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Research Article

COMPARISON OF A HISTORICAL AND A MODERN BUILDING ACCORDING TO ECOLOGICAL CRITERIA

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ABSTRACT
Rapid developments take place in technology. All resources are used without considering what their results will be for affordable production. This situation continues to bring various environmental problems together. Humanity is now questioning the technology and trying to reduce the damage it inflicts on the environment. This reflects with the emergence of ecological building designs in the building sector. Ecological designs are encouraged by certification systems in the building sector and systems that provide comfort conditions without harming the environment. It is necessary to create design solutions in the current environment in order to be able to achieve this position and to provide sustainability of the environment. It is important to examine design criteria of earlier examples in history if it can provide this. In this study, it is aimed to reveal the ecological characteristics of an old and a new residence building in Talas District of Kayseri by making use of the criteria of international certification systems. Thus, it has been shown how past ecological data and present-day ecological designs can be. The new structure and historical structure that are considered in the concept of ecology have been examined comparatively in terms of their suitability to criteria such as ecology, energy, economy, indoor environmental quality, health and welfare, innovation, management, land use, transportation, renewable technology, water, environmental pollution and CO2 emissions material and waste. It is aimed that this study contributes to develop environmental friendly design solutions in terms of sustainable environment in the future.

Keywords: *Ecology, Architecture, Kayseri-Talas, CB house*

1. GENERAL INFORMATION

Human beings have beenchanging the nature by interfering and have faced the threat of extinctions of living creature in serious consequence with the technological developments which started with the increase of the industrialization in the 20th century and continuing today. As a result, it has become important to use technology to produce products that are compatible with the ecosystem and that do not pollute the environment, in order not to be in a more serious situation. The humans who have caused the destruction of nature have begun to seek solutions to the environmental problems. It is obvious that all generations are careful to conserve nature and to live without harm. It is important that the past is well understood for a sustainable transfer to future generations. It is hoped that a sustainable ecosystem is possible as a result of blending the information provided by the examination of traditional life dwelling with today's living standards (Gezer, H., 2013).

The systems and material choices used in the buildings have an important issue in the energy consumption of the building sector. Studies on these issues will contribute to the sustainability of the region. For this, it is necessary to construct structures that contain ecological solutions by calculating the energy used in the design, production, use, demolition phases of the structures (Gezer, H., 2013).

The criteria that are considered in sustainable design are; the system choices that are naturally fed, but that do not consume nature when doing so, street-building positioning, sunshine in space design, use of local materials. This data is encountered in traditional houses. Attention has been paid to the use of the material according to the properties of the place to keep the energy used for heating-cooling in the conventional houses at the appropriate level. Additionally; traditional residences have characteristics of the geographical data of the region they live in and meet the needs without consuming resources for the duration of their use. In the new constructions, the solution with low energy consumption for the cold-hot environment setting which is important to provide the comfort conditions has been produced with the solutions that can not be reached completely and energy is consumed in high amounts. The first thing to do in ecological solutions is the examination of historical and traditional housing structures and the creation of sustainable building designs to be used in the new structures by taking into account the today conditions.

When the construction technique used in the traditional settlements is examined from the perspective of material selection, land settlement and space organization; it is a guiding point for design and construction techniques at the point of solution of today's energy problem. The traditional housing pattern produced by the efficient use of the available

resources has sustainable and ecological characteristics due to the fact that it is produced without harming the nature (Çetın, S., 2010).

In today's designs, it is important to present the ecological approaches considering the data of the past. As the beginning of this, it is important to examine the comparison between the historical and nowadays constructions with certification systems that prioritize ecology. In this study, data from the contemporary ecological new housing and from the traditional housing in Talas were discussed in terms of the criteria included in the certification systems. The two buildings, Yaman Dede and CB, selected for the study were evaluated comparatively within the criteria of international building certifications. CB house built in 2015 with ecological concerns was selected and systems in use were investigated. In this residence, it has been researched how the systems and materials applied by technological developments are resolved in a historical structure made with traditional techniques. In this context, sustainable ecological approaches such as traditional housing culture, harmony with topography, exchange with nature, attitude towards climate conditions and material selection have been examined in the house selected in Kayseri Talas District.The results obtained from these studies were compared and evaluated in the context of ecological architectural practices.

In this study, common ecological approaches in five major certification systems used in the world were determined. Within the framework of these approaches, the house of the CB (Cihangir Biçer House), built in Talas, considering both the Yaman Dede House which is located at traditional housing structure (stone masonry) in Talas province, and the ecological approaches, was examined. It has been attempted to show that the traditional architectural data are guidance for new structures by comparing ecological architecture on the old and the new houses. The result is that sustainable design and environment can be achieved in newly built houses. It is hoped that this study will promote the efficient use of ecological approches in new designs and contribute to sustainable architecture.

2. ECOLOGICAL ARCHITECTURE AND CERTIFICATE SYSTEMS

Sustainability aiming to leave a livable world for future generations by conscious use of resources without giving up innovations brought by technology aims at preserving the environment and energy resources for future generations (Bozdoğan, B., 2003). This situation, which is important for every discipline today, should be handled particularly in the context of building design, where significant negative effects on environmental pollution are seen (Dıkmen, B., Ç., 2011). While buildings are defined as “durability, utility and beauty” concepts, it is now possible to define sustainable structures by adding concepts such as “nature, environment, energy conservation and comfort” (Sakınç, E., 2006).

The term"ecology" that examines the relationship of living beings with each other and with the natural environment they live in have entered into everyday life as a result of the environmental problems emerged due to the change of the world order (Bılgen, S., 2011). The relation between environment and structure has been kept in the forefront of ecology within the scope of sustainability (Sakınç, E., 2006; Van Der Ryn, S., Cowan S., 1996) Today, the topics of ecology have been expanded and ecology has become an interdisciplinary science with human-nature relations leading to environmental problems and affecting the life of living beings in negative direction (Gürpınar, E., 1992). In the 21st century, ecology has become an interdisciplinary force that influences vital issues such as the use of alternative energy, human nature associations, natural life, and philosophy, economy, and politics (Özeler Kanan, N., 2010).

The discipline of architecture takes place under the heading of the artificial environment that people make by using the natural and the natural environment (Hamamcı, C., Keleş, R., 2002). Ecological architecture is not a architectural style but rather a design criterion that will enable us to fulfill our responsibilities towards the environment. Ecological architecture is a system of thinking that can be achieved by using alternative renewable energy based systems in building design (Tönük, S., 2001). It is important for architects to know that ecological architecture is important in achieving urban and global ecology and that it reflects on their own projects. Ecological architecture, which refers to the affected environment at the minimum level, brings comfort conditions in living spaces while using natural resources and energy with high efficiency (Lan, M., 2011). Producing projects that do not harm natural resources is the first step in designing an ecological structure.

The first design criteria in the planning phase of ecological architectural constructions are to constitute the positioning of the building in accordance with the existing topography, the structures designed according to the climate data and the structures which do not harm the green texture. In order to reduce the heating needs of the building, it is important that the north and south directions are taken into consideration in the organization of the space and that the direction of the wind direction and the direction of the dominant winds are examined so that organization of the rooms are appropriate in plan and in cross section. As a sustainable design approach criterion; it is necessary to design the spaces flexibly so that they can respond to changing needs. Energy efficiency will be increased by making solar energy available for storage and design, and / or by designing the building to use intelligent systems. In order to save energy, designs must be made that will benefit from ventilation and illumination. In material selection; materials that do not harm the environment during production and which are durable and low maintenance cost and which can be recycled after use should be at the forefront. Therefore, environmentally sensitive policies are required for ecological architecture in all decisions to be taken at all stages of a building, from design to use and demolition (Tönük, S., 2001). The use of active and passive systems is prominent in exploiting the potential of solar energy in ecological building design. One of these passive systems is to provide heat gain internally as a result of the increase of the glass surface on the south façade (Demır, M., 2015; Berber, F., 2012). Decisions that the architect will take in the design phase will ensure that the building has sustainable design criteria (Dıkmen, B., Ç., 2011).

