



A Framework for Evaluating the Sustainability of Multilayered Historic Rural Cultural Landscapes: The Case of Tahtalı Neighborhood, Bursa

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Abstract

This study examines Tahtalı Neighborhood in Nilüfer district of Bursa as a multilayered rural cultural landscape area where layers from the Ancient, Byzantine, and Ottoman periods can be read together. The research employed a qualitative method; literature review, historical data analysis, fieldwork, on-site observation, photographic documentation, and spatial analyses were considered together. The findings show that historical layers from the Ancient, Byzantine, and Ottoman periods can be read together within the same topographical system in Tahtalı Neighborhood. The area has been documented as a multi-layered rural cultural landscape where defensive structures, religious sites, necropolis areas, rural settlement patterns, and social memory are integrated. Accordingly, the study proposes a holistic and relational assessment framework called the "Multi-Layered Rural Cultural Landscape Continuity Framework" for the preservation and evaluation of multi-layered rural cultural landscapes.

Keywords: Cultural Landscape, Spatial Continuity, Rural Heritage, Tahtalı Neighborhood, Cultural Heritage and Conservation.

Çok Katmanlı Tarihi Kırsal Kültürel Peyzajların Sürdürülebilirliğinin Değerlendirilmesine Yönelik Bir Çerçeve: Bursa Tahtalı Mahallesi Örneği

Öz

Bu çalışma, Bursa'nın Nilüfer ilçesindeki Tahtalı Mahallesi'ni, Antik, Bizans ve Osmanlı dönemlerine ait katmanların birlikte okunabileceği çok katmanlı bir kırsal kültürel peyzaj alanı olarak incelemektedir. Araştırmada nitel yöntem kullanılmış; literatür taraması, tarihi veri analizi, saha çalışması, yerinde gözlem, fotoğrafik dokümantasyon ve mekânsal analizler birlikte ele alınmıştır. Bulgular, Tahtalı Mahallesi'nde Antik, Bizans ve Osmanlı dönemlerine ait tarihi katmanların aynı topografik sistem içinde birlikte okunabildiğini göstermektedir. Bölge; savunma yapıları, dini mekanlar, nekropol alanları, kırsal yerleşim düzenleri ve sosyal hafızanın bütünleştiği çok katmanlı bir kırsal kültürel peyzaj olarak belgelenmiştir. Bulgular, tarihi katmanlar arasındaki mekânsal sürekliliğin ve topografik ilişkilerin bölgenin kültürel kimliğini şekillendirdiğini ortaya koymaktadır. Buna göre, çalışma, çok katmanlı kırsal kültürel peyzajların korunması ve değerlendirilmesi için "Çok Katmanlı Kırsal Kültürel Peyzaj Süreklilik Çerçevesi" adı verilen bütünsel ve ilişkisel bir değerlendirme çerçevesi önermektedir.

Anahtar kelimeler: Kültürel Peyzaj, Mekânsal Süreklilik, Kırsal Miras, Tahtalı Mahallesi, Kültürel Miras ve Koruma.

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1. Introduction

Rural cultural landscapes emerge as a result of long-term interactions between people and the natural environment. These areas are complex heritage sites where spatial, social, and cultural layers from different historical periods. They are gathered within the same settlement system (UNESCO, 1992; Taylor & Lennon, 2012). These areas contain complex heritage elements and these areas are more than physical structures. Beyond the physical building complex, they contain all the tangible and intangible elements representing the area. Topography, defense systems, religious structures, settlement structures, production relations, and elements of social memory are some of these elements. However, in current conservation approaches, all these tangible and intangible elements contained within complex, layered rural landscapes are often evaluated, individually or in combination with a few other elements. Consequently, this fragmented approach makes it difficult to read the historical continuities and spatial relationships in the area as a whole. This situation obscures the relationships between the layers of the cultural landscape and leads to the invisibility of the area's identity (Mitchell et al., 2013; Jones, 2003).

An examination of previous studies on cultural landscape conservation in the literature reveals the following: Firstly, the most important priority in these studies should be the holistic assessment of settlements with all their elements. Studies, particularly those focusing on European countries, indicate that the topography, defense systems, road layouts, and settlement patterns in rural areas are also elements of heritage. They emphasize, the need for careful research and holistic evaluation of all landscape elements in the area (Fowler, 2003; ICOMOS-IFLA, 2017). UNESCO's 1972 World Heritage Convention defines cultural heritage elements in rural cultural landscapes : "the joint effort of man and nature" (UNESCO, 1992). This approach underscores, the need for the holistic conservation of these multi-layered landscapes. It is reflect historical, social, and spatial traces accumulated over time.

