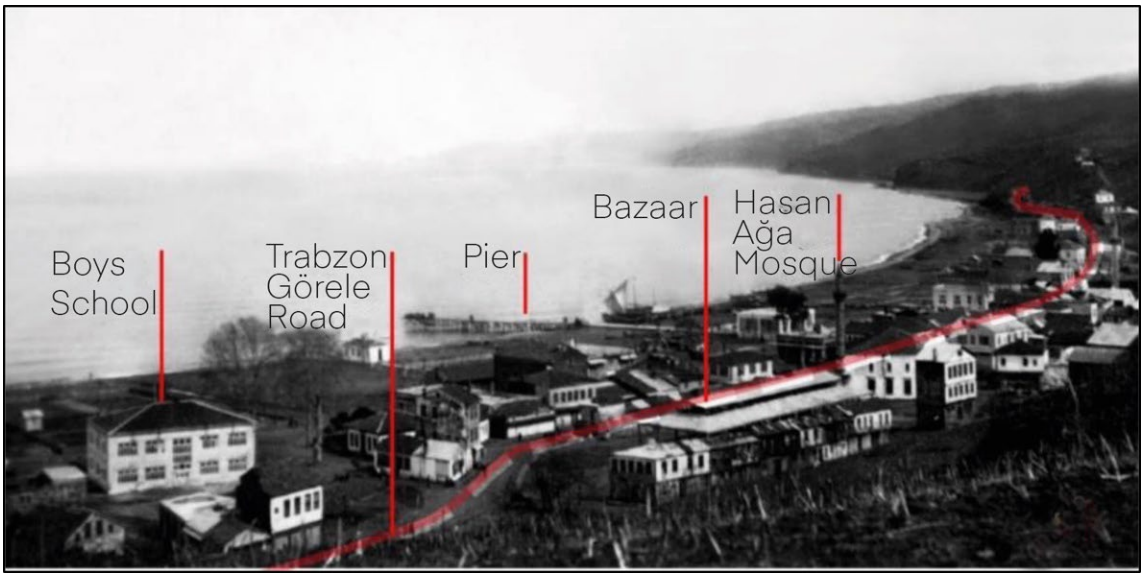

Figure 5 Görele in the 1930s

The commercial area was concentrated along two streets running parallel to the coast, while the earliest residential quarters (Sayfiye, Hendekbaşı, and Soğuksu) were located on the southern ridges above the 30 m contour. These areas consisted mainly of detached two storey houses within garden plots and reflect the early influence of topography on settlement form (Bilir, 2001). By this period, Görele already functioned as a local service center, concentrating public services, commercial activities, and transport functions.

The town retained its rural character until the 1960s, when the road connecting the town to nearby settlements was built. During this period, it was still a small, low-density town with a semi-rural character, and its built-up area showed little growth (Arslan, 1973). New development extended mainly east and west along the coast, with limited growth south toward Çeşmebaşı. On the plain areas, development followed the roads parallel to the shore, while on the slopes it extended upward along the ridges. Without a comprehensive planning framework, the town grew mainly through incremental building activity and scattered public investment. New housing remained low-density, with buildings typically rising two or three storeys. The first westward extensions emerged in Kumyalı and Aydınlıkevler neighborhoods.

Between the mid-1950s and the mid-1970s the built up area of the town expanded to the west. Aerial photographs from 1975, with archival and written sources show that this growth occurred mainly toward the west and along the east-west coastal axis. Despite this expansion, much of the area kept its garden city and rural character. In this period the first spatial plans were implemented. Accordingly, base maps were prepared, the first development plan was approved, and new road connections improved accessibility across the region. At the same time, commercial, residential, and institutional land uses begin to form an administrative and modern town center. The pier, the town's earlier main entry point, had long provided maritime access and was still present during this period, but it was later demolished during the sea-fill works that were carried out as part of the Black Sea Coastal Road project during the 2000s.

Between 1984 and 2004 the initial urban development plans are actualized. Thus, this period can be termed as the "planned period". The first comprehensive urban development plan was made for Görele by İller Bankası (public development / investment bank in Ankara) in 1984 that extends over the built up area of current developed area today. The limits of the city expanded noticeably compared to its state in 1975. Yet, much of this designated area remained unbuilt in the following years. The area along the Görele river, was developed mainly with residential areas as well as institutional areas and Kumyalı district also developed as the new housing area through land reclamation. Some of the reclaimed land was allocated to recreation and small industry uses, while agricultural land at the southern end of the city remained largely outside the main urbanized area. The 1998 Additional Urban Development Plan later expanded the planned area and revised the earlier scheme. Overall, this phase reflects the growing influence of formal planning, land reclamation, and allocation on Görele's spatial development.

