SUSTAINABLE TOURISM CRITERIA AND CRITICAL EVALUATION OF CERTIFICATION FOR ACCOMMODATION ESTABLISHMENTS IN BELEK

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ABSTRACT

SUSTAINABLE TOURISM CRITERIA AND CRITICAL EVALUATION OF CERTIFICATION FOR ACCOMMODATION ESTABLISHMENTS IN BELEK

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Setting environmental strategies, codes and guidelines for designing accommodation establishments is essential in order to maintain the goal of sustainable tourism. There are plenty of labels and certification schemes that assess environmental aspects of these establishments. However, their effectiveness is questionable, particularly from the side of sustainable design.

This study endeavours to be a resource for further designs and to respond the need to assess the outcomes of the planning and design decisions. A survey questionnaire is developed to evaluate the environmental performance of selected hotel buildings. Case studies were carried out in four hotels in Belek which had been awarded the Green Star Certification by Ministry of Culture and Tourism of Turkey. Each hotel building was evaluated through the guideline developed for this study.

The first three hotels were not planned with sustainable design criteria. However, it is found that each has some positive contributions to their environments. In the first hotel, a major part of the natural forest cover was protected; in the second one,

renewable energy systems were installed; in the third one, it was preferred to protect the forest cover rather than using the whole capacity that was allowed. Only the fourth hotel was planned with sustainable design criteria. Additional to its many positive aspects, this high capacity hotel damaged a considerable part of the forested area on its land. Findings show that sustainable design criteria are not employed carefully and there is a need for integration of these criteria from the preliminary planning phase.

Keywords: sustainable design, sustainable tourism, certifications for sustainable tourism.

ÖZ

SÜRDÜRÜLEBİLİR TURİZM KRİTERLERİ VE BELEK'TEKİ KONAKLAMA TESİSLERİNİN SERTİFİKALANDIRILMASI ÜZERİNE ELEŞTİREL BİR DEĞERLENDİRME

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Sürdürülebilir turizm hedefini gerçekleştirebilmek için çevresel stratejiler ve kodların oluşturulması, konaklama tesislerinin projelerini tasarlamaya yönelik kılavuz ilkelerin belirlenmesi önem taşımaktadır. Konaklama tesislerinin çevresel yönünü değerlendiren çok sayıda etiket ve sertifika bulunmaktadır. Ancak, özellikle sürdürülebilir tasarım konusunda bu sertifikaların etkinliği tartışmalıdır.

Bu çalışma, gelecek tasarımlara kaynak oluşturmayı ve planlama ve tasarım kararlarının sonuçlarının değerlendirilmesi ihtiyacına cevap vermeyi hedeflemektedir. Seçilen otel binalarının çevresel performanslarını değerlendirmek üzere bir anket hazırlanmıştır. Kültür ve Turizm Bakanlığımızdan Yeşil Yıldız Belgesi almış Belek'teki dört otel, hazırlanan kılavuz ilkelere göre değerlendirilmiştir.

İncelenen ilk üç otel, sürdürülebilir tasarım kriterleri dikkate alınmadan planlanmıştır. Ancak, yine de çevrelerine bazı olumlu katkılarının olduğu tespit edilmiştir. İncelenen birinci otelde, ormanlık alanın önemli bir kısmı korunmuş,

ikinci otelde yenilenebilir enerji sistemleri kurulmuş, üçüncü otelde, izin verilen tüm kapasitenin kullanılmasından ziyade, ormanlık alanın korunması tercih edilmiştir. Sürdürülebilir tasarım kriterleri ile tasarlanan dördüncü otelde, çok sayıda olumlu özelliğin yanı sıra, yüksek kapasitesinden kaynaklanan ormanlık alanın tahribi de gözlemlenmiştir. Sonuç olarak sürdürülebilir tasarım kriterlerinin özenle uygulanmadığı ve bu kriterlerin planlamanın ilk aşamasından itibaren sürece dahil edilmesi gerektiği belirlenmiştir.

Anahtar Kelimeler: sürdürülebilir tasarım, sürdürülebilir turizm, sürdürülebilir turizm sertifikaları.

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LIST OF ABBREVIATIONS

3S	Sea, sand and sun
BREEAM	Building Research Establishment Environmental Assessment Method
CDD	Cooling degree day
CESD	Center on Ecotourism and Sustainable Development
CIRET	International Center for Research and Study on Tourism
ECOTRANS	European Network for Sustainable Tourism Development
EIA	Environmental impact assessment
FAR	The floor area ratio
GDP	Gross domestic product
GSTC	Global Sustainable Tourism Council
HDD	Heating degree day
HVAC	Heating, ventilating and air conditioning
IUCN	International Union for Conservation of Nature
LEED	Leadership in Energy and Environmental Design
OED	Oxford English Dictionary
SPO	State Planning Organisation
TIES	The International Ecotourism Society
TÜİK	Turkish Statistical Institute
USEIA	The U.S. Energy Information Administration
UNCED	United Nations Conference on Environment and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNWTO	United Nations World Tourism Organisation
WCED	World Commission on Environment and Development
WES	World Ecotourism Summit
WSSD	World Summit on Sustainable Development
WTTC	World Travel & Tourism Council
WWF	World Wildlife Fund

CHAPTER 1

INTRODUCTION

Tourism plays a significant role in economic growth, particularly for developing countries. However, the negative impacts of tourism should not be neglected. Some tourism activities have multiple adverse environmental effects. On the other hand, natural environment is one of the major attractions for tourists. Therefore, environmental conservation is essential for the future of the tourism. The term "sustainable tourism" has arisen from this dilemma and the ongoing discussions on "protection and use balance."

To increase the awareness about environmental protection, certification for sustainable tourism is encouraged by international organizations and governments. Certifications play a complementary role to legislations, regulations and incentives. They are generally assumed as useful tools, which provide accommodation establishments with a trustworthy and transparent way to demonstrate their environmental commitment to the customers. Furthermore, by adopting certification programs, these establishments take the opportunity to improve their current practices.

There are plenty of labels and certification schemes in tourism, and some do not serve to the above-mentioned goals. Besides, from the consumer's perspective, the multiplicity of these initiatives causes confusion. In addition, there is generally a lack of clarity about which certification is credible, and which criteria are included and what performance is measured in these certifications.

Another significant deficiency of certification programs is the lack of criteria regarding architectural design. The impacts of design, construction, operation and destruction of a building on natural environment are often missing in certification schemes. Although often underestimated, architectural design can contribute productively to making tourism sector more sustainable. On the other side, sustainable development can be a guideline to establish design principles, which link the global, regional and local scale.

The above-mentioned arguments have been continued nearly for three decades in the world. Turkey as a late comer to the tourism arena has been trying to adapt and to contribute to these discussions, which come together with tourism development. One of the initiatives taken in Turkey in terms of sustainability is a certification program called “Green Star.” This program has been implemented since 2008 by the Ministry of Culture and Tourism.

In this study, the role of certification of hotel buildings in the context of sustainable tourism, and the place and weight of sustainable design in the criteria of this type of certification systems are questioned. Additionally, the approach of architects, operators, customers and governments to sustainable tourism and its design is evaluated through four hotels, which are located in Belek, Antalya, Turkey. The selected cases are hotels, which have been awarded a Green Star Certification. Furthermore, they are located in Belek, which has priorities for environmental protection since its planning period.

In this chapter, firstly, the problem and the necessity of the study are set and underlined, additionally; the main hypothesis and sub hypotheses are presented in the “argument” subsection. It is followed by the statement of “objectives.” And this subsection continues with “methodology” which introduces the methods and strategies employed through the investigation process and with “limitations and delimitations” of the study. The chapter concludes with “disposition” part, where a summary of material presented in the thesis is given.

1.1 Argument

Although this study deals with sustainable development of tourism, it is not focused on wide scope of sustainability of Antalya or Belek. Primarily, the study concentrates on the need for setting strategies, codes and guidelines for architectural design of hotel buildings to achieve sustainable tourism.

Hotels took the fourth place among the buildings in the service sector for their energy consumption, after facilities serving for: (1) food production, (2) sales and (3) health care (Hotel Energy Solutions, 2011). A substantial amount of energy is used in hotel buildings for their heating and cooling requirements. There are many different ways for the hotel sector to reduce operating costs by taking advantages of energy-saving opportunities and preference for renewable energies. Furthermore, protection of local architecture, using environmental friendly construction methods and materials, conservation of natural resources and landscaping with native plants are some of the essential design objectives of these buildings in order to minimize their negative impacts on the environment.

Taking into account of these facts, the present study is carried out with the aim of developing a survey questionnaire to assess the design of the selected hotel buildings from the perspective of sustainable tourism. Criteria within the questionnaire vary from selection of the site to the usage of the materials. The outcomes of the study are expected to give results about how design decisions affect the energy efficiency and to what degree it supports sustainability of tourism and its main source, the environment.

The main hypothesis of this thesis is as follows:

"Sustainable design criteria are employed carefully in the hotels of Belek, which has priorities for nature conservation in Turkey."

Following sub hypotheses are developed to support the main hypothesis:

H1: When the location or setting of the hotel buildings or settlements are first chosen, area-specific conditions such as accessibility, landscape structure and character, the bioclimatic needs and hazardous conditions of the Belek region are considered.

H2: Hotel buildings are designed with the consideration of natural ventilation, appropriate light and shading, passive solar gain, and cooling in order to maintain a good internal comfort in Belek.

H3: Hotels in Belek have building components that are designed to maintain a balanced and comfortable indoor climate.

1.2 Objectives

The main objective of the study is to question sustainable design approach of hotel buildings through a case study. Furthermore, the study aims:

- Expansion of literature on the sustainable tourism and its design by selection of an area that should be considered within the balance between protection of environment and operation of hotel buildings,
- Constitution of a source to guide designers and researchers,
- To respond to the stakeholders' need to evaluate the outcomes of their planning and design decisions.
- To determine the features of sustainable hotel buildings, in order to achieve better practices in tourism industry, especially on a local scale.

1.3 Methodology

This study aims to examine the state-of-the-art of the research related to specific area on the assessment of sustainable tourism in the field of architecture. Firstly, a brief historical background of tourism development and its relation to sustainability are introduced. A critical review on sustainable tourism literature is dealt throughout the past five decades. Afterwards, an overview of the environmental problems and the sustainable design solutions in response to them are assessed. Integrating sustainable approaches into the building design process is evaluated throughout each decade over the past fifty years. In addition, the study aims to evaluate certain sustainable tourism certification schemes according to their relationship with architecture. Based on a critical evaluation of literature survey in Chapter 2, the study comprises an understanding of the changing insights and explanations. This evaluation provides the epistemological framework for better understanding the research area.

In Chapter 3, together with the data on climatic conditions of coastal area of Antalya, a research methodology is designed to develop general sustainable design recommendations. Parameters of the survey questionnaire which is applied to the case studies are prepared depending on the critical evaluation of these design recommendations. Within the survey questionnaire, the traces for sustainable tourism criteria are searched under the headings of general information about the hotels, their architectural design, energy consumption and savings and other services.

The study employed the case study design strategy. The selected four hotel buildings in Belek are investigated on site.The questionnaire form with the previously determined criteria is applied to each hotel in the field work in order to maintain the integrity of the study.

1.4 Limitations and Delimitations

The complexity of the term “sustainability” is one of the most important limitations of the study. There is a wide variety of disciplines and literature on the term and its related concepts: sustainable development, sustainable tourism and sustainable design. The substantial body of literature induced a necessity to make historical analyses of these concepts. Within the light of these analyses, the emergence and development of the terms and the links between the concepts were questioned. However, because of time and space constraints, the examination of the extensive literature in detail is not feasible. Hence, only the literature that is regarded on the common intersection point of the concepts is tried to be examined.

Unfortunately, architectural drawings of the hotel buildings could not be accessed totally. Merely settlement plans and some schematic floor plans of the hotel buildings could be gathered. Although, the architectural drawings were demanded from managers of the hotels and relevant municipalities with the letter taken from METU Department of Architecture, and in person meetings and telephone calls were made highlighting that the data would be used only for academic purposes, unfortunately, they were not shared because of security reasons, loss of projects, disallowance of the owners, or copyright problems. Additionally, because of the issues of town planning and development have been under the responsibilities of municipalities, unfortunately the floor plans of the hotel buildings have not been kept in the archive of Ministry of Culture and Tourism.

One of the limitations is the arrangement of the time of the field work. It was carried out in December 2013. Since hotel buildings work almost with whole capacity in summer months, which are the high season of tourism in Turkey, it is hard to contact the relevant persons who have busy schedules. In December, most of the hotel buildings in Belek were open. Further, it was a more appropriate time to interview authorized persons.

Another limitation is the complexity of the issue itself. Although they are essential, the sustainable design practices are still limited and even weak in Turkey. There is a lack of awareness among the public and even among the architects in the country. Furthermore, the development strategies are based on mass tourism activities rather than sustainable ones.

The case studies presented here have been carefully selected and researched to illustrate the general sustainable design criteria of hotels presented in this dissertation. This work only covers four hotel buildings, which have been awarded the Green Star Certification by the Turkish Ministry of Culture and Tourism, because of their environmental practices. The reasons for the selection of awarded hotel buildings were to benefit from the advantages of formal monitoring mechanism and to define the boundaries of the study. The selected buildings ensured the quality standards and environmentally sustainable criteria, which were demanded by the Ministry. Acquirement of the qualification standards predefined and being inspected by the Ministry gave the opportunity for grouping hotels and comparing them.

Another reason of selection of the four hotels is mainly based on the amount and nature of information that was available. Nonetheless, there are challenges to data collection. The challenge in gathering data for the cases was that information about the construction process and architectural drawings of hotels tends to be less well-documented and publicised than information about their operations. Records of the practices relating to sustainability focus on what the management or enterprise is doing at the current moment, rather than on its past development history.

Another challenge is the limited number of case studies. The ratio of environmentally-friendly accommodations to the total number of accommodations is low in the world, and so is in Turkey. In Turkey only a specific geographic area, Belek is examined. Therefore, apart from current and similar circumstances, the results may not be a benchmark for locations outside. Further studies should be carried out for different contexts and places.

1.5 Disposition

In the second chapter of the study, an attempt is made to develop the theoretical framework. Firstly, the development of tourism, the concepts of sustainable development and its relations with tourism, the conceptual confusion, sustainable design and its certification are examined in a historical context through the world and Turkey.

In the third chapter, the material and the method of the thesis are determined. Guidelines to evaluate the Green Star awarded accommodation establishments towards sustainable design principles are determined regarding the specific research area of Belek.

In the fourth chapter of the thesis, firstly, a general introduction to the study area is presented. Subsequently, the four selected hotels in Belek Tourism Center are examined in accordance with the principles of sustainable design.

In the fifth chapter, the hotel samples are compared and evaluated, the hypotheses are tested, and some proposals are made. The weakness and strengths of the cases are discussed, and some suggestions are made for decision makers like policy makers and executives, hotel managers and architects.

CHAPTER 2

SURVEY OF LITERATURE

This chapter entails a literature survey that covers related topics about subject domain. These are mainly grouped under five sub-sections, which are;

- Tourism development in the world,
- Sustainable tourism,
- Sustainable design,
- Certification as an instrument for sustainable tourism and
- Tourism development in Turkey.

2.1 Tourism Development in the World

Tourism plays significant and divergent roles throughout the world. One of its most important roles is the maintenance of world peace by realization, recognition and mutual understanding of different countries and people. Another one is the undeniable contribution to the economy by generating work force and revenue.

Tourism has expanded dramatically over the past 50 years, and become one of the world's largest industries. The records indicate the persistent expansion of international tourism. International tourist arrivals were 25.3 million in 1950 (Nash, 2007). The data gathered from United Nations World Tourism Organization (UNWTO, 2016) indicated that the international tourist arrivals reached 1186 million, while the receipts increased to US$ 1260 billion in 2015 (Figure 1 and Figure 2).

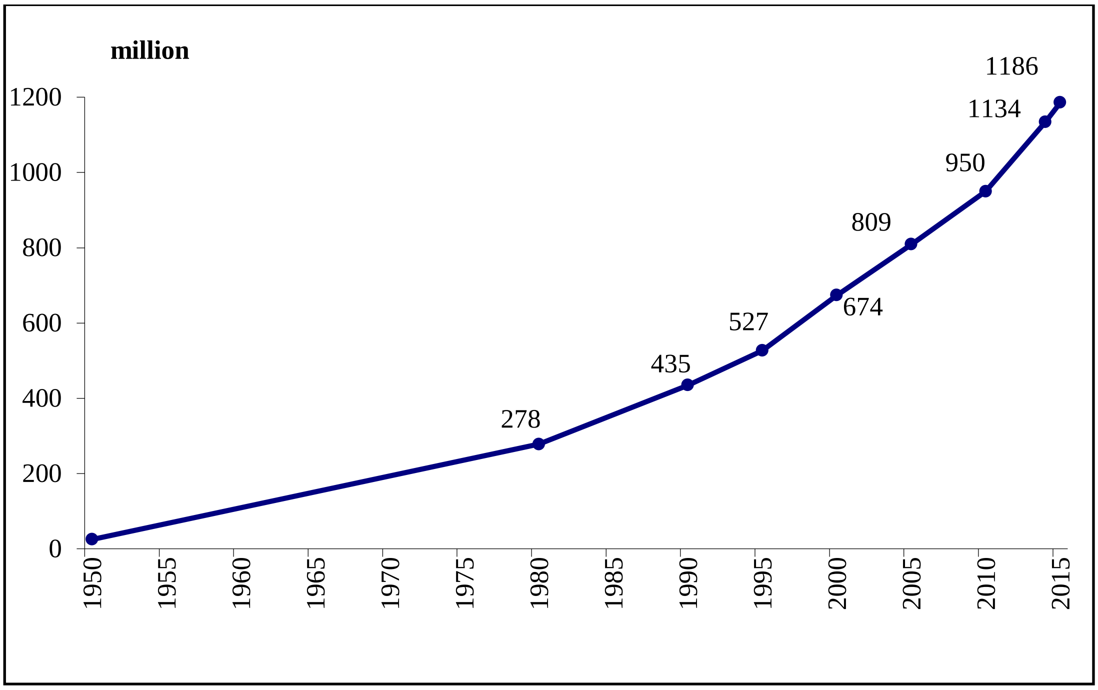


Figure 1 International tourist arrivals (UNWTO, 2016).

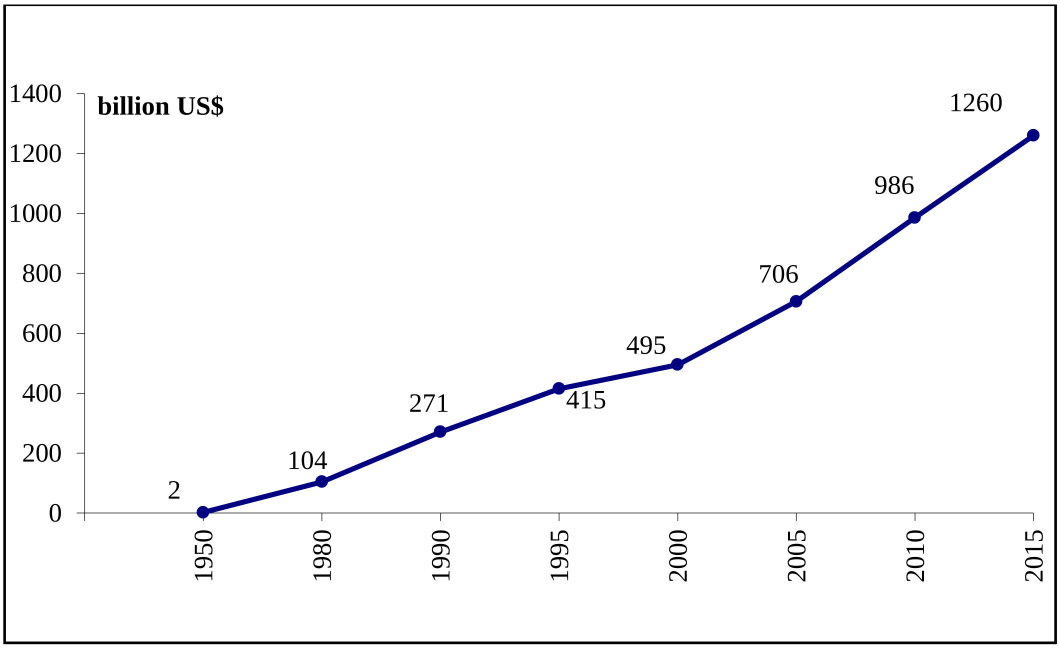


Figure 2 International tourism receipts (UNWTO, 2016).

The above-mentioned figures clearly demonstrate that the international tourist arrivals and tourism receipts have a general trend of escalation. This trend has not changed except for the decline arose from fear of SARS virus in 2003 and the effect of global crisis in 2009. Furthermore, UNWTO estimated that this rapid growth would continue. They forecasted that international arrivals to reach nearly 1.4 billion by the year 2020 and 1.8 billion by the year 2030 (UNWTO, 2016).