An examination of research on rural cultural heritage landscapes in Türkiye highlights several key issues. Firstly; these studies often focus on individual structures. For example, areas such as Cumalıkızık, Safranbolu, Mardin, and Cappadocia are frequently studied. However, within the Turkish context, studies comprehensively examining the continuity and legibility of layers from different historical periods, within the same spatial system are still limited. In particular, the spatial relationship between archaeological heritage and living rural structures is clearly not adequately addressed. Significant methodological gaps are observed in studies It is conducted in Türkiye regarding the integrated evaluation of cultural memory elements and physical landscapes. In this context; this study aims to address this gap in the literature by proposing an evaluation framework, for the integrated assessment of physical landscapes. The study area is the Tahtalı neighborhood in the Nilüfer district of Bursa. The study aims to evaluate the continuity of the multi-layered rural cultural landscape structure of the Tahtalı neighborhood through the proposed evaluation framework. The proposed "Multilayered Rural Cultural Landscape Continuity Framework" offers a holistic approach to understanding the multilayered structure of the area by considering its various dimensions (historical layers, spatial relationships, topographical continuity, cultural memory, and legibility).

1.1.State of art

The concept of cultural landscape in conservation has experienced a major leap in the second half of the 20th century. In 1992, UNESCO officially included the definition of "cultural landscape" in its World Heritage Operational Guidelines. This changed the perspective that cultural landscapes are the natural and monumental elements within an area. The idea that cultural landscape elements are the product of long-term interaction between humans and nature, and that they are formed by accumulating layer by layer over the years, began to take root (UNESCO, 1992). With this perception, conservation efforts have brought multi-layered rural cultural landscapes to the forefront.

Current literature research has begun to include spatial, social, economic, and symbolic dimensions (Taylor & Lennon, 2012). In successful examples from Europe, the long-term relationship between topographic continuity and cultural practices has been analyzed and concluded in detail. Val d'Orcia in Italy (UNESCO, 2004), the Loire Valley in France (UNESCO, 2000), the Lake District in England (UNESCO,

2017), the Upper Middle Rhine Valley in Germany (UNESCO, 2002), and the Rioja wine cultural landscape in Spain are examples of this (Fowler, 2003; ICOMOS-IFLA, 2017). The Jiufeng-Sheshan Historic Rural Area (Shanghai), ancient agricultural systems, topographic adaptation, and living cultural practices have been examined together. In these studies, spatial continuity has been analyzed using the "cultural landscape genes" approach (Li et al., 2024; Hua & Zhou, 2015).

A significant portion of the studies conducted in Türkiye on rural heritage focuses on areas such as Cumalıkızık, Safranbolu, Mardin, Cappadocia, and Bergama. These studies undoubtedly make important contributions to the preservation of traditional architectural fabric and the revelation of the characteristics of rural settlements. However, the number of studies addressing the spatial continuity of rural settlements, the interaction between topography and cultural memory, and the simultaneous evaluation of layers from different historical periods is quite limited. Similarly, the relationship between elements constituting cultural memory, such as oral history, collective memory, migration, and war memory, and the rural cultural landscape is not sufficiently examined in the literature. Existing studies generally, focus on specific heritage elements or individual periods. Systematic frameworks that evaluate the spatial relationships between different historical layers, the continuity of topography, and the different dimensions of cultural memory with a holistic approach are limited. This situation points to a significant methodological gap, in the analysis of complex rural cultural landscapes. This study aims to contribute to filling this gap by proposing an evaluation framework for measuring the continuity of multi-layered rural cultural landscapes, using the Tahtalı Neighborhood as an example.

1.2. Study Area: Tahtalı Neighborhood

Tahtalı Neighborhood is located 15 km from the city center of Bursa (Figure 1).