By 2020, the town center had become denser, and high-rise development was more evident in the urban fabric. Since 2000, this increase in density had occurred mainly through infill development, leaving only a small number of unbuilt parcels within the core area. Commercial activity remained mainly along the two main streets already established in earlier periods. This phase was shaped by the 2016 Environmental Plan and the 2017 Master Development Plan. High-rise apartment blocks emerged around the stadium and the hospital area on the western part of the town. The Black Sea Coastal Road project had started to transform the natural coastal edge by removing the former pier and creating new reclaimed land along the shoreline. This development became evident mainly in Kumyalı and part of Yeşiltepe districts.

Görele's historical development can be understood as a sequence of continuity, extension, planning intervention, and intensification, as summarized in Table 1. Throughout these phases, the traditional center developed into the administrative center of Görele, while later developments in the west changed the urban form from a small coastal town into a more developed urban area. This

layered pattern of development provides the historical basis for the character area differentiation discussed in the following sections.

Table 1 The Historical Development Periods of Görele

Period	Extent	Plot–building–street relation	Dominant building type	Relevance for character differentiation
Pre-1946 / 1946 Compact centre	Compact center and traditional districts on the southern slopes	Front setback from the road on flat areas No front setback from the Road large garden plots on slopes;	1–2 storey detached houses with gardens; small mixed-use/public buildings in the center	Historical core and early garden-based slope fabric
1946–1955 Limited expansion	Limited growth along existing roads and coastal direction	Detached houses in large garden plots; no/limited front setback on steep areas; setbacks and garden walls on flatter plots	2–3 storey buildings in the center; 1–2 storey detached houses in rural/slope areas	Last dominant phase of low-density garden-based structure
1955–1975 First westward expansion	Growth along Görele Stream and east–west road axis	Development along the major roads; buildings generally without front setbacks; narrow gaps between buildings	4–5 storey residential buildings along roads; attached mixed-use buildings in the center	First road-related apartment development and expansion of housing areas
1984–2004 Planned growth and apartment development	Westward planned growth; public facilities; apartment development in vacant areas	Garden plots on flatter land replaced by apartment plots; higher plot coverage; limited garden use	4–5 storey apartment buildings; first 6–8 storey mass housing blocks; institutional buildings	Spread of apartment development and weakening of garden-based fabric
2004–2020 Infill and high-rise development	Densification in the center; high-density development on greenfield to the west	Center: small fragmented plots, high intensity, no front setback. West: large plots with detached high-rise/point type apartment blocks	12–15 storey point type apartment blocks in the west; dense mixed-use/residential buildings in the center	Distinction between dense center, western high-rise development, and remaining garden fabrics

5.2. Natural-Environmental Structure

The terrain of Görele formed by a coastal plain, steep slopes on the south, and stream valleys running across the settlement. These features affected the formation and the location of urban development. As shown in Figure 6, the town is formed around the coastal plain, mostly on the reclaimed land of Görele River valley. Historically, however, much of the housing was located on the north-facing slopes. The natural environment was therefore one of the factors shaping the urban form.

Elevation and slope indicate a break in the building pattern at the 30 m contour. Below this level, the land is relatively flat and suitable for urban development. This zone includes the center as well as later expansion areas such as Kumyalı and Yeşiltepe neighborhoods. South of the 30 m contour, the terrain becomes steeper. In some places, slopes reach 40%, and the land is divided by narrow valleys and ridgelines. This typical natural character generates more linear and fragmented formation. The flatter coastal land contains denser and more continuous development, while for the steeper southern areas the settlement pattern is more fragmented (see Figure 6).