Ecological architecture, are considered in a wide range of applications including the use of local materials, conformity with physical environmental, the ability to produce its own energy, the use of building materials requiring less maintenance, the use of passive systems, and the use of active systems as advanced technology. The fact that one or more of the above-mentioned subjects are included in a structure allows a structure to be discussed within the framework of concepts such as energy efficient building design, ecological architecture, green / environmentalist / harmonious building design, sustainable

architecture and intelligent building design (Dıkmen, B., Ç., 2011). Objectives of ecological architecture; aims to produce building designs that will fit into future societies, socio-economic, cultural and environmental contexts. Reducing the energy used in buildings, design strategies involving passive systems, designing the zone in accordance with local climatic conditions is important (Tokman, L. Y., Tatar, E., 2011).

Certification systems started to be effective in order to evaluate the energy efficiency of the buildings in the world resulting the problems experienced in the energy resources due to increase in energy consumption, (Tmmob Mimarlar Odası; 2006). LEED, BREEAM, CASBEE, DGNB, IISBE and GREEN STAR are among the most known of these certifications in Turkey (Özkıranartlı, Y., Parlak Biçer Z. Ö., 2014). It is also acknowledged that the buildings built with the certification system are less expensive when evaluated in the long term (Erten, D, 2016). Along with the mentioned systems, some countries have their own certification systems.

The entrepreneur chooses one of the certification systems according to the design criterion, the region and the budget. Choosing an incorrect system will adversely affect applicability and cost, and will reduce design quality. The right choice will reduce the harm done to the environment, improve the quality of the design and bring a healthier living environment (Özgören, H., 2010). Each country has also improved its certification system according to its climatic, cultural, social life, level of development and the state of its construction methods. Since Turkey has not a certification system of its own, it seems that LEED and BREEAM certification systems are used (Özgören, H., 2010).

In Turkey, where the number of certified buildings is increasing rapidly (Gbıg, 2017), there is the "Building Energy Performance Regulation" (BEP) based on EU Energy Performance Directives of Buildings in order to evaluate the energy performances of buildings (Resmı Gazete, 2017). The Regulation sets out the calculation rules for evaluating the building's energy use. At the same time, the regulations classify the buildings in terms of carbon dioxide emissions and determine minimum energy performance requirements for new buildings. Other purposes of the Regulation are; to assess the feasibility of renewable energy sources, to control heating and cooling systems, to limit greenhouse gas emissions, to set performance criteria and principles of implementation and to protect the environment. In doing so, it considers external climatic conditions, indoor requirements, local conditions and cost effectiveness (Çevre Ve Şehırcılık Bakanlığı, 2015). No permit certificate is given to the administrations related to the building where the Energy Identity Certificate is not issued (Anbarcı, M., Gıran, Ö., Demır, İ.H., 2012). The CB house, which is the subject of the study, also has the energy identity certificate according to the BEP regulation.

3. STUDY OF ECOLOGICAL TRENDS IN THE HISTORICAL AND TODAY HOUSINGS

In today's architecture, old buildings are transforming physical conditions into advantages without harming the environment while the use of technology products and machinery is often encountered in providing ecology to buildings. The examples of local architecture in the traditional building are considered and evaluated in the new building construction. In the vernacular architecture, sustainable and ecological features are obtained by using the existing resources in harmony with the nature and obtaining the most appropriate benefit (Çetın, S., 2010). In Turkey, traditional settlement and building typologies of many settlements such as Harran and Safranbolu; have ecological traces that vary depending on climate and geographic location.

The geographical location, climate, history, culture, socio-economic status of the area was examined before determining the ecological characteristics of both houses in Talas, which were determined as the study area.

3.1. Geographical Situation, Climate, History and Architecture of Talas

The Talas District in Kayseri is an important settlement due to its history and hosting of various cultures (Map 1). Talas is geographically divided into two parts: The Lower Talas on a flat plain and the Upper Talas on the skirts of Ali Mountain. The altitude of the Lower Talas from the sea level is 1250 meters while the position of the Upper Talas is 150 meters more than this (Özsoy, H., 1991). In the province of Talas where terrestrial climate characteristics are observed, summers are cooler than in Kayseri, and precipitation and strong winds are seen in spring and autumn seasons (Özsoy, H., 1991). In winter, the weather is colder and snowy compared to Kayseri.

Map 1. Location of Talas District (Google Earth, 2016).

Talas, which is home to many cultures and civilizations, is a settlement where the Armenian, Greek and Muslim populations lived together and possessed numerous and various historical and cultural heritages belonging to these cultures. Structures that constitute the traditional urban texture of the Talas, which has been inhabited since the late Roman-Early Byzantine period, were formed in the late Ottoman period in centuries (Figure 1) (Eroğlu, Ö., 2016b). Having a settlement history of 2000 years, Talas has underground cities, rock carvings and water channels. In the province of Talas, where settlement was seen in all ages of the history, traditional housing culture developed after the 18th century (Eroğlu, Ö., 2016a).

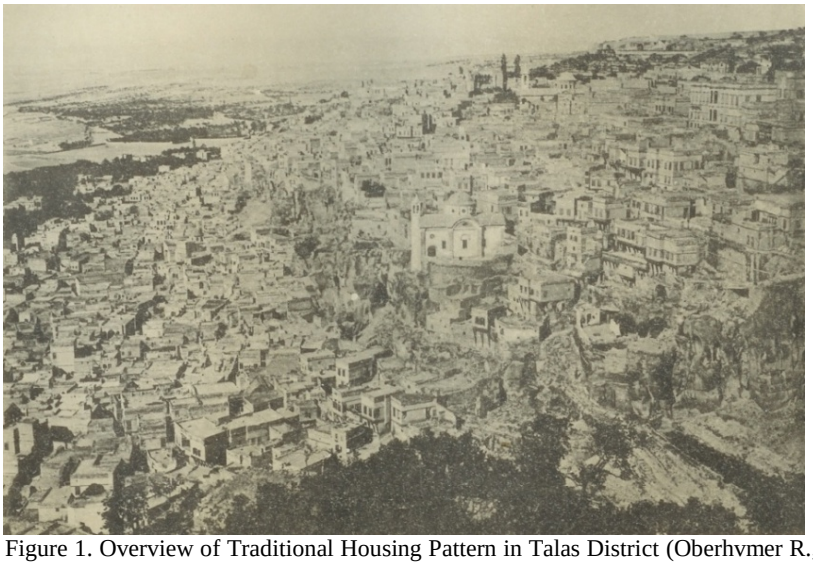

Figure 1. Overview of Traditional Housing Pattern in Talas District (Oberhvmer R., Zımerer H, 1899).

The largest area within Talas' urban conservation area is comprised of houses, mosques and churches. While there is a steep slope separating up and down as the natural site of Talas, underground cities constitute the archaeological site (Talas Belediyesi, 2017). In Talas, because of the tuff rock earth feature, life was built in rock carved spaces. Later, the stone-carved constructions were associated with the traditional rocks. In particular, rock carved areas reached from the basement floors are areas that are not affected by outside heat (Eroğlu, Ö., 2016a).

In Talas where the slopes were chosen to meet the needs of the shelter and defense, the structure of the traditional houses was shaped according to stone carving structures and stone material reserves in the region. Wooden materials were used in the upholstery of the building parts built with stone stacking system. The rain waters of the structures with built-up roofs are transferred to the streets with the gutters (Eroğlu, Ö., 2016a).

The relationship with the slope in the buildings which are mostly constructed as two storeys except the basement with inclined terraces in Talas was made according to the view (Figure 2). In the traditional houses, the main floor is generally located on the upper floors with no relation to the street, and the plans are shaped according to climate. In Talas, the houses have the type of inner sofa plan as they are in traditional Turkish houses. In addition, there are several housingl plans types formed by the effects of different cultures.

Figure 2. Overview of Talas District (Talas Belediyesi, 2008).

In terms of function, the rooms in Talas housing plans are arranged as living room, bedroom and bathroom. The cold place where the food is stored, the kitchen where the food is prepared, and the barn where the animals are kept and nourished constitute service spaces in the houses (Eroğlu, Ö., 2016a). The water, which is generally in the vicinity of the structures and which is required for the gardens located at the back of the structures, is transported by water channels regularly and in a planned manner and there are wells and cisterns in the houses for accumulating this incoming water (Eroğlu, Ö., 2016a).

