...::KENT AKADEMİSİ | URBAN ACADEMY

Volume: 19 Issue: 1 - 2026 | Cilt: 19 Sayı 1 - 2026

ARTICLE INFO | MAKALE KUNYESI

Article Type: Review Article / Derleme Makalesi
Submission Date | Gönderilme Tarihi: 11.02.2025
Admission Date | Kabul Tarihi: 19.12.2025
Published Date | Yayın Tarihi: 22.01.2026

CITATION INFO | ATIF KÜNYESİ

Koca, G. (2026). Ecotourism, Traditional Architecture and Sustainable Settlements, *Kent Akademisi Dergisi*, *19*(1):1-17. https://doi.org/10.35674/kent.1637387

Ecotourism, Traditional Architecture and Sustainable Settlements

Ekoturizm, Geleneksel Mimarlık ve Sürdürülebilir Yerleşimler

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ABSTRACT

Tourism is a major source of income globally, but rapid, uncontrolled development to meet demand has caused serious environmental degradation. As sustainability becomes a central global concern, integrating tourism with nature in a balanced way is increasingly important. In response, ecotourism has emerged as a sustainable alternative, aiming to preserve natural and cultural heritage, respect local lifestyles, and provide socio-economic benefits to communities. Rural areas are often considered ideal locations for establishing ecotourism facilities due to several factors. Primarily, they enable the sharing of natural and cultural assets with environmentally conscious tourists while helping to reduce rural-to-urban migration. Preventing rural depopulation and strengthening local communities socially and economically are therefore key objectives of sustainable settlement development. Proper site selection is the key factor during the construction of ecotourism facilities. Incorrectly located facilities can harm the natural environment. It is also essential to preserve the authenticity of these regions while enhancing their environmental friendliness through modern systems. This study focuses on some important criteria related to ecotourism facilities that are directly related to the protection of ecological balance and ensuring rural sustainability. Accordingly, the main aim of this study is to evaluate the potential of the traditional Turkish House as a model for ecotourism facilities.

Within the scope of the study firstly, a literature review was carried out focusing on ecotourism facilities. This review explored the fundamental concept, key features, site selection and construction characteristics of ecotourism facilities. Then, the suitability of the traditional Turkish House for adaptation as an ecotourism facility is evaluated. In this context, environmentally compatible design, water management, waste management, energy conservation, sustainable technology and material use have been put forward as fundamental design features. When these features are evaluated in terms of traditional Turkish House; it has been seen those issues such as the use of water-efficient fixtures, the development of waste sorting practices, use of alternative energy sources, reforestation projects to meet timber demands and the improvement of wood's fire resistance used come to the fore.

Anahtar Kelimeler: Natural environment, Resilient settlements, Rural development, Traditional architecture

ÖZ

Turizm, tüm dünya ülkeleri için vazgeçilmez bir gelir kaynağıdır. Bununla birlikte, yüksek talebi karşılamak amacıyla kontrolsüz turizm tesisi inşa edilmesi, doğal çevreye büyük zarar vermektedir. Sürdürülebilirlik kaygılarının giderek arttığı günümüzde, dünyanın pek çok ülkesinde turizm alanlarının çevreyle daha uyumlu olması konusu tartışılmaktadır. Turizmin sürdürülebilir türü olarak tanımlanan "ekoturizm", bu amaçla ortaya çıkmıştır. Bu turizm çeşidinin öncelikli amacı doğal ve kültürel dokunun korunmasına fayda sağlarken, bölge halkının yaşam tarzına saygı göstermek ve bölge halkını sosyoekonomik faydalarla desteklemektir. Kırsal bölgeler, farklı sebeplerle ekoturizm tesislerinin konumlandırılması için uygun yerler olarak kabul edilmektedir. Bu sebeplerden ilki, bölgenin doğal ve kültürel zenginliklerinin çevre koruma bilinciyle bölgeyi ziyaret eden turistlerle paylaşılmasıdır. İkincisi ise, hızlı kentleşme sürecinde sosyal ve ekonomik sebeplerle gerçekleşen göçlerin önlenmesidir. Kırsal bölgelerde nüfusu korumak ve bölge halkının sosyal ve ekonomik olarak güçlenmesini sağlamak, sürdürülebilir yerleşimlerin inşasında önemli bir hedeftir. Bununla birlikte, sürdürülebilirliğin sağlanmasında, bu bölgelerin mimari ve kültürel dokusunun korunması da önemlidir. Ekoturizm tesisleri inşa edilirken en büyük öncelik doğru yer seçimidir. Bu tesislerin hatalı konumlandırılması; doğal çevrenin zarar görmesine yol açabilmektedir. Bölgeye özgü geleneksel yapı üretim tekniklerinin korunması, modern sistemlerle donatılarak çevre dostu olma özelliğinin iyileştirilmesi de bir diğer önemli gereksinimdir. Bu çalışmada, ekolojik dengenin korunması ve kırsal