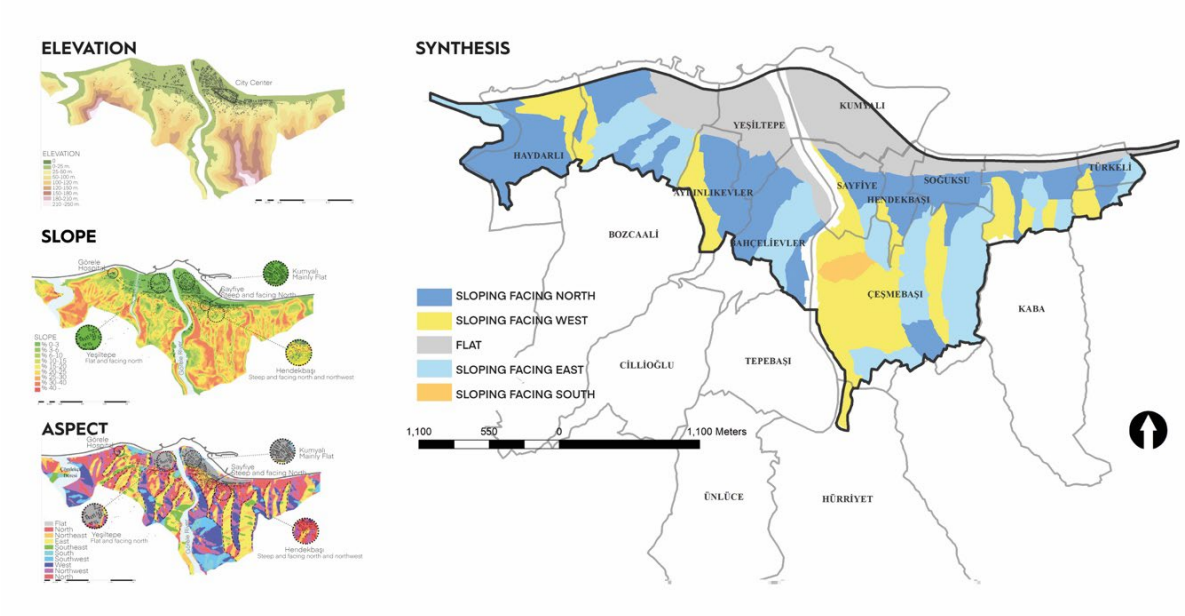

Figure 6 Natural–environmental analysis of Görele

Aspect analysis was effected in order to examine any impact of slope orientation on urban form. The typical coastal town of Görele has a sloping terrain facing north (Figure 6). The coastal zone (areas largely reclaimed following sea-infill) is relatively flat, with the higher and steeper parts of the settlement being distributed across slopes with different aspects. They include largely north-, east-, west-, and south-facing slopes, each forming a different topographic setting within Görele's ridge and valley structure. It is noteworthy that the natural structure of Görele is shaped by elevation and slope, as well as aspect.

Hence, 5 natural character areas have been defined - (1) flat areas, (2) north-facing slopes, (3) west-facing slopes, (4) east-facing slopes, and (5) south-facing slopes (see Figure 6). Flat areas correspond largely to the center and later coastal development zones, while the sloping areas define more fragmented residential and rural edges. In that, built form patterns were created and differentiated by the natural structure.

5.3. Built Form and Land Use Structure

Among Görele's compact center, fragmented expansion areas, and rural southern parts a clear contrast has been revealed using analyses of built form and land use. Land use remains predominantly residential, while commercial and mix use functions are concentrated in the center and continue as roadside trade to the east and west. More than 60% of the planning area remains unconstructed, thus indicating the continuance of the southern areas' rural character (see Figure 7).

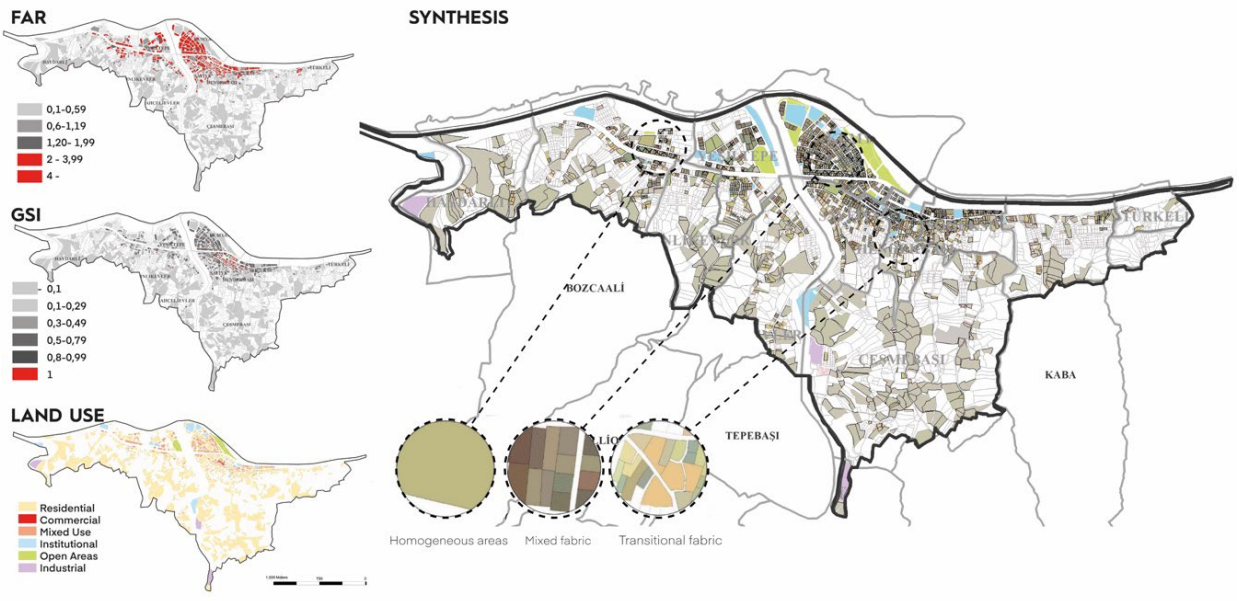

Figure 7 Built form and land use structure of Görele based on FAR, GSI, land use, and synthesized built form patterns

The center is the most dense part of the settlement, while the eastern and western expansion areas are more fragmented. Rural settlements on the southern ridges are sparse and along the roads. Plot size, FAR, GSI, and building height also vary clearly across the study area. Smaller-sized plots and higher density values dominate the center and the Kumyalı district, while larger-sized plots and lower densities are concentrated in the peripheral and rural areas. The newest high-rise development is visible in the Yeşiltepe district (see Figure 7).