The vernacular residential structure built on the high slopes of Talas is situated to the west of the slope and thus is best benefited from the sun (Eroğlu, Ö., 2016a). There are two winged doors and top-floor outings of the traditional Talas houses that contribute to the formation of the street with their façades (Figure 3) (Eroğlu, Ö., 2016a).

Figure 3. Street Pattern of Talas District (Yağmur, Y., 2016).

3.2. Examination of Ecological Design Criteria in Traditional and Contemporary Houses in Talas

Although the ecological structure is perceived as a new approach in modern architecture, the fact that traditional constructions are built using environmental data is a sign that this approach started centuries ago (Zor, A., 2012). It is observed that the systems seen in the examples of new buildings in the world and in Turkey are similar with the structures built in the previous periods (Yağmur, Y., 2017).

The aspects of the ecological design and construction of the two dwellings in Talas' traditional housing structure, one of which is modern and the other modern, are examined and analyzed. A comparative study has been done with the housing made in the traditional residential area and the work done with the present ecological design criteria. This is proof that the past forms of construction include ecological approaches and may be examples of contemporary architecture. As a result of case study, both structures were made based on the criteria included in the certification systems. When the constructions were determined, both structures were selected taking into account the locations on the land, the number of stories, their size and their intended use. It was also important whether or not the energy identity document was selected when the modern structure was selected.

The study was conducted with Yaman Dede Residence, which was selected from this area located in Upper Talas where the majority of the traditional settlements are formed by residential buildings. The selected building is located in Tablakaya Quarter (Map 2). Based on the selected traditional housing example, the life culture of the period, the reflection form of environmental data on the structure and the use of ecological systems were evaluated. Although traditional structures such

as Yaman Dede Residence are concentrated in the area, the number of floors and the size of the building have made Yaman Dede Residence the subject of examination. The new building with the Energy Identity Certificate is also located in the Upper Talas neighborhood (Map 2). It was tried to evaluate ecological aspects of the effects of the environmental data and the solutions of the new housing in order to meet today's needs. Comparisons were made for both structures.

Map 2. Location of Selected Houses (Google Earth, 2017).

3.3. Traditional Structure; Yaman Dede Residence

The building, which was built in 1850 and is located in Tablakaya Quarter has features of a traditional Turkish house. However, due to the deterioration in the usage process and the non-Muslim community as a user, the structure has also added non-Muslim architectural features (Figure 4) (Yağmur, Y., 2017; Eroğlu, Ö., 2016c). The residence appears to have two floors on the entry façade and three floors on the west façade because of the the inclined topography (Figure 4, 5) (Yağmur, Y., 2017).

Figure 4. General view (Yağmur, Y., 2016).

There are 3 basement floors with stone vault, service spaces called “sogukluk” (cold room) and “şirane”. It is possible to reach rock-carved places which are located in several different levels from the same places and which may have been made in previous periods (Figure 6) (Yağmur, Y., 2017). On the ground floor entrance door is reached with double winged wooden entrance door. On the north and south, there are two rooms with a fireplace and a double-winged wooden door opposite to the entrance hall. On the right side there is a winter room and a staircase descending to the basement. On the left side, the main room and the kitchen have a sofa. (Figure 7) (Yağmur, Y., 2017).

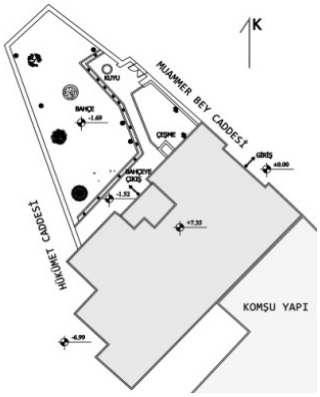

Figure 5. Plan Layout Diagram (Yağmur, Y., 2017; Talas Belediyesi, 2010).

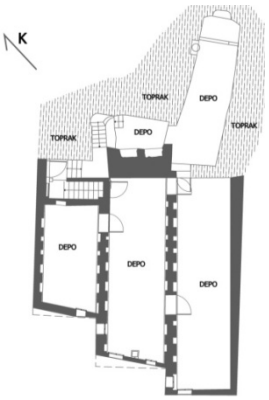

Figure 6. Basement Floor Plan (Yağmur, Y., 2017; Talas Belediyesi, 2010).

The two-sided stairways in the entrance hall provide access to the first façade. There are two room kitchens and roof stairs on either side of the sofa on the top floor (the same floor plan scheme with first floor). The balconies which are thought to have been built by non-Muslim owners and which are subsequently added to the building are reached from the sofa and a room (Figure 8) (Zor, A., 2012; Yağmur, Y., 2017). The east and west façades of the residence are determined by the street and there is a difference of 7.75 meters in east-west direction due to the topography of the residence. The density of window openings in the landscape of the west side of the building is more than that of other facades (Yağmur, Y., 2017).

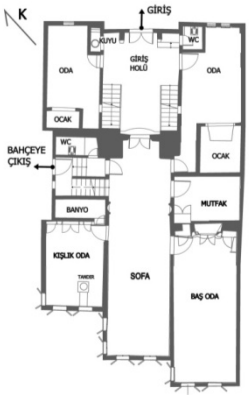

Figure 7. Ground Floor Plan (Yağmur, Y., 2017; Talas Beledıyesi, 2010).

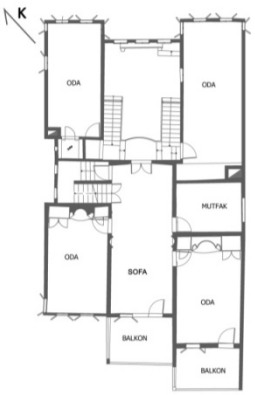

Figure 8. First Floor Plan (Yağmur, Y., 2017; Talas Belediyesi, 2010).

The eastern façade, which is also the entrance façade due to the topography features of the area it is occupying, also contributes to the formation of street texture. The façade arrangements of the residence also contribute to the street silhouette. While there are small wooden windows with wooden shutters in order to provide privacy on the ground floor, there are small windows without shutters for ventilation and natural lighting of the basement and (Figure 9) (Yağmur, Y., 2017). The first floor windows, which are made of console blocks with stone piers, are arranged in two proportions and wooden shutters. Inside, there is a rounded top window with a light entrance hall on top of stone arched windows overlooking the high ceiling entrance hall (Fig. 10) (Yağmur, Y., 2017).

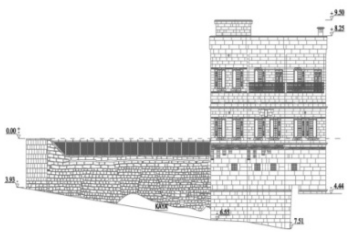

Figure 9. (Yağmur, Y., 2017; Talas Belediyesi, 2010).

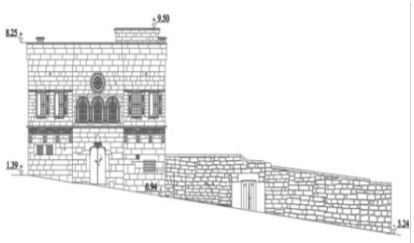

Figure 10. East Elevation (Yağmur, Y., 2017; Talas Belediyesi, 2010).

The north façade with smaller windows relative to the other facades is associated with the garden (Figure 11). Because there is a neighboring building on the southern side of the castle and the adjoining structure, there is no window opening

on this facade (Figure 12). However, a window was added over time. The wood lattices and stone floor cuts seen on all façades were also determinant on the facade without this openness. It has been determined that the roof of the residence is a flat roof and that the concrete as a material is added afterwards (Zor, A., 2012; Yağmur, Y., 2017).

