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Ürünlü-Urfa: Learning from Rural and Urban Vernacular Architecture in the Context of Sustainability

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Abstract

Traditional built environments are one of the most essential parts of maintaining cultural identity and preservation. As awareness about sustainable building grows, researchers are focusing on traditional built environments to understand the role of sustainable considerations in these structures. Thereupon, this paper investigates the rural and urban contexts of Ürünlü and Urfa as a whole, using the immediate context, mass, and envelope systems to get more detailed information. In this study, it was found that in the immediate context, things like land use, environmental coherence, house-site relation, and orientation; in the mass formation, things like mass formation, structures, and building components; and in the envelope system, things like building components, materials isolating body mass, and durability are all part of are among the vernacular features which show in how people respond to environmental factors in these contexts. The study generally shows that both rural and urban settlements highlight the correlation between regional climate and an extensive understanding of building practices.

Keywords: *Vernacular architecture, sustainability, sustainable consideration, sustainable architecture, environmentally friendly approaches.*

Ürünlü-Urfa: Sürdürülebilirlik Bağlamında Kırsal ve Kentsel Yerel Mimariden Öğrenmek

Öz

Geleneksel çevreler, kültürel kimliğin ve korumanın sürdürülmesinin en temel parçalarından biridir. Sürdürülebilirlik konusunda farkındalık arttıkça, araştırmacılar bu yapılarda sürdürülebilirlik hususlarının rolünü anlamak için geleneksel çevrelere odaklanmaktadır. Buna bağlı olarak, bu çalışma, daha ayrıntılı bilgi edinmek amacıyla Ürünlü ve Urfa'nın kırsal ve kentsel geleneksel yerleşimleri bütün olarak, yakın bağlam, kütle ve örtü sistemlerini kullanarak incelemektedir. Bu çalışmada, yakın bağlamda arazi kullanımı, çevresel uyum, ev-yer ilişkisi ve yönlendirme gibi unsurlar; kütle oluşumunda kütle oluşumu, yapılar ve bina bileşenleri gibi unsurlar; ve zarf sisteminde bina bileşenleri, vücut kütlesini izole eden malzemeler ve dayanıklılık gibi unsurların, bu bağlamlarda insanların çevresel faktörlere nasıl tepki verdiklerini gösteren yerel özellikler arasında olduğu bulunmuştur. Çalışma genel olarak hem kırsal hem de kentsel yerleşimlerin bölgesel iklim ile yapı uygulamalarının kapsamlı bir anlayışı arasındaki korelasyonu vurguladığını göstermektedir.

Anahtar kelimeler: *Yerel mimari, sürdürülebilirlik, sürdürülebilir düşünce, sürdürülebilir mimari, çevre dostu yaklaşımlar.*

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1. Introduction

The traditional built environments were shaped under the influence of the natural environment, social-cultural factors, human health, and economic factors. Traditional built environments were created via trial-and-error methods. Thereupon, the traditional built environments demonstrate the living style of society, the socioeconomic situation of society, construction techniques, existing construction materials, and the local climate conditions. They rely on considerable experience, environmental circumstances, and locally available materials such as stone, adobe, and timber. They are regarded as an outstanding example of sustainability, especially in their unique traditional environments, because of their continuity. These environments are considered the predecessors of sustainable built environments.

At the start of the twenty-first century, new building design strategies took sustainability factors into account. It is a new phase for most countries to improve the design of sustainable building strategies. Accordingly, designers seek the best sustainable guides for implementation and continue to seek further expertise to understand how to include sustainable aspects in buildings. For the issue of sustainability consideration, designers look to traditional built environments to have basic solutions. Unlike modern buildings, which depend on mechanical systems and non-renewable energy sources, vernacular architecture embodies bioclimatic and passive design principles (Pan et al., 2024). For instance, the essential methods are form, orientation, and materials, which are particularly found in local resources, and applying low-energy methods to create human comfort in the building. While vernacular buildings in tropical climate regions have high structures, wide eaves, multiple openings, and lightweight, locally obtained timber to mitigate hot and humid conditions, those in hot and dry climate regions have thick walls with small openings, rooms organized around courtyards, and adobe and stone used for wall construction. These cases illustrate how vernacular architecture may be created in accordance with local climates and natural resources that are found in nearby environments, rather than relying predominantly on artificial methods for internal climate control (Elaouzy & El Fadar, 2022). Referring to the essence of sustainability, traditional built environments allow us to gain knowledge through inquiry into traditional built environments. Sustainability standards in architecture refer to sustainably beneficial practices that are considered for environmental, economic, and social goals. Some vital issues to take into consideration are the environmental sustainability of building materials, the practice of renewable energy, indoor environmental quality, contextual fit and community relations, local ecology, land use, and visual effects (Nguyen et al., 2019).

Thus, the precise criteria to guide suitable design can be found by exploring rural and urban vernacular architecture. Accordingly, the objective of this study is to inquire into Ürünlü and Urfa vernacular architecture to show sustainable architectural information from the past and to transfer this information to current and future architects.

1.1. Literature Review

Research on traditional architecture reveals that both traditional buildings and traditional settlements have ecological implications for sustainable architecture. Sustainable architecture means the amalgamation of building design and construction that considers every aspect of the construction process that will impact and influence the environment (Poveda, 2009). Referring to Poveda (2009, p. 1), while designing a sustainable building, it is important to consider energy flow, environmental loads, building quality, serviceability, and lifetime, which include distinct consumption and waste dynamics. For Kim and Rigdon (1998), sustainable design is to create architectural solutions that ensure the well-being and relationships of these three core groups: inorganic elements, organisms, and people.

In traditional built environments, inhabitants together designed and constructed buildings. In response to their needs, they developed a continuous design process that responds to their lives, built environments, and natural environments. Salgın et al. (2017) mention that “traditional building

forms could be shaped by different parameters such as local materials, social and economic facts of the community, the natural environment, or the reflection of events in social memory." Traditional architecture is fundamentally sustainable in regard to learning from traditional buildings and settlements that they are environmentally sensitive in architecture (Dayaratne, 2000). Thereupon, sustainable design solutions in traditional environments involve energy-efficient and environmentally sustainable practices that utilize local climates and building features to improve indoor environments while reducing energy usage (Elaouzy & El Fadar, 2022). According to Sev (2009), sustainable architecture is all of the actions aimed at creating buildings that promote the use of renewable energy sources that are environmentally friendly, make efficient use of energy, water, materials, and space, and preserve people's health and comfort in the situations they face throughout their lives. Sustainability in architectural planning discourse addresses environmental, economic, cultural, and social dimensions, with universal design as a key factor in promoting social sustainability (Burkut & Çakmak, 2024; Duman & Asilsoy, 2022). Kazimee (2008) points out that the traditional building process is a learning process that may help tackle global issues like global warming, housing issues, and economic equality. In order to achieve passive climate control in buildings, professionals could be inspired by the climate control implications of traditional buildings (Naciri, 2007). The passive strategy effectively addresses high energy consumption and reduces the negative environmental impacts of buildings (Song et al., 2021). The initial practice of sustainable form utilizes the available materials as well as accessible technologies (Halıcıoğlu, 2012). The traditional building displays a basic and effective answer for buildings that struggle with topographic constraints and climate conditions (Rakoto et al., 2009). Also, the features of traditional built environments are an approach to developing building energy performance that provides a strategy for designers to enhance the energy performance of buildings (Zhai & Previtali, 2009; Halıcıoğlu, 2012).