The synthesis of plot size, floor area ratio (FAR/KAKS), ground space index (GSI/TAKS), building height, and land use all revealed recurring plot-level patterns (interpreted as homogeneous, mixed-fabric, and transitional-fabric built form areas). As shown in Figure 7, this layer guided the distinction of built form differences within the broader natural and historical structure and provided the third basis for the delineation of character areas later in the study (see Figure 7).

5.4. Synthesis and Delineation of Character Areas

The three analytical layers were evaluated in unison in order to identify areas where convergence of historical development, natural structure, and built form characteristics occurs. The final delineations were not derived from a single variable, but were drawn rather where the historical, natural, and built form analyses showed consistent spatial differentiation. The resulting character areas are presented in Figure 8.

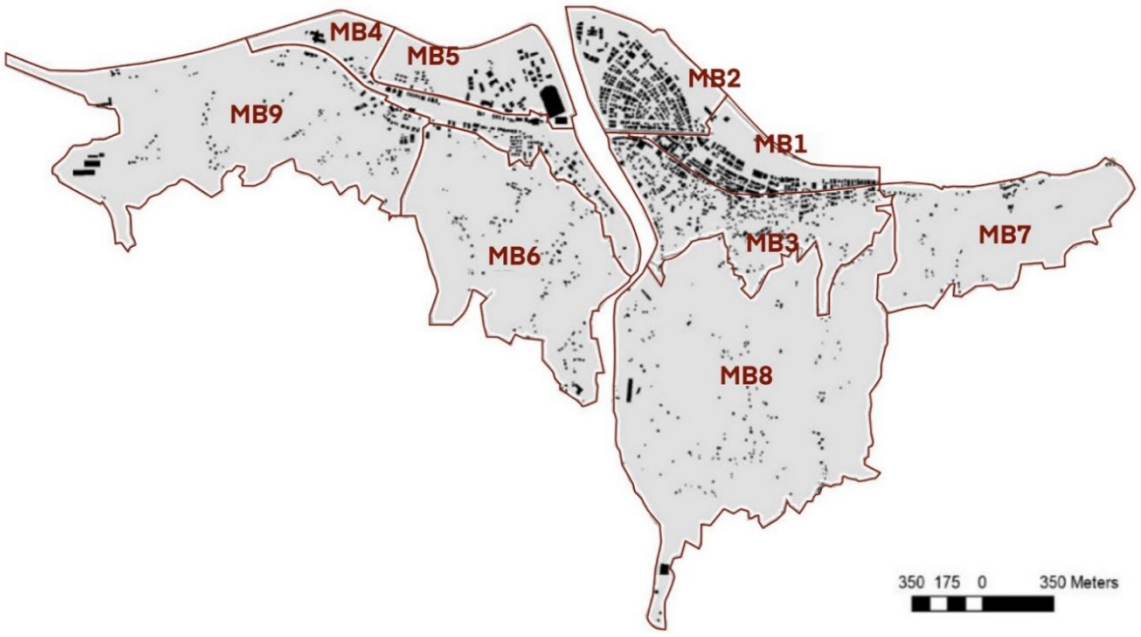

Figure 8 Görele–delineation of character areas

The synthesis yielded 9 character areas (see Figure 8) which have differences in their topography, development period, plot structure, density, and building pattern. Some areas represent the dense and historically layered town center, while other areas show planned expansion, linear growth, or rural and semi-rural character; thus, delineation is not based solely on density. The synthesis also shows how historical development, environmental conditions, and built form vary across Görele. The morphological basis of the delineation is summarized in Table 2 as per the characteristics of each character area: (1) location, (2) street pattern, (3) land use and building form, and (4) plot-density.

Table 2 Character Areas in Görele

Character area	Location	Street pattern	Land use and building form	Plot structure and density
MB1	Central flat historical core	Grid	Commercial and mixed use; attached and detached buildings	Small plots; highest ground coverage (median GSI 0.88, median FAR 3.42); median 4 storeys
MB2	West of the center on flat reclaimed land; Kumyalı	Arc-shaped grid	Planned residential area with ground-floor commercial use along main roads	Medium-sized plots; compact residential fabric; median GSI 0.50, median FAR 2.90; median 5 storeys
MB3	South of the centre on sloping ridges; Soğuksu, Sayfiye, and Hendekbaşı	Organic/linear ridge roads with dead-end streets	Residential area with traditional houses, family apartments, and highrise apartment blocks	Medium-sized plots; lower density than the centre; median GSI 0.40, median FAR 1.20; median 3 storeys
MB4	West of the centre along the main road corridor; part of Yeşiltepe	Linear	Mixed residential, roadside commercial use, and some production uses	Medium-sized plots; linear roadside growth; median GSI 0.39, median FAR 1.92; median 5 storeys
MB5	West of the centre on flat delta land; Yeşiltepe	Incomplete	Recent high-rise residential area with detached and block development	Large plots; high intensity but incomplete consolidation; median GSI 0.40, median FAR 3.50; median 7 storeys
MB6	Southwestern slope area; Aydınlıkevler and Bahçelievler	Linear ridge roads with dead-end streets	Residential area with rural garden houses and scattered clusters	Large plots; low density; median GSI 0.08, median FAR 0.19; median 3 storeys