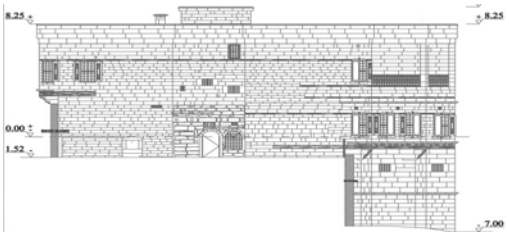

Figure 11. North Elevation (Yağmur, Y., 2017; Talas Belediyesi, 2010).

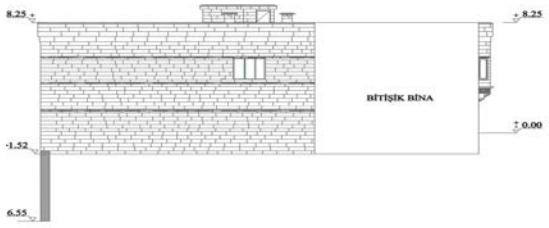

Figure 12. South Elevation (Yağmur, Y., 2017; Talas Belediyesi, 2010).

Stone, a local material, appears to be the determining factor in this residence as building material. Load-bearing walls are made of stone in the structure which is constructed with masonry system. However, stone vaults became bear-loading in the basement. Besides the stone, the used wood was not only used as a bear-loading element, but also in decoration of walls and ceilings, window handles and shutters (Fig. 13-14) (Yağmur, Y., 2017).

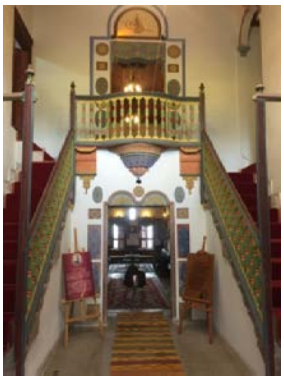

Figure 13. Interior Staircases (Yağmur, Y., 2016).

Figure 14. Interior Sofa (Yağmur, Y., 2016)

The ecological footprints of Yaman Dede Residence can be addressed in many ways, such as its location, material, and relationship with the environment. It is seen that the trees selected for the landscaping around the cascade of the terrain along with the slope of the terrain are selected from the types of trees that are planting the leaves in winter. Thus, in the winter months, the building has also benefited from the sun. Trying to achieve thermal comfort conditions in the interior by taking advantage of the sun at the highest level in the house suggests that the planning of the environmental data is also at the forefront. In addition to having small window openings to prevent heat losses on the northern side, wet spaces are placed in the plan. Since the landscape for Talas is west, the large openings are located on the west side of the residence, paying attention to this point. This was another factor that increased the use of the sun in the winter. The fact that the center of the sofa in the plan is in the east-west direction makes it possible to feel the sunlight inside as much as possible and contributed to the heating of the building again in the winter. As the structure is adjacent to the neighboring structure on the south side of the building, the advantages of this facade cannot be used. However, this situation has provided a defense control for the strong winds in the south of the Talas region. In the summer, solar control is provided by wooden shutters. In addition, the stone used in the construction system ensures that the thermal energy remains on the walls for a long time, thus contributing to the ambient temperature. The geological features of the place where the residence was built brought about the use of rock carving techniques and space. The basement floor, which includes rock carved spaces, is cool as opposed to hot weather during the winter. Thus, storage of food is provided by natural means without energy need (Eroğlu, Ö., 2016a; Zor, A., 2012; Yağmur, Y., 2017).

For heating during winter, fireplaces are used, mostly of which organic-based solid wastes are used as fuel. Apart from the fireplaces in the two winter rooms on the ground floor, the other tandems functioning as ovens did not contribute to heating. For ventilation, air is circulated through the gutters between the floors, alongside ventilation windows (Yağmur, Y., 2017).

The rock carved spaces created by the area where the building was built are formed by the possibilities of the regional material, and the materials used in the walls forming the main carrier are also local materials. Because of the use of natural and local materials, which are ecological design criteria, and the recycling of all these materials, it can be argued that the house carries ecological traces (Yağmur, Y., 2017).

3.4. Contemporary Building; CB House

There is a house with golden windows in a fairy tale that most children know. The hero of the fairy tale is seeing a house with a golden window in the skirts of a hill every day and climbing the hillside from day to day to reach that house one day. When he comes home made from gold, the hero understands that the sun that falls to the windows has fallen, and the reflection of the house windows shines like gold (Richards, L. E., 1916). The residence on the western facing skirts of Mount Ali in Talas is under the influence of the western sun in the fairy tale and is seen as a golden house when watched at certain times of the day. The CB house was designed in 2013-2014 and the construction was completed in 2014-2015 and started to be used.

There are 4 different terraced terraces arranged in past periods in the land where the building is located. Between each level is about 3 meters. The orientation of the levels constitutes of the east elevation as the upper level and west elevation as the lower level. The first level is 3 meters above the road level and the last level is 12 meters above the road. The long, 12-meter elevation of the arch is right on the south where Ali Mountain is located. The land in which the residence is settled is in the historical region of the Upper Talas region and is a neighbor to the historical site.

The registered area where the neighboring registered buildings are located on the eastern front is home to the former Talas American School. Talas American College, closed in 1968, opened as a girl in 1871 and as a boy school in 1882, offers paid, boarded and English education at the time it is open. As a result of the 19th century american missionary efforts, the school was opened by the missionaries in the province of Talas and was reorganized as a residential secondary school in 1889 (Talas.Bel.Tr, 2016). The building, which remained a missionary school until the end of World War I, was not closed at the end of the Treaty of Lausanne and remained a foreign school in the administration of US educators. Doctors and nurses working at the American Hospital in the school campus during the First World War and the War of Independence performed the treatment of soldiers injured in the war transferred there. However, some of the soldiers who were seriously injured and unable to withstand long road conditions were martyred. Local people believed that soldiers were knowingly martyred by the Americans for a time. The building group which was used by Kayseri Province Youth and Sports Directorate since 1976 as a hospital and dormitory was transferred to Erciyes University in 1978 (Figure 15-16) (Wikipedia.Org, 2017).

Figure 15. The Levels of the Construction site (Parlak Bıçer, Z. Ö., 2013)

Figure 16. Levels of the Construction Site and Talas American College (Parlak Bıçer, Z. Ö., 2013)

Talas American College is located in the foothills of Ali Mountain and in the west to Talas and Kayseri. The perspective of Miss Hemingway, who was a teacher here and also a relative of famous writer Ernst Hemingway, "the sun has sunk differently from this hill every day" has become important in the orientation of the CB house. F.L. Wrigt's approach to be seen through the waterfall rather than seeing the waterfall in the Waterfall House has also been valid in the design of the CB House. Not to look at the American College, but to look in the same direction, emphasizing the historical touch behind it, not to be overwhelming, has been important for the CB house. This house shows an ecological approach to this historic and environmental sensitivity. In addition, the building was placed in a lower quota instead of a level close to the old school building. Thus, the inhibition of the historic touch, and its competing with it, is also inhibited (Figure 17-18).

Figure 17. Talas American College and CB House (Parlak Biçer, Z. Ö., 2017)

Figure 18. Talas American College and CB House (Parlak Biçer, Z. Ö., 2017)

The building is entered from the street on the western side of the building. The terraces built in the past years have also been made with the same denim and construction technique and stone material supplied from the same place. Street pattern is maintained by these high stone walls (Figure 19-20). Approximately 9 meters above the street level, the entrance to the building is reached. No mechanical transport system was used at the height required to reach the structure. It is also seen as an ecological approach by the user to go out to the house with his own energy (Figure 21-22).

Figure 19. CB House (Parlak Bıçer, Z. Ö., 2016)

Figure 20. CB House (Parlak Bıçer, Z. Ö., 2016)

Figure 21. CB House (Argeus Mımarlık, 2013)

Figure 22. CB House (Argeus Mımarlık, 2013)

In the planning of the construction, the approach of the users and consultants in constructing a residence that emphasizes the local culture and architecture, the topographical structure of the region, and the daylight and landscape are important (Figure 22-23). The structure was planned with the two masses facing the long side of the view and taking advantage of the maximum view and daylight (Figure 24-25). This has led to the perception of scenery from all locations, as well as the cost of heating, especially during the very cold winter time. With this settlement, the use of energy has been reduced both in terms of heat and electricity.