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sürdürülebilirliğin sağlanmasıyla doğrudan ilişkilendirilen ekoturizm tesisleriyle ilgili bazı önemli kriterler üzerinde durulmuştur. Çalışma kapsamında öncelikle ekoturizm tesislerine odaklanan bir literatür taraması yapılmıştır. Bu taramada ekoturizm tesislerinin temel kavramı, temel özellikleri, yer seçimi ve yapı özellikleri incelenmiştir. Daha sonra geleneksel Türk evinin ekoturizm tesisi olarak adaptasyona uygunluğu değerlendirilmiştir. Bu kapsamda, çevre ile uyumlu tasarım, su yönetimi, atık yönetimi, enerji korunumu, sürdürülebilir teknoloji ve malzeme kullanımı temel tasarım unsurları olarak ortaya koyulmuştur. Belirlenen bu tasarım kriterleri geleneksel Türk evi açısından değerlendirildiğinde; su korunumunu destekleyen ekipman kullanımı, atık ayrıştırma uygulamalarının geliştirilmesi, yenilenebilir enerji kullanımı, ahşap ihtiyacının karşılanmasına yönelik ağaçlandırma çalışmaları yapılması ve kullanılan ahşabın yangın direncinin iyileştirilmesi gibi konuların ön plana çıktığı görülmüştür.

Anahtar kelimeler: Dirençli yerleşimler, Doğal çevre, Geleneksel mimarlık, Kırsal kalkınma

INTRODUCTION

Many of the disasters experienced today are a direct consequence of human-induced damage to the environment. In order to protect the natural environment, measures must be taken in different sectors and at different scales. Each of these measures and practices is valuable for the continuity of life on earth in achieving environmental sustainability. Among the sectors which give most hazard to the natural environment, the construction industry bears a significant responsibility for mitigating the harm it causes.

Tourism plays a pivotal role in the economic development of all nations. Each country promotes the natural and cultural heritage within its borders through tourism activities of varying types and scales. However, considering the natural and cultural resources that exist in the world and the number of tourism structures built to promote them, it becomes evident that there are many built environment products that cause permanent damage to nature during the construction and operational phases. These structures often fail to harmonize with the natural environment or align with the cultural characteristics of surrounding region. Since these structures are often designed isolated, they cannot contribute to the development of the settlements surrounding them, and in some cases, they can even harm the social structure of these regions.

In response to growing concerns in recent years, a tourism approach has emerged that emphasizes the recognition and respectful engagement with both the natural and cultural environment. This approach aims to integrate harmoniously with its surroundings, avoiding disruption to the local way of life while seeking to become an inclusive part of it (Kiper, 2013).

This approach, a branch of sustainable tourism and known as "ecotourism", has garnered significant attention worldwide. Ecotourism can significantly benefit the environment, provided it is carefully planned and managed. These benefits are particularly evident when it is developed in rural areas and involves active participation from the local community (Kiper, 2013; Okan, Köse, Arifoğlu, 2016).

Today, especially in countries like Türkiye, one of the most fundamental problems regarding sustainability is the abandonment of rural areas and the uncontrolled population growth in urban areas. In order to solve this important problem and to ensure rural development, economic activities in rural areas need to be increased. Recent development plans have highlighted themes such as ecotourism, natural resources, cultural heritage, and the unique characteristics of local lifestyles as critical components of rural economic activity (T.C. Kalkınma Bakanlığı, 2018; T.C. Çevre ve Şehircilik Bakanlığı, 2011; T.C. Orman ve Su İşleri Bakanlığı, 2011; European Commission, 2008).

Türkiye possesses a large number of regions that are strong candidates for becoming ecotourism routes. In 2017, the T.C. Ministry of Agriculture and Forestry General Directorate of Forestry identified ecotourism areas throughout the country and initiated efforts to revitalize these regions. Accordingly, 70 ecotourism routes were designated across various parts of Türkiye, 37 of which have been opened to tourism (T.C. Tarım ve Orman Bakanlığı Orman Genel Müdürlüğü, 2017).

In the regions designated as ecotourism routes, different types of accommodation facilities are planned in accordance with the specific characteristics of each area. In zones with sensitive ecosystems, non-permanent accommodation units are preferred, whereas in areas with a strong traditional fabric, permanent accommodation facilities are constructed with an emphasis on preserving the existing architectural context.