MB7	Eastern sloping area near the coast; Türkeli	Linear ridge roads with dead-end streets	Residential area with rural character	Large plots; low density; median GSI 0.10, median FAR 0.22; median 2 storeys
MB8	Southern steep rural zone; Çeşmebaşı	Linear north–south ridge roads	Sparse residential and rural garden houses, with tall apartment blocks along the valley road	Largest plots; lowest density; median GSI 0.03, median FAR 0.06; median 2 storeys
MB9	Western peripheral slope area; Haydarlı	Linear ridge roads with dead-end streets	Mixed residential and commercial uses with rural characteristics	Large plots; low density; median GSI 0.16, median FAR 0.34; median 3 storeys

The Table 2 shows that the identified areas can be grouped into compact central areas (MB1–MB2), historically layered and transitional areas (MB3–MB4), a recent high-rise development area (MB5), and lower-density rural or semi-rural peripheral areas (MB6–MB9). The character areas were delineated according to differences in historical development, natural setting, and spatial structure.

5.5. Statistical Evaluation and Transect Interpretation

In the final part of the findings, the character areas were tested statistically to see whether they also differed in plot structure and development intensity. For this purpose, non-parametric tests were applied to plot area, GSI, FAR, and number of storeys. The results are given in Table 3.

Table 3 Statistical Evaluation of the Character Areas and the Main Rural-to-Urban Gradient

Variable	**Kruskal–Wallis H**	**p**	**Spearman[1] rho**	**p**	**Trend along the gradient**
Plot area	796.115	< 0,001	- 0.500	< 0.001	decreases toward the urban end
GSI (TAKS)	903.307	< 0,001	0.653	< 0.001	increases toward the urban end
FAR (KAKS)	813.867	< 0,001	0.620	< 0.001	increases toward the urban end
Building Height (Number of storeys)	489.797	< 0,001	0.401	< 0.001	increases toward the urban end

The Kruskal-Wallis H test showed significant differences among the character areas for all four variables: plot area ($H = 796.115$, $p < 0.001$), GSI ($H = 903.307$, $p < 0.001$), FAR ($H = 813.867$, $p < 0.001$), and number of storeys ($H = 489.797$, $p < 0.001$). These results represent that the character areas also differ statistically in terms of selected building and plot variables. However, this does not mean that the same boundaries could be drawn using these variables alone. The areas were delineated through a combined reading of historical development, natural-environmental structure, and built form. Therefore, the statistical analysis supports the delineation but does not replace the synthesis.

The character areas were also examined along a rural-to-urban gradient introduced earlier as an evaluative planning lens. Moving toward the urban centre, plot sizes decrease, while GSI, FAR, and building height increase. is illustrated by The sequence: MB8, MB6, MB3, MB4, MB2, MB1 (see Figure 9) illustrates this transition from low-density peripheral and rural areas to the dense urban core. The gradient highlights the general sequence of transition and reveals points where spatial patterns shift.

[1] Spearman correlations were calculated for the ordered subset of character areas included in the main rural-to-urban sequence.