Figure 22. CB House Entrance Floor Plan (Argeus Mımarlık, 2013)

Figure 23. CB House First Floor Plan (Argeus Mımarlık, 2013)

Figure 24. CB House Entrance Floor Plan Image (Argeus Mımarlık, 2013)

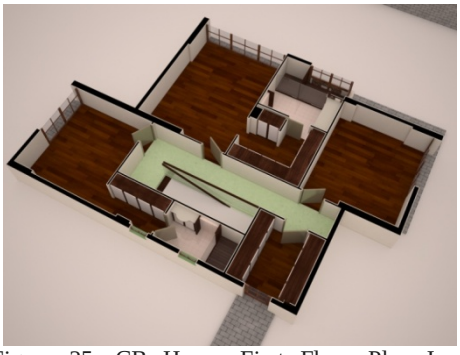

Figure 25. CB House First Floor Plan Image (Argeus Mımarlık, 2013)

The floors of the three-storey building are accessed seperately and each floor have their own garden use. During the planning stage, the visitors of the house users are considered in the spaces located on the first level and the guest floor where the bedroom, hall, wet spaces, heat center and depot are located is designed. The main entrance of the building is realized from the northern edge. There is a open living space oriented towards the west, where the main entrance of the building is provided with a landscape view (Fig. 27). This floor, which is accessed from the north side, is located in the south direction where the kitchen is dominated by the view of Ali Mountain. The wet places are located on the north and east mezzanine. This reduced heat loss to the north and east of the building (Fig. 28).

Figure 27. CB House Living Space (Parlak Bıçer, Z. Ö., 2016)

Figure 28. CB Home Kitchen (Parlak Bıçer, Z. Ö., 2016)

In the design, which is divided into two by mass, there is a one-flight staircase and main corridor in the center. The stairs are designed with a design and material selection to enhance the open-plan typology (Figure 29). On the sides of the stairs glass material is used for the purpose of preventing rapid airflow in the house. This situation is positive in ecological approach. During this application, space is provided between the glass material and the steps of the stairs, along the entire stairway, to provide air circulation between all the floors (Figure 30).

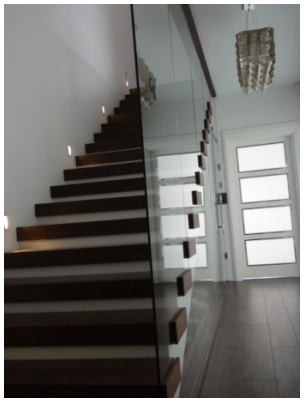

Figure 29. CB House Staircase (Parlak Biçer, Z. Ö., 2016)

Figure 30. CB House Staircase Detail (Parlak Biçer, Z. Ö., 2016)

The upper floor, where the bedrooms are located, has a parent's room, it's dressing room and a bathroom, a children's room it's dressing room and bathroom. There is also a study room due to the fact that housing users are academicians (Figure 31). All the spaces are again directed to the western view towards the main landscape and to the south as it is at the entrance floor (Fig. 32). The secondary rooms, such as the laundry room, the children's room bathroom and the dressing room, are located in the east and north directions. Thus, the western and southern view and day heat are also benefited at a high level.

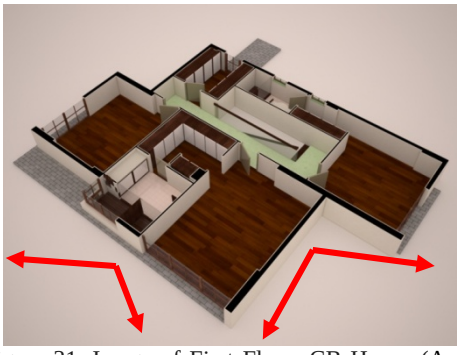

Figure 31. Image of First Floor, CB House (Argeus Mımarlık, 2013)

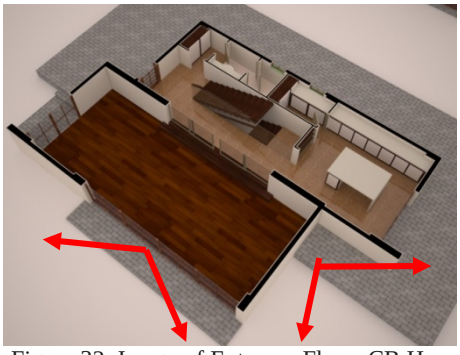

Figure 32. Image of Entrance Floor, CB House (Argeus Mımarlık, 2013)

Flat roof is seen in traditional Talas houses. Over time, these roofs were replaced with reinforced concrete slabs. In CB house, gable roof was chosen. However, in order to be able to adapt to the traditional environment, the gable roof is designed to be concealed (Figs. 33-34).

There are windows in the western and southern façades. The large transparent surfaces increase the dominance of the view and daylight reception and heat penetration (Figure 33-34). This has seriously impacted and reduced the cost of the build in use. Reducing the heat loss from the glass in the large façade openings used in cold regions in the winter months has been a major problem. For this reason, the glasses are chosen from glass with properties that prevent heat transfer between the exterior and the interior. Care has been taken to ensure that ecological approaches are used in the use of materials. In the summer of the western sun there are disturbing effects. In planning, cantilevers were made out, aiming to cut the western sun. In addition, automatic shutters have been made for the disturbing western sunshine in the summer months, using the facilities of modern technology. In the north and east facades, the windows of the spaces that are the reflection of the planning are small (Fig. 34). The cold from these facades is blocked. In the general ventilation of the building, the windows on the south side and the small-sized windows on the north side play an active role in ensuring air circulation. The hot air that will be generated in the summer months is provided by this ventilation system. No mechanical ventilation was needed in the house.

Figure 33. CB House Western Façade (Parlak Bıçer, Z. Ö., 2016)

Figure 34. CB house South and Eastern Façade (Argeus Mımarlık, 2013)

The stones used in the terraces and buildings in the historical texture of the house were brought from the local stone quarries. The use of local materials seems as an ecological approach. However, materials with top-notch performances of today are preferred with respect to the center while designing the residence. Cold weather conditions in the upper Talas area have been decisive in the selection of materials used in building walls. Material with low heat transfer coefficient is used as wall material. In the building which has the energy identity certificate, although the insulation value of 8 cm is sufficient in the calculations made by the experts, the heating cost is lowered once again by the construction of 15'cm insulation so the usage cost has been minimized. In some parts of this insulation material on the facade with the design concerns, stone pavement is used which is different from the stone materials of the old stone materials but also different from the stone quarries in the previous ones. Because of the impossibility of coating large-scale stone pavements without mechanical systems on thick thermal insulation, the stones used in the pavement were chosen in small sizes. In some parts of the building facades, recycled composite facade materials are used.

4. COMPARATIVE STUDY OF TWO SELECTED DWELLINGS IN TERMS OF ECOLOGICAL ARCHITECTURAL CRITERIA

Talas is divided into two parts: the ancient Upper Talas and the newly developed Lower Talas. Two of the buildings inspected are located in Upper Talas. Climatic and microclimatic differences are important, as the difference in elevation between the two regions of Talas is brought about. Summer months are cooler and winter months are colder in Upper Talas.

While using the drawings and restitution and restoration projects of Yaman Dede Residence, which is the historical one of two houses subject to research, the CB House's application projects and render drawings designed by Argeus were used. The CB House's Energy Identity Certificate has become important in the selection of work to be done. A comparative table was prepared for the structures examined and efforts were made to determine the ecological aspects of both structures (Table-1). The terrain data in the buildings located in the sloping region of Upper Talas was utilized. There are places in the cellar floors of the buildings that utilize the amenities they have used, which are accessed by natural light and have entrance from different denim.

Yaman Dede Residence is a semi-detached structure, which reduces heat loss. This is particularly suited to the Upper Talas climate conditions in energy conservation (Yağmur, Y., 2017). The CB house is a detached house. In order to reduce heat losses, materials produced with today's technologies have been used. It is observed that both structures constructed as semi-detached and detached are located in the land with large gardens. It has been found that the orientation of the main entrance doors of traditional and modern houses to the highest level of daylight is made accordingly. For both structures, it was considered to remove snow that could accumulate in the entrance gate (Table-1).