During the construction of permanent accommodation facilities along ecotourism routes, the core principles of sustainable tourism must be taken into account. A more environmentally conscious approach should be adopted, prioritizing materials and construction methods that have lower impacts on the natural environment. Across various regions of Türkiye, there exist diverse traditional building techniques developed using locally specific materials, each holding significant value within Anatolia's architectural culture. Among these methods, the one that holds a particularly distinguished place in the history of world architecture is the Traditional Turkish House. The Traditional Turkish House is significant not only for its materials and construction techniques but also for its resilience to earthquakes—one of the most critical issues in Anatolia. Therefore, this study focuses on the potential of the Traditional Turkish House as an ecotourism facility.

Supporting ecotourism initiatives in Türkiye, which is a country rich in natural and cultural heritage, can contribute to maintain sustainability in many ways. Ecotourism can serve as a powerful tool for achieving long-term ecological, cultural, and economic balance by fostering harmony between tourism activities and the environment.

1. The Concept of Ecotourism

In countries with abundant natural and cultural heritage, one of the most challenging decisions regarding tourism is determining how tourism activities are carried out. Mass tourism, often favoured for its ability to rapidly and significantly increase tourism revenue, has been a common approach. However, in countries where coastal tourism is predominant, mass tourism has led to intensive development along shorelines, causing the natural environment and architectural texture to deteriorate and the lifestyle of the local people to change. When evaluated from this perspective, poorly planned mass tourism leads to significant long-term environmental and social consequences (Kısa Ovalı, 2008).

The increasing interest in ecology and cultural heritage in recent years necessitates the protection of the natural environment and encourages the enhancement of aesthetic values. This also increases the interest in ecotourism. As an integral component of sustainable development practices, ecotourism is recognized as a critical stakeholder in both preserving the natural environment and ensuring economic growth. In planning these activities, it is essential to prioritize not only the conservation of natural resources but also the enhancement of local benefits. However, ecotourism activities often occur faster than the awareness and perception of the local people increases. This can lead to inadequate and faulty practices, causing unintended harm to the natural environment and social fabric, rather than the long-term contributions to sustainable development that ecotourism aims to achieve (Su Yeong et al., 2014).

In many countries of the world, strategies related to ecotourism activities are often inadequate and far from realistic. Faulty site selection and construction methods, in particular, can lead to the destruction of natural habitats and the deterioration of local living conditions. Therefore, the careful and accurate planning of ecotourism activities is crucial. In order to obtain meaningful outcomes, some criteria must be taken into consideration in the design and execution of these initiatives (Su Yeong et al., 2014).

1.1 Key Principles in Planning Ecotourism Activities

The planning of ecotourism activities is guided by four fundamental principles: a nature-oriented approach, environmental sustainability, social sustainability, and initiatives aimed at education and research (Parker, Khare, 2005; de Grosbois, Fennell, 2022).

- ***Nature-oriented Approach*** emphasizes site selection, accommodation and infrastructure development, and the design of activities that harmonize with the natural environment.
- ***Environmental Sustainability*** prioritizes features of the design and construction process that align with the natural environment and ecosystem, with particular attention to biodiversity conservation and minimizing ecological impact.
- ***Social Sustainability*** involves improving the well-being of local communities by preserving socio-cultural heritage, especially by preserving the architectural texture, enhancing the social welfare of the local community and contributing to the regional economy.
- ***Education and Research*** include activities aimed at informing tourists about the region, encouraging their participation in local events, and promoting research focused on the area's unique attributes (de Grosbois, Fennell, 2022).

The primary objective of ecotourism facility planning is to ensure sustainability. In achieving and maintaining sustainability, environmental and social dimensions stand out as key areas of focus. While the protection of environmental sustainability includes careful consideration of site selection and construction, the protection of social sustainability requires support for the local community.

2. Site Selection and Construction Characteristics in Ecotourism

The most important priority during the planning of ecotourism facilities is the correct site selection and construction decisions in order to maintain environmental sustainability.

2.1 Key Criteria for Site Selection in Ecotourism Facility Planning

The proper planning of sustainable tourism routes requires careful consideration of various factors, including location, proximity to settlements, distance to transportation networks, as well as the density, scale, and typology of proposed structures. Collaboration with experts from multiple disciplines is essential during the planning process, and all decisions must comply with local planning regulations (Kiper, 2013; Hattap, Tarım, 2023).

Site selection is one of the most critical aspects of planning ecotourism activities. The foremost priority is to ensure that these activities do not harm nature. Ecotourism facilities should be established without damaging protected natural areas, which currently account for only 13.9% of the world's surface area (Figure 1) and approximately 5% of Türkiye's surface area. These already limited proportions underscore the importance of preserving such regions (Picuno et al., 2015).