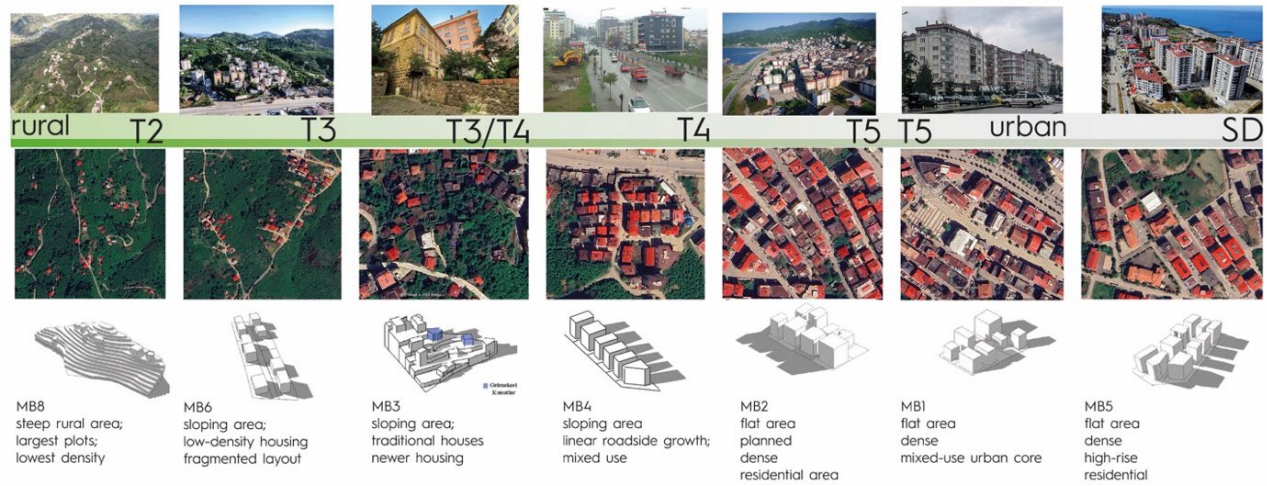

Figure 9 Transect interpretation in Görele

Also analytically important finding, not all character areas could be placed within this ordered sequence, in that MB5, MB7, and MB9 indicate where the settlement departs from a balanced gradient and where recent development has resulted in consolidated forms that are fragmented or incompletely consolidated. For instance, MB5 is a recently developed high-rise area with density values similar to the urbanized part of the transect. However, the plot structure, incomplete road system, and unfinished development of MB5 distinguish it from the dense urban core. In that, identification of continuity and imbalance within the settlement is assisted in this study by the transect.

5.6. Planning Interpretation of Character Areas

Here, the present authors summarize 3 implications for urban planning practice:- (1) character area delineation proposes a more differentiated basis for planning than solely density categories because even when there are density values over areas, any appropriate planning response may be different. (2) the methodology can identify positioning of misaligned density, form, and context, thus highlighting areas have occurrence of high-density growth with no adequate integration into the urban context. (3) the methodology operates at a scale that is relevant to the urban planning process and creates units that remain legible across the entire planned area, which would subsequently guide zoning and development. Where plot-level planning decisions on density are required, these areas can be further subdivided; but, the broader delineation is important for preserving the settlement character that has developed over time.

6. Discussion

The case of Görele shows that character areas can be delineated through the combined reading of historical, natural, and built form layers, and that the resulting areas are usable in planning terms. In this respect, the study returns to the foundations of the historico-geographical tradition: the delineation follows the logic of morphological regionalization established by Conzen (1969), in which the town plan, building fabric, and land use are read together as historically layered components of the urban landscape. Nine character areas were identified, ranging from the compact mixed-use centre and planned residential expansion to recent high-rise development and rural or semi-rural slope areas. After, Statistical analysis demonstrates that these boundaries are not arbitrary; however, the delineation was not based on any single layer, and boundaries were drawn only where at least two of the three layers changed together. Making these steps explicit responds to recent calls for procedural clarity in regionalization studies (Oliveira & Yaygın, 2022). At the same time, existing procedural frameworks remain largely confined to the built components of urban form; the present study extends them by using the natural setting as a primary layer of the delineation.

The findings also indicate what is gained when the natural setting is treated as a primary analytical layer rather than a background condition. In Görele, the 30 m contour, the stream valleys, and the ridge structure carried a substantial part of the character area perimeters, and the natural-environmental layer formed the initial spatial framework of the synthesis undertaken. This supports the argument of Kropf (2009) that natural elements can be embodied in morphological analysis in unison with historical development and built form, and promotes the fact that in topographically constrained settlements this incorporation is necessary to provide a coherent delineation.

This is also applicable to the transect interpretation, whereby the main sequence from (a) the rural southern slopes to (b) the dense coastal core confirms that the delineated areas form a coherent slope. However, areas MB5, MB7, and MB9 could not be placed in this sequence although they proved more informative (analytically) than the sequence itself, indicating where recent development has produced fragmented or poorly consolidated forms. This information can be interpreted to indicate that the transect is more valuable as an analytical / evaluative aspect in morphological research, and not simply as a prescriptive code (Talen, 2002), especially regarding where the rural-to-urban transition is uneven and shaped by terrain in settlements.

It is noteworthy that the above findings are particularly relevant in the Eastern Black Sea with its topographically constrained coastal towns are created by strong internal contrasts within (1) a limited urban area steep terrain, (2) narrow coastal plains, and (3) reclaimed land, whereby the historical, environmental, and morphological character that shapes the adaptive capacity of the town is threatened by any density-driven development. The focus on Görele in the present study gives empirical support for the concern that data and density-based classifications could potentially reduce any complex characters to solely density measures (Kropf, 2013b; Birkhamshaw & Whitehand, 2012). In that, several areas have similar density values but these areas differ greatly in (1) plot pattern, (2) street structure, and (3) historical development, and would need different planning responses as a result. In the planning context pertinent to Tükiye, with development controlled largely through density rights and that usually proceeds plot by plot (Balamir, 1975; Ünlü, 2026), character area delineation would certainly provide a viable means to make these differences clearly visible at the pertinent scale where important zoning decisions are established.

This study has some noteworthy limitations. (1) The delineation process involves interpretive decisions, especially in transition areas, and this is a common feature of urban character analysis and should not be perceived as a flaw inherent only in this method. (2) As this study has a focus on one case in particular, in future studies the methodology needs to be tested in other coastal and topographically differentiated settlements before defining broader generalizations. (3) The dependence of the methodology on cadastral and archival data may also limit its direct transfer to settlements with incomplete records. (4) The scope of the present study diverts from conventional morphological regionalization: the methodology lacks accurate historical data on how the street and plot systems changed over time when covering the overall planned area, and as a result does not trace plan-unit evolution in great detail. Rather, the study prioritizes applicability over morphogenetic depth by linking the established urban morphology methodology to the urban planning process.