Table 1 Tourism's direct and total contribution to economy (WTTC, 2016).

World	**2015** **% of total**
Direct contribution to GDP (Gross Domestic Product)	3
Total contribution to GDP	9.8
Direct contribution to employment	3.6
Total contribution to employment	9.5

As shown in Table 1, which is based on data gathered from World Travel & Tourism Council (WTTC), the percentage of travel and tourism's total contribution to Gross Domestic Product (GDP) was higher than its direct contribution to GDP in 2015. This can be explained by complex structure of tourism which has close relations with different sectors.

More specifically, as stated in the recent research by Akdeniz Turistik Otelciler ve İşletmeciler Birliği (2014), tourism has direct impacts on 54 sectors; foremost nourishment, food and beverage, and transportation. Besides these interrelations, having labour-intensive structure and being a service sector also increased its contribution to employment.

The research done by WTTC (2016) indicated that the sector supported almost 284 million jobs, which constitute 9% of world's total employment in 2015. These results demonstrate the impact of tourism on economic development and creation of new job opportunities.

On the other hand, despite the above-mentioned advantages, the impacts of tourism and consequences of its growth are complex and problematic (Green & Hunter, 1992; Coccossis & Nijkamp, 1995; Stabler & Goodall, 1997). The growth should be supported by new destinations, and wellbeing of current destinations' natural and built environment and cultural qualifications. Furthermore, the support of national and international authorities, setting strategies and policies, sufficient infrastructure and qualified human power are required for sustainability of tourism.

2.1.1 Emergence of the terms sustainable development and sustainable tourism

There are 15 different definitions of "sustain" in Oxford English Dictionary (OED) Online (2014a). Among these, the primary definition of the term is: "support, maintain and uphold." Furthermore, "sustainable" was defined as "capable of being maintained or continued at a certain rate or level" (OED Online, 2014b). The mentioned dictionary established relations with "sustainability" and environment.

Parallel to the definition of sustainability, "sustainable development" was explained as setting relations of development with long-term maintenance of and conservation of natural resources in OED Online (2014c, 2014d). As seen from the lexical meanings of the terms, there is a close relationship with environment, conservation and continuation of resources.

The term “sustainable development” was first appeared in the report entitled “World Conservation Strategy.” In the report published by International Union for Conservation of Nature (IUCN, 1980), development was defined as usage of resources in order to enhance the quality of life and to satisfy human needs. Furthermore, the need to pay attention to environmental and social factors, as well as the economic ones was highlighted for achieving sustainable development. Additional to these, in the report conservation was defined as: “the management of human use of the biosphere so that it might yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations” (IUCN, 1980). Notably, this definition of “conservation” provided a foundation for subsequent definitions of “sustainable development” in the relevant literature.

Following the report by IUCN, in 1987 another report, “Our Common Future,” which was widely known as “Brundtland Report,” was prepared by World Commission on Environment and Development (WCED, 1987). In this report, “sustainable development” was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

In fact, the definition of sustainable development given in Brundtland Report is quite indefinite and inadequate, for instance, regarding the meanings of the “needs” and the “future.” The extended definition, which was also adapted to tourism, appeared in “Agenda 21 for the travel and tourism industry: Towards environmentally sustainable development.” Sustainable tourism development was defined as the following: “development that meets the needs of present tourists and host regions while protecting and enhancing opportunity for the future” (WTTC, UNWTO, & Earth Council, 1995, p.30).

However, the interpretations of “needs of present tourists and host generations” and “future opportunities” are various, not fixed and likely to change. Furthermore, there are many unsolved problems relating to population increase, economic growth, education and income inequality. Therefore, in both definitions adjective of “sustainable” should refer to a dynamic process which requires thoughtful planning and gradual adjustments in response to changing needs.

The above-mentioned definitions have been widely quoted in the relevant literature. Even though, particularly the Brundtland Report’s definition was criticized harshly for being uncertain and meaningless (Sharpley & Telfer, 2008). Apart from this critic, the report is a breaking point for the increase of the number of literature emerged in the research area of the sustainable development.

Similarly, there has been an extensive literature on sustainable tourism. This substantial output was affiliated with the diversity of disciplines interested on the subject: varying from Urban and Regional Planning to Hotel Administration, Physical Education and Recreation, Environmental Policy and Business Strategy, Social Sciences, Parks, Recreation and Tourism Group, Marine Estuarine Environmental Sciences and the Ecological Economics, Energy Technology, Economics, Architecture, etc. Nevertheless, there have been confusion and ambiguity regarding the definition of sustainability, sustainable development and sustainable tourism. Moreover, each has been often used instead of other without questioning their differences.

2.1.2 Misleading terminology regarding sustainable tourism

Intense concern to “sustainable tourism” from diverse disciplines has resulted in the emergence of different terminology and interpretations. The terms used interchangeably with “sustainable tourism” in the relevant literature were varying from “ecotourism” to “green tourism,” “nature tourism,” “responsible tourism,” “small-scale tourism,” etc. The use of these terms synonymously caused false assumptions. In this part, the differences and common points of the terms are evaluated.

One of the main aspects of sustainable tourism was environment. Therefore, environmental and tourism-related matters were often linked with sustainable tourism. One of them is “nature tourism” which comprises main attractiveness of tourism, including scenery, topography, water resources, flora and fauna. However, sustainable tourism is a broader concept than tourism types, which have close relationships with environment. Furthermore, some practices in nature tourism such as hunting, motor biking, and rafting was also criticized for being apart from environmentally friendly or sustainable (Ceballos-Lascuráin, 1996).

Another concept which was commonly substituted for “sustainable tourism” was “ecotourism.” Ecotourism, which had foundations on nature tourism, was often perceived as a form of tourism embracing responsible travel principles, promoting conservation and involvement of local populations (Ceballos-Lascuráin, 1996, The International Ecotourism Society [TIES], 2007).

Similar to the scholarly efforts to make a definition of sustainable tourism, academicians tried to delineate ecotourism. Arising from the discussions of the phenomenon, a global consensus on ecotourism was attempted to be reached in 2002. The United Nations (UN) declared the year 2002 as the International Year of Ecotourism at “World Ecotourism Summit (WES)” held in Québec. As a result of the summit, “Québec Declaration” was disseminated. In the document (WES, 2002), it was stated that ecotourism embraced the principles of sustainable tourism.

Moreover, specific principles diverging ecotourism from the wider concept of sustainable tourism were also introduced. These principles were varied: (1) the contribution to the conservation of natural and cultural heritage, (2) integration of local people, particularly into planning, development and operational phases, (3) interpretation of the destination's natural and cultural heritage to tourists and (4) to adapt itself, especially to independent travellers or small size groups.

Even though the first three matters were introduced as unique principles of ecotourism in the report of WES (2002), they were also attributed to sustainable tourism in the literature. The only distinguished qualification could be the one related with small-scale groups. Sustainable tourism had a more extensive objective of addressing both the small and large scales. Consequently, "sustainable tourism" with its complicated structure struggles to be an answer for all types of tourism. There is an attempt to ensure well-managed mass tourism as well as small-scale, niche tourism types. The prolonged academic debate on the definitions of the phenomenon might be responsible for the delay to provide a certain development strategy for the sector.

2.2 A Critical Review on Sustainable Tourism Literature

There has been a tremendous volume of output in the literature of tourism. According to the bibliographic database provided by International Center for Research and Study on Tourism (CIRET, 2015) on the 1st January 2014, there were 170317 references on tourism, 4234 references on ecotourism, and 5994 references on sustainable tourism. Although the number of publications on the sustainable tourism was remarkable, there has been no consensus on the definition of sustainable tourism development (Sharpley & Telfer, 2008).

Based on a critical literature survey, this study aims to provide a general overview to the changing insights and explanations on sustainable tourism. The transformation of the literature is examined throughout each decade over the past fifty years. The analysis starts with the literature of the 1960s, the decade at which the number of tourists began to rise. There is no clear-cut pattern of change between each decade, but this approach provides links between periods to gain a better understanding of the research area.

2.2.1 The assessment of the 1960s

One important limitation of this period was to access the full text of the articles written at the time. One of the few articles accessible was by Crampon (1966), in which the description of a tool to increase economic success of tourism was given. Another example was by O'Donnell (1970), who defined tourist as a variety of exports and as an asset to economy. According to the mentioned works, it could be said that the economic importance of tourism was noticed, and tourism was seen as a vehicle for development. Although, no questioning of the negative impacts of tourism was observed, some emerging developments of the period paved the way for sustainable tourism.

One of the most important developments was the technological progress in aircraft, which made it possible to transport large number of tourists over long distances at high speed. Since 1950s, the technical advances in design and engines of planes made air transport faster, more reliable, more comfortable, and significantly more affordable (Sharpley, 2006). In 1960s, the first charter flights transported tourists from cool Northern Europe to the warmer Southern Europe (Hoyer & Aall, 2005). Moreover, at the end of this period, wide-bodied jumbo jets were introduced (Sharpley, 2006). These advances in air transport facilitated the rise of mass tourism in 1960s.

Since 1960s, air transport plays a vital role in long haul international travel. The technological progress facilitated the growth of mass tourism on a global scale. Particularly, there has been growing interest among developing countries in this type of tourism for its economic return. However, the negative impact of mass tourism would be noticed in the forthcoming years.

2.2.2 The assessment of the 1970s

There was a radical change from 1960s to 1970s, in apprehension of economic growth as an ecological threat. Until the oil crisis in 1970s, tourism was recognized as a major sector in the world economy and there was no awareness of its negative impacts. In 1972, the needs for a common outlook and principles to inspire and guide the people on the preservation and enhancement of the human environment were discussed in UN Conference on the Human Environment (1973) in Stockholm.

Following the interest on these emerging changes, the social, cultural and environmental concerns relating to tourism came to the academicians' agenda in 1970s (Smith, 1977; Cohen, 1978). The book written by Smith was an early example which published observations on impacts of the tourism over the structure of society. Through case studies, it demonstrated cultural exchange between local residents and tourists.

Another work from 70s was by Cohen (1978) which was one of the premises attempting to evaluate the environmental impact of tourism. The factors were aligned as: (1) the intensity of tourist site-use and development, (2) the resiliency of the eco-system, (3) the time perspective of the developers and (4) the transformational character of tourism developments. The dilemma between protection of environment "for" and "from" tourism was also discussed in his paper (Cohen, 1978). Both examples were important for their character of having pioneering roles for measuring impacts of tourism, apart from economic ones, in a systematic form.

2.2.3 The assessment of the 1980s

In 1980s, there was a growing literature on the cultural and environmental impacts of tourism. Many of the researchers advocated the necessity of conservation and regulations to ensure that the benefits of tourism reach local communities (Brougham & Butler, 1981; Krippendorf, 1982; Liu & Var, 1986; Farrell & McLellan, 1987;

Krippendorf, 1987). The publication of two important reports, "World Strategy for Conservation" in 1980 and Brundtland Report in 1987, also had an influence on tourism scholars.

As an example, Krippendorf (1982) was one of the pioneers who wrote on the need for a political transformation and the importance of planning in tourism. He asserted that tourism, as a resource-based industry, should adopt a defensive tourism development policy. Furthermore, Krippendorf offered caution and control rather than aggressive tourism development and also promotion of conservation instead of depletion of natural and cultural values. Moreover, in his further publication, Krippendorf (1987) advocated "balanced tourist development" and declared that the major problem of the contemporary tourism was that of its huge number.

2.2.4 The assessment of the 1990s

As the popularity of the word "sustainability" increased with Brundtland Report, which was published in 1987, the term has been prevalent among many scholars (Nash & Butler, 1990; May, 1991; Butler, 1991). Moreover, in 90s, various negative impacts of mass tourism were considered as major issues and the level of awareness about environmental issues significantly increased.

Many researchers considered mass tourism and alternative forms of tourism as polar opposites in 80s and 1990s. Former was considered conventional, commercial, large-scaled and detrimental in long-term, whereas the latter was seen as small-scaled, locally planned and beneficial (Krippendorf, 1982, 1987; Pearce, 1992; Nash, 1992; Valentine 1993). Briefly, the tourism based on small-scale characteristics was regarded as sustainable.

There were also efforts to go beyond identifying the effects of mass tourism. For example, studies concentrating on setting strategies, guidelines and policies for sustainable development in tourism were seen in 1990s (Clarke, 1997; Hunter, 1997;

Butler, 1999). Furthermore, the researchers investigated ways to collaborate with different stakeholders, to address the needs of tourists, to improve local residents' quality of life whilst protecting the environment (Krippendorf, 1982, 1987; Bramwell & Lane, 1993; Sautter & Leisen, 1999).

A significant change in the researchers' approach to sustainable tourism was observed over the 90s. In the first half, there was an attempt to define the new term "sustainable tourism" and establish its connection with sustainable development. For example, in 1993, Butler defined sustainable tourism from a semantic point of view: "tourism which is in a form which can maintain its viability in an area for an indefinite period of time" (p. 29). On the other hand, in his further article, Butler (1999) criticized this definition for emphasizing only maintenance of tourism, and argued that sustainable tourism would not automatically mean the kind of tourism, which developed in line with the principles of sustainable development. Additionally, he pointed out that the key problem of sustainable development in the context of tourism was linking small-scale tourism with sustainability, rather than challenging how to make mass tourism as sustainable as possible.

Another important suggestion in this decade was the need for a flexible approach to tourism, because of its structure of addressing different destinations, goals and situations. As a consequence of the widespread geography of tourism, various implementations were observed; in pristine and delicate natural environments, in highly dense urban developments, in developed or developing countries, etc. Having regard to these variations, Hunter (1997) suggested that the concept of sustainable tourism should be regarded as an "adaptive paradigm" that incorporated four different alternative approaches; very weak, weak, strong and very strong sustainable tourism interpretations. His premise ranged from the very weak sustainable tourism strategies that centralized tourism development and satisfaction of tourist and operator to the very strong sustainable tourism strategies, in which the precautionary approach to environmental protection was taken and the concept of carrying capacities were highlighted.

Moreover, the intense interest of the subject among scholars was also observed within the publication of Journal of Sustainable Tourism. This journal has been focusing on the specific area since its first publication in 1993.

The particularly noteworthy change in the apprehension of the need to set strategies, guidelines and policies for sustainable development in tourism could be related with the UN Conference on Environment and Development (UNCED) which was held in 1992 in Rio. It was arranged twenty years after UN Conference on the Human Environment held in Stockholm. UNCED which is also known as Rio Conference had two main outputs: Agenda 21 and Rio Declaration. The first one was Agenda 21, which offered a detailed list of recommendations for application of sustainable development policies globally, nationally and locally by organizations of the UN, governments, and major groups. The second one was the Rio Declaration, which established key principles, with the aim of guiding sustainable development throughout the world (UNCED, 1993).

Another important action of UNCED was the establishment of UN Commission on Sustainable Development to review and ensure the progress. The mentioned Commission prepared two publications: “Indicators of Sustainable Development: Framework and Methodologies,” and “Indicators of Sustainable Development: Guidelines and Methodologies (UN Department of Economic and Social Affairs [UNDESA] 2001, 2007). The publications addressed the need of development of indicators with the aim of supporting countries making decisions regarding sustainable development. Both documents can be regarded as further steps taken to implement Agenda 21.

2.2.5 The assessment of the 2000s up to the present

In 2000s, the questioning and criticism of the term continued. There was a shift from understanding sustainable tourism as an end point or a stable achievable goal to realizing its complex, dynamic structure and uncertainty within multiple dimensions and temporal scales (Farrell & Twinning-Ward, 2004; Gössling, Hall, & Weaver, 2009). Furthermore, the attempts to develop a flexible approach to this complex issue continued in 2000s. Additional to the premise of "adaptive paradigm" as suggested by Hunter in 1997, an "adaptive management" for tourism was put forward by Farrell & Twinning-Ward (2004). They asserted a system comprised of trans-disciplinarity, integrative and non-linear approaches as an effective way to accomplish sustainable tourism (Farrell & Twinning-Ward, 2004).

The topics of the articles become diversified in this period. Literature varying from climate change (Scott, 2011; Hall, Scott, & Gössling, 2013), to government policy for sustainable tourism (Hall, 2011; A. Yüksel, F. Yüksel, & Culha, 2012), spatial planning from the aspect of sustainable tourism (Simão & Partidário, 2012; Tomić, & Stojsavljević, 2013), resident's attributes (Yu, Chancellor, & Cole, 2011), visitor behaviours (Thapa, 2013) was observed in this period. Moreover, setting sustainable strategies, clarification of the indicators, and tourism planning framework for sustainable development were research subjects that continued to be discussed in the literature (HwanSuk & Sırakaya, 2006; Kernel, 2005). For example, HwanSuk & Sırakaya (2006) added political and technological dimensions to the widely accepted sustainable tourism dimensions, which were economic, social and cultural and environmental ones.

Besides works carried out by academicians, important worldwide meetings were arranged in this period. Among these, two significant meetings took place in 2002, which was designated by United Nations as the International Year of Ecotourism. One was in Johannesburg, South Africa, "the Rio + 10: UN World Summit on Sustainable Development (WSSD) meeting." The other one was in Quebec City, Canada, "World Ecotourism Summit (WES)."

At WSSD meeting, themes such as poverty eradication, changing unsustainable patterns of production and consumption, and conservation of natural resources were defined and recognized as objectives of, and requirements for, sustainable development (WSSD, 2002). The other meetings' output was "The Quebec Declaration on Ecotourism." The Declaration had the objective of preparing a preliminary agenda and a set of recommendations for the development of ecotourism activities in the context of sustainable development (WES, 2002). Additional to the events of 2002, TIES (2007) prepared "Oslo Statement on Ecotourism" as an outcome of "Global Ecotourism Conference" in 2007. Besides, in Johannesburg, 2012, "Rio+20: UN WSSD meeting" was arranged (WSSD, 2012).

However, the mentioned conferences, summits or meetings addressed to all countries without discerning the developed or developing countries, in practice their results were far from being universal. At "Rio+20: UN WSSD meeting" in 2012, it was recognized that the 20 years since the UNCD in 1992, there had been uneven progress in sustainable development, poverty reduction or closing development gaps between developed and developing countries.

Moreover, the "Review of Implementation of Agenda 21 and the Rio Principles" implemented by Division for Sustainable Development of the UNDESA in 2012, had shown disappointing results. For example, it was asserted that since 1992, globally, consumption and production patterns remained unsustainable, the ecological footprint, ozone depletion, greenhouse gas emissions and other atmospheric pollutants had increased, the main global economic institutions - the IMF and World Bank - had not meaningfully reformed their practices (UNDESA, 2012). Consequently, the review of the 20 years by UNDESA indicated that the recommendations were not adequately accepted or implemented and the challenges facing the world were still growing.

2.2.6 A general review

In order to observe the changes in insights and approaches, an overview of the literature according to their periods will be made. Firstly, it could be said that in 1960s the researchers were primarily interested in "economic benefits of tourism."

On the other hand, in 1970s the impacts of mass tourism started to be questioned. In 1980s, there was a continuation on questioning the impacts of tourism. Within 1990s, the ecological and sustainable issues on tourism were started to be mentioned. The transformation from "tourism in economic development" to "ecological and sustainable tourism" started to be observed in the literature in this period. Additionally, the perceived effects of mass tourism and providing strategies, guidelines and policies for sustainable development were argued. Later in 2000s, the questioning and criticism of the term continued. There was a shift from understanding sustainable tourism "as an end point or a stable achievable goal" to "realizing its complex, dynamic structure and uncertainty within multiple dimensions and temporal scales." Moreover, there were many articles concerning various aspects of tourism. Awareness about the importance of participation of local people, balance between tourist satisfaction and protection of the environment, effects of climate change, importance of spatial planning, and governments' role on sustainable tourism were some issues, that were pointed out in this period.

Consequently, it can be said that there is a real interest of scholars in sustainable tourism. However, there are still missing points about setting guidelines and codes of globally good practices regardless of scale. The ambition is high both in the academic field and the countries attending or arranging the international meetings. Unfortunately, there is still resistance among tourism industry to carry sustainability into action. On the other hand, there is an urgent need for changing minds and current practices to achieve sustainable tourism.

Apart from the previously mentioned arguments for sustainable tourism or any other substitute terms, the success of the implementation of the subject in practice was still problematic (Wheeller, 1993; Dodds & Butler, 2012; Buckley, 2012). Buckley (2012), attempted to underline priorities for future research in order to bridge the gap between theory and practice. In his comprehensive research that made an overview of the subject, it was demonstrated that there was a high practical interest but low research and progress on environmental indicators. Therefore, these indicators should be clearly defined, and further research is needed.