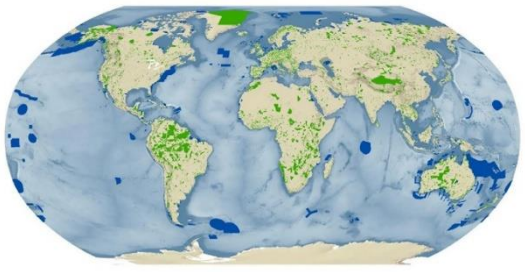

Figure 1. World's Protected Natural Areas Map (European Commission, 2008, UNEP-WCMC, 2016)

In this tourism model, which is based on being together with nature, site selection must avoid causing harm to any natural components or putting pressure on the environment. All built environment elements should be designed with locally sourced materials, use modular construction techniques, and should be integrated with the existing landscape. The preservation of region-specific structures and the development of building typologies supported by modern systems should also be prioritized.

During the evaluation of site suitability, both short-term and long-term impacts must be taken into consideration. The density of structures, the construction process, and its associated effects should be emphasized. Effects such as the deterioration of visual richness, damage to recreational areas, and damage to ecosystems must also be taken into consideration. Furthermore, long-term impacts, such as permanent changes to the current land use characteristics, degradation of traditional landscape features and the local environment, should also be evaluated (Buckley, 2009; Su Yeong et al., 2014).

The evaluation should be conducted by a multidisciplinary commission comprising local administrators, urban planners, architects, and archaeologists. In order to determine general expectations and trends, the opinions of the local people should also be consulted at different stages of the evaluation. By following this approach, ecotourism activities can be located in the most appropriate areas, and potential negative impacts can be mitigated (Su Yeong et al., 2014).

In order to protect the natural environment and social sustainability, four key criteria should be taken into consideration in site selection;

2.1.1 Regions to be Excluded

The site selection for ecotourism activities must prioritize the preservation of natural environments and cultural heritage. Accordingly, the selected area should be situated away from sensitive ecosystems requiring protection, groundwater and surface water sources at risk of contamination, and regions with unique vegetation (Su Yeong et al., 2014).

The conservation of water and water resources holds critical importance for Türkiye. The Environmental and Natural Resources Sustainable Management Report prepared by the Ministry of Development in 2018 highlights that significant amounts of water are consumed for energy production worldwide. The report predicts that global water consumption for energy production will increase by 85% by 2035 compared to 2012 data (T.C. Kalkınma Bakanlığı, 2018).

According to The Water Resources Management and Security Special Expertise Commission Report, which is a continuation of the previously mentioned report, Türkiye is stated to be in the category of countries with water restrictions. Therefore, protecting Türkiye's groundwater and surface water resources is an essential priority (T.C. Kalkınma Bakanlığı, 2018).

Similarly, the research prepared by the World Resources Institute (WRI) using various climate models and socioeconomic scenarios indicates that many countries will face water scarcity by 2040. As shown in Figure 2, Türkiye is among the countries that will experience significant water stress.

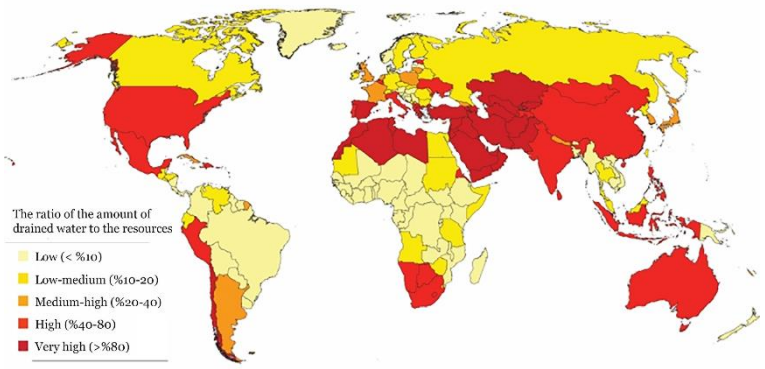

Figure 2. Countries that will Face Water Scarcity in 2040 (World Resources Institute, 2015)

Site selection for ecotourism facilities must consider the previously mentioned factors. Structures should be located in compliance with this approach. Building construction in areas that are likely to disrupt natural and cultural degradation should be avoided. Ensuring that the planning and construction of ecotourism facilities do not harm natural or cultural resources is imperative to support sustainability and long-term environmental resilience.

2.1.2 Tourism Resources

Regions selected for ecotourism must be carefully evaluated based on their tourism resource characteristics. Specifically, the selected area should not be located within a forest nor it have resulted from an unidentified fire. If the area has undergone deforestation through natural processes, it must possess unique ecological characteristics, support the regrowth and spread of its natural vegetation, and maintain a safe distance from groundwater and surface water sources. Furthermore, the area should be visually isolated from major highways and railway routes (Su Yeong et al., 2014).