In accordance with this fact, traditional built environments embody characteristic, unwritten data for comprehending the value of experience correlated with the notion of sustainability in architecture. Consequently, traditional buildings and traditional settlements are sources of knowledge for the notion of sustainable building design. Thus, the significant insights and lessons that are gained from the analysis of traditional built environments can provide a strategy for designing ecologically responsive built environments. The architect will involve these lessons in the improvement of future sustainable built environments. Table **1** illustrates the increasing trend of international studies on vernacular architecture over the last five years. There is an increased focus on the sustainable aspects of vernacular architecture and their possible applications within the building research community. This shift highlights how traditional building techniques, often adapted to local climates and resources, can inform contemporary design practices. By prioritizing sustainability, architects and researchers are working to create structures that not only respect the environment but also enhance community identity and resilience. Thereupon, this research is considered to investigate knowledge and inherited experience and correlate the notion of sustainability in architecture. The research will try to explore traditional built environments in the eastern and western parts of Türkiye, which have some of the outstanding features of sustainability. In the literature, only a few research studies have investigated urban contexts in hot climates and rural contexts in Mediterranean climates holistically. Only several levels of analysis from a holistic perspective can fully understand the dynamics of interactions between buildings and their environment in the context of sustainability.

Table 1. Review of some selected research about sustainable design strategies in the traditional context.

Research	Year	Description	Region/Climate	Examined sustainable design strategies	Examined features
Elaouzy & El Fadar	2022	The study focuses on energy, economic, and environmental factors for evaluating the effectiveness of passive design solutions.	Global	Passive design strategies.	Energy performance
Song, Darani, Khdair, Abu-Rumman, & Rasool	2021	The study examined the primary passive cooling techniques applicable in arid and warm climates, with a focus on energy conservation and economic considerations.	Arid and warm climates	Passive cooling strategies: shading, natural ventilation, PCM, convective cooling, solar chimney, evaporative cooling, radiative cooling and a cool roof.	Energy efficiency and economic advantages
Friess & Rakhshan	2017	Investigated passive envelope design strategies	Hot climates	Building orientation and layout, natural ventilation, wall and roof solar absorption.	Environmental benefits
Nguyen, Truong, Rockwood, & Le	2019	The study examined vernacular architecture and the insights and design strategies that might be extracted from it.	Global	Sustainable features of vernacular architecture.	Environmental benefits
Pan, Zhong, Zheng, Xu, & Zhang	2024	The study examines the natural ventilation strategies employed in vernacular architecture, highlighting their intrinsic qualities associated with bioclimatic and passive design.	Global	Ventilation mechanism in vernacular architecture.	Environmental benefits
Gil-Piqueras & Rodríguez-Navarro	2021	The investigation focuses on the primary features of this vernacular architecture as an exemplary model of an environmentally friendly habitat, gathering specific data regarding its traditional attributes and sustainability.	Hot climates	The environmentally friendly features of vernacular architecture.	Environmental benefits
Sirror	2024	The study examined traditional architecture's environmental, cultural, and social sustainable strategies.	Hot climates	Sustainable strategies of traditional architecture adaptable to contemporary architecture.	Environmental benefits

2. Material and Method

The research methodology included data collection, analysis, and synthesis parts, which provide a detailed examination of the subject (Figure 1). Literature reviews and field studies were used to gather information on sustainable factors that can be found in rural and urban vernacular architecture in Ürünlü and Urfa. These factors included how compatibility with topographic and climatic conditions, common building plans, materials, and passive design strategies.

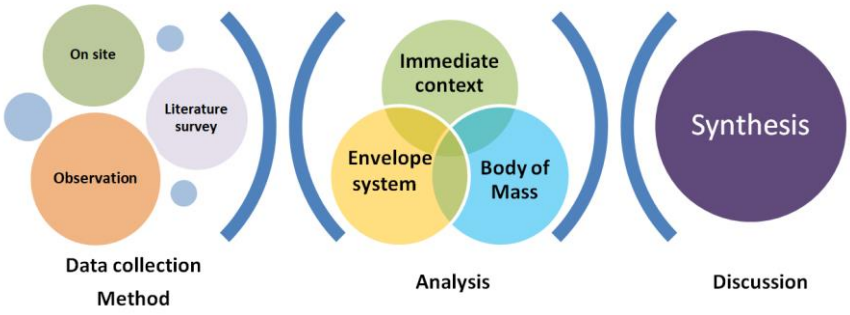


Figure 1. Systematic method for investigating the cases (Author).

The analysis of vernacular architecture can be approached holistically in an immediate context, considering the body of mass as a building system and the building envelope system as a subsystem (Poveda, 2009). The entire built environment should be studied in the context of sustainability: "the pieces as individual entities, both as part of a group and as part of the whole" (Poveda, 2009). As Gissen pointed out, human, architectural, and environmental subsystems are part of sustainable buildings, which foster a holistic approach to design that goes beyond only products and enhances environmental sustainability (Gissen, 2002, p. 147). Thereupon, to achieve the specified objective of the research, three steps are used to follow (Figure 2):

- The first level of ecological thinking requires to analysis of settlement characteristics and the interaction between the building and nature within the immediate context.
- The second one is the whole building level as the effect of ecological dynamics and relations on the effect relation the building components, lifespan and building use.
- The third one is the envelope system, which is the facade components and structure, which are walls, openings, and columns. Thereupon, rural and urban vernacular architecture in Ürünlü and Urfa is analyzed in this framework.

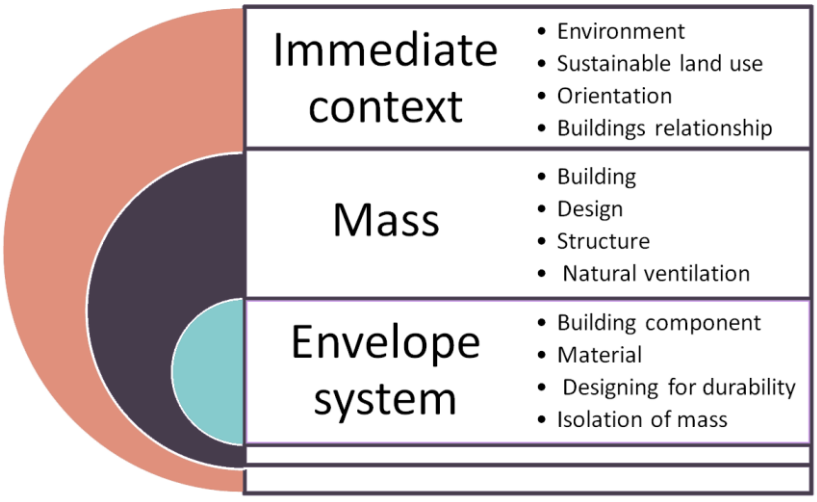


Figure 2. Building and environment: scales of analysis and design responses (Author).