While the volume of the literature demonstrated the interest of scholars in the field, sustainable tourism is not adequately adopted or implemented by the other stakeholders. In brief, the lack of implementation is most likely related to the following reasons:

- Low level of awareness and interest in the subject among the tourists,
- Misconceptions about the costs of sustainable design and construction among investors,
- Absence of adequate monitoring and evaluation tools to a conduct cost-benefit analysis from the side of hotel managers, and
- Lack of nationally and internationally recognized sustainable tourism certifications from the side of governments and private sector.

2.3 Sustainable Design

In OED Online (2014e), architecture is defined as "the art or science of building or constructing edifices of any kind for human use." Architecture has diverse properties and as the practices and insights changed its definition transformed. Parcell (2012), in his recent book, examined four historical definitions of Western architecture: firstly, as a *techné*, which includes science, art and craft, in ancient Greece; secondly, as a mechanical art in medieval Europe; thirdly, as an art of *disegno*, which includes drawing and design, in Renaissance Italy, and lastly, as a fine art in Europe during the eighteenth century.

Another book was by Tabb and Deviren (2014), "The greening of architecture: A critical history and survey of contemporary sustainable architecture and urban design." This book begins with an introduction to architecture to seek for the codes of green principles and sustainable design. The authors recommended that “architecture is the practice of the artful composition of design elements and scientifically responsible construction of buildings” (p. xvii). Furthermore, they defined green architecture, which is commonly used interchangeably with sustainable design, as “the inclusion of sustainable principles of design, introduction of renewable resource technologies and environmentally conscious use” (p. xvii).

Additional to green architecture or design, there are some other terms often used interchangeably and share almost the same objectives with sustainable design. Generally, they start with an adjective used for description of architectural design which is oriented towards sustainability. The widely used and accepted ones are environmental design, green design, and eco-design, which are extensively related with issues of environmentally sustainable design. Emergence of these terms in the history indicates that there is a tendency to dwell upon environmental problems rather than other dimensions of sustainability among architects.

However, sustainable design had a more complex and comprehensive goal, finding a balance between economic, environmental and social considerations. Because of the high volume of literature on the subject, only key developments in architecture and its interaction with sustainable development are dealt in this study. The key historical developments are identified to provide an overview of the term of sustainable design.

The earliest examples of the relations between architecture and environment were seen in literature with Vitruvius’ well known “Ten Books on Architecture.” The importance of environmental factors for design principles was dealt in the books such as responding to climatic conditions, usage of regional materials and improvement of living conditions or comfort of the inhabitants (Alberti, 1955).

Furthermore, vernacular architecture, which depends on experience, offers local people to tackle with difficult environmental conditions and to adopt basic principles for architectural design such as orientation, light, and scenery. With rapid growth of world population and dependence on fossil fuels in virtually every aspect of daily life, new architectural design principles are called for, particularly to combine earlier solutions to the shelter problems with recent technologies into the effects of climate on environment.

The climate has always influenced building principles or architecture in general. Victor Olgyay is one of the pioneers of bioclimatic design. In 1951, he published his first article outlining the issue, “The Temperate House,” which was followed by “Bioclimatic Approach to Architecture” in 1953 and subsequently in 1963; he explained the influence of climate on building principles in his well-known book, Design with Climate (Olgyay, 1963).

The traces of relations with environment and architecture could be observed also in Modernism, in terms of comfort, quality of living and particularly functionalism. For example, Le Corbusier’s proposal for design of high-rise buildings was based on increasing the areas of open green areas (Le, Cohen, & Goodman, 2007). However, the goal of modernism to be globally applicable has caused the denial of local conditions, cultural values and differentiation in geography and climate. On the other hand, it opened a new window to sustainable design with technologically supported materials, systems and aesthetics (Fieldson, 2004). Furthermore, in city planning, there were proposals for hygienic modern city with low densities, easy access to the environmental qualities, allowance of more sunlight and air to circulate and benefits by all social groups, cheap housing (Lynch, 1981). These concerns were directly related with sustainable design principles, so that it would be unfair and misguided to degrade modernism into an unsustainable design.

2.3.1 The assessment of the 1960s

The issues related with environmentalism movement are generally dated back to 1960s. However, there were only a few architectural responses to the emerging environmental challenges. Tabb (2014a) asserted that certain works and publications from 1960s strengthened the bond between bioclimatic design, the natural environment, and ecological zones with architectural design and planning.

One of the pioneering works during the period was the previously mentioned book, Design with Climate, by Olgyay (1963). He focused on the relations of human physical and psychological reactions with the climatic elements and advocated the architectural regionalism and the consideration of environment in design. He recommended achieving environmental control through working with, not against climate.

By the late 1960s, McHarg (1969) has published "Design with Nature." The book aimed to address the relations of human with its environment, define the problems of modern life, particularly, destructive nature of development and provide a methodology integrating environmental data into the planning process. He mentioned the importance of preservation, developed ideas for designing with nature. He argued that, everything in the natural environment should be considered while planning anything built by humans.

Except for the certain works, the prevailing attitude among many architects was towards the normal process of practicing architecture regardless of current challenges. Particularly, the circumstances in the 1960s led architects into basing their arguments on a variety of false assumptions. The world populations were increasing. The land was affordable and available for development. And there was a seemingly unlimited supply of energy. However, what resulted was the inefficient use of energy and resources, a significant increase in thermal bridging, uncontrolled infiltration, excessive heat gain or loss, and therefore, a requirement for more energy to compensate (Tabb, 2014a). Consequently, the majority of architectural projects or research studies at that time were not carried out regarding with sustainable design principles. Moreover, there were only a few examples of work promoting passive design solutions or focusing environmental considerations.

2.3.2 The assessment of the 1970s

Oil crises in 1970s not only caused questioning deterioration of environment but also a transition in life styles, health, energy usage, technology and industry. The UN Conference on the Human Environment, which was held in 1972, was the sign for the emergence of new terms related with sustainability. The themes dealt in the conference, “human” and “environment,” are both the main concerns of architecture. As a result, architectural forms and materials were originated and inspired from these developments.

Madge (1993) claimed that the first implications of environmentalism as a socio-political movement were seen in the late 1960s and early 1970s. In her further article, Madge (1997) asserted that the term “ecological” was generally used to refer to anything vaguely related with the environment, at the beginning of environmental movement.

After, the Oil Crisis of 1973-74, multiple creative works were carried out to achieve energy independence. In the quest for alternative energy solutions to meet the energy needs in a cost-effective way, passive solar systems were being proposed as an option. Particularly, in the mid-to-late 70s, this option came to the forefront as more and more architects became involved in the development of solar architecture. Furthermore, there was an increasing tendency among architects to deal with analytical researches, building typology and design methodologies to facilitate the creation of high-quality spaces (Tabb, 2014b; Durmuş Arsan, 2008).

The terms “alternative design” and “design for need” also gained popularity in this period (Madge, 1993). For example, Papanek (1972) published “Design for the real world: Human ecology and social change.” In his book, he advocated socially, morally and ecologically responsible design. He stated that the design was a conscious and intuitive attempt to impose meaningful order. Papanek then expounded six areas of a design as follows: use, method, need, *telesis* (reflection of its time, place and conditions), association, and aesthetics. Moreover, he was critical of the design profession for dealing with temporary desires that deteriorated natural resources, neglecting social and moral responsibilities and aggravated the environmental crisis.

The movement of environmentalism and related literature of ecology is problematic because of their polemical nature. Madge (1993) dealt that, even environmentalism was not classified as overtly political; it was at least an oppositional movement. Besides, she claimed that the main texts of environmentalism were generally part of a continuous debate. Furthermore, Ciravoğlu (2006) criticized that the actual concern was the energy costs and related politics rather than energy shortage.

2.3.3 The assessment of the 1980s

In 1980s, the new era of liberalization encouraged consumption in the capitalist world. The term "green" was used widely because of the views of "green party." The changing in life styles with green movement brought new terms such as "green consumerism" which had an emphasis on consuming less (Madge, 1997).

In architecture, the approach was broadly called "green design." Additional to the "green movement," the green design concept was also timed to coincide with the discussions on "sick building syndrome." Polluted air and water, toxic emissions, dangerous chemicals and synthetic materials were suspected of causing syndromes in buildings. Especially, the health and productivity of workers and residents were threatened by the poor quality of built environment (Edwards, 1999). Green design was appreciated as a way to reduce the incidence of sick building syndrome. Moreover, architects generally dealt with recycling and usage of ozone-friendly or degradable materials in their design (Durmuş Arsan, 2008). However, the approach of green design was criticized for depending on a politic view and its tendency to technical issues rather than aesthetics or socio-economic context of design (Madge, 1993; Durmuş Arsan, 2008). Besides, the term gradually lost its popularity during 1990s, and most recently, it has a very limited use.

Furthermore, the 1980s were the years of the integration of ecological architecture with the regionalist attitude (Durmuş Arsan, 2008). The notice for locality, geography and climate came to the scene with post-modernism. Additionally, with the awareness of environmental issues, there was a general tendency to return to vernacular architecture and basics of architectural design, in both the literature and practice.

Hagan (2001) categorized the architects who saw vernacular architecture as a solution for environmental problems into two groups. According to Hagan, the first group followed an anti-industrial approach, seeking for a vernacular revival with supporting crafts and the other group viewed it a model for architectural practice and relied on passive environmental design to live with limited resources.

In 1980s, there was a significant change in the approach to environment. There has been a shift from modernism's universal perspective regardless of locality to post-modernism's more holistic perspective regarding culture, local and nature.

It should also be noted that the major event of 1980s was the publication of Brundtland Report in 1987. The term "sustainable development" gained popularity, after it was used in the report. The growing significance of the term in the late 1980s also affected sustainable design literature.

2.3.4 The assessment of the 1990s

After the publication of Brundtland Report, "sustainable development" became the buzzword of 1990s. Madge (1997) pointed out the transition from "green" to "eco-" and to "sustainable" in the design field. She asserted that the transition can be perceived as one of the widening of the scope in theory and practice. As Dewberry &

Goggin (1994) asserted, “the concept of sustainable design, however, is much more complex and moves the interface of design outwards toward societal conditions, development and ethics …” (as cited in Madge, 1997, p. 52).

Additional to the Brundtland Report, UNCED, which arranged in 1992, played a significant role for sustainable design. As mentioned in the previous sections, the conference had two important outputs the Rio Declaration and Agenda 21, which constituted a statement of key principles and detailed list of recommendations for environment and development.

After the conference, WTTC, UNWTO and Earth Council (1995) jointly published a follow-up report “Agenda 21 for the travel and tourism industry - Towards environmentally sustainable development” in 1995. The aim of the report was to adapt the recommendations of Agenda 21 to the specific area of the tourism. An action plan, serving as a guideline for stakeholders was developed to draft, set and implement sustainable tourism practices. Furthermore, a general list, defining the priority areas and their objectives for tourism establishments, was introduced to be utilized in planning, design, construction, operation and management periods (Table 2).

As can be seen in Table 2, the report encouraged new technologies and energy-efficient design solutions for sustainable tourism. Similarly, there was a growing tendency for utilization of technology in design among architects in 1990s. The development of technology was important, especially for energy efficiency, but it was more related with construction rather than architectural design.

Table 2 List of priority areas for travel and tourism industry (WTTC, UNWTO, & Earth Council, 1995).

Priority area	Objective
1. Waste minimization	To minimize resource inputs, maximize waste inputs.
2. Energy conservation and management	To reduce energy use and reduce potentially damaging atmospheric emissions.
3. Management of fresh water resources	To protect the quality of water resources and to use existing resources efficiently and equitably.
4. Wastewater management	To minimize wastewater outputs in order to protect the aquatic environment, to safeguard flora and fauna, and to conserve and protect the quality of fresh water resources.
5. Hazardous substances	To replace products containing potential hazardous substances with more environmentally benign products.
6. Transport	To reduce and control harmful emissions into the atmosphere and other environmental effects of transport.
7. Land use planning and management	To deal with the multiple demands on land in an equitable manner, ensuring that development is not visually intrusive and contributes to conserving environment and culture while generating income.
8. Involving staff, customers and communities in environmental issues	To protect and incorporate the interests of communities in developments and to ensure that the environmental lessons learned by staff, customers and communities are put into practice at home.
9. Design for sustainability	To ensure that new technologies and products are designed to be less polluting, more efficient, socially and culturally appropriate and available worldwide.
10. Partnerships for sustainable development	To form partnerships to bring about long-term sustainability.

Slessor (1997), depending on the results of her international survey, mentioned the evolution of high-tech architecture and its transformation to more environmentally intelligent concerns in 1990s referring to works of Rogers, Foster, Grimshaw and Hopkins. On the other hand, Hagan (2001) reminded works of Eisenman, Foreign Office Architects, Kipnis, and Shirdel, who explored new models of nature in order to generate different architectural forms.

Significant projects by eminent architects of this time tended to take place within urban settings rather than around the fringe or on isolated building sites. In addition to their energy conservation and environmental considerations, Tabb (2014c) defined these buildings as "high-tech, lightweight, low-mass, highly glazed, often delicate, bold and heroic" (p. 100). The use of eco-technology in the practice of architecture was starting to become more widespread.

Moreover, in 1990s environmental assessment methods for buildings came into the agenda of architects. Suggestions for a sustainable index for architectural design, (Krotscheck & Narodoslawsky, 1996; Ding, 2005) and assessment of environmental issues (Van Pelt, 1994; Lowton, 1997) were observed in the literature. These works were published to coincide with the previously mentioned studies on setting strategies, guidelines and policies for sustainable development in the field of sustainable tourism.

Furthermore, foundations of most widely used certification systems, such as Building Research Establishment Environmental Assessment Method (BREEAM), Leadership in Energy and Environmental Design (LEED) and Sustainable Building Tool (SB Tool), which were developed for assessment of sustainable buildings were laid during this period. The spring out of these certifications is also related with the suggestions of Agenda 21 for the development of sustainability indicators.

2.3.5 The assessment of the 2000s up to the present

The year 2000, was the turn of the 21st century. For sustainable design, it refers to the transition from an environmental remediation or optimization of building performance to a large scale, more complex and broader approach.

Although many architects in the 1990s were mostly concentrated on the adoption of high-performance building technologies, architects and designers of the 2000s were influenced by a wide range of disciplines. These involve ecology, physics, geography, climate science, mathematics, biology, sociology, agriculture, ecological economics, and political science (Tabb, 2014d). Moreover, with 2000s, subjects related with reducing resource consumption, reusing resources, usage of recyclable resources, elimination toxics, lifecycle costing, low embodied energy intensity in building materials, efficient short- and long-term uses of natural resources were observed in the literature (Kibert, 2008; Ding 2008).

The beginning of the new century brought questioning the negative impacts of architecture on climate change. This resulted in a diversity of ideas and plurality of different approaches regarding sustainable design. Tabb (2014d) categorized the approaches adopted in 2000s into 7 subgroups. These were: (1) poly-scaler sustainability, (2) biometrics and biomimicry, (3) infrastructure, (4) sustainable urbanism, (5) agricultural urbanism, (6) ecological footprint, and (7) next generation green.

According to Tabb (2014d) poly-scaler sustainability included three significant considerations. The first one was delineation and differentiation of particular scales, the second one comprised setting appropriate strategies for each scale, and the last one examined how these scales interacted and nested with each other. Furthermore, he declared that sustainable design strategies could operate at diverse scales varying from global scale to regional, settlement, urban design, neighbourhood, cluster, building, system and products scale.

The second approach in 2000s was biometrics or biomimicry, which was basically used for implementation of lessons learnt from nature and biology in architecture and urban design. Landform architecture and landscape urbanism inspired through nature, geology, topography and ecological processes. The interpretation of forms and natures found in nature brings useful design strategies. However, it was difficult to apply its principles to dense urban districts or existing historic contexts (Tabb, 2014d).

The third subgroup mentioned by Tabb (2014d) was infrastructure architecture, which was generally applicable across dense urban centers and residential areas in the suburbs. These districts were typically zoned according to their functions and tended to be dominated by network of automobile roads. Moreover, he claimed that this approach focused on integrated solutions for complex, often chaotic and spatially fragmented urban landscapes. This subgroup was followed by sustainable urbanism, which included greater densities and mixture of various functions, less single-family dwellings, different building typologies, more pedestrian-oriented integrated transportation, more environmentally friendly infrastructure systems, alternative energy sources or technologies, more relation with nature and creation of open spaces.

Another subgroup mentioned by Tabb (2014d) was agricultural urbanism, which included practices based on application of agricultural systems into architecture and urban scale. He declared that the goal of this approach was to tackle with the real issue of access to food, improvement of the present production and its distribution. Furthermore, he claimed that the main challenge of this approach was its limited suburban and urban context. Besides, there are also new environmental opportunities inspired from agriculture. For example, photovoltaic farms and wind turbines contribute to the global electricity production.

Ecological Footprint is another approach adopted in 2000s, which was cited by Tabb (2014d). The concept of ecological footprint is based on the assessment of the impacts of construction and built environment on nature. Tabb also mentioned the zero net energy buildings, which can be defined as buildings which produce as much energy as they consume on an annual basis.

According to Tabb (2014d) the next generation green includes combination of design strategies additional to the considerations of past decades such as clean technology and design measures. Depending on the researches of him, the main characteristic of 2000s can be summarised as full engagement with nature (non-toxic materials, enhancement of views, natural light, ventilation, water, etc.), adaptation to change, responsiveness to temporary pressures, conservation of energy and resources, surface tectonic (design of building façade with the considerations of energy, sun, wind and light), hybridized energy solutions, responding local and global contexts, having a dynamic structure, planned infrastructure, urban focused, regenerative, embodying various scales, connected, integrative, applicable to diverse conditions and having global responsibilities.

In the light of above-mentioned analyses, sustainable design embodied broader and more diverse considerations after 2000s. The design strategies included greater scales and increased densities as well as the provision of renewable energy sources and various forms inspired from nature or technology. The emergence of diverse approaches in the 2000s is a result of postmodernism and the architectural responses to growing problems facing the earth. However, the challenges and the aims are the same. These are generally conservation of the environment, increasing energy demand, and response to climatic needs. As a result, over the decades, to some extent there have been similarities between the periods, although there are differences in technology, architectural form, scale and context.

Besides, the number of buildings received certification as a proof of their sustainability continued to increase globally. In the following sections the role of certification in sustainable tourism will be dealt with through assessing its emergence, the stakeholders approach to this issue, and comparison of leading certification schemes.

2.4 Certification as an Instrument for Sustainable Tourism

Tourism policy has a significant role on the sustained success of a tourism destination. Goeldner and Ritchie (2003) defined tourism policy as "a set of regulations, rules, guidelines, directives, and development/promotion objectives and strategies that provide a framework within which the collective and individual decisions directly affecting long-term tourism development and the daily activities within a destination are taken" (p. 413). This type of policy was regarded as an important declaration of intent within which tourism was expected to revive and develop (Jenkins, 2000).

The tourism policy is generally shaped by the governments as preparation of strategic plans and put into practice by the private sector and inspected or assessed by governments or private sector or collaboratively. An integrated tourism policy, which assesses both theory and practice, is needed to achieve sustainable tourism. According to Rivera (2002), the policy instruments could be classified in three general categories: firstly, compulsory instruments such as mandatory regulations; secondly, voluntary instruments, such as self-regulatory programs; and finally mixed instruments such as information provisions, subsidies and pollution taxes.

Mandatory environmental regulations provide the foundation of the implementation of sustainable tourism. Governments have become increasingly aware of the need for more effective measures to protect the environment and have realized the importance of legislation and regulations. Most countries, including Turkey, adopted various legal provisions on environmental protection, including regulations on impact assessment, packaging, and the control of waste, waste oil and used batteries. The effectiveness and implementation of these compulsory instruments are ruled by legislations. Buckley (2011) declared that government regulation was more effective than industry-based eco-certification. On the other hand, this command-and-control approach was criticized for being costly, inefficient, legalistic, and an obstacle to improving competitiveness (Rivera, 2002).

The second alternative, voluntary initiatives are the key instruments which constitute the research area of this study. Voluntary initiatives were based on individual choice or social responsibility in order to comply with, and preferably, go beyond regulations enforced by governments (Honey, 2003; Buckley, 2012). Depending on the lexical meaning of "voluntary initiative," two sides voluntarily participate in the initiative; former, the developers, who propose and monitor the process and the latter, their target group, the tourism suppliers or operators who apply and implement the on-going project or tool. According to a comprehensive study carried out by UNWTO in 2000, voluntary initiatives were grouped into three main categories: (1) Eco-labels, which create and guarantee a choice to the consumer; (2) awards, which stimulate and discover innovations and (3) self-commitments, which get voluntary support for a common goal (UNWTO, 2002).

The third one, the mixed instruments generally have the intent to offset costs based on environmental protection activities of the government. In this type, a sum of money can be granted by government to the sector for assurance and enhancement of environmental quality, as in the examples of subsidies, or a fee can be paid to the state by the industry for pollutants released into the environment.