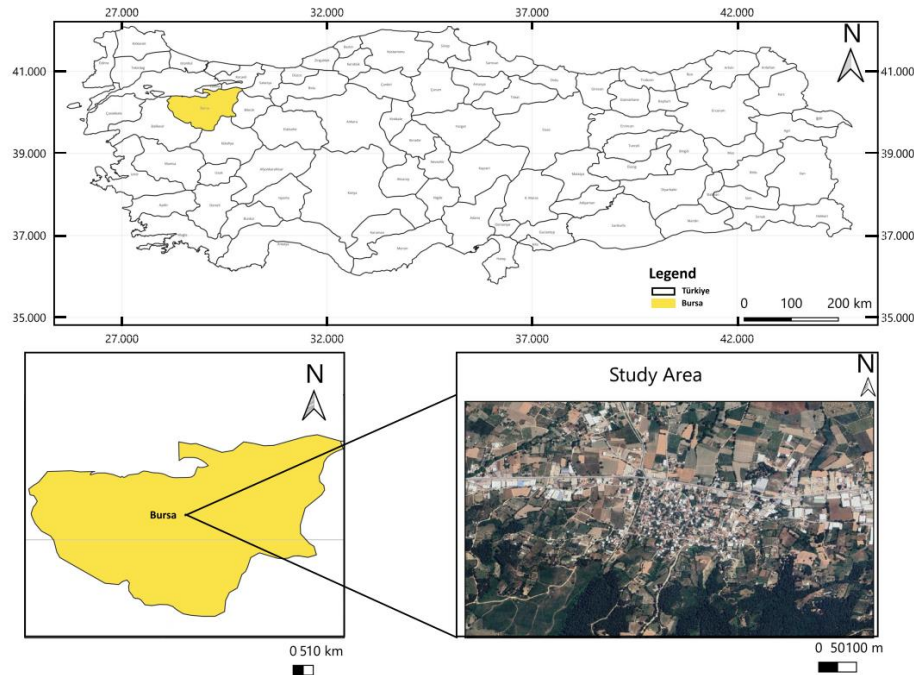


Figure 1. Location of Tahtalı Neighborhood in Bursa (adapted from Google Earth).

The Tahtalı Neighborhood, which is still inhabited today, was later established on top of an ancient settlement whose surface materials indicate a history dating back to the 2nd century BC. Necropolis areas are located in the eastern and western parts of the settlement, and on the southern part, on a strategically important hill, also known as File Tepe, which is the highest peak, there are remnants of a watchtower structure. The boundaries of the urban-archaeological, 1st, 2nd, and 3rd degree archaeological sites were determined by the decision of the Bursa Cultural and Natural Heritage Protection Board dated 10/09/1999 and numbered 7380. The urban archaeological site was transformed into an archaeological site by the decision of the Bursa Regional Board for the Protection of Cultural and Natural Heritage dated 25/08/2005 and numbered 839. By decision number 183 dated

18/11/2011 of the Bursa Regional Board for the Protection of Cultural Heritage, it was decided to register 7 monumental structures and 63 examples of civil architecture located in the village center as immovable cultural heritage requiring protection. By decision number 10768 dated 30/09/2021 of the Bursa Regional Board for the Protection of Cultural Heritage, urban site boundaries were determined around the registered structures (Bursa Regional Board for the Protection of Cultural Heritage, 2021).

The Tahtalı neighborhood in the Nilüfer district of Bursa province is partially located within the city walls of the ancient city. Today, a section of the city wall, approximately 2 meters high and 100 meters long, extending north-south, remains standing in the southern part of the village. Ceramic materials and city ruins from the ancient city were used in the construction of existing buildings by means of adobe. From ceramic materials and marble architectural fragments, it can be determined that the history of the ancient city extends back to the 2nd century BC (Bursa Regional Board for the Protection of Cultural Heritage, 2021).

2. Method

This research employed a qualitative research method. The study included literature and historical data analysis, fieldwork and on-site observation, spatial and morphological analyses, and archival cultural memory assessments.

In the first stage of the research, a literature review was conducted regarding Tahtalı Neighborhood and its surroundings. Decisions of the Regional Conservation Board, archival documents, local history studies, old maps, and relevant academic publications were evaluated. The layered historical development process of the region was investigated. In the second stage, on-site investigations were conducted. During this process, castle ruins, wall systems, necropolis areas, the ruins of the Hagios Theodoros Church, traces of the watchtower at Filetepe, the historical mosque, the traditional settlement pattern, and old Greek houses were examined on-site. The current condition of the structures, their relationships with each other, their connections with the topography, and their viewing angles were documented with photographs.