Planning reports prepared for this purpose emphasize the necessity of applying the Euclidean distance method (Figure 3) to determine the proximity of selected sites to groundwater and surface water resources. This approach involves connecting points such as water bodies, water sources, or wells with straight lines. The area closest to the water source, as indicated by the imaginary line, is classified as unsuitable for settlement (Su Yeong et al., 2014).

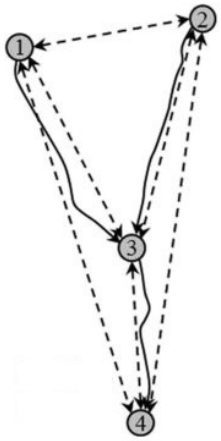

Figure 3. Euclidean Distance Method (Zhang, Gao, Cai, 2019)

2.1.3 Environmental Characteristics

Another important criterion for the placement of ecotourism facilities is ensuring their alignment with the environmental characteristics of the region. During the planning, sensitive ecosystems should be

avoided, and land-use policies should be developed to support the region's economic growth (Su Yeong et al., 2014).

Figure 4. Population Density Caused by Mass Tourism, Brazil (CNN Travel, 2015)

It is essential to anticipate that ecotourism activities will inevitably lead to an increase in population density, waste generation and environmental degradation depending on the number of tourists (Figure 4). Measures should be taken to mitigate the common issues related to mass tourism (Kısa Ovalı, 2008).

2.1.4 Socio-Economic Characteristics

Measures must also be taken to prevent the adverse effects of ecotourism facilities on the socio-economic structure of surrounding local communities. These measures include assessing the distance of the facilities from residential and urban areas, evaluating their accessibility, and considering the anticipated population density (Kiper, 2013; Su Yeong et al., 2014; Amalu, 2018).

The distance of the selected site from residential and urban areas should be determined using the Euclidean distance method, ensuring reasonable proximity to various transportation networks. Furthermore, to maintain social sustainability and support local communities socio-economically, the facility should be located within an economically viable radius of residential areas (King, Stewart, 1996; Su Yeong et al., 2014).

2.2 Key Criteria for Construction in Ecotourism Facility Planning

During the construction of ecotourism facilities, the primary goal must be the preservation of the ecosystem rather than the pursuit of striking or visually dominant designs. Support should be obtained from local people, local materials should be used, disaster resilient structures should be produced, inspiration should be taken from traditional architecture developed over centuries, and inclusive designs that can be used by everyone should be proposed.

In this context, the basic criteria that should be focused on in the architectural design of ecotourism facilities are as follows:

- Design in harmony with nature
- Water management
- Waste management
- Energy conservation
- Sustainable technology and material selection (Mehta, Baez, O'Loughlin, 2002).

2.2.1 Design in Harmony with Nature

Ecotourism facilities must avoid replicating the negative effects associated with mass tourism. Designs should minimize physical and visual pollution, harmonize with the natural landscape and vegetation, and avoid competing with the surrounding environment. Architectural forms specific to the region should be examined during the design process and inspiration should be taken from the solutions offered by traditional structures that have been evolving for centuries. Details which are produced to problems specific to the region should be examined. Facilities should be physically and culturally compatible with the region, ensuring they integrate seamlessly into their surroundings (Mehta, Baez, O'Loughlin, 2002; Crosbie, 1994).

Structures should not dominate their natural surroundings but blend into the existing landscape, as shown in Figure 5. It should be designed with elements that are suitable for the climatic characteristics of the region, and should include details that especially consider the precipitation regime. Buildings should not exceed the height of natural components in their surroundings, and their colour palette should harmonize with the environment. Traditional construction techniques usually meet these features (Mehta, Baez, O'Loughlin, 2002; Crosbie, 1994).

Figure 5. Nature-Compatible Architecture, Faroe Islands (Mistry, 2020)

Cultural harmony of the building with its environment is as important as its physical integration. Incorporating traditional construction techniques and motifs helps reflect the cultural history of the region. In this way, discomfort among local communities is prevented and the tourist experience can be improved. Engaging local artisans can ensure authenticity and foster stronger relationships between locals and visitors. However, traditional methods should not be merely replicated but thoughtfully synthesized with modern technology to create innovative and functional designs (Mehta, Baez, O'Loughlin, 2002; Crosbie, 1994).

2.2.2 Water Management

Water supply is expected to become one of the most pressing challenges in the coming years. Therefore, ecotourism facilities must adopt sustainable methods for water conservation and usage. Sustainable methods should be prioritized for obtaining water, and water use should be reduced as much as possible. In this context, rainwater harvesting and reuse can be recommended.

The planning process should begin with consultation with a hydrogeology expert to evaluate local water sources and their potential for sustainable use. A comprehensive plan should ensure the preservation and efficient use of water resources, highlighting the conservation, collection, reuse, and treatment of water (Mehta, Baez, O'Loughlin, 2002).