All the mentioned initiatives foster and promote the sustainable tourism and contribute to raise the overall standard of the tourism sector. Besides, their results might be used as a solid base for the development of a certification scheme in the future.

2.4.1 Overview to Certification

The issue of certification is relatively a new subject entered the research area of sustainable tourism. It is important to note that the focus of this study remains on sustainable tourism certification schemes rather than accreditation processes. The difference was clearly defined by Honey and Rome (2001). They described certification as a voluntary procedure, which could evaluate, monitor and declare that a business, attraction, destination, tour, service, service provider, process, or a management system has met specific standards in the context of tourism. On the other hand, accreditation was defined as the process of qualifying, recommending and licensing entities that certify businesses, processes, products or services. Briefly, Honey and Rome (2001) pointed out that “an accreditation program certifies the certifiers” (p. 17).

Before the emergence of certification programs related with sustainable tourism, there were other certification programs that measured business quality, service and safety standards. Honey (2003) in her article, “Protecting Eden Setting Green Standards for the Tourism Industry,” gave a brief history of certification programs. The proliferation of automobile travel and the family vacations were the triggers of certification for accommodation establishments.

In 1900s, tire company Michelin published its first guidebook rating hotels and restaurants. Soon afterwards, the American Automobile Association, which was made up of motor clubs, published handbooks that listed and classified hotels located along highways. The Association used a series of stars to rate the quality and cost of the hotels. Progressively, the five-star rating system for accommodations, particularly hotels, spread all over the world. Today, the five-star certification programs, and the recent sustainable tourism certification programs frequently exist together (Honey, 2003).

In Turkey, a similar process was followed. The five-star certification program that rates the quality co-exists with the green star program that assesses the environmental practices of accommodations. Both certification processes are carried out by Ministry of Culture and Tourism. The former has its origins in 5647 numbered "Tourism Establishments Encouragement Law" which was enacted in 1950. This Law brought the tourism establishment license, which was given to establishments that met the specific qualifications. Afterwards, in 1993, the foundation of the latter was laid. The Green Star certification program has its roots in pine label, which was given to accommodation establishments that were environmentally friendly. The assessment of Turkish tourism from the perspective of sustainable tourism will be dealt in detail within Section 2.5.

As described above, the issue of certification is a relatively new area of research in sustainable tourism. The growth of sustainable tourism certification began with the UNCED which was held in 1992 in Rio. Among the many outcomes of this conference was the "Agenda 21." Chapter 40, "Information for Decision-Making," of Agenda 21 called upon the international community and countries to elaborate the indicators of sustainable development and to promote their worldwide use (UNCED, 1993).

Soon afterwards, many of the certification systems began to be developed. The ISO 14001, which is also known as a generic standard for environmental management systems, was first released in 1996. Further, in 1997, Green Globe Destination Program was designed. The program particularly provides guidance material, and a certification process based on Agenda 21 principles and linked to ISO Standards (Green Globe, 2014).

On November 17-19, 2000, The Institute for Policy Studies convened an international workshop at Mohonk Mountain House, a venue in New York, to discuss the certification of sustainable tourism and ecotourism. The workshop's outcome document specifically highlighted a set of common principles and elements that were considered to be necessary parts of any sound ecotourism and sustainable tourism certification programs (Mohonk Agreement, 2000).

In 2000-2001, UNWTO (2002) prepared a report which includes a comparative analysis of 104 eco-labels, awards and self-commitments. According to this report, the majority of these were in Europe (Figure 3). Tourism sectors certified by these initiatives were also wide, nearly covering all types of tourism suppliers, including accommodation, destinations, tour operators, sports/leisure facilities and transport (Figure 4). The number of these initiatives has been a steadily rising since the report of UNWTO was published. Depending on the records demonstrated by ECOTRANS (2015), there were more than 160 sustainable tourism standards and certification programs throughout the world.

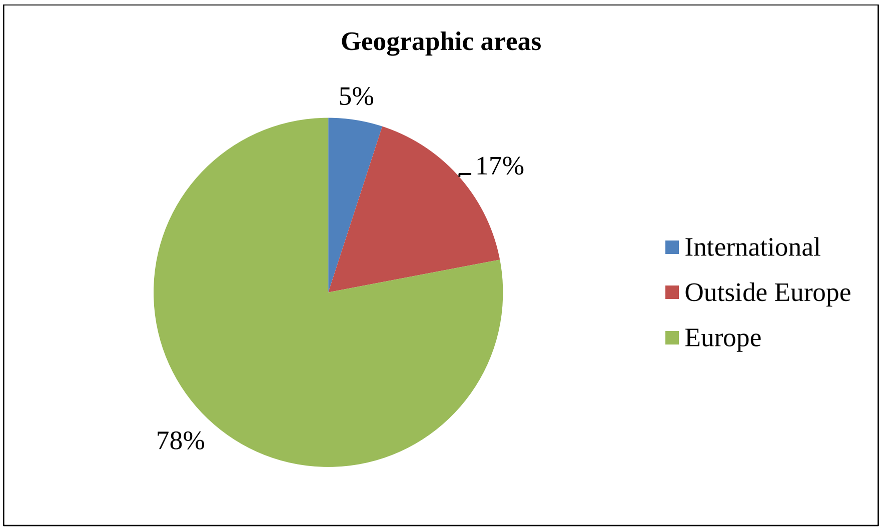


Figure 3 Geographic distribution of certification programs (UNWTO, 2002).

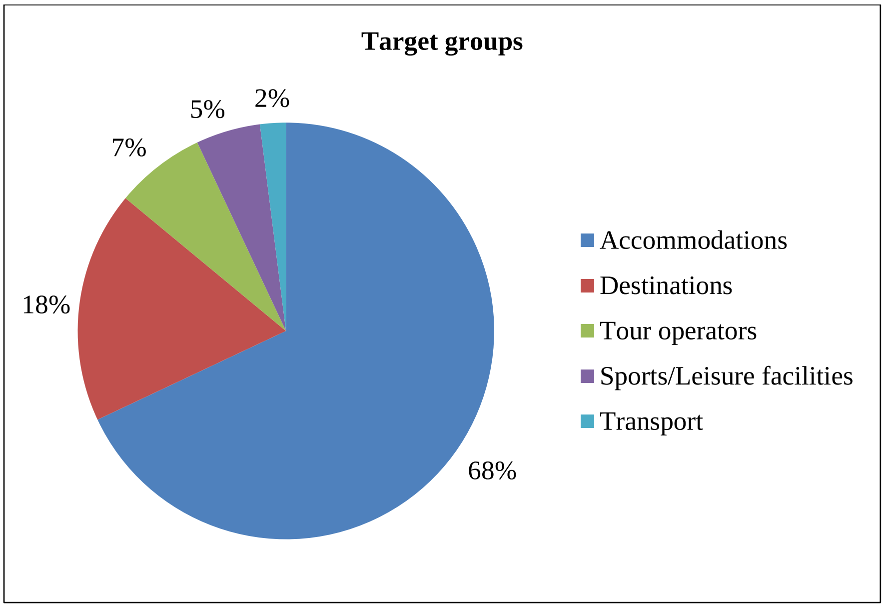


Figure 4 Target groups of certification programs (UNWTO, 2002).

2.4.2 Methodology of Certification

The credibility and accessibility of a certification scheme is important to be accepted and recognized by consumers. To understand and analyse their integrity, the methodology which the certification programs are depending on is a significant factor.

According to Honey and Rome (2001) tourism certification programs could be grouped into two, according to the methodologies they utilize. The first one is process-based, using internally set environmental management systems tailored to a specific business and preparing a monitoring and improving system. The second one is performance-based, using externally generated environmental and often socio-cultural and economic criteria or benchmarks against which the performance of a business is assessed (Table 3).

Table 3 Comparison of process based programs with performance based programs (Adapted from Honey, 2003; Eco-Destinet Network, 2009).

Process-based programs	Performance-based programs
❖ implement Environmental Management Systems such as ISO 14000	❖ can include a clear and understandable checklist to both companies and consumers
❖ set up systems for monitoring particular criteria through management	❖ Can involve a range of stakeholders
❖ Require external consultants or audits and fees; are comparatively expensive for small and medium businesses	❖ Are more transparent and relatively more affordable
❖ Underline internal operating systems and environmental impact reforms	❖ Can involve environmental and socio-cultural and economic criteria
❖ Have no universal standards; the business cannot be compared with its peers	❖ Involve criteria which allows comparisons among certified businesses
❖ Give logo to businesses for their setting up or operation process, not for achieving certain goals	❖ Measure achievement, not intent ❖ Can offer different levels of logos
❖ Are best suited to large scale businesses	❖ Are suitable for small, medium and large business

Depending on the data from Table 3, process-based certifications are generally concerned with how a business operates rather than what is achieved. Moreover, the social and economic impact on the environment and surrounding is often neglected. Furthermore, these certification programs do not guarantee that the activities of the company are in line with sustainable tourism principles. As a result, adoption of performance-based programs, which allows compliance with previously-determined criteria and comparison between similar businesses, can be preferred to increase the credibility.

2.4.3 Components of Certification

Within the two methodologies (process vs. performance), all certification programs shared at least five components (Maclaren, 2002; Eco-Destinet Network, 2009; Honey, 2003).

1) Voluntary enrolment: The businesses decide to apply and implement the necessities of the certification programs voluntarily.
2) Logo: The logo, seal, plaque or brand are given to encourage businesses to improve their practices and to be recognizable to consumers.
3) Complying with or improving upon regulations: For process-based programs this can be at minimum level. However, for performance-based programs it is generally demanded to go beyond regulations. It should be noted that every nation can have different regulations. Therefore, there is no universal standard for this component.
4) Assessment and auditing: This process can be applied in three different ways. First one is the first-party assessment and audit, which can be applied by the business itself, such as filling out a questionnaire. The second-one is by industry associations like WTTC and the third one is by third-party or independent audits. The last one is generally considered as most credible one because the audits are objective, impartial and do not connect with either the business or the certifiers.
5) Membership and fees: Most of the programs charge enrolment fees and request a payment for costs associated with on-site assessment.

Consequently, additional to clarification of methodological distinctions, common components will help to determine how to use strengths to take advantage of opportunities and to avoid and solve problems. Businesses or tourists can select one of the certification programs or certified products according to their order of precedence.

2.4.4 Tourist's Attitude for Sustainable Tourism and its Certification

Toth (2002) stated that in the tourism industry, customer satisfaction could be depicted by a three-legged stool of "quality," "sustainability" and "health, hygiene, and safety" and each leg was essential to remain standing (Figure 5).

Figure 5 Toth's (2002) three legged stool of customer satisfaction.

The factors influencing the holiday choice of the tourists are significantly related with the Toth's premise for the legs of customer satisfaction. However, the motivation of tourists for choosing a destination is much broader and complex. Additional to his suggestions, another research indicated that for the tourists from the United Kingdom the main criteria for the holiday choice was the cost of the holiday with a 82% vote from the respondents followed by the weather (78%) and the service quality (71%) (Tearfund, 2000). Furthermore, ethical policies and social, cultural and environmental considerations were seen as key concerns effecting tourists' travel decisions (Tearfund, 2000; Chafe, 2005).

On the other hand, tourists' positive intention for sustainability does not always lead to actual behaviour such as unwillingness to pay more for the above-mentioned considerations. As Weaver (2009) analysed, tourist had sympathetic attitudes towards sustainability, but did not want to make a major personal sacrifice. Furthermore, a report by Synergy for WWF - UK (2000), basing on the experience of companies such as British Airways Holidays and TUI- one of the Europe's leading travel groups- supported the differences between the intent and real buying patterns.

2.4.5 Investor's Attitude for Sustainable Tourism and its Certification

One of the main attractiveness of an accommodation establishment depends on the environmental quality of its surrounding. In order to achieve a development in their business, hotel managers and the investors should give importance to conservation of environment and more generally adopt sustainable tourism principles.

According to a survey carried out in 2002 and 2003 among 610 hotels across Europe, approximately eight out of ten hoteliers believed that issues relevant to environmental protection were important for the performance and development of tourism. However, desire for diminishing environmental damage was at the fourth place, regarding the incentives which would encourage respondents to introduce more environmentally-friendly initiatives in their hotels. The strongest incentive was reducing operating costs; the demands of customers ranked at the second place which was followed by desire to improve the image of the facility (Bohdanowicz, 2005).

2.4.6 Leading Standards and Certification Schemes on Sustainable Tourism

Major standards and certification schemes that assess hotel buildings and their services will be dealt in this section. The Global Sustainable Tourism Council (GSTC) Criteria, Green Globe and European Ecolabel are major guidelines or certification schemes on sustainable tourism. LEED and BREEAM are also architectural design assessment methods, which have more general criteria that could be applied to different types of buildings. LEED will be dealt in this chapter, because there are LEED-certified hotels. However, no data can be found on BREEAM-certified hotels so this scheme will not be covered in this study.

- *GSTC Criteria*

The GSTC (2016) establishes and manages global sustainable tourism standards increasing awareness and practices among public and private stakeholders. The GSTC has been initiated in 2007, with the coalition of 27 organizations to develop the criteria. Nearly 80,000 tourism stakeholders examined more than 4,500 criteria from more than 60 existing voluntary initiatives and received comments and remarks from over 1500 individuals. The first version of GSTC criteria was released in 2008 and after the review of comments received second version for hotels and tour operators was released in 2012.

The GSTC (2016) criteria aims to come to a common understanding of sustainable tourism with preparing the minimum criteria any tourism establishment should aspire to reach. They are grouped under four main categories; A) Demonstrate effective sustainability management, B) Maximizing social and economic benefits for the local community and minimize negative impacts, C) Maximize benefits to cultural heritage and minimize negative impacts D) Maximize benefits to the environment and minimize negative impacts. Among these, there are some criteria related with architectural design under the section of “Buildings and Infrastructure” in Category A and under the section “Alien Species” in Category D. According to these criteria planning, design, construction, renovation, operation and demolition of buildings and infrastructure should:

- comply with zoning requirements and with laws related to protected areas and heritage consideration,
- respect the natural and cultural heritage surroundings in planning, siting, design and impact assessment,
- use locally appropriate sustainable practices and materials,
- provide access for persons with special needs, where appropriate,
- avoid the introduction of invasive alien species, use native species for landscaping and restoration wherever feasible, particularly in natural landscapes.

The GSTC criteria serve as a basic guideline for tourism sector instead of scoring the establishments. The recommendations they determined can be utilized by establishments, certification bodies, governments, travel agents, tourists, and training bodies such as schools and universities.

- *Green Globe*

The Green Globe (2016) is a certification scheme which assesses the sustainability performance of businesses in travel and tourism industry. It provides certification standards for various industry specific categories; attractions, congress centers, meeting venues, cruise ships, golf courses, hotels, restaurant, spa, health centers, transportation etc.

The Green Globe (2016) includes 44 principal criteria supported by more than 380 compliance indicators. It can be applied worldwide; hence the applicable indicators can vary by geographical regions as well as local factors. The criteria are grouped under four main themes; A) Sustainable management, B) Social/economic, C) Cultural Heritage, D) Environmental. Among these, there are some criteria related with architectural design under the section of “Local Zoning, Design and Construction” in Category A and under the section of “Landscaping” in Category D. These are:

- Compliance with local land acquisition and land rights legislation and local zoning and protected or heritage area requirements.
- Using locally appropriate principles of sustainable construction and design while respecting the natural and cultural surroundings.
- Using native species for landscaping and restoration, and takes measures to avoid the introduction of invasive alien species.

These criteria are based on broadly accepted international standards and agreements, such as GSTC criteria, Agenda 21, and principles of Sustainable Development which defined in Rio Declaration. Therefore, they have several characteristic and criteria in common. Certification of Green Globe is confirmed yearly when over 50% of indicators related with the criteria are met. Additionally, applicants should complete independent and compulsory onsite and desktop audits in the following years (Green Globe, 2016).

- *European Union Ecolabel*

European Union Ecolabel is a voluntary label, which is valid throughout Europe. The scheme involves certification as well as onsite audits by independent experts. This initiative certifies different businesses and products from tissue paper to detergents, to electronic devices, each with its own set of criteria. Moreover, it has specific criteria for accommodation establishments (European Commission, 2016).

The scheme for accommodation establishments consists of six categories; energy, water, detergents and disinfectants, waste, other services, and general management. There are 90 criteria which have two levels of requirement, mandatory with the number of 29 and optional criteria with the number of 61. The scheme has a scoring

system, in which all the mandatory criteria must be fulfilled and a minimum of 20 points is essential in the optional criteria section (European Commission, 2016).
The specific assessment and verification requirements are indicated within each criterion. Moreover, where appropriate, applicants should provide test methods, standards, declarations, documentation, analyses, technical reports, tests or other similar evidence to demonstrate compliance with the criteria (European Commission, 2016).

Among the scheme, there are some criteria related with architectural design. Some of them are written as general requirements, such as complying with regulations regarding landscape, biodiversity conservation, energy conservation, water sources, water treatment/disposal, waste collection/disposal, maintenance and servicing of equipment, safety and health issues. Moreover, as a mandatory criteria, the applicants shall provide the energy certification determined in the Directive of European Parliament and Council or where it is not implemented in the national system, the results of an audit on energy performance of buildings performed by an independent expert. Moreover, there are optional criteria on energy efficiency and energy performance of buildings, energy performance audits for buildings, bioclimatic architecture, and roof landscaping, regarding grassed or planted roofs (European Commission, 2016).

- *LEED for Existing Buildings: Operations & Maintenance*

This is a certification scheme for on-going operations and maintenance of existing buildings. It differs from the above mentioned schemes as the criteria involved in this scheme are not specific to tourism industry, but can be applied to hotels (LEED, 2016).

LEED for Existing Buildings: Operations & Maintenance contains performance standards for the sustainable building operations and covers building components, infrastructure, actions, policies and plans. The scheme consists of six categories; A)

Sustainable sites, B) Water efficiency, C) Energy and atmosphere, D) Materials and resources, E) Indoor environmental quality, F) Innovation in operations.

This certification scheme also has some mandatory and optional criteria. Since the scheme is applied to existing buildings, it mainly assesses on actual energy performance and operational issues rather than architectural design of the buildings.

2.5 Tourism Development in Turkey

Tourism is one of the most important sectors, which has a considerable impact on employment levels and foreign-currency inflows. Further, this industry plays a crucial role in international trade and national income. It has a significant contribution to economic growth and social stability. Moreover, in the global arena, tourism is an effective marketing and promotion tool to constitute and improve a country's image. Particularly, developing countries benefit from tourism, just like the case of Turkey.

Although being a latecomer to the sector, Turkey rapidly became a center of attraction. Due to its location that brings Europe and Asia together, the country has rich historical and cultural characteristics. In addition, because of its geographical position and features, the climate conditions vary significantly from one region to the other.

Another advantage is the Turkey's geographical proximity to European countries, which possess highly developed welfare states and can be considered as target markets. According to the research carried out by UNWTO (2016), Europe is still the world's major source region, generating just over half of the international arrivals worldwide (50.1%) and moreover majority of tourists mainly visit destinations within their own regions.

Being surrounded by sea on three sides, and having 8333 km length coastline are the main reasons for the success of Turkey. It is one of the leading countries in 3S (sea, sand, and sun) tourism, which has a major contribution to mass tourism.

Furthermore, its surface area is larger than most of the European countries. Turkey's wide geography hosts various climatic conditions in different regions. As a result of its climatic diversity, the country is also home to distinctive soil types and flora. Rich diversity of plant species can be observed in Turkey. Compared to 12,500 species found in Europe, the number is 11,000 in Anatolia (Atik, Öztekin, & Erkoç, 2010). More than one third of these species are endemic, that are unique to its geographic area (Çevre ve Orman Bakanlığı, 2008**)**. The research area of this study, Belek region, is on the Mediterranean coast, where most of the endemic species of Turkey are observed.

Based on the above-mentioned facts, there is a huge potential for the development of various tourism types in Turkey. According to "Tourism Strategy of Turkey -2023", which was published by Ministry of Culture and Tourism (2007), one of the strategies of strengthening tourism industry was to spread the tourism season over 12 months. Furthermore, the Ministry declared that this strategy could be achieved by the diversification of tourism. Turkey has the potential for different types of tourism: coastal tourism which is generally commemorated with mass tourism; luxury tourism (such as golf tourism, yacht and cruise ship tourism); tourism types related to health and sport (thermal tourism, winter sports, mountain climbing and layout tourism, adventure trips); conference and expo tourism; cultural heritage tourism; nature-based tourism (plateau tourism, ecotourism, bird watching) and so on.

The diversification has multiple positive effects. One of them is the extension of tourism season. The summer months are considered the high season in Turkey. Hence, consequences for exceeding the carrying capacity of the coastal areas in peak season could be avoided by this method. Besides, directing the tourism investments to the less-developed areas for a more balanced economic development could be achieved. Therefore, diversification of tourism ensures not only sustainability of Turkish tourism sector, but also the creation of new market areas and an increase in the economic share of the industry.