2.1. Criteria of Selection Cases

Under this scope, the study explores two cases of traditional Turkish architecture to trace sustainable design criteria. These two cases have distinct traditional housing cultures and unique architectural

characteristics in Türkiye. This study explores two extremely different cases: one in Ürünlü (a Mediterranean area) and the other in Urfa (southeastern Anatolia). Ürünlü is located in the Akseki-İbradı basin. It has tremendous importance for the study of the traditional built environment in Türkiye since it is one of the few settlements that continues to preserve its unique historic fabric. Ürünlü is located on the historical trade route, which is between Alanya and Konya. It is the region that cuts through the Taurus Mountains. The location of Ürünlü creates a transition zone between the internal Anatolian region and the western-south coastal territory of Anatolia (Braudel, 2002). In 1994, the location of Ürünlü was designated as a cultural heritage site and a protected region by UNESCO. Urfa was settled on the historic crossroads of the Eastern and Western worlds. Because of commerce's mobility, cultural interaction occurred in the historic center. The city was governed by the richest and most powerful states in history: the Romans, Persians, and Byzantines. The city was one of the earliest centers of civilization due to its fertile agricultural land and proximity to important trade routes. The city had different ethnic groups and religions that co-lived and co-existed with their own culture, religion, and languages (Doğan, 2016).

Here are the main reasons for choosing two distinct locations to analyze.

- Urfa is selected due to its urban fabric, which consists of organic narrow streets, squares, kabaltı, and cul-de-sacs. In this dense urban fabric, the buildings interdepend on each other, providing spatial continuity within the traditional urban context.
- Ürünlü is selected due to its natural environment in which it formed under environmental aspects such as natural topography and natural materials.
- These regions are in different climate zones: the Mediterranean climate and the continental climate how does climate impact the formation of the buildings in these two distinct zones?
- The socio-cultural aspects of these regions have a certain impact on the organization and formation of the house. The people in Ürünlü have a semi-nomadic life pattern in winter and summer, in which environmental factors have a certain impact on building practices.

Thereupon, the physical and social features of these regions, the rural and urban vernacular buildings, are distinctive and indigenous. The social-cultural and climate of the environment have a substantial influence on the architectural formation of the house and urban fabric, which achieves interdependence between them.

- Sustainable development activities have not explored these two sustainable patterns: the rural area of Ürünlü and the urban fabric of Urfa. These areas present unique opportunities in which their distinct characteristics may yield valuable insights into effective sustainable practices. By examining both settings, we can better understand how to integrate rural and urban sustainability efforts for holistic community development.

Therefore, the goal of studying these two cases, which are different from each other and thereby have a variety of traditional housing cultures, is to inquire about sustainable design criteria in different traditional Turkish-built environments (Figure **3**).

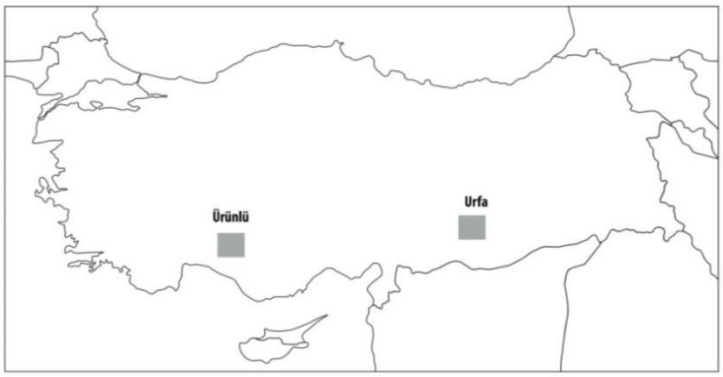


Figure 3. The location Ürünlü and Urfa (Author).

3. Findings

3.1. Rural Vernacular Architecture in Ürünlü

3.1.1. Immediate context

The characteristics of the Ürünlü built environment were formed under the impact of cultural and environmental aspects, climates, and natural topography and materials. In terms of architecture, the region offers plenty of examples of sustainable building practices. This region's semi-nomadic lifestyle led to the development of two distinct settlements, winter (kışlak) and summer (yaylak), based on environmental factors. A lifestyle is maintained through the use of permanent houses in the winter (kışlak) and summer (yaylak) zones. The Ürünlü built environment developed as a winter settlement (Kavas & Bakır, 2015). Thereupon, it becomes an important source for understanding the context of sustainability in traditional built environments (Figure 4). The organic pattern nestles at the foot of the Erenler and Belen mountains. Most of the houses in this valley face southeast. The buildings are located parallel to the slopes of the mountain, and they are interwoven into the slope. Thereupon, they are in harmony with the natural topography. The streets are organized in a way to support the movement of rainwater from the hills to the downtown.

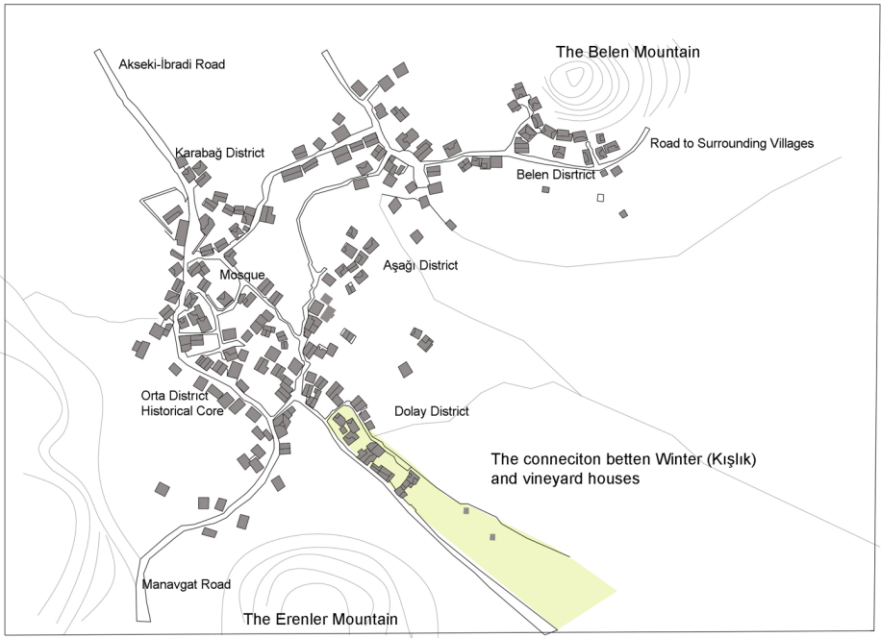


Figure 4. The organic pattern of the traditional rural settlements of Ürünlü (Author).

On the other hand, each family constructs a vineyard house for agricultural production during the summer. Unlike the dense pattern of the winter (kışlak) zone, the vineyard houses have a dispersed settlement pattern in this valley. Built on south-facing slopes, the vineyard houses in this valley aim to absorb maximum sunlight (Kavas & Bakır, 2015). Life in the settlement revolved around the rhythm of the summer season, with families working together during harvest time. For Kavas and Bakır, these houses support the sustainability of a stable life cycle in this challenging rocky terrain (Figure 5).



Figure 5. View of a vineyard house (Kavas, 2009).

Within the immediate environmental context, the traditional built environment of Ürünlü is an important case that shows the adaptation of available material within its immediate context (Figure 6). As architectural evidence, the physical condition of the Ürünlü built environment displays a strong sense of environmental continuity (Kavas, 2009). Ürünlü's architectural setting is distinguished by the interplay of man-made and natural components, including stone and local timber. Certain interactions between culture and nature create a unique spatiality in the environment. For instance, the architectural detail that illustrates the interaction and continuity between the environment and man and highlights the physical dimension of the cultural landscape is essentially based on such an architectural construction approach.