Thirdly, spatial layer analysis and morphological analysis were conducted to reveal possible continuities between the ancient defense system and the Ottoman-era rural settlement pattern. Within the scope of spatial analysis, defense structures, religious structures, necropolis areas, and settlement patterns were evaluated in terms of their relationships with the topography. In the morphological analysis, the village's street layout, building orientations, slope-based settlement patterns, and defense-oriented spatial organization were examined. Finally, in order to reveal the relationship between the physical landscape and the social memory of the region, the components of cultural memory were investigated. All data obtained from the archives, including local oral narratives, legends about the tunnel said to be between the castle and Ürünlü Castle, memories related to the War of Independence, Turkish-Greek coexistence culture, and current visitor practices, were analyzed.

Finally, within the scope of this study, a "Multilayered Rural Cultural Landscape Continuity Framework" was developed using Tahtalı Neighborhood as an example. This framework offers a systematic framework aimed at evaluating the readability of spatial layers. This layersis belonging to different historical periods in multilayered rural settlements. The framework components were created by considering the main evaluation areas that stand out in cultural landscape theory, historical environment analyses, spatial organization studies, and cultural memory literature.

The developed framework consists of five main components. These elements are followed. It is analysis framework, historical layer analysis, spatial organization analysis, topographic continuity analysis, cultural memory analysis, and spatial readability analysis. The framework, iteratively developed based on literature reviews, field studies, and spatial analyses, is applicable not only to Tahtalı Neighborhood but also to rural settlements where different historical layers coexist. The reasons for selecting these analyses are as follows:

- (I) Historical layer analysis aims to determine the continuity of different periods within the settlement.

- (II) Spatial organization analysis examines the relationships between defensive structures, religious structures, and the rural fabric.
- (III) Topographic continuity analysis aims to evaluate the impact of topography on settlement decisions.
- (IV) Cultural memory analysis investigates the spatial counterparts of oral narratives and collective memory.
- (V) Spatial readability analysis is included in the framework to reveal the extent to which historical layers are perceived today.

This evaluation approach to be applied in the research; This framework is compiled from proposals in studies that argue cultural landscapes should be read by considering spatial relationships, environmental continuity, and social memory together (Corner, 1999; Smith, 2006; Antrop, 2005; Fairclough, 2008; Taylor & Lennon, 2011; Nora, 1989). The detailed structure of the framework and its methodology are presented below (Figure 2).