Tourism is gaining a foothold in many emerging and developing countries. In the assessment of Turkey's potential for tourism, the records demonstrate that the country has shown considerable growth and posted remarkable results. In the following section, statistical data on Turkish tourism development will be provided to achieve a better understanding of the position of the country relative to the other nations.

2.5.1 Statistical Data on Tourism Development in Turkey

Tourism is one of the largest and fastest-growing industries in Turkey, like many other destinations in the world. Similar to the previously mentioned international records, the sector has experienced a continuous expansion within the country. In 1963, Turkey attracted 198,841 tourists and generated receipts of 7,659,000 US$. The arrivals reached 1,288,000 and tourism receipts increased to US$326,634,000 in 1980 (H. Sağkurt[1], personal communication, January 4, 2016). As Figure 6 and Figure 7 demonstrate, 1980 is a breaking point in terms of arrivals and revenues. The increase at a faster rate might be tracked back to the tourism investments performed since 1980. According to data from Ministry of Culture and Tourism (2016a), in 2015, the total arrivals of foreign visitors reached 36,244,632. Besides, based on the data from Turkish Statistical Institute (TÜİK, 2016), the tourism receipts were US$31,464,777,000 in 2015.

[1] The data was provided from Halil Sağkurt, who works as a section chief in Department of Research and Assessment of Ministry of Culture and Tourism of Turkey.

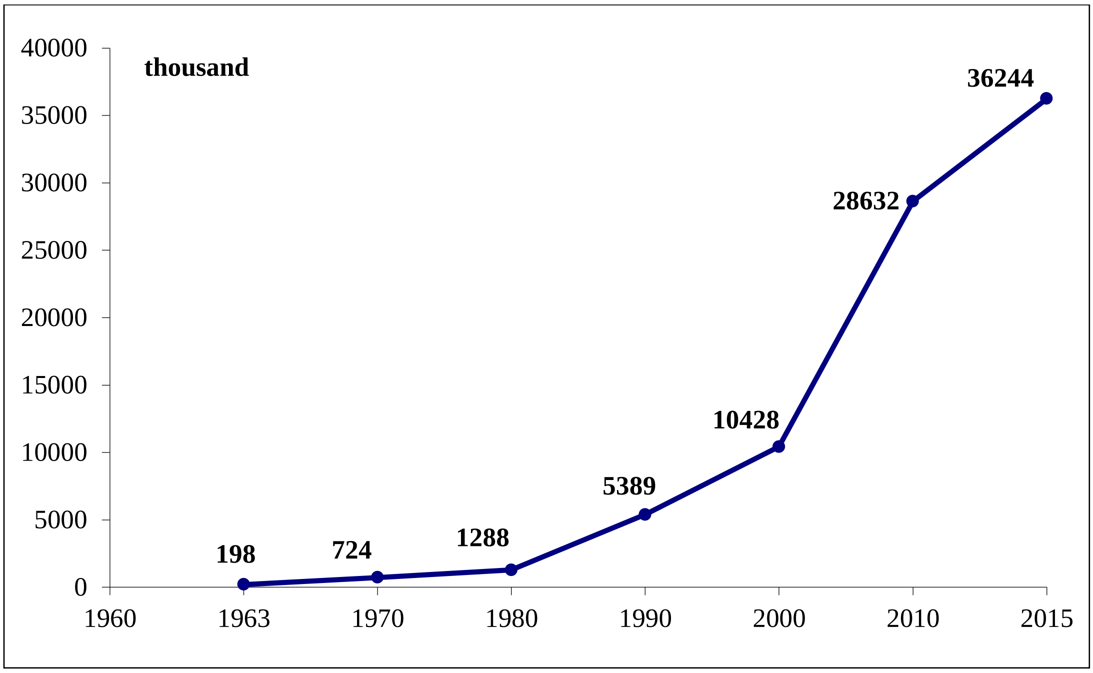


Figure 6 Foreign visitor arrivals (H. Sağkurt, personal communication, January 4, 2015).

As can be seen in Figure 7, Figure 8 and Table 5, which are on tourism receipts, there is a mismatch between the data on the international tourism revenues of Turkey. According to Ministry of Culture and Tourism (2015) the reason behind this is using different calculation methods. For example, the data of UNWTO have been sourced from the "Balance of Payments/Current Account/Tourism" account released by the Turkish Central Bank. Therefore, accounts such as "international transportation costs" and "GSM roaming expenditures" are not reflected in the world ranking tables. Besides, the mentioned Ministry recommended the use of their data for foreign visitor arrivals, and data collected by TÜİK should be preferred in calculation of tourism revenues. However, it is undeniable that Turkey has steadily increased its world tourism market share.

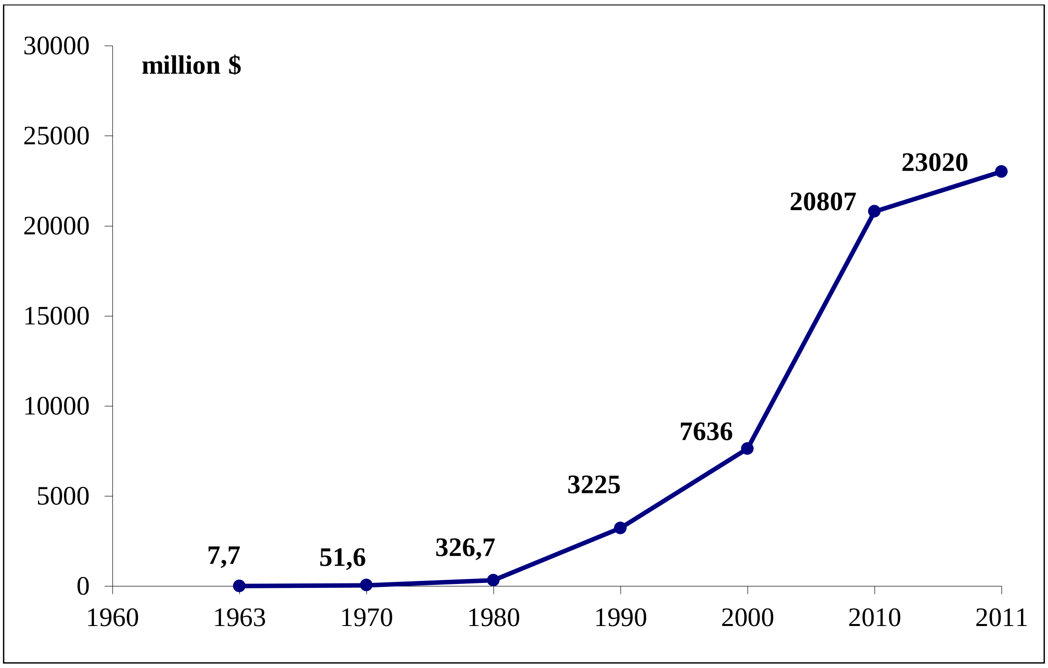


Figure 7 Tourism Receipts (H. Sağkurt, personal communication, January 4, 2015).

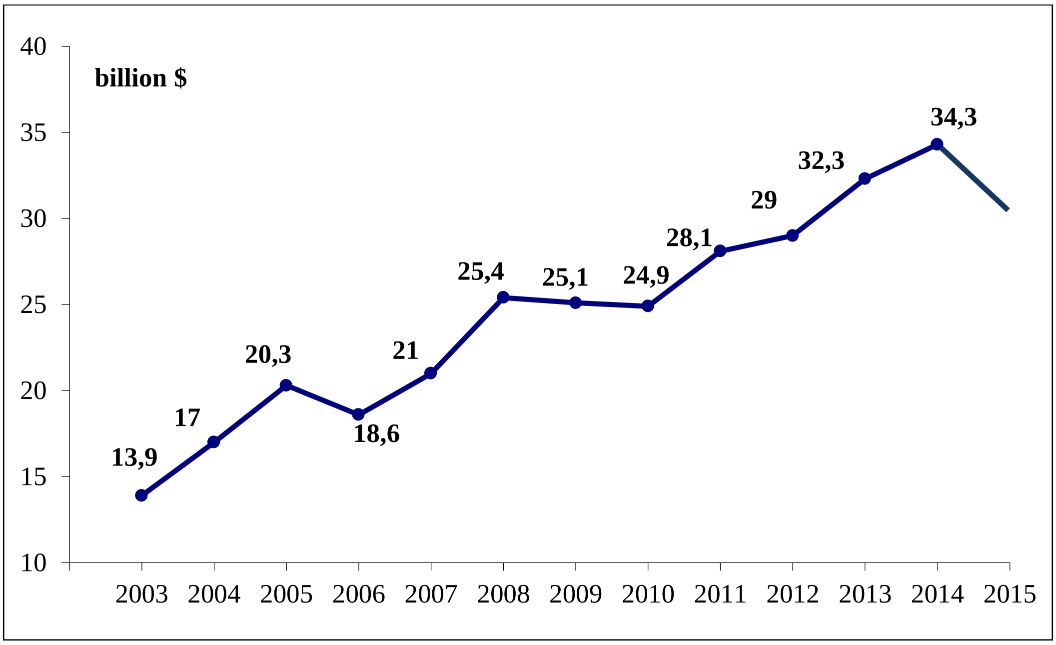


Figure 8 Tourism receipts (TÜİK, 2015a).

Accordingly, the country moved into 6th place in international arrivals and 12th in receipts by 2015 (UNWTO, 2016) (Table 4 and Table 5). Further, as stated in Tourism Strategy of Turkey -2023, the government targets to be on the list of the top five countries in terms of arrivals and revenues by 2023, the 100th anniversary of the Turkish Republic (Ministry of Culture and Tourism, 2007).

Table 4 International tourist arrivals in 2015 (UNWTO, 2016).

Rank	**Country**	**Million**
1	France	84,5
2	United States	77,5
3	Spain	68,2
4	China	56,9
5	Italy	50,7
6	Turkey	39,5
7	Germany	35
8	United Kingdom	34,4
9	Mexico	32,1
10	Russian Federation	31,3

Table 5 International tourism receipts (US$ billion) in 2015 (UNWTO, 2014c).

Rank	**Country**	**Tourism Receipts (US$ billion)**
1	United States	139,6
2	China	60,4
3	Spain	56,1
4	France	51,7
5	United Kingdom	51,6
6	Thailand	43,9
7	Italy	42,1
8	Germany	41,2
9	Hong Kong (China)	40,6
10	Macao (China)	38,9
11	Australia	29,4
12	Turkey	26,6

Table 6 Number of tourism investment licensed accommodation establishments by classification of statistical region units (Ministry of Culture and Tourism, 2016b).

Classification of Statistical Region Units	**Number of Establishments**	**Bed Capacity**
Istanbul	207	45 740
West Marmara	58	10 705
Aegean	258	82 344
East Marmara	69	18 132
West Anatolia	43	11 675
Mediterranean	**245**	**107 111**
Central Anatolia	44	8 871
West Black Sea	29	4 108
East Black Sea	48	5 649
Northeast Anatolia	22	3 485
Central east Anatolia	38	4 436
Southeast Anatolia	64	11 938
TOTAL	**1125**	**314 194**

Table 7 Number of tourism operation licensed accommodation establishments by classification of statistical region units (Ministry of Culture and Tourism, 2016b).

Classification of Statistical Region Units	**Number of Establishments**	**Bed Capacity**
Istanbul	498	98 042
West Marmara	183	20 948
Aegean	721	179 607
East Marmara	201	29 183
West Anatolia	199	29 953
Mediterranean	**918**	**424 859**
Central Anatolia	122	16 946
West Black Sea	129	10 935
East Black Sea	109	10 289
Northeast Anatolia	53	6 394
Central east Anatolia	59	7 260
Southeast Anatolia	117	15 673
TOTAL	**3 309**	**850 089**

Table 6 and Table 7 refer that most of the tourism investments are concentrated in coastal areas. The majority of licensed accommodation establishments have been built in Aegean and Mediterranean regions. Besides, according to the statistics released by TÜİK (2015), in terms of number of arriving foreign visitors, Antalya was recorded as the leader with 11,120,730 tourists in 2013. These data also demonstrate that Turkish tourism mainly depends on 3S and mass tourism.

Although, it is not preferable by most of the supporters of sustainable tourism, 3S tourism is the largest segment of the tourism market around the world (Yunis, 2003). Because of the security concerns of travellers and the lack of infrastructure, mass tourism is preferred by both the customers and investors. The tourists have several advantages for buying package tours; knowing the amount of money required during their vacation, and lack of need to leave the resort and to travel to places believed to be dangerous or unknown. Investors also have benefits of selling the package deals. They conceal the lack of infrastructure and the negative sides of the destination by serving luxury and security to the tourist in the resort. Their profits increase as the customers' experience meets their expectations.

Accordingly, Turkish tourism experienced a consistent and rapid growth over the past 50 years. Mass tourism, which is generally depending on 3S, remains the biggest share of the tourism industry. On the other hand, the effects of this conventional large-scale tourism should be questioned. In the following section, the evolution of the tourism industry in Turkey is examined and reviewed from sustainable tourism perspective. It is aimed to gain a better understanding of the emergence of the term and its adoption.

2.6 A Critical Review on Tourism Legislations and Practices in Turkey

The first footprint of tourism can be tracked back as early as the formation of the Turkish Republic. Hence, this section covers the development of tourism of Turkey from 1923, the year of proclamation of the Republic, up to the present. Some significant political changes that affected the tourism development will be studied below. Since 1963, Turkey has pursued five-year development plans, which set out national goals, objectives and targets. Therefore, the assessment on tourism legislation and legislations will be done through two main periods: the Pre-Planning Period (1923-1963), and Planned Period (since 1963).

2.6.1 The assessment of pre-planning period (from 1923 to 1963)

The early years of Turkish Republic between 1923 and 1963 can be divided into two parts according to changing insights and conditions. In the first part comprising years between 1923 and 1950, there were not significant developments in tourism due to the harsh economic and social conditions in the country as well as Second World War and political problems of the world. However, tourism was included in the agenda of government. In the second part, between the years of 1950 and 1963, legal arrangements in the field of tourism took place, which laid the foundations of recognition of tourism as a policy sector.

The assessment of years from 1923 to 1950

Because of the constitution of a new society after the collapse of Ottoman Empire, the Turkish Republic had major problems to tackle with. The lack of industry, money, capitalist class, enterpriser, infrastructure, experience and education was the urgent problems of the country. Nevertheless, revolutions in the first years of Republic were taken place in order to gain not only political freedom but also economic independence. The planned economic development since 1930s paved the way for local capital accumulation and establishment of enterprises. Furthermore, the political transition to multi-party system and pluralistic approach caused construction of a limited but also dynamic civil society and emergence of new partners since 1940s (Göymen, 2000). The situation was similar throughout the world, because of the effects of war; there were not a significant tourism activity, policy, strategy or instruments. Nohutçu (2002) defined the years 1923-1950 as pre-problem period but significant steps were taken for the future of tourism in this period some of which are as follows.

With the declaration of the Republic, the first steps of transformation to a new society were taken, and the studies on organization have been initiated in the field of tourism. As Kepenek (1990) mentioned, the number of private enterprises were scarce in the first years of Republic. However, in 1923 "Türk Seyyahîn Cemiyeti," a travellers' club was established on instructions of Atatürk by a group of intellectuals. Although the club was a private enterprise, it worked as a government body, printed Turkey's first circulars, posters, tourist guides and road maps. Furthermore, this club opened the first language courses, published the first tourism studies, and organized tourism congresses and conferences (Türkiye Turing ve Otomobil Kurumu, 2014). With the current name of Türkiye Turing ve Otomobil Kurumu (Touring and Automobile Association of Turkey), the authority and responsibility area of the institution has been limited.

The first organization in public administration was realized with Law No. 2450 "Law on the Organization and Duties of Ministry of Economy" in 1934. According to this Law, the charge of tourism is given to Turkish Office, which served under Department of Foreign Trade of Ministry of Economy (Kozak, 2012). This can be interpreted as the approach of government to the tourism as a branch under the state economy in those years.

The assessment of years from 1950 to 1963

In the second period between 1950 and 1963, tourism was started to be recognized as a policy sector with specific legal arrangements and foundation of a Ministry in this particular area and context. The first law for promoting and orienting tourism is 5647 numbered "Tourism Establishments Encouragement Law" enacted in 1950. The law brought the foremost "encouragement" concept to tourism sector and also the tourism establishment license and credit facility to these establishments. In 1953, the scope of encouragement of the establishments relatively extended, and "Tourism Industry Encouragement Law" was enacted. The representation of tourism as an organization at Ministry level is in 1957 with the establishment of “Ministry of Press, Broadcasting and Tourism” with Law No. 4951 (Özdemir, 1993).

Moreover, the Constitution of 1961 brought the expropriation of coasts on behalf of tourism. Another important organizational development in the first period as a public administration taken is the conversion of “Ministry of Press, Broadcasting and Tourism” to “Ministry of Tourism and Promotion” within the aim of constituting new politics in the field of tourism in 1963 (Ministry of Culture and Tourism, 2010).

In the second period, Turkish tourism was still at its infancy, questioning and challenging to solve its problems (Korzay, 1994; Nohutçu, 2002). The developments in tourism at the governmental level took place with the economic approach of the period’s ruling party. The Democrat Party criticized the policy of state control and had an emphasis on private entrepreneurship. However, the heavy investment program of the government resulted as increasing of inflation and foreign debt. In 1960, with military intervention the government was overthrown with the declared aim of completion of the stabilization program and restoration of political stability (Akıncı, 2000).

Moreover, in 1960, The State Planning Organization was founded and the mentioned organization set up five-year development plans, the first of which was launched in 1963. After 1960s tourism was recognized as a branch of service sectors in development plans.

2.6.2 The assessment of the planned period (from 1963 to Present)

The preparation of the five-year development plans after the establishment of the State Planning Organization was a breaking point for the development of Turkish tourism. The governments set their development policies with these documents. At the macro level, these plans contained objectives, strategies, tools and investment programs (Boratav, 1990). The relevant literature called the period after 1963 as the "planned period" regarding the beginning of development plans (Boratav, 1990; Göymen, 2000). In this section, the period will be assessed by the changes for each 10 years, particularly seeking for the traces of sustainable tourism.

The assessment of the 1960s

The first development plan compromised the years between 1963 and 1967. The main objective of this plan was increasing national income because of the economic problems of the period. Tourism was seen as an evolving sector for closing the gap in balance of payments with the help of foreign currency. Because of the limitations in economy, it was targeted to develop only a narrow area (Marmara, Aegean and Antalya) which had the potential to attract more tourists in a short time. However, the projected development in tourism did not succeed in the first plan.

In the second development plan (1968-1972), the strategies to obtain the goal of increasing tourism revenues were set more systematically. The 3S and mass tourism were promoted within this aim. Particularly, investments on holiday villages with high capacities in coastal areas were supported. Moreover, the importance of road transport investment to south and west part of the country was emphasized and put into this plan.

Statistically significant results were accomplished through the actions taken with the second development plan. At the beginning of the Planned Period (1963) Turkey was hosting only 198.841 foreign visitors, deriving a revenue of 7.659.000 US dollars, while in 1970s, the number of visitors rose to 724.784 and revenues to 51.597.000 US dollars almost sevenfold of 1963's revenues. The desire for more tourists and revenue created a need for more accommodation establishments. The policy for easing up on investment for mass tourism, both with legal arrangements and financial support resulted as a significant rise in the number of licensed accommodation establishment. In 1963, there were 38 investments- and 109 operation-licensed accommodation establishments, while in 1970 the numbers were 301 for the former and 292 for the latter (H. Sağkurt, personal communication, January 4, 2016).

During this period, development plans had targets, specifically for the economic development of tourism. Utilization from economic, social and cultural functions of tourism, improving the number of foreign visitors and revenues, increasing domestic tourism, and creation of new job opportunities were significant objectives of the plans. Parallel to the literature on tourism in 1960s in the other parts of the world, the attention was on the economic importance of tourism without questioning its negative impacts.

The assessment of the 1970s

Turkey faced with various problems at macro and micro levels during this period. The Military Memorandum in 1971, two oil crises with global effects in 1973 and in 1979, political instability, constantly shifting government, security problems, financial difficulties and external political effects, and finally the 1980 military coup were the main handicaps of the period. The uneven structure of the 1970s also affected the growth of tourism. Until 1973, there was a continual growth in the number of visitors. However, because of the effects of the military coup in 1980, tourist arrivals fell behind the numbers of 1973. Even though there was a drop in tourism revenue in 1976, the revenue increased fivefold from 1971 to 1980.

On the other hand, some important steps were taken by government agencies in this period. One of them was the transfer of authority of regional tourism planning from State Planning Organization to Ministry of Tourism and Promotion in 1972. The task was shared through two organizations; state planning organization was responsible for development plans, whereas Ministry of Tourism and Promotion was charged with implementation, particularly, physical planning studies.