Positive aspects related to ecological architecture were discussed through plan charts of two houses consisting of basement, ground and first floors. In Yaman Dede Residence, basement floor service areas and ground floor are used as winter floor and the first floor is used as summer house. In addition, the region has rock cut sites due to its geological structure. The basement floor of the building provides the protection of the food from the heat of summer and winter. In the CB House, living and bedrooms were also planned by taking advantage of the slope of the land while still having basement floor service areas. In Yaman Dede Residence, which has a central and inner sofa type plan, the sun rays and heat are provided to the inside of the building (Yağmur, Y., 2017). In the CB House, which has an open plan scheme, the daylight interior can be felt at every point and its heat can be utilized (Table-1).

It was thought that the environmental data are important on the fronts of the constructions and the observations were made on this subject. In both buildings, the northern front has fewer and smaller sparsely windows than the other windows. The CB House, a modern building, offers a lot of new materials and the window openings on all fronts are much bigger than the old one. This practice is not seen in the modern housing where there is a hill window which is seen in traditional buildings in Yaman Dede Residence and contributes to natural ventilation illumination. However, this has not been a disadvantage for housing. In the case of the traditional house, there is a wooden side-opening system for solar control, whereas in the modern house, an automatic shutters system with plastic lamellae is used (Table-1).

There are similarities in some building materials of the two buildings. However, it reflects the technology of the materials used in the constructions, which have a construction year difference of close to 150 years. In Yaman Dede Mansion, stone is used for the walls and wooden materials are used for the upholstery. CB House is carried by carcass system and heat insulated filling material is used on its wall and it is covered with insulation material. In the original construction of the old masonry, the roof was laid, while the earth was made of flat roof, then it was converted into concrete. In the new residence, a hidden cradle roof, which is not perceived from the front, was built. The floor and ceiling coverings of Yaman Dede Residence and the doors and windows were made of wood (Yağmur, Y., 2017) while the flooring and doors of the CB House were made of wood and window furniture made of plastic based material (Table-1).

Table 1. Comparison of the two selected buildings in Talas

		HOUSE	
		Yaman Dede Residence	**CB House**
Year of construction		1850	2015
	Basement	service rooms	services and guest rooms
	Ground floor	interior sofas-general use	Open-plan-general use
Plans	**First Floor**	interior sofas - bedrooms	bedrooms-service rooms
Rock Carving Unit		Available	Not Available
Number of Floors		3	3
Facades	**East**	Miniature window	Small windows
	West	Miniature window	Large Windows
	South	Facade without window	Large Windows
	North	Less- Small windows	Small Windows
Construction materials	**Flooring**	Wood	Wood on reinforced concrete
	Wall	Stone	Heat insulated brick-15 cm isolation
	Ceiling	Wooden lining	Stucco-work
	Roof	Flat	pitched-hidden roof
	Door	wood	Wood
	Window	Wood	Plastic based joinery
Entry Façade		Northeast	North
Land Slope		Available	Available
Additional Equipment for Window		Wooden shutters	Plastic laminated automatic shutter
Neighbor Relations		Semi-detached	Detached
Garden		Available	Available
Facing the street		Available	Not Available

5. EXAMINATION OF SELECTED HOUSES IN TERMS OF ECOLOGICAL ARCHITECTURE CERTIFICATE EVALUATION CRITERIA

Nowadays, there are similar or different evaluation criteria for the certification systems used to facilitate the assessment and standardization of organizations on a structure. It has been observed that the main similarities of these systems are integrated in ecology, energy, economy, indoor environmental quality, health and welfare, innovation, management, land use, transportation, renewable technology, water, environmental pollution, CO2 release materials and waste (Yağmur, Y., 2017). In this study, the benchmark criteria were examined on two old and new structures. It is thought that the criteria can be examined in traditional housing as well as in new structures. It is possible to see traces of ecological architecture in traditional houses. In modern constructions, ecological design approaches with these criteria are tried to be applied.

Although traditional structures are built before the concept of ecology today, they are seen as qualities to be evaluated in ecological production with their ecological concerns. In modern constructions, it is important that the designs are directed in this way in order to capture the ecological architectural criteria. For a sustainable environment, it is deemed necessary for the designer and the user to go over these concepts. These traces have also been examined in the building which has the subject of study and Energy Identity Certificate, and it is hoped that this work will have an incentive and dissemination effect of new construction in terms of ecological architecture.

There is increasing energy needed for to make man's life easier. The supply of this energy is the consumption of energy resources. The use of renewable resources is important because it is not possible to replace renewable energy sources (Bekar, D., 2007). Therefore, energy sources such as sun, wind, wave, biomass, geothermal, hydraulic, hydrogen, ocean current and heat effect of the ocean are important (Yağmur, Y., 2017; Koçhan, A., 1997). In ecological certification systems, energy criterion and therefore how energy is to be provided is the front plan. Yaman Dede Residence, has seen the use of renewable energy produced by the transformation of organic-based wastes supplied from the facility, since there is a stall site. There is also the use of wood which can be regarded as organic based waste. These are energy slides that meet the

required thermal energy needs and do not harm the environment. In modern structure; the natural gas system, which is low in nature, is being used with the progress of today's technologies and the improvement of the collective use and infrastructure possibilities (Table 2).

Economy, another criterion in ecological buildings, is an important issue because ecological building is perceived as non-economic. This situation prevents the construction sector from investing in ecological construction. In fact, it is necessary to understand that the ecological structure means that the cost of use is low and does not harm the environment. It is important that the cost of construction from design to construction, use and destruction is low, and that even the recycling of the destruction materials is ensured. It is important to pay attention to the fact that the design decisions made at the design stage are made with durable, frequent maintenance and non-destructive material, and that the life of the material in use is extended with the use of the material (Dıkmen, B., Ç., 2011). In addition, the short transport distance of construction materials will reduce transport costs and damage to the environment. The recycling and use of the wastes after the destruction of the structure is also economical. In today's construction systems, materials such as concrete, iron, brick and bonding materials are used. While some of them can be recycled, the cost of recycling is costly because the systems are not adequate. In the traditional residential area examined, local stone materials and timber were chosen as building materials. This election has brought the economy from the frontier. The new building has brought economics with its reinforced concrete system, insulated wall materials, stones from local stone quarries, day-to-day construction techniques and materials (Table 2).

In all of the certification systems the indoor environment quality is considered important. In contemporary constructions, CB, the desired level of comfort is attained through mechanical systems which consume a high amount of energy in interior conditions. In ecological constructions, the use of mechanical systems is reduced by considering the indoor living standards since the design phase and the passive systems are aimed at achieving comfort. Wooden shutters were used as sun breakers in the inspection date. In the CB House, blinds were also used as the sun breaker for the western sun and balanced indoor comfort was achieved (Table 2)

Due to the fact that the temperature differences between the summer and winter months and the day-night time in the Upper Talas region are excessive, It is a problem to create the average living temperature in the interior. Therefore, the selection of suitable materials in the traditional house has reduced the influence from this situation. The stone, which is the main building material of the historical house, stores the heat in the winter and provides a cool interior for the summers. Small window openings applied during the orientation of Yaman Dede Residence contribute to this situation. In CB House, the advantages brought by modern materials are utilized. The walls are made of materials with thermal insulation properties and built with an insulation material that is thicker than the value indicated on the Energy Identity Certificate (15 cm) ensuring that the interior temperature is not affected by the outside temperature during the winter and summer. In order to evacuate the heat generated during the summer months, windows were opened in the direction of the dominant wind. In Yaman Dede Residence, the clerestories were made and air evacuation was provided. Despite the large window openings in the CB house, heat-sealable materials were preferred (Table 2)

Human health and well-being are important in certification systems. In these systems, the values that make up the comfort conditions of the structures are the first criteria for human health. Due to the fact that Yaman Dede House is a gardens structure, it is the natural way to obtain the foods and the advantages of designing the structure in the summer and to keep the foods healthy in the natural environment for a long time. Particularly rock-cut and a cool basement are used for this purpose. In the CB House, the basement floor service areas are used for the same purpose, and the food is also naturally obtained from the garden (Table 2).