In order to ensure water conservation, water-efficient equipment should be used. It is also important to prevent water leaks in the plumbing system and to avoid water-intensive amenities, such as swimming pools (Mehta, Baez, O'Loughlin; 2002; Edwards, 1996).

Figure 6. Water Harvesting for Reuse (Green Travel Blog, 2023)

Obtaining water from nature is a method that has been applied in different parts of the world throughout history and it is also compatible with the existence purpose of ecotourism facilities. Water can be collected naturally from rain and snow through rooftops, cisterns, or barrels, as illustrated in Figure 6, and then be used after the improvement process. This method can also help preventing erosions. Another natural water obtaining method is storing snow in pits covered with soil and then gathering the melted snow (Crosbie, 1994; Edwards, 1996).

Designers must prioritize systems for treating and reusing water for various purposes. It is possible to collect greywater from kitchens, sinks, and showers which then can be filtered and repurposed for flushing toilets or irrigation. Additionally, using biodegradable soaps and detergents simplifies the water treatment process and enhances sustainability (Crosbie, 1994).

2.2.3 Waste Management

One of the most critical challenges that ecotourism facilities must address is effective waste management. Improper disposal of waste can cause significant and potentially irreversible harm to the environment (Figure 7). The primary recommendation for tackling this issue is to prioritize waste reduction. Waste generated in ecotourism facilities generally falls into three categories: construction waste, solid waste, and liquid waste (Mehta, Baez, O'Loughlin, 2002; Sharma, 2020).

Figure 7. Tourists Walking Along a Path in a Rainforest (Global Voices, 2022)

To prevent construction waste from causing significant environmental issues, waste removal should be planned during the design phase. Excessive delivery of materials to construction sites should be

avoided, and toxic materials must be safely disposed of using appropriate methods (Mehta, Baez, O'Loughlin, 2002).

Sustainable materials that are durable, biodegradable, and recyclable should be prioritized to minimize waste. Solid waste should be sorted and evaluated for reuse when possible. Non-degradable waste must be separated and sent to appropriate recycling facilities. Organic waste can be composted for fertilizer production or converted into biogas (Mehta, Baez, O'Loughlin, 2002; Sharma, 2020).

The primary goal when performing wastewater treatment is to prevent environmental degradation while protecting public health. Various treatment methods are available, with subsurface soil absorption being one of the most common. This technique is based on the natural filtering properties of soil and requires minimal maintenance. However, different soil absorption characteristics may necessitate more complex and costly solutions in certain cases (Mehta, Baez, O'Loughlin, 2002; Edwards, 1996; Sharma, 2020).

2.2.4 Energy Conservation

Energy conservation and use are other important issues in the planning of ecotourism facilities. Passive climatization principles should be integrated into the design to maximize energy efficiency. It is crucial to take advantage of sunlight and wind to ensure natural ventilation, heating and lighting. The adoption of renewable energy sources is also important in terms of consuming fewer natural resources (Mehta, Baez, O'Loughlin, 2002; Farmer, 1996).

Passive climatization principles are used to consume the least amount of energy possible. Most passive climatization and low energy consumption applications are based on the principles of mitigating harsh climate conditions and benefiting from favourable climate conditions. Traditional construction techniques, developed over centuries, offer valuable solutions for adapting to diverse climatic conditions. The passive design principles observed in the evolution of Anatolian towns, as illustrated in Figure 8, balance access to sunlight, wind, and view effectively. These traditional techniques should inspire the design and construction of ecotourism facilities.

Figure 8. View of a Traditional Anatolian Town, Şirince, İzmir

Buildings should be oriented to maximize sunlight and wind benefits. When necessary, specialized features, such as water or landscape elements, should be incorporated to benefit or protect from sun and wind effects.

The building envelope should be designed to maximize thermal efficiency. High-quality, impermeable materials should be used at junction points where different materials meet. Local and durable materials compatible with the region's climate should be prioritized.

After taking appropriate passive climatization measures, the active energy required by the building should be obtained from renewable alternative energy sources. Viable options that can be used for this purpose include solar panels, wind energy systems, and biogas generated from recycled solid waste. Wood is frequently used as a source for cooking and heating in ecotourism regions. Efforts should focus on minimizing wood consumption and efforts should be made to obtain wood from afforested areas or utilizing waste wood where possible (Mehta, Baez, O'Loughlin; 2002).

Lighting is another significant energy consumption source in buildings. Therefore, measures that are taken to reduce electricity consumption due to lighting are important. LED lighting is a suitable alternative to incandescent bulbs, as it reduces electricity usage, generates minimal heat, and avoids disrupting wildlife with excessive brightness. Its durability and low energy requirements make it an essential component of sustainable building design.