Publication of the third and fourth development plans were other significant events of these years. The objective of the third development plan (1973-1977), was the continuation of physical planning in areas where rapid tourism development was observed in order to avoid uneven development of hotel and recreation facilities and organize relations with land use and infrastructure. Furthermore, utilization of natural park areas for public interest, protection of these areas and the term of social tourism found a place in the development plan.

Two important policy instruments were launched in consistence with the objectives of third development plan. One of them was the preparation of first land use plans of Western and Southern coastlines of the country starting from Çanakkale- Balıkesir provincial border to Antalya-İçel provincial border, and the other was a special project, South Antalya Tourism Development Project (Örs, 2005; Nohutçu, 2002).

Especially, the objectives of the third development plan tried to be implemented through the project of South Antalya. The hard task of "maximizing benefits from economic impacts of mass tourism" and at the same time "protection of environment, social and cultural life" was targeted in the development plan and the project. Although the word "sustainable" was not used to define the project, it had sustainable tourism goals. Additional to the apart mentioned targets, it had the goal of creation of trained workforce, improvement of infrastructure and accessibility, participation and maximizing the benefits for local people and return of investment. Furthermore, South Antalya Project was awarded as one of the six best integrated projects in 1991, in Rio. However, the final project was also criticized for the modifications done on the original plan because of the pressures from the investors and land speculators. One of the major causes of environmental decline in the region was considered as these modifications, such as increasing the bed capacity from 25.000 to 65.000 (Örs, 2005).

Moreover, in the fourth development plan (1979-1983), a chapter with the title of problems of environment was included. Regarding with the marine pollution the plan indicated participation of Turkey to the “Convention for the Protection of the Mediterranean Sea against Pollution” which was also known as “Barcelona Convention” in 1976, as a first measure taken. Besides, the plan dealt with the oil crises that affected global relations. However, two separate chapters about tourism and environment were not integrated yet. Additionally, the emphasis on the potential of forests as natural recreation areas was the first attempt to use the forests for tourism activities within the general aim of public interest.

The assessment of the 1980s up to the present

At the beginning of 1980, 24 January Decisions were taken as a breaking point for the process of transition to liberal economy and integration with the capitalist world. Despite 12 September Military Coup, implementation of 24 January Decisions progressed. The pioneering role of the state gradually moderated and with the aim of maximization of profits of private sector and entrepreneurship was supported (Göymen, 2000; Nohutçu, 2002).The new era of liberalization also affected tourism policy and two important legal arrangements took place: The “Tourism Encouragement Framework Decree” in 1980 and more importantly the “Tourism Encouragement Law” in 1982.

The Framework Decree was published in 1980, because the existing law related with tourism remained incapable for the recent conditions. After 30 years from the first law, this Framework Decree brought a critical renewal. The identification and planning of “tourism investment areas” and “tourism centers”, where the investments would be concentrated, the attraction of foreign investment into these places, new sources and methods for funding and the foundation of "Tourism Coordination Committee" were significant changes dealt within the Framework Decree. Additionally, the subject of utilization of forests for the tourism activity that was previously mentioned in fourth development plan was extended. Despite not using the word “allocation” yet, the forests could be given to licensed tourism establishments for 99 years by the ways of permission, constitution of servitude, leasing if the Tourism Committee had a positive opinion. Consequently, it paved the way for the 2634 numbered Tourism Encouragement Law, which could be defined as a reform for Turkish tourism development.

The purpose of Tourism Encouragement Law was to give a “dynamic structure and mechanism” for the development of tourism sector. It reflected the general tendency for the development of Turkish economy. On the other hand, the protection of natural resources of tourism as well as their utilization was also declared in the Law. Additionally, alternatives to mass tourism, which was adopted as the main policy, were mentioned, such as winter sports, health tourism, hunting and water sports tourism. The transformation of “perception of tourism as an economic asset” to “realization of the need for protection of environment and cultural properties” took place in Turkey’s tourism policy.

Furthermore, the Law brought new terminology and new insight to tourism planning. For example, the definitions of the terms, such as “tourism regions,” “tourism areas” and “tourism centers” were provided. With these terms, it was aimed to succeed a more holistic and deliberate planning than the examples of 1970s, which followed a specific coastline or a region. One of the significant examples of 1980s was the declaration of Belek as a “tourism center” in 1984 and as a “tourism investment area” in 1986.

Tourism sector was included in the program of 1985 as “the sector with special importance in development” and until 1992, when the premium support for resource use was removed, the number of the licensed accommodation establishments showed a significant increase (Toker, 2007). Bed capacities of accommodation facilities were reached to record levels, from 66.000 in 1983 to 200.000 at the end of 1991 (H. Sağkurt, personal communication, January 4, 2016). Between these years, number of arrivals increased four times and tourism revenues rose ten times.

By the end of the 20th century, tourism sector lost its acceleration due to the Gulf War, increasing terrorist activities and the 1999-Marmara earthquake. The fall in demand caused by these events resulted in significant price reduction and decrease in the quality of tourist arrivals (Uras, 2006).

Another major change in this period was at the organization level. In 1982, Ministry of Tourism and Promotion, and Ministry of Culture were integrated. They were separated in 1989, and re-integrated in 2003. This transformation caused primarily confusion, loss of time and efforts, additional to the problems of integrating two different sections, tourism and culture.

After the last formation of the Ministry in 2003, amendments were made in the Law numbered 2634 with the Law numbered 4957. The paragraph for tourism areas was annulled, and tourism regions were transferred to “culture and tourism protection and development regions.” With this new term, the need for preservation and utilization of the natural resources, and historical and cultural areas having a high potential for tourism development were declared within the tourism policy. Besides, there was a significant emphasis given to planned development.

The incentives of the Law numbered 2634 had a positive approach. However, it failed at some points in implementation. It was criticized for disregarding spatial togetherness such as failure in formation of common spaces that gathered tourist and local people, and in realization of activity plans that lead tourists visiting settlement areas (Erdem Almaç, 2005).

The changing nature of tourism development was also seen in the development plans. In the fifth development plan (1985- 1989), utilization and protection of natural, historical and cultural assets for tourism purposes took part. Additionally, in the sixth development plan (1990-1994) several objectives were mentioned related with sustainable tourism such as, the need for incentives for diversification of tourism, extension of tourism season, the studies for trained personnel, improving tourism infrastructure and superstructure, protection of physical and historical environment, supporting family pensions and social tourism. The seventh development plan (1996-2000) also had similar concerns. Furthermore, instead of increasing the bed capacity of accommodation establishments, more efficient utilization of existing superstructure was highlighted. Additional to the previous plans, the eight development plan assessed supporting small and middle-sized enterprises and participation of local people to decisions related with tourism. The ninth development plan (2007-2013) further pointed out tourism's social and ethical role for reducing regional imbalance. The tenth development plan which announced recently (2014-2018), focused on minimizing the negative impacts of tourism on social, cultural and environmental values and improvement of sustainable tourism with environmentally friendly and responsible tourism approaches. It referred to the Green Star Certificate of Ministry of Culture and Tourism within this respect.

2.7 Special Projects Related with Environment in Turkey

Particularly, early years of 1980s had an importance for accelerating the legal arrangements and initiatives in protection of natural and cultural areas. In the 1982 Constitution, with Article 43 the state guaranteed the protection of public interest at the coasts. Additionally, with Article 63 the protection, supporting and encouragement of historical, cultural and natural assets and values were accounted as the state's duties and responsibilities.

Following adaptation of 2634 numbered Tourism Encouragement Law in 1982, 2863 numbered Cultural and Natural Heritage Protection Law, 2872 numbered Environment Law and 2873 numbered Natural Parks Law were enacted in 1983. Furthermore, eight years after the Tourism Encouragement Law in 1990, 3621 numbered Coastal Law was enacted. Through these years, the number of investments increased so did the destruction of coasts. However, the Coastal Law is important for integration of coastal planning with tourism development. There are also several significant projects launched out in this period related to environmental concerns, which will be detailed in the following sections.

2.7.1 Mediterranean- Aegean Tourism Infrastructure and Coastal Management Project

In 1989, another important initiative was launched by the Ministry of Culture and Tourism regarding with infrastructure. Mediterranean- Aegean Tourism Infrastructure and Coastal Management Project, which is widely known as "ATAK Project," compromises approximately 100 settlement areas along the coastal line from Çanakkale-Balıkesir to Antalya-İçel province border (Ministry of Culture and Tourism, personal communication, February 13, 2015).

The infrastructure which was prepared to serve 10 first and 15 second priority areas along this line is essential for the sustainable tourism development. The primary aim of the project was to respond environmental protection of coastline, procurement of master plan, feasibility projects and construction of potable water, sewerage system, waste-water treatment plants and discharge and solid waste disposal facilities (Ministry of Culture and Tourism, personal communication, February 13, 2015).

The implementation of the project was initiated with a grant of 607.5 million Yen from the Japanese government under the contract signed between the World Bank and Turkey. Even though the project was envisaged to be implemented by local governance and infrastructure unions founded by the users, the project is mainly financed by the Ministry of Culture and Tourism (personal communication, February 13, 2015). Moreover, the Ministry allocated 38 million Turkish Liras to complete the ATAK Project (Ministry of Culture and Tourism, 2016c).

There are several factors that caused the delay and cost overruns of the project. Some of these were: its comprehensive structure and large scale, difficulties in covering the operating costs, problems regarding organization and strategic planning, and the insufficient operational resources (both human and financial) of municipalities.

2.7.2 Blue Flag Programme

“Blue Flag Programme” is an international environmental program that was also applied in Turkey since 1993. This program was initiated at a national level in France in 1985. In 1987, which was the "European Year of the Environment,” the French concept was presented to the European Commission, and the program was launched as one of the year’s community activities. It includes areas of sewage treatment, bathing water quality, waste-management and coastal planning and protection. Beaches, marinas, boats and whale-watching boats can apply for this international award (Blue Flag, 2014).

The program is being implemented in Turkey with the establishment of Turkish Foundation for Environmental Education (TÜRÇEV), under the leadership of the Ministry of Culture and Tourism. In 2014, there were 397 beaches and 22 marinas, which were awarded the Blue Flag. Turkey is at the third ranking for the number of beaches, following Spain with 573 and Greece with 407 beaches. Furthermore, in Antalya-Serik, which is the selected area of this thesis, there are 25 beaches with blue flag (Mavi Bayrak, 2015).

The program is important because of its recognition at the international arena. The high number of the beaches with blue flag indicates that there is a tendency to acquire the award from the side of beach managers, the operators of public beach or the accommodation establishments. In Turkey, it is also supported by the government with the membership and sponsorship of two Ministries (Turkish Ministry of Culture and Tourism and Ministry of Health) to the program.

However, according to a survey about visitor’s motivation in Ireland, Wales, Turkey and the USA, beach awards play an insignificant role in the selection reason of the beach from the view of tourists (McKenna, Williams, & Cooper, 2011). The results of their survey indicated that cleanliness and water quality were revealed to be very significant. Besides, it was stated that even aesthetic and emotional factors like scenery and general ambience, and practical concerns such as physical proximity and range of activities offered were much more important factors than beach awards in attracting tourists.

Even though, the ownership of the award was not a significant factor for choosing a destination for tourists, it plays an undeniable contribution for establishments for increasing awareness. Moreover, the program provides the opportunity to study with pre-defined criteria and motivation for acquiring and maintaining an award.

2.7.3 Campaign for Environmentally Friendly Tourism

The Ministry of Culture and Tourism launched a campaign for protecting environment in 1993. Within this campaign special certificates are given to establishments that have positive contribution to their environments. The initiative started with the awards “pine label” to accommodation establishments, “anchor label” for marinas and “dolphin label” for yachts. The project is parallel to the awareness studies started synchronically with the examples of other parts of the world. Furthermore, it has a larger scope and is relatively above of its contemporaries. However, lack of incentives and promotion caused some difficulties in appropriation of the project not only for the establishments but also the certifier, the Ministry of Culture and Tourism.

The number of accommodation establishments with pine label was 26, until a revision was made in the standards in 2008. The Ministry renewed and improved the standards on environmentally friendly accommodation establishments published as a circular on 22 September 2008. The name of the label was changed from “pine” to “green star.” The principles for certification of green star will be detailed in the following section.

2.7.4 Green Star Certification

Developments in the field of environmental protection, and sustainable tourism led to renew and improve the current criteria of pine label and harmonize with the EC eco-label criteria. As a consequence of the researches and studies on environment friendly accommodation establishments, consideration of relevant criteria of different countries, respecting conditions of Turkey and evaluation of the related authorities' remarks, 122 new criteria which constitutes the foundation of Green Star Certification were determined. These specified standards are carried into action with the application of classification form that was given in the attachment of Communiqué, published in 2008 (See Appendix A).

These specified criteria involve:

- limiting energy consumption, water consumption and the use of substances which are hazardous to the environment;
- improving energy efficiency;
- encouraging the use of renewable energy resources;
- planning and constructing environmentally friendly accommodation facilities from the investment (planning) phase;
- the compatibility of the establishment with its surrounding natural and built environment;
- arrangements and activities to embellish the environment;
- ecological architecture;
- raising awareness on environmentally friendliness issues;
- providing training;
- and collaboration with relevant organizations and institutions.

The project is initiated by the Ministry and implemented as a public service. Its main objectives are to protect environment, to develop environmental consciousness, to encourage and promote the positive contribution of accommodation establishments to the environment.

Upon the request of Green Star Certificate, a specified classification form is implemented by a classification commission. The commission is formed by two experts from the Ministry and one representative of the society or association established by the accommodation establishments. The establishments that exceed the minimum points determined according to their type and class in the classification form are awarded with green stars and the inscription of "Environment Friendly Accommodation Establishment" is written on their plaque. The establishment is exempted from fees, certificate and plaque charges for Green Star Certificate.

Green Star certification is awarded to only existing accommodation establishments that already have tourism operation license from the Ministry. According to relevant legislation, accommodation establishments refer different types of accommodations; holiday villages, hotels, motels, boutique hotels, special establishments, hostels, etc. As seen in the classification form these accommodation establishments are divided into two groups; resorts and city establishments, which usually have different land areas, services, location, activities and amenities. According to the records of Ministry of Culture and Tourism (2016d), there are 346 accommodation establishments awarded Green Star Certificate in 32 out of 81 cities in Turkey.

The criteria in the classification form are grouped under 10 categories; A-General management, B- Training, C-Arrangements in guest rooms of the establishment, D- The compatibility of the establishment with the environment, arrangements and activities to embellish the environment, E- Ecological architecture, F- Energy, G- Water, H- Detergents, disinfectants and dangerous chemicals, I- Waste and J- Other services. These criteria are divided into two levels of requirement, the mandatory and the optional criteria. Mandatory Criteria are indicated with symbol "*" in the form and the establishment can be evaluated in case it meets all mandatory criteria that are mentioned in the form.

A breakdown of weighting of each individual category, which is represented as a percentage of total points is shown in Figure 9 below. According to this data, energy related criteria are more heavily weighted than the other ones with the rate of 30%. The ecological architecture category accounts for 42 out of 573 points (7%) and all of these criteria related with this category are optional.

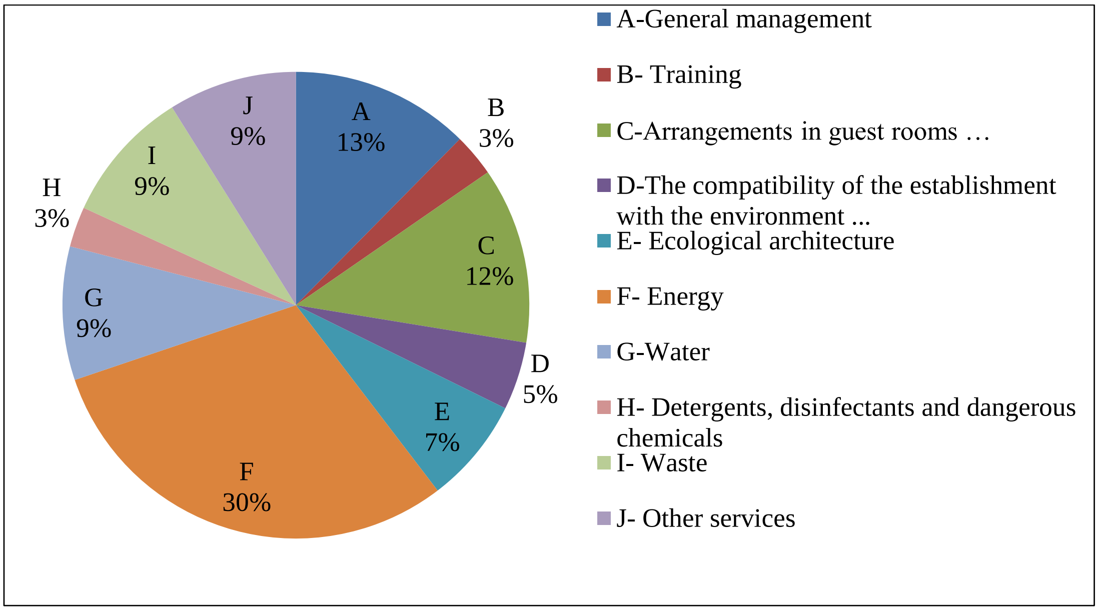


Figure 9 Point score breakdown of Green Star certificate (prepared by the author).

Within each category, specific assessment and verification requirements were determined for the classification commission and the applicants (managers or the representatives of the establishments). The applicants are required to provide documentation, declarations, analyses, test reports, or other evidence to show compliance with the criteria. Where appropriate, members of the classification commission may require supporting documentation and may carry out independent verifications. For example in category E, ecological architecture, technical reports from experts such as architects or mechanical engineers and nationally or internationally recognized certificates are asked.

CHAPTER 3

MATERIAL AND METHOD

The aim of this chapter is to discuss the research material and methodology utilized in this study. The first part of this chapter entails the data collected by the author for the use of her analysis. This part covers two subsections; selection of hotels in Belek for the case study, and climatic conditions of the coastal area of Antalya. The second part includes the method of the study. It is comprised of data compilation process and development of the questionnaire form (Appendix B).

3.1 Material

This study is carried out on questioning the design of accommodation establishments in Turkey, specifically hotel projects, in Belek/Antalya from the perspective of sustainable design. In order to fulfil the objectives of this study, reason for selection of hotels for the case studies and the data on climatic conditions of Antalya will be given in the following sections.

3.1.1 Selection of the hotels in Belek for the case study

There is a need for hotels designed and operated in sustainable manner, especially in Belek, where tourism is important for economic development as well as for protecting, maintaining and restoring natural values.

Hotel examples for the case studies were selected from Belek district of Antalya. According to the records reported by the Ministry of Culture and Tourism (2016d) there are 346 accommodation establishments in Turkey that are awarded the Green

Star Certificate, and 177 of them are in Antalya. More specifically, 38 of them are in Belek Tourism Center (Ministry of Culture and Tourism, personal communication, August 9, 2016).

3.1.2 Climatic conditions of coastal area of Antalya

As the case studies of this research were selected from Belek, which falls within the borders of Antalya, climatological data of this city was obtained from Turkish State Meteorological Service. It is an affiliated institution of Turkish Ministry of Forestry and Water Affairs. The main mission of the institution is monitoring and measuring meteorological events in Turkey. Since, it is the only official organization that provides all necessary information on climate, this section of the chapter is generally based on the archive of this institution[2].

According to the data gathered from Antalya Regional Directorate of Meteorology, a general climatic analysis of the region is made. Then a detailed analysis of temperature, sun, prevailing and secondary wind directions, precipitation, average humidity and minimum humidity are given.

A general analysis:

Antalya, particularly its coastal region, has a Mediterranean climate. Summers are hot and dry, while winters are mild to cool and rainy, especially on the coast. The research area of this study, Belek is located close to the Antalya Airport Meteorological Observation Station with the number of 17300. Hence, the cited climatic data for Antalya are all based on the analyses of this station (See Appendix C).

[2] Firstly, a letter and an email requesting information were sent to the institution’s local department, Antalya Regional Directorate of Meteorology. Primary data is gathered through telephone interviewing, and the institution’s response letter and e-mails. It covers long-term monthly average meteorological data of Antalya from 1960 to 2012 (See Appendix C).

Detailed analysis:

a) Temperature

Highest recorded temperature is 45º; lowest -4ºC from 1960 to 2012. The mean annual temperature is 18.4ºC. In winter, the average maximum temperature ranges between 14.9 and 16.5°C, and in summer between 30.9 and 34°C. On the other hand, the minimum temperature in winter averages between 5.9 and 7.4°C, and in summer between 19.5 and 22.6°C. In spring, temperatures by day reach to 21.6°C on average, falling to 11.3°C overnight. In autumn, average maximum and minimum temperatures are 26.2°C and 14.9°C, respectively (Figure 10) (Antalya Regional Directorate of Meteorology, personal communication, September 19, 2014).