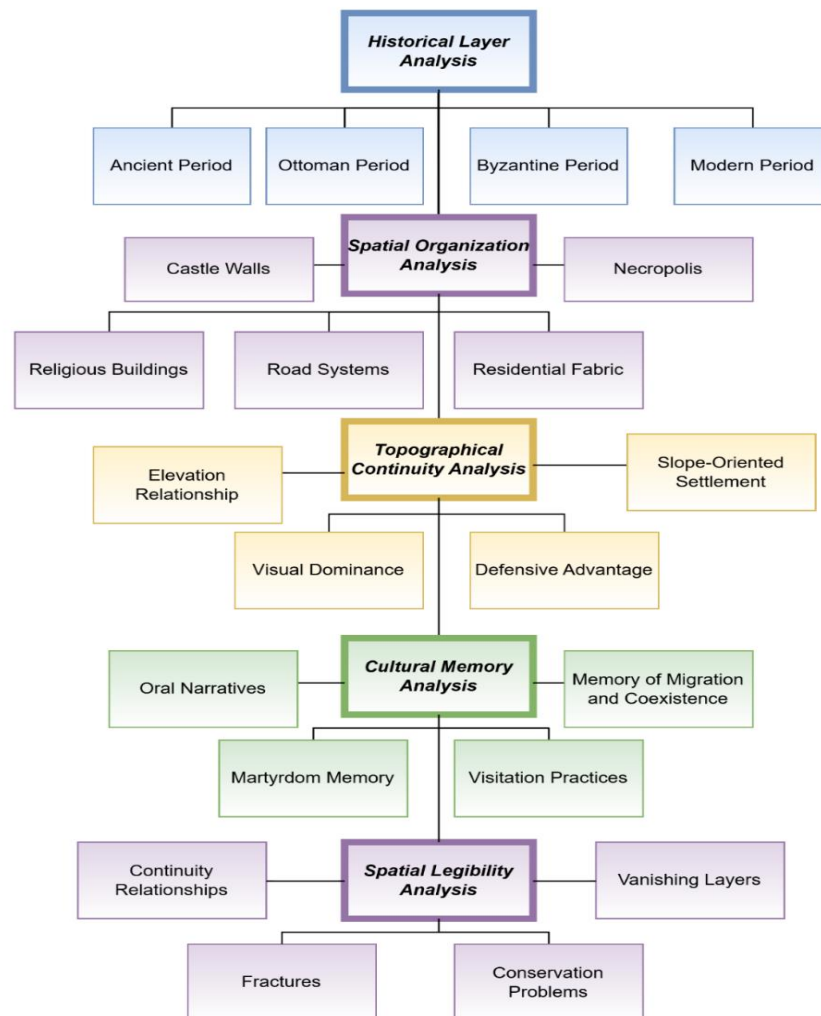


Figure 2. Sustainability Assessment Framework for Multilayered Rural Cultural Landscapes (Author, 2026)

3. Findings

In this section, Tahtalı Neighborhood was analyzed in accordance with the Multilayered Rural Cultural Landscape Continuity Framework developed within the scope of the study. The structural diagram of the model is presented in Figure 2.

3.1 Historical Layer Analysis

Bursa's Tahtalı neighborhood is considered, according to the literature, to be the earliest settlement in Bursa. Based on historical findings, experts estimate the region's history to date back to around 3000 BC. Believed to be a rural settlement with continuous habitation from antiquity to the present day, the area contains spatial traces from the Ancient, Byzantine, and Ottoman periods. The most significant historical finds include castle ruins and city walls, cemeteries, and pottery. The castle ruins and city walls indicate that the area was primarily defensive from the beginning, and architectural and archaeological findings suggest that the settlement dates back to the 2nd century BC (Bursa Regional Cultural Heritage Protection Board, 2021).

Byzantine-era remains are prominent in the area. These include the ruins of the Hagia Sophia Church and the Filetepe observation terrace. Experts believe that the Hagia Sophia Church is one of the oldest churches in Bursa that has survived from the Byzantine period to the present day. The presence and prominence of defense systems and artifacts in the region indicate that the defense system in the area continued from antiquity to the Byzantine period. The central location of religious structures in the region shows that Tahtalı Neighborhood was an important center for both defense and religious purposes during the Byzantine period (Figure 3).



Figure 3. Remains of the ancient city walls (Bursada Bugün, 2014).

Looking at another period in this region, the Ottoman period is observed. During the Ottoman period, a multicultural rural settlement structure where Turks and Greeks lived together is observed in the region. It is also known that this region was one of the settlements where the Greek population was in the majority during the Ottoman period. The main Ottoman-era artifacts in the region consist of traditional rural residential architecture and old Greek houses (Bursa Regional Cultural Heritage Protection Board, 2021; Bursa'da Kültür, 2026) (Figure 4).



Figure 4. Examples of traditional houses (Author, 2026)

Among the Ottoman-era structures in the village, there is also a historical mosque believed to have been built in the 1850s (Bursa Regional Board for the Protection of Cultural Heritage, 2021). The historical mosque, which was recently restored, is one of the finest examples of Ottoman civil architecture on a village scale (Figure 5).



Figure 5. Exterior(a) and interior (b)images of Tahtalı Village Mosque (Author, 2026)

The Tahtalı neighborhood, examined in this study, is an area that experienced the Turkish War of Independence. During this period, it suffered numerous attacks and fires. Remnants of a cemetery built for the villagers martyred by the Greeks during this time still exist. Tombstones remain as remnants in the village. In light of these historical values, the village settlement was placed under protection by the Monuments Board in 1999 (Bursa Regional Cultural Heritage Protection Board, 2021). Within this context, it is clear that the remains of the martyrs of the War of Independence constitute one of the most recent historical layers. When all this data is considered holistically, it is evident that the Tahtalı neighborhood is not merely an area consisting of individual structures from different periods. The conclusion drawn from these results is that the Tahtalı neighborhood is a region with a complex cultural landscape formed by the superposition of historical layers.