Figure 6. The view of settlement in Ürünlü (Author).

3.1.2. Mass

The traditional Ürünlü houses are generally associated with the traditional Turkish house by Şimşek (2007), which has similar features in different built environments in Anatolia where they have comparable climatic conditions. The houses are closely related the traditional Turkish houses through their way of dealing with spatial organization, their selection of materials, and the presence of unique eaves, cumbas, sofas, and windows (Figure 7).

Ürünlü geleneksel konutlarının hemen hemen hepsinde açık ve kapalı çıkmalar kullanılmıştır. Kapalı çıkmalar yörede 'şahnişin' olarak adlandırılırken açık çıkmalar ise 'ayazlık' olarak adlandırılır. Şahnişinler genelde sofanın sonunda ve giriş kapısının üstünde yer alırlar. Ayazlıklar ise mekansal organizasyona göre sofaya eklemlenirler



Figure 7. The view of traditional Ürünlü houses, with the upper floor serving as a living space and the ground floor serving as a barn (Author).

Ürünlü houses generally have two floors, each of which has separate functions and characteristics. The ground floor is benefiting from the slope solution. Accordingly, the barn, stable, storage, and hayloft areas of the house are organized on the ground floor. The main living spaces are located on the first floor. The major living rooms are oriented to the southeast to benefit from sunlight and interact with the prevailing wind. The first floors exemplify the most significant and active spaces of the structure: the rooms and the sofa. The number of indoor spaces formed as squares or rectangles varies with regard to the size of the house. Sofas in-between link the indoor spaces (rooms) and the outdoor (courtyard). The design of the two house typologies revolves around the sofa (Figure 8). The first one features a central sofa, with rooms located on both sides of it. The central sofa, which organizes this scheme, is the service area, such as the rooms that open onto the sofa, the kitchen, and the toilet. The second sofa is an outer sofa, with rooms located on one side of it By positioning the sofa as a focal point, each typology creates a distinct atmosphere that caters to various lifestyles and preferences. The house with the outer sofa is vulnerable to the harsh climate; however, the sofa has found shelter due to the surrounding rooms. Another important element in the spatial configuration of the vernacular of the winter settlements and vineyards is ayazlık, which is a semi-open space. This space is the extension of the transition space sofa between the interior of the house and the outdoor environment, allowing for ventilation and social interaction while protecting from harsh weather. This space is the outcome of the climate to provide a cool and comfortable space in the house (Figure 8 Figure 9). Kavas and Bakır pointed out that this form of space evolved from the tents of nomadic life, in which the spatial organization of permanent houses played a role (Kavas & Bakır, 2015).



Figure 8. Plan the typology of houses with central and outer sofas (Author).

3.1.3. Envelope system

Load-bearing masonry construction is used to build the houses. Timber and stone are basic construction materials. The construction system is a hybrid system, which is a combination of stone and timber materials. There is a certain continuity in the timber components in houses. It is used in the construction of building walls, garden walls, fences, roofs, and terraces (Figure 10). Accordingly, the continuity of the timber components provides certain environmental coherence in the Ürünlü traditional build environments. Therefore, architectural consistency was established throughout the settlement and valley. At the architectural level, the organic interface shows a variety of space arrangements. Figure 9 shows cross-sections defining the different spaces, such as the ayazlık, yard, and barns. Ayazlık, semi-open spaces, faced southward as platforms for vegetable-fruit drying. These areas are designed to optimize natural sunlight, enhancing the drying process while also providing a comfortable place for residents to gather.

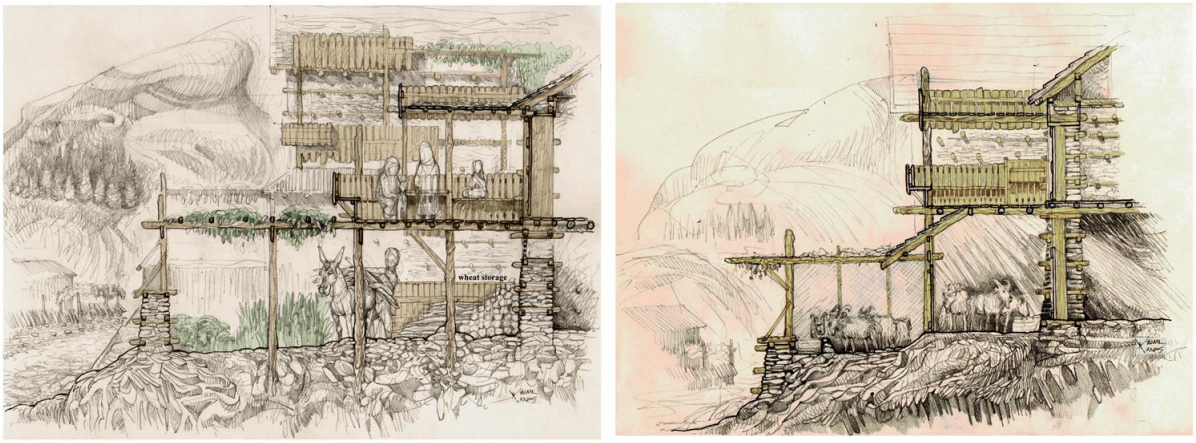


Figure 9. The organic interface of Ürünlü houses: the integration of timber frame construction via the inclusion of ayazlık (Kavas, 2009).

The ground floor of houses is generally made out of a 50- to 60-cm-thick ‘drywall’ technique without mortar being applied. In order to ensure a better seismic response of the building during an earthquake, along the masonry stones, the wall sides of 7x7 or 8x8 in the 'timber beams' are extended. These beams are named ‘dügme’ and 'pestivan', which are interconnected to each other, and between them, stones are located (Yeşildal, 2008).

A pitched roof style, made by using the timer, is applied to the houses. Eves form based on the state of the roof and the orientation of the building. Eves extend 50–60 cm from the stone wall of the body. They act as an overhang to protect the walls of the house from rainfall and as shading devices to protect openings from solar heat. Moreover, the timber is not only used as a structural components; it is also used for doors and windows. The filling walls of the houses serve as great

insulators. The walls also provide the absorption and storage of heat and coolness. They act as extensive thermal masses (Âlim & Sağıroğlu, 2015).



Figure 10. The interaction between man and the environment in the traditional built environment of Ürünlü (Author).

3.2. Urban Vernacular Architecture in Urfa

The development of the traditional settlement of Urfa was largely influenced by a variety of elements, including social conditions, climate, and the usage of stone as a construction material (Yıldırım & Turan , 2012). At the urban scale, the settlements evolved to offer shaded areas in streets and were positioned in accordance with the wind pattern. On the architectural scale, semi-open spaces are planned to optimize the advantages of seasonal shifts (Güleç, Canan, & Korumaz, 2014). The traditional settlement is unquestionably influenced by the climate, causes in which houses to be oriented towards the south in order to maximize the amount of sunlight that is available during the winter months (Doğan, 2016). Thereupon, Environmental factors played a certain role in the development of the traditional settlement of Urfa, on an urban scale and an architectural scale (Figure 10).