7. Conclusion

In the present study, a methodology was developed and tested for delineating character areas in a coastal town named Görele which has been shaped by historical development, topographic constraints, and recent urban growth. The study results demonstrate that character areas cannot be explained by using solely density variables. While there were significant differences concerning plot size, GSI, FAR, and building height among the areas, the final delineation had great reliance on the combined interpretation of historical formation, natural setting, street pattern, plot structure, land use, and building form.

This case study demonstrates that character area analysis can be useful in urban planning for distinguishing among areas with different developmental pressures and spatial capacities, including (1) dense historical center, (2) planned residential expansion areas, (3) recent high-rise development zones, and (4) rural or semi-rural areas. The transect interpretation confirmed a general sucession from rural gradient areas to the dense urban core, while also pinpointing areas that do not comply with a simple linear gradient. Character area delineation can therefore support planning decisions that respond more closely to local topography, urban form, and development pressure. It also provides a framework that can be applied in other small settlements where formal planning has treated morphologically distinct areas as uniform developable land. Where specific planning provisions apply, land is regulated accordingly; elsewhere, however, areas are often treated as equivalent despite their morphological and environmental differences. The character areas proposed in this paper are not intended to replace existing planning provisions, but to complement them by making these differences more visible within the planning process.

CRediT Authorship Contribution Statement

Beyza Karadeniz: Writing – review & editing, Writing – original draft, , Methodology, Investigation, Formal analysis, Data curation, Conceptualization, Data visualization. Yelda Aydın Türk: Writing – review & editing.

Declaration of Competing Interest

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

Data Availability

Data will be made available on request.

Ethics Committee Approval

Ethics committee permission is not required.

Acknowledgements

This article is based on the first author's doctoral dissertation entitled "Urban Morphology as a Method in City Planning: Görele"*, completed in 2020 at Karadeniz Technical University, Graduate School of Natural and Applied Sciences, Trabzon, Türkiye.*

References

An, X., & Gu, K. (2018). Urban intensification and the character of urban landscape: A morphological perspective. *International Journal of Architectural and Environmental Engineering*, *12*(9), 898-902.

Arat, M. (2023). *Morphological regionalization*. Springer.

Arslan, M. (1973). *Görele coğrafya, tarih, folklor, yönetim*. San Matbaası.

Aydin, S., Çelebioğlu, B., & Aytuğ, A. (2024). Morphological analysis of historical urban landscape through heritage transect: A computational model. *Journal of Digital Landscape Architecture*, *9*, 354-364.

Balamir, M. (1975). Kat mülkiyeti ve kentleşmemiz. *ODTÜ Mimarlık Fakültesi Dergisi*, *1*(2), 295-319.

Bilir, A. (2001). *Geçmişten günümüze tüm yönleriyle Görele*. Simurg Yayınları.

Birkhamshaw, A. J., & Whitehand, J. W. R. (2012). Conzenian urban morphology and the character areas of planners and residents. *Urban Design International*, *17*(1), 4-17. https://doi.org/10.1057/udi.2011.22

Boyko, D., Zuev, A., & Parygin, D. (2021). Land plot data usage for urban transect zones delimitation in case of Tula. In *XXVIII International Seminar on Urban Form (ISUF 2021): Urban form and the sustainable and prosperous cities*.

Conzen, M. R. G. (1969). *Alnwick, Northumberland: A study in town-plan analysis* (2nd ed.). Institute of British Geographers.

Conzen, M. R. G. (1988). Morphogenesis, morphological regions and secular human agency in the historic townscape, as exemplified by Ludlow. In D. Denecke & G. Shaw (Eds.), *Urban historical geography: Recent progress in Britain and Germany* (pp. 253-272). Cambridge University Press.

Duany, A., & Plater-Zyberk, E. (2003). *The SmartCode and manual*. New Urban Publications.

Emecen, F. M. (2020). *Karadeniz kıyı kentleri tarihi* (1st ed.). Turkuvaz Kitap.

Emecen, F. M., Yüksel, A., & Keskin, İ. (2019). *Görele tarihi*. Görele Belediyesi Kültür Yayınları.

Fan, Y., Zou, H., Zhao, T., Fan, B., & Cheng, Y. (2025). Typological mapping of urban landscape spatial characteristics from the perspective of morphometrics. *Land*, *14*(9), 1854. https://doi.org/10.3390/land14091854

Fleischmann, M., Feliciotti, A., Romice, O., & Porta, S. (2022). Methodological foundation of a numerical taxonomy of urban form. *Environment and Planning B: Urban Analytics and City Science*, *49*(4), 1283-1299. https://doi.org/10.1177/23998083211059835

Hall, P. (2008). The form-based development plan: Bridging the gap between theory and practice in urban morphology. *Urban Morphology*, *12*(1), 77-95.