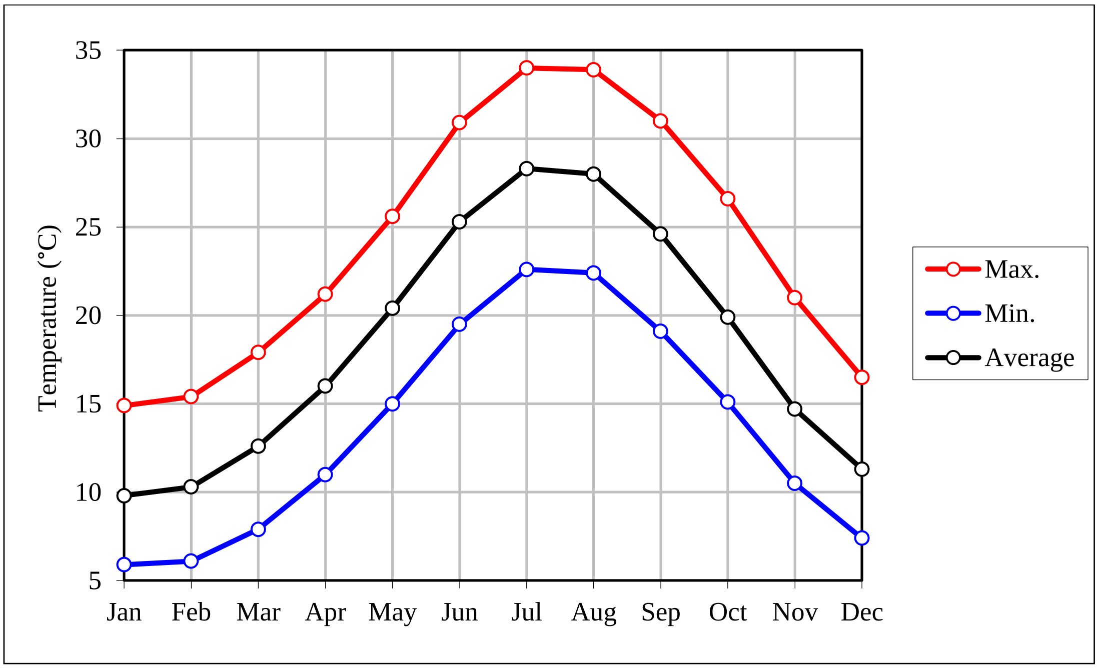


Figure 10 Minimum, maximum and average temperatures in Antalya, Turkey (prepared by the author, depending on the data given in Table 18).

b) Sun

The number of clear days is more than 20 in July, August and September. The clear days are less than 10 but more than 5 from November to the beginning of June. The average number of cloudy days per month ranges from 15 to 20 days from October to the beginning of June. From July to the end of September, the number of cloudy days decreases to around 9 per month. Totally, there are nearly 325 clear and cloudy days in a year. Overcast days are rare. Even in winter months, there is an average of five hours of sunshine a day (Figure 11 and Figure 12) (Antalya Regional Directorate of Meteorology, personal communication, September 19, 2014).

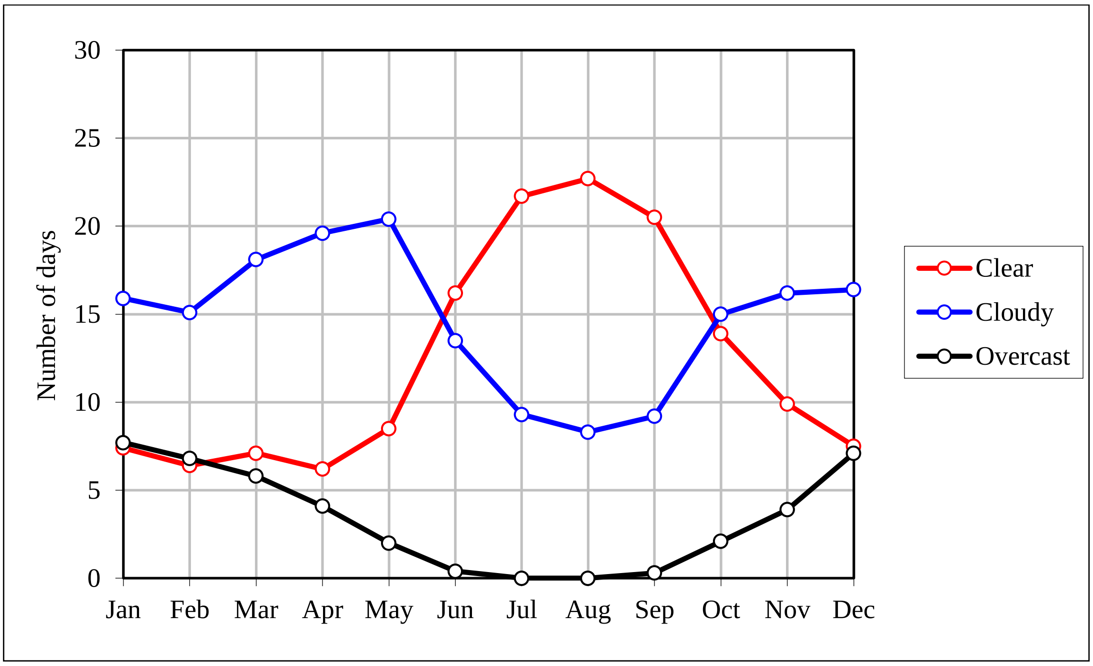


Figure 11 Average number of clear, cloudy and overcast days per month (prepared by the author, depending on the data given in Table 18).

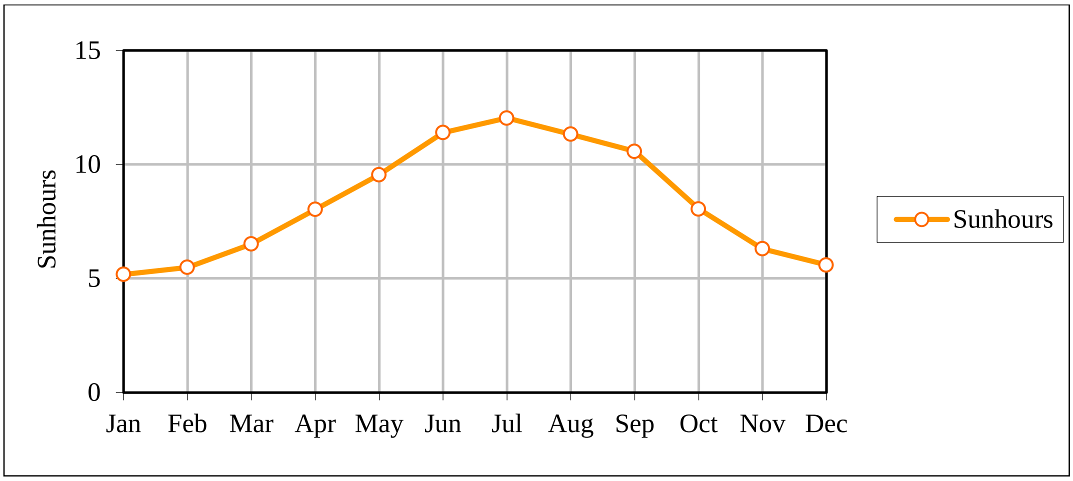


Figure 12 Average total hours of sunshine per day (prepared by the author, depending on the data given in Table 18).

c) Wind

Prevailing wind direction is the direction with the highest percentage of frequency. According to the wind diagram for Antalya (Figure 13), the prevailing winds are north-northwest (NNW) and north (N) with a frequency of 81,795 and 63,082 blows, respectively. Based on the data of the meteorological observation station, the average wind speed in Antalya is 3 m/sec. (Antalya Regional Directorate of Meteorology, personal communication, September 19, 2014).

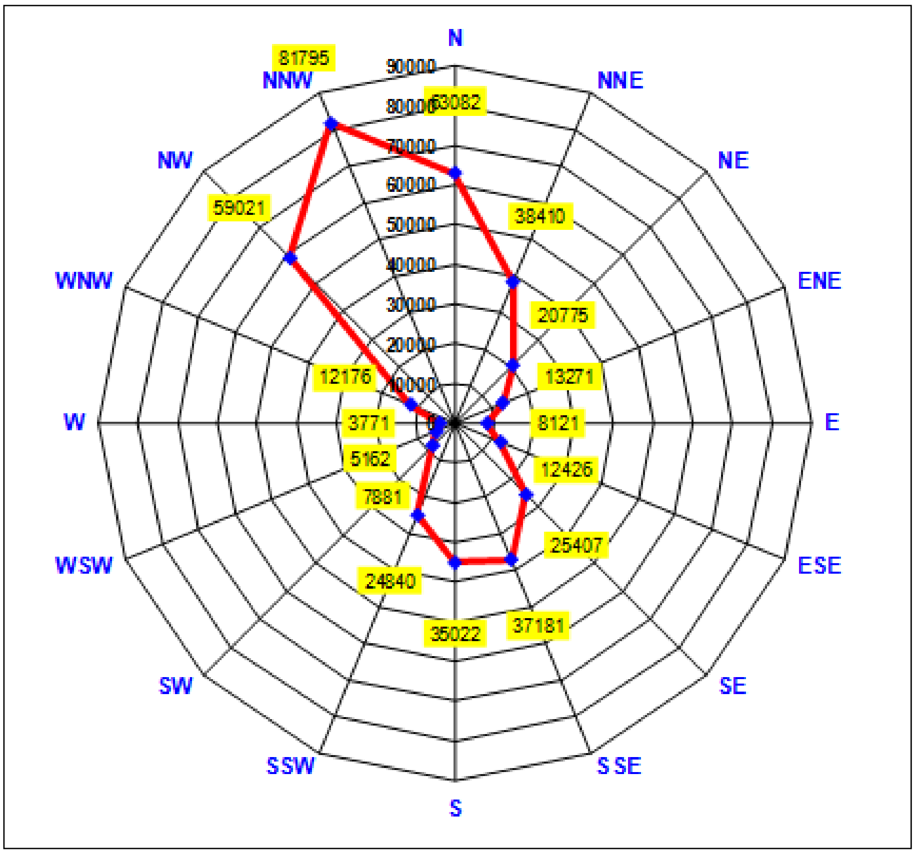


Figure 13 Wind diagram for Antalya from 1954 to 2013 (Antalya Regional Directorate of Meteorology, personal communication, September 19, 2014).

d) Precipitation

Snow, fog, hail and hoarfrost are hardly relevant throughout the year. The maximum precipitation was measured as 331.5 mm in January. Antalya has dry periods in June, July, August and September. The mean precipitation throughout these months varies from 7.3 mm in June to 12.5 mm in September. In December, the precipitation reaches its peak, with an average of 251.2 mm. On the other hand, August is the driest month with 1.8 mm average precipitation (Antalya Regional Directorate of Meteorology, personal communication, September 19, 2014).

e) Relative humidity and vapour pressure

Based on the above-mentioned data, temperature distribution has a smaller range in winter and in spring, than in the overheated summer period. The general location is at the humid site. The bioclimatic chart (Figure 14) for Antalya is prepared according to the data gathered from Antalya Regional Directorate of Meteorology (See Appendix A).

As shown in the chart (Figure 14), radiation is necessary from October to early May. On the other hand, solar heat has a significant contribution during these under-heated periods. For example, average global sun intensity is above 300 cal/cm^2 in March, April, May and October. Even in January, February and December it is nearly 200 cal/cm^2 (Antalya Regional Directorate of Meteorology, personal communication, September 19, 2014).

According to Figure 14, in May, June and September, the plotted points fall into the comfort zone. In July and August, where the points are higher than the upper perimeter of the comfort zone, wind effects are required to counteract both vapour pressure and high temperatures. Additional active cooling is also needed in this very hot and humid period. The chart also demonstrates that throughout the peak season for tourism (from June to the end of September) shading is required.

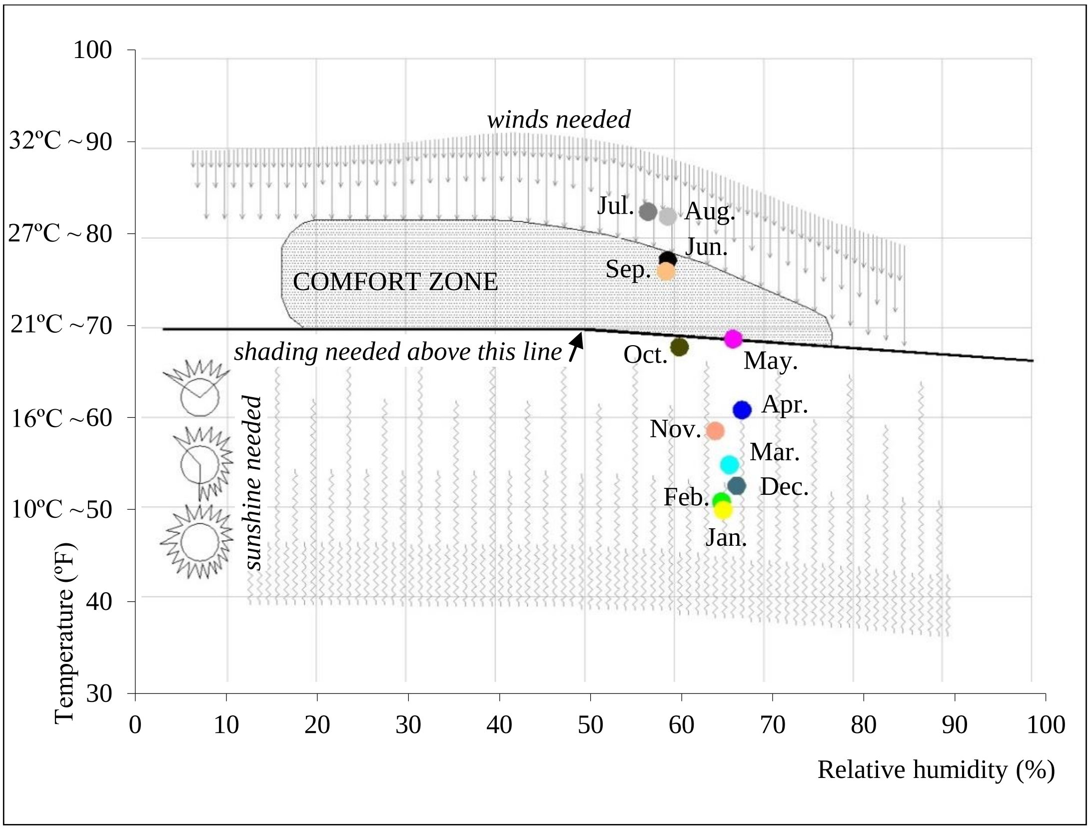


Figure 14 Bioclimatic Chart for Antalya [prepared by the author, adapted from Olgyay (1963)].

Besides, Turkish State Meteorological Service (2015), prepared long-term heating and cooling degree-days for Turkey. The data on heating degree day (HDD) reflects the demand for energy required to heat a building. The HDD index is calculated by summing the differences of a reference temperature (according to the institution it is 18ºC) and the mean outside temperature for all the days of a year, whose mean temperature is below the threshold temperature. Threshold temperature of 15ºC was chosen in the calculation of HDD by this institution. On the other hand, the measure for cooling degree day (CDD), demonstrates the amount of energy needed to cool a building. In this case, the annual CDD value is arrived at by calculating the differences between the average outdoor temperature and the threshold temperature (taken as 22ºC) for all the days of one year, whose average temperature is above the threshold temperature.

Compared to other provinces of Turkey, Antalya is one of the cities that have minimum heating requirements with the annual HDD value of 993 (Figure 15). It is 5155 for Ardahan, the city with the highest annual HDD, whereas it is 803 for Mersin, the province with the lowest value (Turkish State Meteorological Service, 2015).

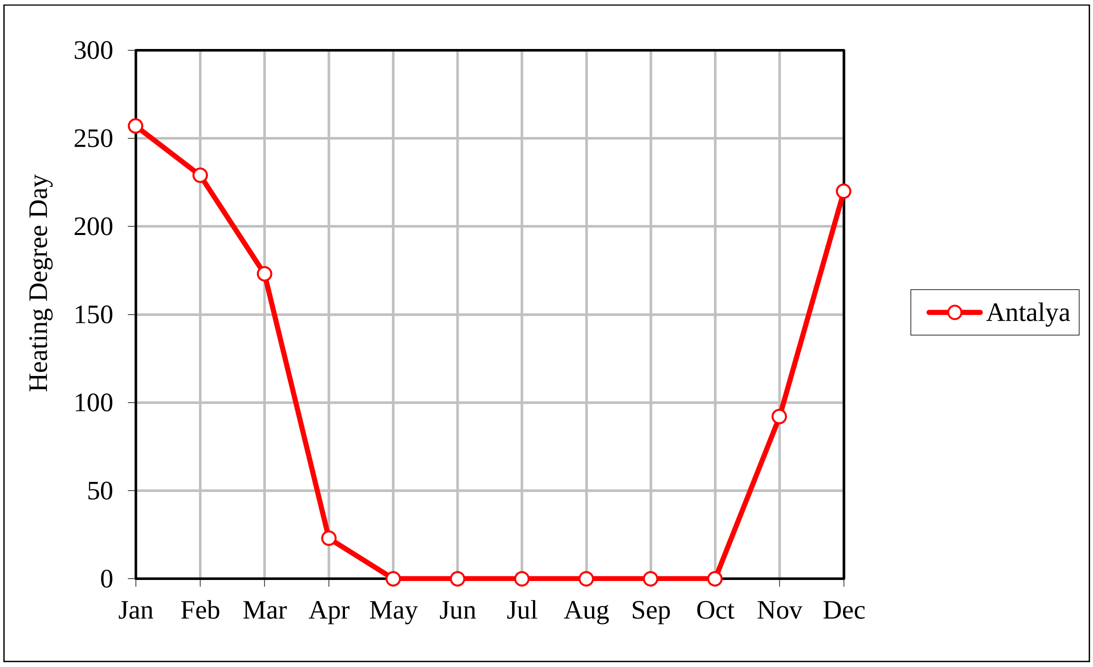


Figure 15 Variation of monthly average HDD for Antalya (prepared by the author, adapted from Turkish State Meteorological Service, 2015).

On the other hand, in June, July and August, the amount of cooling required in Antalya is greater than most of the other provinces, with the CDD value of 99, 195, and 182, respectively (Figure 16). The CDD index for Şanlıurfa, the city with the highest values, is 179, 303 and 278, correspondingly during these months (Turkish State Meteorological Service, 2015).

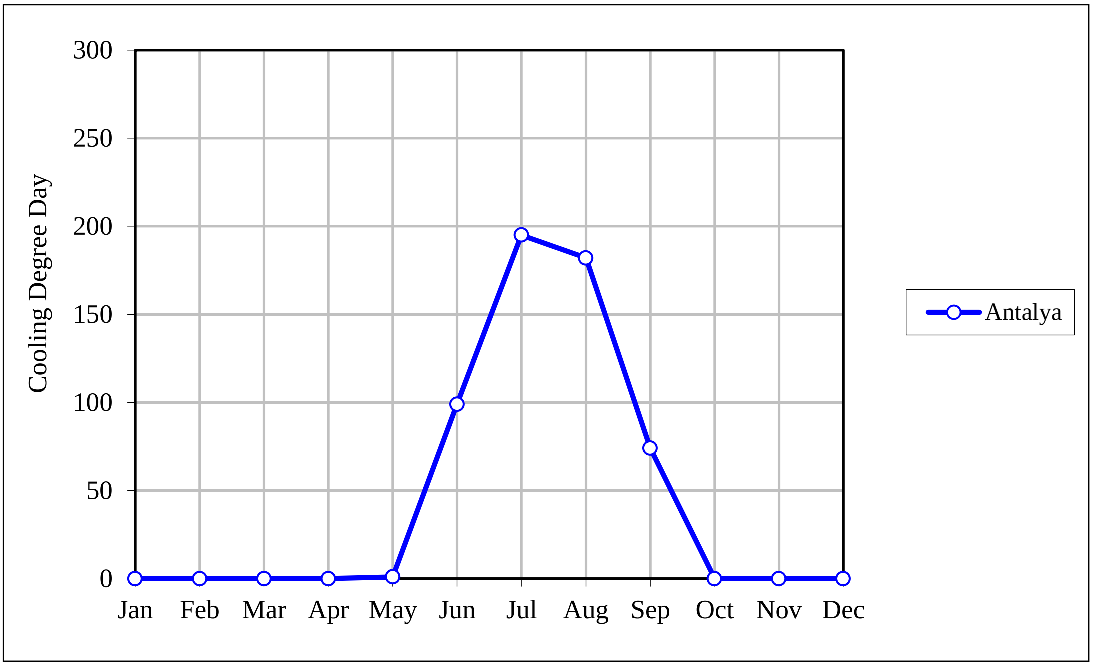


Figure 16 Variations of monthly average CDD for Antalya (prepared by the author, adapted from Turkish State Meteorological Service, 2015).