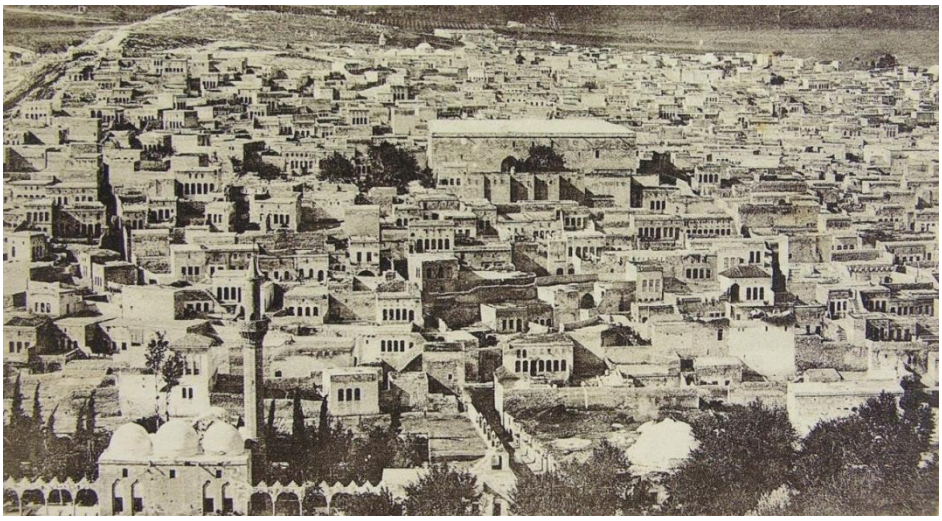


Figure 11. View dense housing patterns in the traditional urban core of Urfa-Houses that are oriented towards the south (Doğan, 2016).

3.2.1. Immediate context

Urfa has a continental climate in which winters are cold and snowy, and summers are generally hot and dry. The climatic conditions of the region played a significant role in the development of the traditional settlements in Urfa. Such as the buildings were oriented in the south direction so as to absorb more solar heat in winter. Streets were organized narrowly so as to provide shade for occupants and protect them from direct sunlight in the summer (Figure 12).



Figure 12. The narrow street provides shade in the urban vernacular built environment in Urfa (Author).

The traditional urban settlement has an organic street pattern. Kabaltı and cumbas are architectural elements that create safer designs that will withstand hotter urban environments. Cumabas, whose upper floors of the houses were extended toward the street, provide ventilation on hot summer days. Kabalati, which covers the street, provides shelter for the streets. This kind of spatial approach is a climatic solution to dense urban settlements. The kabaltı rooms across the street provide shade and allow an influence of cooling in public spaces in the summer. Such shade spaces are used as an outdoor gathering space for old people and a space for play for children.

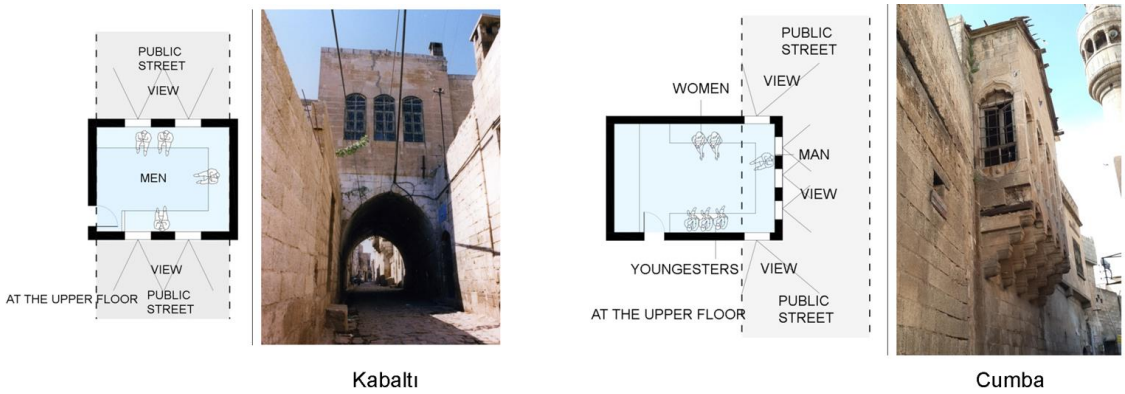


Figure 13. A traditional solution for cross-ventilation in the dense urban settlement of Urfa (Author).

3.2.2. Mass

The houses consist of two floors. Architectural elements, such as a courtyard, portico, and iwan, were provided to the product for the burning sun. The rooms, portico, and iwan are oriented toward the courtyard. The houses usually have a modular system with an L-shape, square, or rectangular form in their plan (Akkoyunlu, 1989). The spatial organization of houses expresses confidence and adaptability to the region's climate. The houses are formed to achieve suitable climate conditions through constant interaction between indoor and semi-open outdoor spaces (Figure 13).