2.2.5 Sustainable Technology and Material Use

The sustainability of a building is significantly influenced by the materials and construction technologies used in its production. Regular usage and consistent maintenance are also critical criteria for assessing sustainability.

For an ecotourism facility to exhibit strong sustainability characteristics, it should integrate traditional and modern construction technologies while prioritizing materials that minimize harmful environmental impacts. Traditional construction techniques play a vital role in ensuring environmental and social sustainability due to their ecological and economic benefits, as well as their contribution to cultural preservation. These techniques should be thoroughly understood and adapted—rather than merely replicated—by integrating them with modern technologies (Mehta, Baez, O'Loughlin, 2002; Crosbie, 1994).

The appropriateness of modern construction technologies should also be evaluated in terms of their applicability on-site and their comprehensibility by the workers implementing them. Given that ecotourism facilities are often located in pristine or minimally disturbed environments, even the construction process itself must be carefully managed to minimize its impact.

Material choice should prioritize compatibility with the region's climatic conditions. Using lightweight, locally sourced, renewable, biodegradable, low-waste, and non-toxic materials can simplify maintenance and reduce environmental harm. Traditional materials offer additional advantages; (Mehta, Baez, O'Loughlin; 2002; Crosbie, 1994):

- Sourced from natural resources
- Avoiding synthetic content
- Low energy consumption during production
- Minimal environmental pollution
- Low transportation emissions due to local availability
- Economic support to the local community through local labour employment

Structures that combine traditional and modern elements should also incorporate disaster-resilient techniques, high-performance insulation, fire-resistant measures, and renewable energy systems such as solar power. These features not only extend the building's lifespan but also reduce energy consumption.

- Most of the structures produced with traditional methods in Anatolia have the stated sustainable quality. Therefore, the usability of traditional buildings of Anatolia as ecotourism facilities needs to be evaluated.

3. Evaluation of the Usability of the Traditional Turkish House in Ecotourism

Like other regions worldwide, Anatolia features numerous traditional building types evolved by using methods adapted to local needs and conditions. Among these, the Traditional Turkish House is the most widely used and globally recognized typology in Ottoman architecture.

Designed to address region-specific challenges, particularly seismic resistance, these houses have been constructed over centuries with ground floors constructed by using natural stone and upper floors by using wooden frame. The voids within the wooden frames were filled with locally sourced materials, ensuring efficient and sustainable construction.

When the potential of the Traditional Turkish House for use as an ecotourism facility is evaluated, the findings summarized in Table 1 were identified.

Table 1. Evaluation of the Usability of a Traditional Turkish House as an Ecotourism Facility

Design Feature	**Requirements**	**Compliance with Requirements**
Design & Integration with nature	• to avoid physical and visual pollution • to harmonize with natural landscape and vegetation • to ensure climate-responsive design • to avoid exceeding the height of surrounding natural elements • to use colours that align with the environment • to prefer authentic details and ensure cultural harmony • to benefit from the experiences of local community	*Aspects that comply with the criteria;* Traditional Turkish House is designed in accordance with the climatic characteristics of the region, does not compete with the surrounding natural environment and is in harmony with it. Each structure benefits sufficiently from the landscape and physical environmental elements. It has local cultural harmony with the region and can be easily constructed by the local community as it is built by using local materials.
Water management	• to prefer sustainable water obtaining techniques • to protect water sources through effective planning • to use water-efficient designs and equipment • to adopt methods like rainwater harvesting to collect and reuse water • to use biodegradable soaps and detergents	*Aspects that comply with the criteria*; Since Turkish House is constructed by using locally obtained, traditional, non-toxic materials it usually does not harm water resources. Many of the houses have wells in their courtyards. Additionally, sometimes practices such as collecting and reusing rainwater is preferred. However, modern practices aimed at protecting water resources are not used very often. *Aspects that need to be improved*; Turkish House lack modern water-saving and reusing technologies. Additionally, they are constructed without water-efficient equipment. These systems need to be integrated into these structures.