Han, S. (2021). The use of transects for resilient design: Core theories and contemporary projects. *Landscape Ecology*, *36*(5), 1567-1582. https://doi.org/10.1007/s10980-020-01172-9

Jachimowicz, A. M. (2022). Morphology of Warsaw city structure using urban indexes and GIS tools. *Land*, *11*(1), 135. https://doi.org/10.3390/land11010135

Kropf, K. (2009). Aspects of urban form. *Urban Morphology*, *13*(2), 105-120.

Kropf, K. (2011). Morphological investigations: Cutting into the substance of urban form. *Built Environment*, *37*(4), 393-408.

Kropf, K. (2013a). Evolution and urban form: Staking out the ground for a more mature theory. *Urban Morphology*, *17*(2), 136-149.

Kropf, K. (2013b). Ambiguity in the definition of built form. *Urban Morphology*, *18*(1), 41-57.

Larkham, P. J., & Morton, N. (2011). Drawing lines on maps: Morphological regions and planning practices. *Urban Morphology*, *15*(2), 133-151.

Monteiro, C., & Pinho, P. (2022). Comparing approaches in urban morphology. Journal of Urbanism: *International Research on Placemaking and Urban Sustainability*, *15*(4), 491_518. https://doi.org/10.1080/17549175.2021.1936602

Moudon, A. V. (1997). Urban morphology as an emerging interdisciplinary field. *Urban Morphology*, *1*(1), 3-10. https://doi.org/10.51347/jum.v1i1.4047

Musard, C. (2023, July 10). *Theorizing the rural_urban transect*. CNU. https://www.cnu.org/publicsquare/2023/07/06/theorizing-rural-urban-transect

Oliveira, V. (2006). The morphological dimension of municipal plans. *Urban Morphology*, *10*(2), 101-113. https://doi.org/10.51347/jum.v10i2.3929

Oliveira, V., & Yaygın, M. A. (2022). The concept of the morphological region: Developments and prospects. *Urban Morphology*, *24*(1), 35-52.

Peck, J., Theodore, N., & Brenner, N. (2009). Neoliberal urbanism: Models, moments, mutations. *SAIS Review of International Affairs*, *29*(1), 49-66.

Şengül, H. T. (2009). *Kentsel çelişki ve siyaset: Kapitalist kentleşme süreçlerinin eleştirisi*. İmge Kitabevi.

Talen, E. (2002). Help for urban planning: The transect strategy. *Journal of Urban Design*, *7*(3), 293-312. https://doi.org/10.1080/1357480022000039349

Talen, E. (2023). Transect-based coding: A methodology. In H. Kamalipour, P. Aelbrecht, & N. Peimani (Eds.), *The Routledge handbook of urban design research methods* (1st ed.). Routledge. https://doi.org/10.4324/9781003168621

Tekeli, İ. (1994). Şehir planlama mimarlık üzerine sürülen bir krema değildir. *Planlama*, 10-21.

Turkish Statistical Institute. (2025). *Population of province/district centers and towns/villages by province and district* [Data set]. TurkStat Data Portal. https://veriportali.tuik.gov.tr/tr/databrowser/tuik/TR,DF_ADNKS_T22,1.1

Ünlü, T. (2026). İdeallerin Kenti'nden parçalanan Kent'e: Türkiye kentlerinde değişim ve dönüşüm. In A. Gürün & P. Çobanyılmaz (Eds.), *Cumhuriyetin 100. yılında planlama*. İdealKent Yayınları.

Vartholomaios, A. (2025). Detection and clustering of urban form types with machine learning: Insights into Thessaloniki's urban planning and evolution. *Computational Urban Science*, *5*(1), 51. https://doi.org/10.1007/s43762-025-00206-9

Whitehand, J. W. R. (2005). Understanding and shaping urban landscape character. *Urban Morphology*, *9*(2), 1-3. https://doi.org/10.51347/jum.v9i2.5139

Whitehand, J. W. R., & Morton, N. J. (2004). Urban morphology and planning: The case of fringe belts. *Cities*, *21*(4), 275-289. https://doi.org/10.1016/j.cities.2004.04.001

Resume

Beyza Karadeniz is an Assistant Professor in the Department of City and Regional Planning, Faculty of Architecture, Karadeniz Technical University, Türkiye. She received her undergraduate degree in Urban and Regional Planning from Istanbul Technical University in 2010, her master's degree in Landscape Architecture from Clemson University in 2013, and her Ph.D. in City and Regional Planning from Karadeniz Technical University in 2020. Her research focuses on urban morphology, urban geography, planning education and the social dimensions of planning and design.

Yelda Aydın Türk is a Professor in the Department of City and Regional Planning, Faculty of Architecture, Karadeniz Technical University, Türkiye. She received her bachelor's degree in Architecture from Karadeniz Technical University in 1997, her master's degree in Architecture from Karadeniz Technical University in 2001, and her Ph.D. in Architecture from Karadeniz Technical University in 2006. Her research focuses on urbanism, planning, design, and architecture.