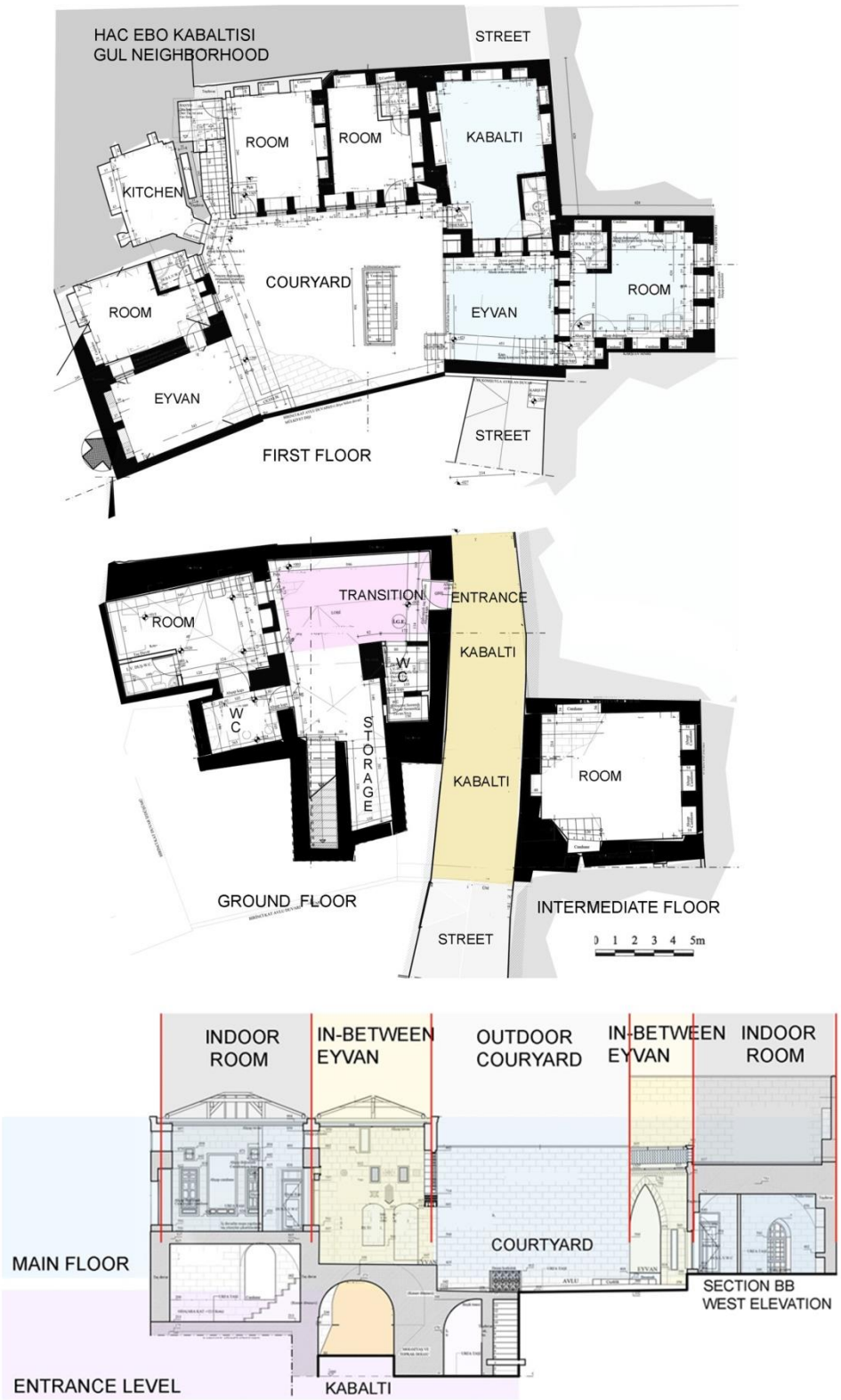


Figure 14. The spatial interaction of traditional Urfa houses: achieved suitable climate conditions (Author).

The iwan, as an in-between space, provides a significant relationship between indoor space (room) and outdoor space (courtyard). Besides the role of the circulation of in-between space, iwan provides a shady cooling reset space in the summer. Particularly, iwan is located toward the south and east,

which are suitable for the microclimate to prevent after midday sun. In traditional urban houses in Urfa, the iwan usually has a window that is located on the north façade. However, cases do not have windows; there is a small niche in iwan. A chimney is placed, which opens with a flat roof on the niche. Accordingly, iwan provides a pleasant cooling environment on hot summer days. The courtyards achieve suitable climate conditions in many ways; the rooms draw cool air and daylight from the courtyard. They maintain a gentle microclimate that provides a comfortable outdoor space. For microclimate, small pools or fountains were provided in courtyards (Figure 13).

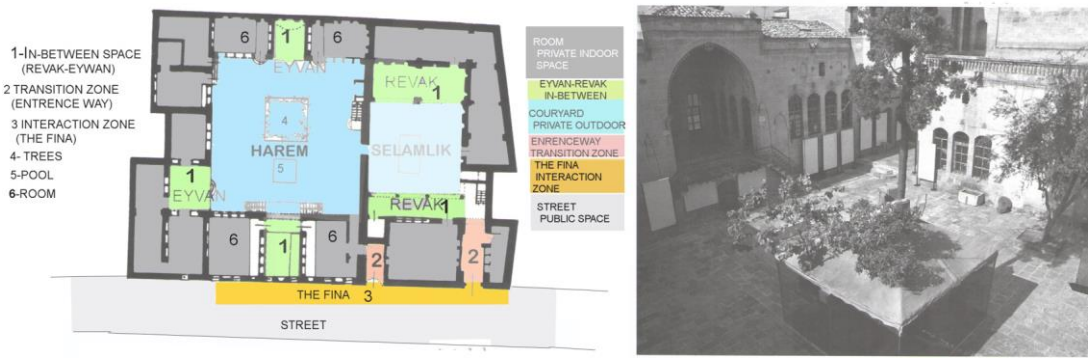


Figure 15. The spatial configuration of traditional Urfa houses: designed to maintain a microclimate (Author).

The rooms are also organized as summer and winter rooms so as to respond to climate conditions. The summer room is oriented to the north, placed on the northern part of the court, and faces the street so as to protect the room from solar radiation and achieve ventilation. Generally, these rooms have high ceilings and more windows. However, the winter rooms are oriented to the south and set on the southern part of the court so as to absorb solar radiation. These rooms have low ceilings and few windows. Besides, the kabaltı room, which covers the street, provides cross ventilation due to the fact that two sides of the room are open streets (Figure 16).



Figure 16. Kabaltı in the urban vernacular built environment in Urfa (Author).

3.2.3. Envelope system

The main construction material is limestone, the primary supporting component of a load-bearing structure. Due to temperatures varying between night and day, a thick stone wall was used that served as a heat reservoir and an insulator. In winter, the thick stone wall acts as a thermal mass that stores heat during the day and radiates it at night. In addition, the room is located toward the courtyard. The windows are located on the longest wall of the room. Due to limited cross ventilation, the small rectangular or round windows, which are named locally “ışık takası," are located on top of large windows on the wall. Accordingly, these small windows provide effective air circulation in houses, where warm air comes out through the small window in the summer. The sustainable characteristic of limestone is the cleaning of stone through a sort of combing or sanding process. A binding mortar is used for the cleaning process of the Urfa houses (Figure 17).



Figure 17. The small rectangular windows for ventilation and the cleaning of the limestone of the Urfa houses (Author).

3.3. Discussion

3.3.1. The site and immediate surroundings

In traditional rural and urban-built environments, the features of these mutual relations are obviously depicted. There is an influential connection between architecture and environment, man-made and nature, which cannot be evaluated alone. Thus, there is a certain interdependence and interaction between them. As Poveda (2009) stated the ecological impact of buildings depends on the site and its immediate environment. Through the separate analysis of traditional Ürünlü and Urfa-built environments, it is clearly shown that the physical entities have certain integration and interaction with constraints for natural resources, climate, topography, and local culture.

Consequently, both traditional built environments have sustained environmental coherence. The associations of both of them with nature were shown in the synthesis. As an outcome, two cases, which are located in different regions, in different climate conditions, and in different cultural landscapes, essentially have very similar sustainable design processes.

The construction of buildings may be considered as the combination of separate elements yet interconnected elements, known as assemblies and subassemblies (Poveda, 2009), thereby the buildings on both sites have certain interactions in their environments. *Sustainable design culture* is considered one of the most significant elements that influence architectural design (Ozorhon & Ozorhon, 2014) which has a substantial contribution to sustainability in architectural design.

- Environment: Mediterranean climates dominated the natural environment in which Ürünlü established itself. In both winter (kışlak) and summer (yaylak), environmental continuity is achieved through the use of timber and natural stone as construction materials. There are organic interfaces in Ürünlü houses, which are the architectural representation of the human-environment integrity at the architectural scale (Kavas R. K., 2009). Thereupon, houses integrate and interact with the natural environment. Consequently, these settlements have achieved environmental coherence and provide a unique aesthetic. The Mediterranean climate influences the mass formation of houses through the creation of sofas, kösks, and ayaslıks. Also, the hot and arid climate influences the mass formation of houses through the creation of kablatı, iwan, and revak. A natural material, ashlar stone, was utilized for construction materials. Thereupon, the traditional architecture in both cases reflects a harmonious adaptation to the surrounding landscape.
- *Sustainable land use*: In both cases, there are peculiar continuations by using available materials within their immediate context that have been adopted in the design of the buildings. Two separate settlements, winter (kışlak) and summer (yaylak), emerged in this area as a result of the semi-nomadic way of life (Kavas & Bakır, 2015). Environmental factors influenced the establishment of these settlements. The winter (Kışlak) settlement has a dense pattern. The streets are organized narrowly; all houses have eaves in order to protect the buildings from rain and snow in the winter and the sun in the summer. The houses are southeast-oriented. The

summer settlement, known as yaylak, disperses the vineyard houses. Vineyard houses are south-oriented. The main reason to orient houses toward the south is to provide more sunlight to the ayazlık. South-oriented houses reduce energy consumption in houses. The careful architectural design not only enhances comfort but also promotes sustainability within the settlement. By maximizing sunlight exposure, residents can enjoy natural warmth while minimizing reliance on artificial heating, contributing to a more eco-friendly lifestyle. Thereupon, the orientation enhances the functionality of spaces. In Urfa, the built environment is dense, and there is an organic pattern of narrow streets. The dense settlement's streets were covered to create shaded areas.