3.2 Spatial Organization Analysis

During the research process, the following findings were reached regarding the spatial structure of Tahtalı Neighborhood: The spatial structure of the area is directly related to the land and defense systems. The most important finding demonstrating this is that the castles, walls, religious structures, necropolises, and traditional settlement structures in the area developed together within the same spatial structure. The castle and wall complexes are placed on topographic elevations. The spatial arrangement in the area, taking the topography into account, shows that the defense structures were built using the natural topography. Another finding is that the wall system in the area shows a trace that defines the boundaries of the settlement. The existence of this trace clearly reveals that the spatial scheme of the neighborhood developed around this system. Another finding concerns the necropolis areas. In the area, the fact that the necropolis area is located on the east and west borders of the settlement reveals that the living and dying areas were planned within a specific organization. In the research conducted on religious structures within the spatial scheme of the area, the following findings were made. In the spatial arrangement of Tahtalı Neighborhood, religious structures such as the Hagia

Sophia Church and the historical village mosque are important focal points in the region. In other words, religious structures are central to the spatial layout of the area and occupy their place as the most important landscape elements (Antrop, 2005; Tuan, 1977; Limongiello et.al, 2026).

3.3 Topographic Continuity Analysis

The placement of buildings and cultural heritage elements in Tahtalı Neighborhood has been significantly influenced by the topography. Topography appears to be the most decisive factor in the placement of structures. Looking at the spatial settlements formed in different periods in the area, the formation of similar topographical settlements is noteworthy, indicating that topography is a compelling settlement element (Aşur et al., 2025). Elements showing that similar topographical preferences were maintained in different historical periods include. It is the settlement's location on the slopes of Uludağ, the prioritization of natural elevations providing defensive advantages, and the use of points providing visual control. The observation systems at Filetepe are particularly noteworthy. These observation systems demonstrate, that the land was used for defensive purposes. The castle and wall structures in the area, are located at points overlooking the surrounding valley. This shows that the natural topography of the area was an important part of the defense strategy. The spatial traces of the castle and wall structures in the area are evidence of a topographical continuity. This continuity is between the old defense system and the Ottoman rural settlement system (Çakan et al., 2026). Observational studies of traditional houses in the area have revealed that these architectural structures were also shaped in accordance with the topography. Traditional houses in Tahtalı Neighborhood are designed along the slopes. Looking at the street layouts in the neighborhood, the streets are also in accordance with the natural structure of the topography. The natural landscape in the area has been preserved. These findings show that the rural settlement pattern developed in harmony with the topography. When the settlement pattern that developed during the Ottoman period is examined, the same elevation systems and slope relationships are observed. This situation shows that the settlement logic has been largely preserved throughout the historical process (Figure 6).



Figure 6. In the street patterns of the neighborhood, the street weave follows the natural topography (Author, 2026)

3.4. Cultural Memory Analysis

A cultural examination of Tahtalı Neighborhood has revealed the following findings: The area's cultural memory is not solely derived from physical structures. The cultural memory of the area is also sustained through oral narratives and collective memory. Archival records show that the castle in the area is frequently mentioned in local stories. Particularly important is the legend of the tunnel said to be located between the castle and Ürünlü Castle, which is mentioned in these tales. These legends demonstrate that the cultural memory of past defense systems continues to this day. Another memory area in the region is the Cemetery of the Martyrs of the War of Independence. This area is one of the most important memory areas in the region. Here, there are the graves and tombs of villagers who fell

as martyrs in the War of Independence against the Greeks. The tombs erected for the martyrs frequently depict the weapons used to kill them. The depictions of weapons in the tombs clearly show the reflection of the war memory in the physical and spatial memory of the settlement structure where Turks and Greeks lived together during the Ottoman period. It is observed that Greek visitors still maintain their connection with the region today. The continuation of this connection shows that Tahtalı Neighborhood is an international cultural memory area. All these findings, obtained through observational methods and archival records, document that the cultural elements of Tahtalı Neighborhood are not limited to physical structures, but also include its social memory (Wang et al., 2025).

3.5. Spatial Readability Analysis

Today, different historical layers can be read together in the region. In particular, the architectural elements of the area, such as castle ruins, city walls, religious structures, traditional houses, and monumental areas, coexist within the same landscape system. However, it has been observed that the legibility of some historical layers in the area is gradually decreasing. Several reasons contribute to this, including. It is the fragmented preservation of archaeological remains. It is the fact that only the foundations of some architectural structures especially traditional ones, remain. The presence of modern interventions is in some archaeological sites due to their private ownership. All these reasons make it difficult, to read the rural cultural landscape of the region holistically. The insufficient visibility of the spatial relationships between the castle, necropolis areas, religious structures, and traditional housing fabric leads to a fragmented perception of historical layers. Therefore, the preservation of the cultural landscape of Tahtalı Neighborhood will not be possible solely through the restoration of individual buildings. The holistic preservation of the rural cultural landscape is only possible through the preservation of spatial relationships between the historical layers in the area. All these findings clearly show that the principles presented in UNESCO (1992) for the preservation of rural landscapes are not met in this respect. In this context, measures for holistic conservation should be taken as soon as possible.