Waste management	• to minimize building material waste in construction with careful planning during the design stage • to avoid toxic materials • to prefer long-lasting, biodegradable, and recyclable materials • to implement waste sorting, composting, and biogas production systems • to treat wastewater	*Aspects that comply with the criteria*; Due to the use of natural materials like stone, wood, and adobe, construction waste is minimal, and environmental impact is low. Besides, sometimes extracted wooden materials can also be used. *Aspects that need to be improved*; As old traditional villages lack waste collecting and sorting practices they need to be introduced to these settlements. Besides, compost and biogas production technologies and modern wastewater treatment systems are not available in these traditional buildings as well. These systems should be adopted by considering their costs and application methods. They can also be introduced to the entire settlement by expanding its scope with the help of local authorities.
Energy conservation	• to adopt passive climatization practices • to ensure appropriate orientation and placement in order to take advantage of sunlight and wind • to provide natural ventilation • to take advantage of appropriate water and landscape features compatible with the region's climatic properties to benefit or avoid from sunlight and wind • to design a thermal-efficient envelope • to utilize alternative energy sources • to conduct afforestation to meet timber needs • to prefer energy-efficient lighting solutions	*Aspects that comply with the criteria*; Traditional construction techniques are designed by using passive climatization principles such as proper orientation, proper positioning and benefiting from sunlight and wind. These buildings also benefit from water and landscape elements when necessary. The traditional and local building materials used for construction have the ability to solve the problems specific to the region. When stone and adobe walls can easily solve problems related to heat and sound due to their thickness, wood is successful due to its structural properties. *Aspects that need to be improved*; Alternative energy sources, afforestation activities for sustainable timber use and energy-efficient lighting solutions need to be adopted.
Sustainable technology & Material use	• to integrate traditional and modern construction techniques • to select materials suitable for the region's climate • to prefer local building materials to reduce the energy consumption due to logistics • to prefer renewable and biodegradable building materials	*Aspects that comply with the criteria*; As traditional techniques use materials which are obtained from nature, they are renewable, biodegradable, non-toxic and low waste. Additionally, Turkish House has a high earthquake resistance as it is evolved in

	• to prefer materials that produce less waste and do not emit harmful gases • to use disaster resilient techniques in construction • to use materials with high/or improved fire resistance	Anatolia which is an earthquake prone region. *Aspects that need to be improved*; Fire vulnerability remains a major issue, requiring improvements in fire-resistant technologies.

Traditional Turkish House meets nearly all the requirements for ecotourism facilities, excluding some modern technological needs. When complemented with sustainability-focused technologies, its compatibility with modern expectations can be significantly enhanced.

CONCLUSION and RECOMMENDATIONS

Ecotourism activities, with its numerous environmental and social benefits, must primarily aim to preserve sustainability. Environmental and social sustainability are particularly critical in achieving this goal and necessitates a focus on site selection, appropriate construction practices, and the protection of social sustainability.

Ecotourism facilities must be located in areas that do not harm sensitive ecosystems, groundwater and surface water resources. Selected sites should avoid regions affected by unexplained deforestation. The first step involves government-led identification of critical habitats that support biodiversity. These protected and pristine ecosystems also serve as natural barriers against disasters. Following this, maps delineating these areas should be integrated with strategic information like surface water and groundwater sources, enabling the determination of protected zones and potential ecotourism routes. At this stage, it is vital to remember that the expansion of hydroelectric power plants and mining licenses poses significant threats to natural resources.

Another important factor effective in the sustainability of natural areas and areas that support biodiversity is the income generation for the protection of these areas. Sustainable management of these valuable areas requires substantial financial resources. Therefore, such regions should be declared as national parks, governed by clear policies, and managed by local authorities under a transparent fee structure to prevent unfair profit or destruction.

Key criteria for construction include protecting the natural environment, reducing resource consumption, and implementing effective waste, water, and energy management. Integrating traditional and modern techniques has been identified as one of the most effective strategies. Accordingly, this study highlights the Traditional Turkish House, one of Anatolia's most significant contributions to global architectural heritage, as a viable option for ecotourism facilities.

Traditional Turkish House demonstrates strong environmental sustainability through its adaptation to regional climatic conditions, harmony with its natural surroundings, use of local materials, and unique architectural characteristics. Designed to address region-specific challenges, including climate-related issues, it offers adequate energy efficiency. Enhancing these buildings with modern technologies and systems can further improve their performance. In this context; during the construction of these buildings:

- Use of water-efficient fixtures
- Implementation of wastewater treatment systems
- Adoption of waste sorting practices
- Installation of systems for compost production and biogas generation

- Integration of alternative energy sources
- Initiation of reforestation projects to meet timber demands and
- Improvement of wood's fire resistance can be recommended.

These improvements can support the development of prototype designs for the Traditional Turkish House. These designs should be shared with local governments and promoted for construction. Broad adoption of these practices, particularly with government support, is essential for their success. When governments adopt such initiatives as part of national policy and receive support from local administrations and public institutions through strategic & development plans, their effectiveness and impact significantly increase.

Compliance with the Ethical Standard

Conflict of Interest: The author(s) declare that she does not have a conflict of interest with other third parties and institutions, or if so, how this conflict of interest arose and will be resolved, and author contribution declaration forms are added to the article process files with wet signatures.

Ethics Committee Approval: There is no need for ethics committee approval in this article, the wet signed consent form stating that the ethics committee decision is not required has been added to the article process files on the system.

Financial Support: No financial support was received for the study.

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