- Building relationships: In Ürünlü, the buildings are independent, whereas in Urfa, they are interdependent. The originality of the built environment: In Ürünlü, the buildings have a particular structure, which is composed of timber and stone. Due to the interdependence of the buildings in Urfa's urban settlement, a uniform mass formation known as kabaltı has developed to cover the street. Additionally, a room named "kabaltı" atop the street provides shaded public spaces, a unique architectural characteristic of the region.
- Orientation: The house in the winter (Kışlak) settlements is southeast-oriented. The vineyard houses are south-oriented. The main reason to orient houses toward the south is to provide more sunlight to the ayazlık. The houses in the traditional urban environments of Urfa are oriented towards the south, as the influence of environmental factors absorbs more sunlight that is available during the winter. It is a passive design strategy to orient houses to the south to reduce energy consumption in houses. The careful architectural design not only enhances comfort but also promotes sustainability within the settlement. This non-mechanical method maximizes sunlight exposure, and residents can enjoy natural warmth while minimizing reliance on artificial heating, contributing to a more eco-friendly lifestyle; thereby, this strategy reduces the negative environmental impacts of buildings. Table 2 displays the findings from the analysis of the cases, focusing on the interaction between the building and the environment, using the following parameters.

Table 2. Assessment of the immediate context in of Ürünlü and Urfa (Author).

Context	The traditional rural environment in Ürünlü	The traditional urban environments in Urfa
Environment	Mediterranean climate Mountain area natural environment Organic interface	The hot and arid climate Urban context
Sustainable land use	Settlements in harmony with the topography	Settlements in harmony with the topography
Buildings Relationship	Independent between building to building	Interdependence between building to building
Orientation	Winter settlement: The houses are southeast-oriented. Vineyard houses are south-oriented.	The houses are south-orientated.

3.3.2. Assessment of the body mass

According to Poveda (2009), the overall ecological effect of a mass is influenced by the interplay between its architectural components, usage patterns, and lifespan. The formation of the body mass is crucial in terms of sustainability (Ozorhon & Ozorhon, 2014). The analysis of the cases, with a focus on body mass, was conducted using the following parameters.

- Building: In Ürünlü, houses have an indirect relationship with the topography. The buildings in Ürünlü have no connection to the ground, where they originally served as barns. Therefore, the

main body of the building is elevated. The first floor is used as the main floor. Therefore, as a passive design strategy, it allows for better ventilation and protection from potential flooding. However, in Urfa, houses have an indirect relationship with the topography; thereby, there is an interaction between topography and buildings.

- The orientation of the Mass: Buildings in Urfa face south. Commonly, some living units face south to maximize energy efficiency. While all the houses are oriented towards the south, none of them impede or reduce the view of one another. Therefore, the main body mass organizes "open-cool and closed-well protected" spaces in response to the various seasonal requirements. The 'open-cool' summer room, with thinner walls and floors and abundant and spacious windows, maintains a generally cool temperature by allowing air to circulate. Generally, the closed-well-protected wider room, however, is shielded from the passage of air, located on the middle levels, constructed with durable and impermeable materials, and equipped with small windows (Küçükerman, 2007, pp. 39-42). In the winter (kışlık) settlement of Ürünlü, it faces southeast to absorb more sunlight during the winter months. For agricultural purposes, the summer (yaylak) settlement orients its vineyard houses to the south. The semi-open space, ayaslık, of the vineyard houses faced south to absorb more sunlight during summer months to dry fruits and vegetables.
- Mass formation: In both regions, the spatial formation of the body of mass is organized according to the climatic conditions of the region. Buildings in Urfa, courtyard, iwan, revak, portico, and kabaltı are important elements that play a role in the creation of the mass. In terms of energy efficiency, these spaces are very beneficial, particularly throughout the summer season. Iwan, revak, portico, and kabaltı are roofed spaces providing shade. To provide a microclimate, courtyards are designed as open spaces with fountains or small pools, which increase humidity in an arid climate.
- In Ürünlü, the spatial formation of the houses, sofa, kösk and ayaslık were organized according to the climatic conditions of the region. In Urfa, in the courtyard, iwan, revak, portico, and portico were organized according to the climatic conditions of the region. Ivan, courtyards, and ayaslık are the spaces that sustain social life during the summer months in these regions.
- The structural techniques: In Ürünlü, a hybrid system, which is a combination of timber and stone, has been used. In Urfa, load-bearing masonry walls, which are constructed with stones, have been used.
- Natural ventilation, which allows external fresh air to enter a building without the need for air conditioning, coolers, or other mechanical equipment, significantly contributes to energy efficiency and maintains human health (Passe & Battaglia, 2015). In both cases, passive cooling strategies have been applied so as to provide the entrance of call air and the existence of worm air. In Ürünlü, the building is placed windward across streets and perpendicular to the inclination; thereby, cross-ventilation has been provided in the buildings. In Urfa, windcatchers which are locally bagırt, have been designed to provide an ecological cooling system. Windcatchers are traditional technology for cooling hot summers (Zargari & Işık, 2016). Besides windcatchers, indoor ventilation was provided by hill windows (ışık takası), whereby the warm air in the room is thrown out through those windows. Table 3 displays the findings from the analysis of the cases, focusing on the body mass, using the following parameters.

Table 3. Assessment of the Body Mass (Author).

Context	The traditional rural environment in Ürünlü	The traditional urban environments in Urfa
Building	Indirect relation with the site: Located on the base, which will connect the main body of the building to the ground. Buildings are independent	Close relation with the site: Interaction between landscape and building
Design: mass formation	Sofa, kösk and ayazlık	Iwan, courtyard, revak, and portico
The structure techniques	Hybrid system	Masonry
Natural ventilation	The first floor is used as the main floor to provide better natural ventilation.	Cross ventilation Hill windows (ışık takası), Windcatchers (bagırt)

3.3.3. Assessment of envelope system

Analyzing the building systems, including the envelope system as a subsystem, is part of the entire system so as to be able to work for the reduction of energy consumption (Poveda, 2009). Therefore, the envelope system is very important in the ecological design process. This section of the work synthesizes the envelope systems of the two settlements within a sustainability context.