Innovation means to grow economically, to improve living standards and quality. Most of the certification systems are considered as one of the criteria for evaluation of innovation. It is hoped that the modern architecture will be guided by the ecological systems that have been used in conventional housing. The historical house in consideration contributes to the innovation criterion because it will lead the new construction. CB House is considered to be innovative by using all the techniques and materials in the modern period and by designing it in accordance with the environmental data and directing the further designs (Table 2).

Management with its subtopics such as Project, site, use and demolition is included in certification systems as a subject. Project management in the building sector, where different specialties work together, is important in achieving the desired standards within a limited budget of time, finance, machinery, materials and human power. In ecological structures, project management is the determining factor for the efficiency of these structures at all stages from design to use. Especially in each stage, providing feedback and improving efficiency are among the subjects of certification systems. The maintenance work of the building at Yaman Dede House has increased the efficiency of this house. The maintenance procedures to reduce the impact of the structure on environmental factors during the period of use are examples. Since the CB House is just a new building, there is no impact on the type of wear from environmental factors. In the new structure, the user is required to carry out the maintenance operations at regular intervals and try to remove the snow from the building area during winter (Table 2).

The suitability of the building from all directions with the land is important from an ecological point of view.Within the scope of the regional plans put into practice by the national and local governments, it is a matter to be considered in the selection and design of the land. In addition to the green area, studies on the protection of natural resources such as agricultural land, water resources etc are also the front plan for the sustainability of life. The selection of land is also an ecological approach in the regions where the sub-structure ends in order to use the existing sub-structure. In addition to this, the green area within the region where the structure will be settled is left intact and the necessary planting is evaluated in the certification systems. Yaman Dede Residence was constructed in accordance with the topographical data of the area where it was settled. The CB House is also located in accordance with the land slope. In addition, while the endemic plant cover surrounding the CB House was protected, the green area ratio was five times the building ratio and additional planting was performed (Table 2)

The provision of energy consumption, especially in relation to buildings with public transport services, is an issue in ecological certification systems. The reason is that transportation is reducing the energy consumed and the environmental pollution while reducing finance. It is necessary to construct buildings on public transport lines and to reduce the use of single vehicles. It is known that importance is given to the issue in certification systems (Yağmur, Y., 2017). Yaman Dede Residence has been transported by motor vehicles with the developing technology, which was made with traditional ways in that period as of the date of construction. In this regard, Yaman Dede Rresidence is ecological because it does not pollute the environment during its period and it is transported by means of transportation. Today, it is close to the public transport lines. In the CB House, transportation is provided by motorized vehicles due to the inclined landing settlement as well as access to public transportation lines within two minutes walking distance and by bicycle (Table 2). the pedestrian access to both structures is at the forefront.

Table 2. Comparative Evaluation of Selected Buildings in terms of Ecological Criteria

Structure Comparison Criteria		**HOUSE**	
		Yaman Dede Residence	**CB House**
In terms of Ecology-Energy-Economy Criteria	**Ecology**	*Ecological architecture will set an example for constructions	*It was built with ecological design criteria in mind. *Owner of Energy Identity Certificate
	Energy	Solid fuel (Wood) heating	*Energy efficient systems *Natural gas heating systems
	Economy	*Material that can be used again in the same function	*Recyclable material *Supplied material from nearby *Passive systems
Internal Environment Quality, Health and Welfare Criteria	**Internal Environment Quality**	*Material selection *Direction of construction *Window sizes *Clerestory *Contributing to the heat control of solar control with wooden shutters	*Active systems *Remote controlled solar shredder on the western edge contributes to the temperature control inside the building *honeycombed heat transfer singing systems *Double wall application *Contribution to heat control of plastic lamellar shutters *Orientation *window sizes
	Health and Welfare	*Feeding with natural products without additives	*Increased quality of life from human activities *Feeding with natural products that do not contain additives with the use of garden *Promotion of movement by not using mechanical systems
In terms of innovation and management criteria	**Innovation**	*Opening of technological developments with reference from historical structures	*Leading feature for ecological structures *Use of new technologies
	Management	*Building maintenance management *Expandable construction system *Usage management	*Intelligent systems *Passive systems *Building Maintenance Management *Expandable construction system * Usage management
In terms of land and transportation criteria	**Land Use**	*Semi-detached	*Not located in city center *Placed in historical texture *Green area around *Landing on the land to increase the performance of the daylight *800 m2 green area
	Transportation	*Close proximity to each other *Not located in city center	*Not located in city center *Focus point on historic pattern *Close proximity to public transport stops *3 km to Metro stop

In certificate systems, it is important to use passive systems that provide comfort conditions in the indoor environment with the data obtained from the natural environment without harming the environment and without spending energy from a source of active and passive energy usage. Active systems that utilize technological products are thought to make comfort

conditions better, although the initial investment cost is high. However, the active systems used for the heating, cooling and ventilation of the majority of the certification systems are concerned with the use of renewable energy (Yağmur, Y., 2017; Akyol, Ömerca, M., 2012. It is seen that passive systems are preferred instead of active systems in both houses examined in Talas. CB House, a modern residence, uses only natural gas, which is provided to the surrounding area provided by the city network, for heating only. In both houses, there can be given examples such as fewer window openings on the facades that do not receive sun and situated on the dominant wind direction, stone materials that store heat in traditional houses, and modern materials used to store heat in modern houses (Table 3).

Water usage criteria have an important place in certification systems. It is expected that some of the water required for the building will be used from wastewater and that there will be less water consumption systems and thus water saving will be ensured. For this; there are many ways to use shower and basin batteries to provide low water consumption which can control the flow rate. In addition, the use of waste water and accumulated rainwater in different functions and the use of water meters for efficiency is an ecological approach. The water in the well at Yaman Dede Residence, which is considered in Talas, is provided and can be used when necessary. At CB House, rain water was found to be used for some garden irrigation system (Table 3).

Depletion of natural resources is an important problem today. The use of new and unexploited energy resources is crucial for the conservation and sustainability of natural resources. The use of renewable energy sources in this way will both protect natural resources and prevent the use of polluting energy. It is clear that the influence of the buildings in the built environment that creates the fissures is much. It is observed that measures are taken to reduce the use of technologies, materials, construction systems that will cause environmental pollution in the certification system, considering the pollution rate of the buildings. In CB House, natural gas systems known to have low environmental damage are used as fuel. In addition, thanks to the good insulation of the build, the amount of fuel consumed for heating up is also reduced. For the ventilation and cooling inside the house, the air conditioner gases are prevented from harming the environment by using the windows which provide mutual ventilation. In Yaman Dede Residence, which is in harmony with the environment, there is the use of renewable energy sources which are not exhausted by the effects of planning and topographical data with traditional methods for heating and cooling. In addition, none of the building materials used for the two buildings are harmful to the environment (Table 3). In the world where 40% of carbon emissions originate from buildings, reduction of carbon dioxide emissions by global warming has become important. (Yağmur, Y., 2017; Akca, S., 2011). The fuels used by the buildings for heating and cooling are stated as the greatest cause of the increase in carbon dioxide emissions (Yağmur, Y., 2017; Serın, E., 2011). The CO2 emission criterion is also included in the certification systems. The choice of fuel type in both housing units also reduces this oscillation (Table 3).

The reason why the buildings that apply to the certification systems in Turkey cannot get high points about materials is the deficiencies in ecological material production in the country and therefore the import of materials used in ecological buildings abroad. In addition to this, this situation is likened to selection of local material, which is another ecological design criterion (Yağmur, Y., 2017; Canbay, N., 2010). Selection, production, use, maintenance and recycling of building materials are important (Yağmur, Y., 2017). The fact that it is the local material obtained from the nearby area in supplying the material also brings down the energy consumed in the transportation. All of the materials used in the CB House are materials obtained from nearby area. In the facades where composite panels are used, the selection of this material is mentioned because it is easy to clean and maintain. Plus, when the building finishes, most of the material used is recycled. The furniture used in the interior design has been selected from materials that allow long-term use. The materials used in Yaman Dede Residence are the local materials provided by the region (Table 3).