4. Conclusion and Suggestions

The "Multilayered Rural Cultural Landscape Continuity Framework" proposed in this study offers a systematic approach aimed at addressing the fragmented assessment problem in the literature. The framework consists of five main components: historical layer analysis, spatial organization analysis, topographic continuity analysis, cultural memory analysis, and spatial readability analysis. Thus, archaeological, architectural, topographic, and memory-based data are evaluated together within the same analytical framework. This approach aims to provide a viable methodology for rural settlements by enabling the reading of the cultural landscape not only through period layers but also on the basis of continuity, relationality, and spatial context.

The findings obtained using the evaluation framework proposed in this study reveal that the region still contains an integrated cultural landscape system where defensive structures, religious sites, cemeteries, rural settlements, oral narratives, and collective memory coexist. These results demonstrate that there are landscape elements influencing rural heritage beyond physical structures. This supports studies explaining that restoration efforts focusing solely on physical structures are never sufficient for conservation and preservation in cultural landscape areas. Because, as seen in this region, the preservation and uncovering of heritage values in multi-layered areas requires examining the long-term relationships between people, nature, history, settlement patterns, and collective memory in the region. The study results support the need for a holistic assessment of cultural landscape areas, as stated by Sauer (1925) and UNESCO (2011). Another important finding of the study is that topography is a decisive element in the continuity of settlement. Indicators showing the importance of topography on settlements across all layers include: The settlements include defensively chosen elevations, vantage points providing visibility, slope-based settlement arrangements, and the observation system at Filetepe. These settlements demonstrate that similar spatial preferences continued in different periods. The topographical continuity between the ancient defense system and the Ottoman-era rural settlement model reveals that settlement decisions followed a similar spatial logic throughout history.

This aligns with approaches emphasized in rural landscape studies, such as "settlement-topography relationship," "development in harmony with the natural environment," and "defensive advantage" (Tuan, 1977; Limongiello et al., 2026). Research has shown that evaluating archaeological sites and historical structures separately reduces the overall readability of rural landscapes. As presented in the study in Tahtalı Neighborhood, strong spatial relationships exist between castles, city walls, necropolis and church ruins, historical mosques, traditional houses, and ancient Greek houses. However, the fact that some archaeological sites remain in private ownership and modern interventions in the region have fragmented the perception of the cultural landscape. This situation is directly related to the problems of "loss of context" and "loss of readability" highlighted in the literature (Antrop, 2005). Therefore, in all future efforts to protect rural cultural heritage, if archaeological heritage is involved, these areas should not be treated merely as isolated remnants of the past. These areas should be considered as part of the living rural landscape (Dragan et al., 2024; Yin et al., 2019).

Future research could focus on the following areas:

- Detailed archaeological surface surveys, and excavations in Tahtalı neighborhood could provide, more comprehensive data on the settlement's ancient and Byzantine periods.
- The use of digital documentation methods; such as photogrammetry, LiDAR, three-dimensional modeling, and geographic information systems could contribute to making the spatial relationships, between historical layers more visible.
- Through oral history studies and cultural memory research; data on Turkish-Greek coexistence culture, migration memory, and war memory could be documented more comprehensively.
- Applying the developed model to similar multi-layered rural settlements; such as Cumalıkızık, Tirilye, Gölyazı, Safranbolu, and Cappadocia can contribute, to evaluating the model's validity in different geographies. This would create a comparative analysis framework, for the conservation and evaluation of multi-layered rural cultural landscapes.

Acknowledgments and Information Note

The article complies with national and international research and publication ethics. Ethics Committee approval was not required for the study.

During the preparation of this manuscript; artificial intelligence-based tools were used solely for translation, grammatical corrections, and improving the readability and clarity of the text through wording and, sentence refinement. Artificial intelligence was not used, in the design of the study, data collection, data generation, data analysis, interpretation of the results, or the production of the scientific findings. The author takes full responsibility, for the accuracy, integrity, and scientific content of the manuscript.

Author Contribution and Conflict of Interest Disclosure Information

This is a single-author study

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