- Building component: In Ürünlü, the houses predominantly featured hip and cross-hipped styles as the outcome of environmental factors. This roof style leads to houses being breezy and cool during hot temperatures. Also, the roof efficiently directs rainfall away, which is essential for preserving the structural integrity throughout the region's rainy season. For floors, wood is used: The wooden beams that carry the upper floor slab. They are laid at regular intervals over the wooden lintels in the lang stone wall. The rafters were placed on wooden beams along the sort side of space. Then cladding boards are nailed perpendicular to the floor beams (Şimşek, 2007). Thereupon, wood is being environmentally sustainable material, and wooden floors have certain environmental benefits in terms of renewable resources and energy efficiency. The solid extension body of the house, such as cumba and kösk, is constructed of timber. Opening: Generally, the windows at ground level which are used as service areas such as barn and storage rooms on the ground floor have been kept quite small. On the upper floor, the winter room windows are small and few. However, spaces used for summer, such as kösks and cumba, have large and numerous windows because these extensional spaces are constructed with timber, thereby allowing large openings. In Urfa, houses predominantly featured with a flat roof. The ivans feature barrel vaults and cross vaults that encircle the rooms. Opening: Windows are generally small in size. However, the cumba and kablatı rooms utilize large windows, allowing some areas of the room to open up to the courtyard. Accordingly, it is obvious that social life and architecture in both cases, shaped by climatic conditions, provide coherence within themselves.
- Materials: While modern materials typically require a lot of energy to produce and have little to no recycling potential, traditional materials are referred to as “ecological, green, and environmentally friendly” (Özgünler, 2017; Torgal & Jalali, 2012). In Urfa, the thick stone walls achieve suitable climate conditions by protecting internal spaces from the impact of the hot and dry summer and cold winter seasons. Furthermore, the windows, which are placed on the top part of the thick wall, provide effective natural air circulation in the rooms. The ivan usually has a window located on the north façade, and it has small niches. On the niches, a chimney is placed, which opens to the flat roof. This kind of architectural approach provides a pleasant cooling

environment in the summer. Thus, the energy required to heat or cool the space was minimized in the initial construction stage. In Ürünlü, the first floor is used for living which provides natural ventilation. The room used for winter and the ground floor small size windows are used. Kösks and cumba include several large openings owing to their wooden structure, allowing for substantial apertures. In Ürünlü, the construction process of the building is easily done with local natural materials such as timbers and rubble stones. In stone walls, pine and cedar (katran) are chosen for the horizontal lintels, and juniper, locally known as 'andız', is selected for the buttons, ensuring the structures last for a long time. Accordingly, environmental continuity is provided with the use of pine and cedar (katran), juniper (andız), and rubble stones in the construction process of houses.

- Isolation of body mass: The thick stone wall improves the inside comfort whereby, reflecting the intense sun rays during hot summers and reducing their impact in the interior areas, while allowing the entry of solar radiation during winters (Özgünler, 2017; Torgal & Jalali, 2012; Ozorhon & Ozorhon, 2014). In Urfa, small windows above the wall provide natural ventilation.
- Designing for durability: Natural stone and local timber enhance the durability of the houses in Ürünlü. In particular, the design of eaves for houses in Ürünlü protects walls from rain, thereby preventing timber deterioration. Also, according to Salgın et al. (2017) timber resists humidity and heat; therefore, it is one of the best materials in terms of durability.

Reusing traditional materials is important not only for energy efficiency but also for the architecture's sustainability. Therefore, by reconsidering traditional materials, we can ensure the continuation of traditional architectural culture and carry the past into the future. Additionally, the healthy nature of these materials will meet the sustainability requirements needed in the future (Özgünler, 2017). In this section of the work, Table 3 synthesizes the envelope systems of the two settlements within a sustainability context.

Table 4. Assessment of Envelope System in the traditional Ürünlü and Urfa houses (Author).

Context	The traditional rural environments in Ürünlü	The traditional urban environments in Urfa
Building components	Hip and cross-hipped styles Wooden flooring Opening: small size and a few windows used winder rooms and large and numerous windows used for summer spaces.	Flad roof with barrel vaults and cross vaults. Opening: small size and a few windows, more opening was used room cumba and kapaltı.
Materials	Tiber Natural stone	Natural stone limestone and ashlar stone
Isolation of body mass	Stone and wood material improves the inside comfort conditions.	Thick walls, small windows
Designing for durability	Natural stone and local timber connected	The usage of thick walls

4. Conclusion and Suggestions

The traditional built environment of Urfa was formed under the influence of natural forces such as climate, topography, and social-cultural factors. The traditional built environment of Ürünlü is an important case that shows the adaptation of available material within its immediate context. As architectural evidence, the physical condition of the Ürünlü built environment displays a strong sense of environmental continuity with the natural setting.

Both traditional built environments of Ürünlü and Urfa provide significant lessons in regard to the relations they create with the natural setting from the different points of view given on the tables and can be characterized as substantial cases of sustainable design. The traditionally Ürünlü-built environment ensured the formation of a friendly settlement that achieved environmental coherence

in parallel with the continuity of nature. Correspondingly, the traditionally built environment in Urfa is in harmony with the topography. Also, the buildings respect each other as they abstain from hindering each other's views, light, and wind directions. Consequently, through the centuries, these knowledge accumulations of individuals, which improve with the natural environment, provide a methodology for building production and a culture of life. These spatial organizations that respond to the culture and environments appear through sofas, kösk, and ayazlık in the Ürünlü built environment. Houses harmonize with their natural surroundings, utilizing local materials (rubble stones, timber, pine, cedar (katran), and juniper (andız)) and traditional construction techniques to enhance energy efficiency. The space's thick walls and small windows serve as thermal mass during the winter months, helping to retain heat and create a cozy environment. The extension body of the house, which consists of only timber allows a large opening that is used during the summer months since the design allows for natural ventilation, keeping the interior cool and comfortable despite the rising temperatures outside. The houses have an indirect relation with the site in which they are elevated from the ground, allowing for natural ventilation. By maximizing natural light, ventilation, and thermal mass, they provide comfortable living spaces while minimizing environmental impact. These spatial organizations that respond to the culture and environments appear through portico, revak, kabaltı, courtyard, and iwan in the traditional urban settlement of Urfa. In this hot and arid climate, streets are narrowed and shaded by covering kabaltı, or side walls of houses. To achieve natural ventilation in this dense urban pattern, windcatchers (bagırt) are integrated into the houses. Windcatchers (begirt) as a non-mechanical method reduce the negative environmental impacts of houses. Similar to Ürünlü, more openings integrate the extension bodies of houses towards the street as a passive design strategy to provide more natural ventilation. The semi-open spaces in both contexts minimize heat absorption in summer while facilitating the entry of beneficial heat into the building during winter. In Ürünlü, greenery is integrated into semi-open spaces (ayazlık), which creates a colder environment due to greenery's rise in evaporation rates. Therefore, this interaction provides a more comfortable microclimate for residents durıng the summer months. However, there is no greenery interaction ın the urban context of Urfa. Yet, water elements are included in the courtyard through the design of pools or fountains, which increase humidity in an arid climate. Traditionally, buildings were produced with natural materials that could be easily found in a closed environment. Traditional buildings are sustainable buildings due to the use of natural and recyclable materials. Accordingly, the use of natural materials is encouraged for environmentally friendly solutions and the maintenance of low-tech and energy-efficient design principles. The research demonstrates that traditional built environments present an important opportunity to learn about experiences connected to sustainability. Traditional built environments have inherent benefits with their environmentally friendly approaches. Subsequently, traditional built environments must be viewed as a source of knowledge that could interest professionals and experts inspired by sustainability.

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