Table 3. Comparative Evaluation of Selected Buildings in terms of Ecological Criteria

	HOUSE

Structure Comparison Criteria		Yaman Dede Residence	CB House
In terms of Renewable Technology and Water Criteria	**Renewable Technology**	*Wood Non renewable	*energy save *natural ventilation and cooling system *energy save
	Water	*Availability of wells for rain and snow accumulation	* Savings in the use of resources (water, electric) * Choice of taps for low water use *Choice of lighting elements for low energy use
In terms of Environmental Pollution and CO2 Release Criteria	**Environmental Pollution**	*Renewable sources of energy *Energy efficiency provided with applications	*Less energy expenditure compared to a standard residential buildings (compared with 10 houses energy cost) *Use of renewable sources of energy *Provision with energy efficient systems
	Co2 Emission	*Renewable sources of energy	*While the building consumes less energy, it emits less carbon dioxide than other houses *Energy efficient systems *Renewable energy sources *Not using CFC or HCFC which causes ozone layer to be thinned because there is no cooling system
In terms of Material and Waste Criteria	**Material**	*The selection of materials that do not harm nature	*Use of recyclable materials on the exterior *The glass systems used on the facade are sparing natural light and less solar energy. *Preventing harmful effects of sunlight while benefiting from natural illumination *Low-E coated and insulated double glazing for outer layer in double wall application *Inadequate use of building materials containing hazardous materials such as cadmium, lead, mercury in the construction *Use of splitters that provide flexibility in the interior *Building materials that do not damage the environment *Increased thermal insulation performance due to the choice of glass with argon gas in the spaces between double glazing in insulated glazing *All of the materials should be provided within a maximum distance of 15 km *Material selection for recycling
	Waste	*Recycled materials used to prevent damage to nature *Stone material can be used for the same function repeatedly	*Recycled materials used to prevent damage to nature *Stone material can be used for the same function repeatedly

6. RESULT

The construction sector is a sector that is the locomotives of the country in which indirect and direct business lines are connected. Ecological building certification systems encourage ecology and sustainability in the building sector as well as control in all sectors related to the industry. Structures are checked with a number of criteria found under certification systems. Using these criteria, Yaman Dede Residence and the modern building sample CB House were examined for Talas traditional housing. The criteria are based on certification system criteria such as ecology, energy, economy, indoor environmental quality, health and welfare, innovation, management, land use, transportation, renewable technology, water, environmental pollution, CO2 release material and waste. The criterion on the selected houses is graphically charted by means of tables.

In the CB House, some of the ecological approaches have been made with the advantage of new materials and technologies, and most of them have been met with natural intentions. In Yaman Dede Residence, it is seen that about a century ago, ecological approaches were found to be due to necessity. In the CB House, renewable resources were used to select energy sources. Efforts have been made in this direction in Yaman Dede Residence. Especially the use of organic based fuel is an example of renewable energy.

The initial investment cost for today's technology is high. However, the low cost of use is enough to cover the initial investment cost. User and construction / venture firms should be encouraged to work in the building by being aware of this

issue. It is important that the efficiency criterion included in the certification systems is widely considered in terms of economy. According to the conditions of the times, the developments of the structures with the additions are mentioned. According to user requirements in Yaman Dede Residence, the structure life has been extended as differentiations. In the CB House, it was not possible to investigate this situation with the possible reason of a new housing, but the possibilities of enlargement were realized considering the future plans. In this structure, the traces of sustainability are similar to those of traditional houses.

Life quality in interior, especially in residential constructions, is the front plan. Interior comfort is defined as heating, cooling, ventilation, natural lighting. At Yaman Dede Residence and CB House, it is observed that providing passive systems with indoor comfort instead of active systems is at a high level. Both buildings have traces of ecological design with window openings that create ventilation, orientation and window openings contributing to heating, and wooden shutters and louvers that control daylight. Not only passive systems but also some smart systems and technology provide comfort. Systems that are used without human power have negative effects on human health due to inactivity at the same time. In buildings, it is thougt that it is important to keep the movement of people in their daily life at the natural level and to encourage the movement of people. There are designs that encourage the use of human power in traditional housing and modern housing. It is an ecological approach that there is a lot of steps in vertical transportation within the CB House and no mechanical system is used. In addition, the user side of the maintenance and repair work required during the use of the home is also an example of subject and management criteria.

Both structures have features that will lead to the next structure and age. Innovative approaches are open to research and design, as well as material use and innovation, where the most important issue is to create a management plan, especially at the stage of use. This will enable the efficiency of intelligent systems to be increased in ecological structures. Maintenance repair by both users for both structures is an example of this. The proportional relationship of buildings with the land is another element of the ecological approach. The approach that protects endemic plant tissue without harming nature due to its large green areas is one of the ecological characteristics of both structures. Both structures were constructed integrated with the existing urban infrastructure without damaging agricultural land. In addition, the inclination of the land has been decisive in the design. As this increases the cost of construction overhead, favorable settlement is preferred. Both structures are fertile for garden plants. Ecological approaches have been pursued with a specific structure using their own traits. The approach to both houses seems difficult due to the sloping land. However, their proximity to public transportation lines, natural structure encouraging bikes and walking, and historical ambience both attracted to their hinterland traces of ecology. It is certainly not possible to remove the comfort that today's motor vehicles have brought from their homes. But it is clear that there are environments and designs that encourage walking and action.

It is emphasized that renewable energy is important in certification systems. The use of passive systems in traditional and modern housing increases efficiency. The use of self-referential materials and the ability to reuse materials with heat-retaining structure outer walls and heat retaining systems demonstrate that both are successful examples.

In the evaluation criteria of structures in certification systems, taking into account unconsciousness and pollution in the use of natural resources, the use of water and its resources has taken place. Waste water is also supported to be used while water usage is saved. Considering the period in which it is built, the water has become important in the traditional housing from the buildings inspected and brings solutions for water accumulation. In the CB House, it was seen that the application of the rain water for the garden has given importance to both issues and ecological approaches. The first issue that affects other environments such as water is pollution. This is also the first order in the design criteria of ecological structures. It is expected that all subjects will not harm the environment until the materials used for the construction are transported. In Yaman Dede Mansion, completely natural materials are used. In the CB House, materials that can be obtained by short distances and which do not damage the edges are selected with recyclable materials. Both structures exhibit an ecological approach to this issue. The incentives for reducing the CO2 emissions from the buildings in respect of environmental pollution are evaluated in the certification systems. Because of the technology it was built in, the CO2 emission is not available in historical building. In the modern house surveyed, the conditions brought by the day and the choice of fuel used were made with the system with the least CO2 emission. Both houses are ecological in this sense. Another environmental concern in certification systems is the recycling of wastes during construction, use and demolition. Waste management is expected to be effective. First of all, there is a need to reduce the amount of waste to be generated by the use decisions of the materials and to convert the waste to be generated. Both structures were found to use materials that could be recycled. Although the CB House uses reinforced concrete and it is difficult to recycle it, it is clear that after upgrading the technology and waste management to local governments, the material will be recycled after it is completed.

The study of an old and a new structure on the Talas traditional housing were carried out. It is clear that there are ecological traces in the historical Yaman Dede Residence. CB House, which is a modern structure, has ecological structure characteristics by using the advantages of today's technology, materials and so on. While it is not a criteria that makes ecological certification systems compulsory with legal regulations in the country, it should be encouraged to construct the buildings to be constructed within the framework of ecological criteria with incentive characteristics. Structures that have an Energy Identity Certificate must be included and documented in the certification system with these incentives. Sustainability should be ensured with the titles under many certification systems, such as joint venture pollution, unconscious use of natural resources, and the creation of economic structures, which will be created by the construction sector by making legal compulsion and incentive policies on the subject. The ecological approaches in the historical and modern two houses that are considered in the study are in fact examples of the fact that the emphasis can be placed on the issues that are being spoken at any time and that the building can be constructed in the light of these criteria. It is expected that the study will contribute to the topic and set an example for the designs to be made thereafter.

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