The calculation method described above is a way to figure out a rough estimate of how much energy is required for heating or cooling purposes. Whether heating or cooling, the energy needed by a building can be reduced by proper passive design solutions and components. The rest of the energy need can be met by alternative or renewable-energy sources. A careful balance between summer cooling and winter heating should be established. By applying principles of sustainable design, active heating and cooling requirements can be reduced to a minimum.

3.2 Method

Together with the quantitative data on climatic conditions of coastal area of Antalya, the critical evaluation method was used for the analysis of literature on sustainable design parameters to develop the general design criteria and the survey questionnaire (See Appendix B), which can be applied for conducting the particular research. In the first part of this section, recommendations for general sustainable design criteria, particularly for Belek will be provided. In the subsequent part, the development of a questionnaire form for on-site survey will be indicated.

3.2.1 General sustainable design criteria for the research area

Relationship between architectural design and the environment is one of the most crucial driving forces of sustainable tourism. The design parameters should be evaluated and interpreted in a logical sequence. This sequence proceeds from macro-level concerns such as site selection to micro-level details of choosing materials. The steps can be outlined in the following order:

A) Location and site planning, which includes transportation means and ways, topography, natural and man-made surroundings, orientation, settlement patterns and hazards,
B) Building design, which entails plan layout and organization of spaces, shape and volume, and colour selection,
C) Building components, which comprises openings and windows, shading devices, walls, roofs, foundation and basement, materials, and mechanical equipment and technologies.

A) LOCATION AND SITE PLANNING

One of the essential parameters of sustainable design is the site selection. Thermal comfort of occupants and energy efficiency of buildings can be primarily achieved through settlement form, layout and location. When the location or setting of a building or settlement is first chosen, the bioclimatic needs of the region, landscape structure and character, accessibility and area-specific conditions should be considered. Having in mind the mentioned considerations, this topic is organized into the following sections: (1) transportation means and ways, (2) topography, (3) natural and man-made surroundings, (4) orientation, (5) settlement patterns and (6) hazards.

- *Transportation means and ways*

Transport planning has multiple economic, social and environmental effects. So that transportation decisions which are considered in the planning process may support sustainability goals.

A recent report, which was published by Victoria Transport Policy Institute (2014), dealt with application of sustainability indicators in transport evaluation and planning. Outlined below is the summary of the transport planning objectives that were cited in the mentioned report (Victoria Transport Policy Institute, 2014):

a) Transport system diversity: This generally indicates providing more transportation choices, modes, location and pricing options. Examples of transportation ways or means include walking, cycling and public transport, which are affordable, safe, healthy, effective and environmentally friendly. This may also include choosing fuel efficient or alternative-fuel vehicles, and reductions in the total number of motor vehicle trips.
b) System integration: The different components of the transport system should be well-integrated and functioning, such as linking bicycle and pedestrian access to transit, and integrated transport.
c) Affordability: Transport services should provide affordable options for low-income residents to improve the accessibility to basic facilities, goods, services and activities.

d) Resource (energy and land) efficiency: This includes policies that encourage energy and land efficiency.
e) Efficient pricing and prioritization: This includes more cost-based pricing of roads, vehicles, fuel, parking and insurance.
f) Smart growth and land use accessibility: Land-use policies support compact, connected, mixed, and multi-modal development in order to provide more affordable and accessible dwellings and transport options.
g) Operational efficiency: This includes transport agencies, service providers and facilities, which are managed efficiently to reduce costs while maximizing service quality.
h) Comprehensive and inclusive planning: Planning should be comprehensive, so that decision makers can consider all significant goals, impacts and options. Moreover, it should be integrated, which requires coordination among different agencies, sectors, and jurisdictions. Furthermore, inclusion and participation of all affected people should be provided.

Therefore, transportation means and ways are one of the major components of a sustainable landscape design. Integration of transportation options with site planning is essential for designing liveable and sustainable environments. Integrated transportation options, particularly for pedestrians, cyclists, transit riders, and people of all ages and disabilities should be promoted. Moreover, all transportation systems should be affordable, convenient, safe, efficient, and multi-modal.

- *Topography*

Topography is one of the factors affecting macro- and micro-climate. For example, while mountains have a profound influence on the climate of a larger area, a small difference in the topography of terrain can cause variations in localised climate around a building. Particularly, the topographic features of a land have an impact on temperature, air movement, precipitation and solar radiation.

The topography of a terrain could either be flat, undulating or sloping. Flat and smooth lands experience little variation in climate. The selection of location for a building in such a land is not so restricted by climatic concerns. On the other hand, the elevated or sloping sites bring various levels of temperature and air flow in different parts of the terrain. Therefore, different design approaches are required for distinct topographical locations and their climatic conditions.

One of the climatic elements influenced by topography is the temperature. Temperature varies with altitude. For each 100 m of elevation, air cools at a rate of 0.8°C (DeKay & Brown, 2014). Higher elevations such as plateaus and mountains are cooler than low elevations. At night with the outgoing radiation, cold air flows toward the lowest points. This air movement is a result of pressure difference between two areas. As cool air is heavier than warm, the warmer air naturally floats upward, and the cooler air tends to flow downhill. The cool air collects in low areas, depressions and behind any obstacles that baulk its flow. As convex landforms with higher elevation shed cool air, concave forms with lower elevation collect it (DeKay & Brown, 2014). Thus, the plateau will be cold and the valley floor will be colder (Olgyay, 1963; Gut & Ackerknecht, 1993; DeKay & Brown, 2014). However, the higher sides of the slopes will be warm (Figure 17).

Olgyay (1963) claimed that the warm slopes, which are also known as thermal belts, are the most advantageous for placing a dwelling in the temperate zones. These parts of the terrain are usually indicated by vegetation. Since, favourable conditions give rise to the growth of plants which are sensitive indicators of climates.

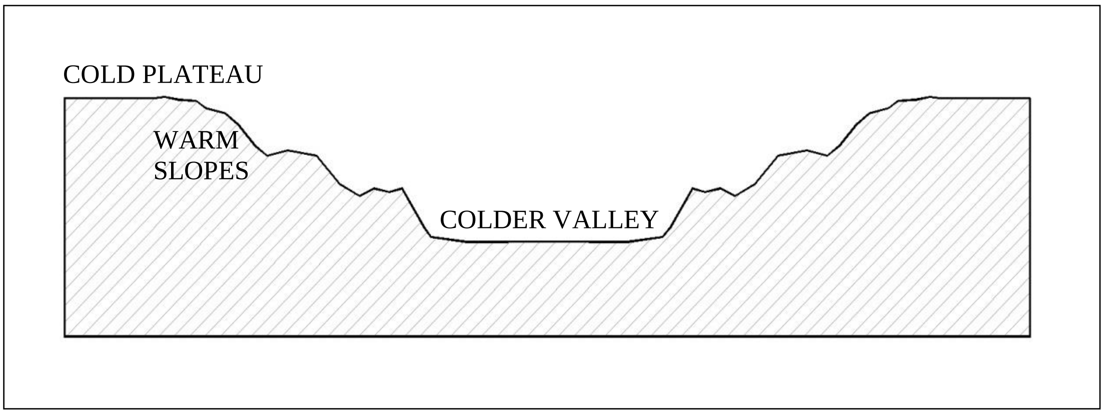


Figure 17 Temperature difference relative to topography (prepared by the author, adapted from Olgyay, 1963; Gut & Ackerknecht, 1993; DeKay & Brown, 2014).

Topographic features also affect the wind speed and the wind pattern. The air speed increases with altitude. The wind flow is diverted by mountains and hills in both its vertical and horizontal patterns. This results in higher speeds near the top on the windward side. Wind speed is maximum at the sides of the crest and minimum nearly at the bottom of the hill in the "wind shadow" or leeside (Olgyay, 1963; Gut & Ackerknecht, 1993). Therefore, buildings nestled on the valley bottom and on the lee slope are typically wind protected. High elevations on the windward side receive more and stronger winds (Figure 18).

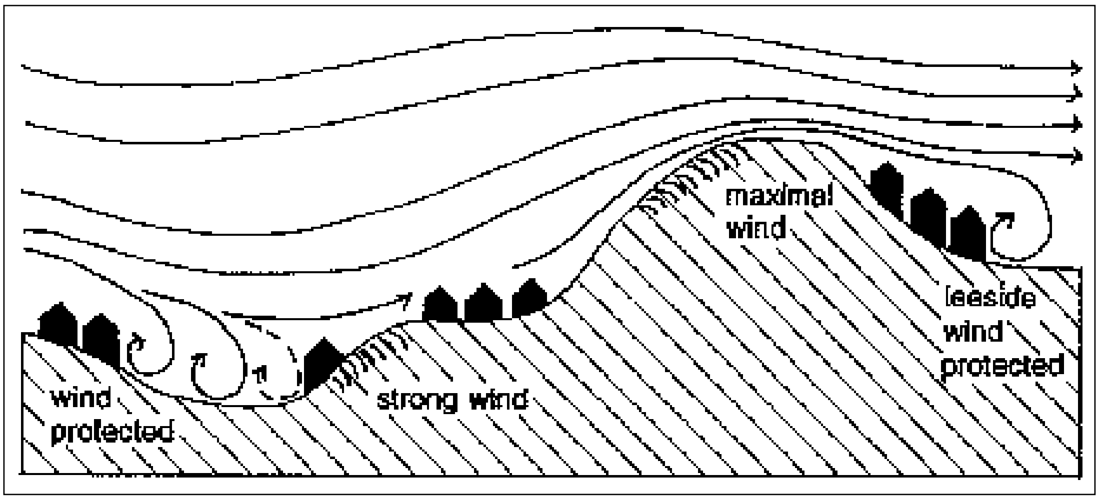


Figure 18 Topographical influence on wind speed (Gut, Ackerknecht; 1993).

Topography also influences the precipitation measures. The windward side of a hill gets less precipitation than its leeward side. As Olgyay (1963) explained and Santamouris and Asimakopoulos (1996) seconded, the wind carries over the precipitation on the windward side of the hill and it strikes the slope, so that the precipitation falls on the lee of the hills. However, precipitation distribution is different at high mountains. They have wet windward slopes (DeKay & Brown, 2014).

Additional to the above-mentioned climatic conditions, the amount of solar radiation varies with terrain aspect. However, there are other factors influencing the amount such as orientation and the latitude. For example, while slope and orientation has a very little effect on radiation levels at tropical latitudes, their impact increases with the latitude (DeKay & Brown, 2014). The combined effect of slope and orientation will be dealt in the subsequent section titled with “orientation”.

For Antalya, warm slope areas offer advantageous positions. The middle to upper hill side locations with access to sun and wind can be preferred. However, during underheated periods, measures must be taken to protect against wind's cooling effect. On the other hand, allowing air circulation during over-heated periods grows in importance.

- *Natural and man-made surroundings*

Settlements located near large bodies of water or green areas may benefit from their regulating effect on the climate. Water, owing to its specific thermal capacity, heats up and cools down much more slowly than the terrain. Additionally, water is cooler in summer and warmer in winter than land surface. Moreover, water is warmer at night and cooler during the day. The resulting temperature and pressure difference between the water and land surface produces breezes (Figure 19). Settlements near seaside may benefit from sea breezes, which blow from the sea towards the land during the day and lower the heat peaks. Sea breezes may have a cooling effect of 10ºC during the daytime. At night, the wind direction is reversed. However, the sea breezes are weaker, because the temperature difference between sea and land is smaller at night (Olgyay, 1963; Gut & Ackerknecht, 1993; Santamouris & Asimakopoulos, 1996).

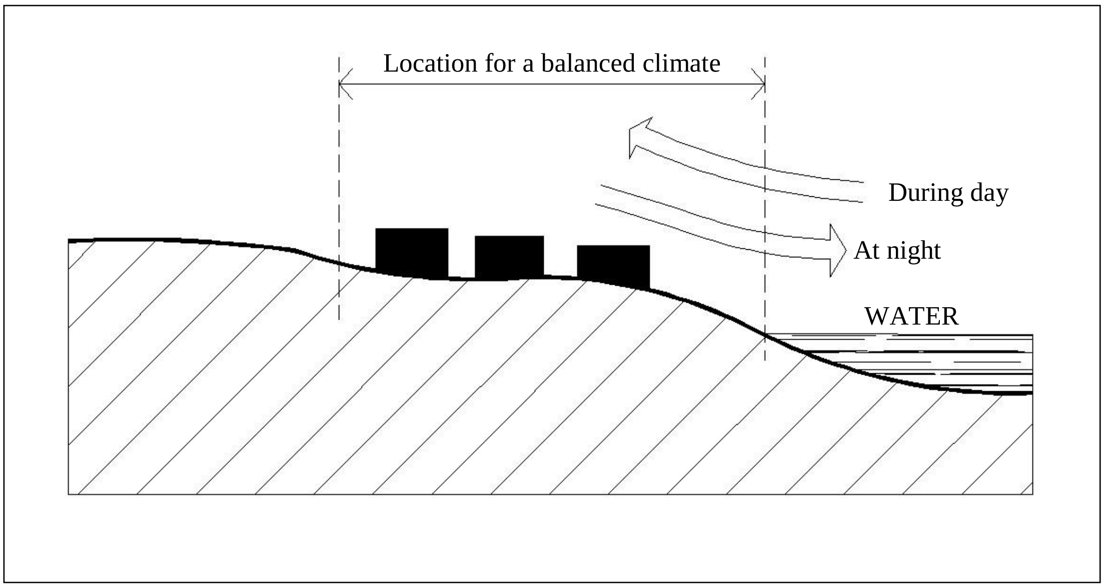


Figure 19 Location near a large body of water (prepared by the author, adapted from Gut, Ackerknecht; 1993).

Additionally, overall site planning should make efforts to preserve existing landscape, vegetation and natural drainage patterns. The native vegetation should be protected as far as possible to moderate temperature fluctuations and extremes and to stabilize conditions. This will also provide conservation of the natural fauna. In this manner, indigenous insects and birds will be encouraged into the garden.

The original habitat of the sites is often impacted on by construction of hotel buildings. Whether developing a landscape design for a new hotel or replanting for an existing one as an on-going garden maintenance, native plants should be preferred. This kind of selection can contribute to conservation of biodiversity, reduce water use and improve customer experience. The proper maintenance or recreation of native plants within the grounds or garden of the hotel is essential for restoring the vegetation to its natural state.

Green areas, particularly trees cool the air by their shade and by evaporation. Moreover, trees and bushes can be arranged to achieve or maintain a desired ventilation effect. On the other hand, "cooling factor" should be considered before deciding the appropriate type of tree. The "cooling factor" for the different species of trees given below specifies the radiation intensity compared to unshaded conditions.

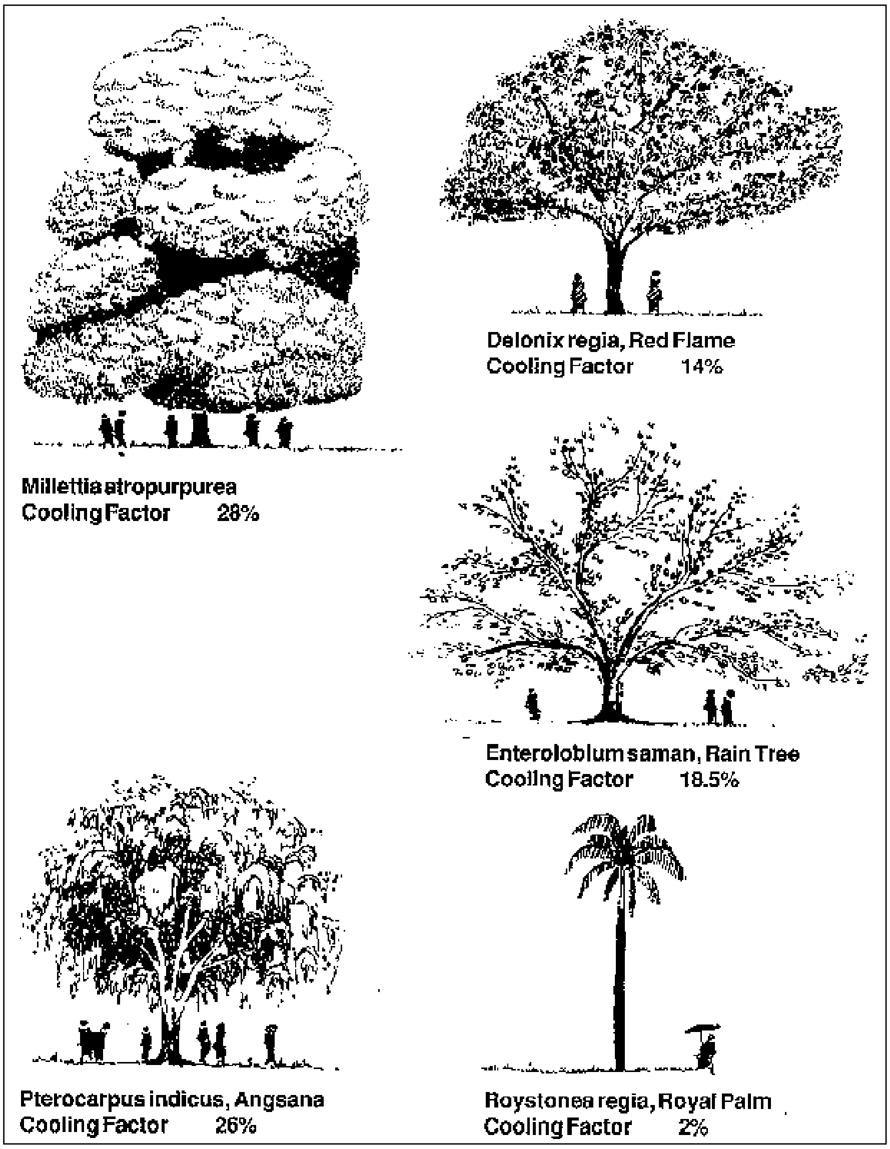


Figure 20 The cooling factor for various trees (Gut & Ackerknecht, 1993).

The trees mentioned in Figure 20 are not the local ones in Antalya or Turkey. However, it should be noticed that compared to the other trees, the ones with a wide canopy and a high trunk can provide the most effective shading solutions for walls and windows. For the settlements with low-rise buildings, these trees can also shade the roofs. Properly placed trees can reduce solar heat gain and cooling load of buildings. Furthermore, the type and density of vegetation have a significant impact on the airflow. Blocking cold winds by plants can decrease energy requirements, particularly in winter.

For the climatic conditions of Antalya region, Özdemir (2005) made recommendations for selection of appropriate type of vegetation for four cardinal directions. She suggested the use of deciduous trees with a long bole on the east and west side of a building to reduce solar radiation and to allow ventilation. Moreover, she recommended the use of evergreen plants with low branching habits on the north side to provide shade during the summer, and to shelter from cold winter winds. Besides, shrubs, bushes and small trees were recommended on the south side.

Another important parameter is planning of the open spaces. The natural cover of the open spaces such as plants and grasses in the terrain tends to moderate extreme temperatures. They can reduce temperatures by absorption of insolation, reflecting less heat and cool by evaporation. On summer days, it is found that temperatures over grass surfaces are about 10 to 14º cooler than that of exposed soil (Olgyay, 1963). Conversely, in modern cities built-up surfaces tend to increase temperatures and leads to the formation of heat islands. The envelope of buildings or surfaces between each structure may absorb, reflect or store and re-radiate incident radiation according to their material, colour and texture. For example, in hot climates, an unshaded pavement exposed to the sunshine can rapidly reach very high temperatures. Olgyay (1963) referred to Landsberg’s researches that found asphalt surfaces reached 51ºC in 37º air temperatures. If the pavement or ground is hard and the facades of the buildings have dark colours, then the amount of heat reflected and absorbed by the surrounding will increase. Light colours and rough textures should be preferred for ground surfaces or facades to minimize heat gain. Furthermore, as well as trees, man-made surroundings can act as windbreaks to protect buildings from unwanted cold winds during winter. These aspects will also be discussed in subsequent sections of “settlement pattern”, “building design” and “building components”.

- *Orientation*

Orientation of buildings depends on different factors ranging from privacy requirements, enjoyment of view to reduction of excessive noise. In the context of this section, the role of orientation in passive design solutions will be dealt.

Orientation is one of the main design considerations, particularly with regard to solar radiation, wind, daylight and overall building energy consumption (Wang, Gwilliam, & Jones, 2009). It is especially related with the most common sources of renewable energy, sun and wind. Hence, orientation plays a crucial role for daylight and natural ventilation.

The results of solar radiation on slopes of different orientation and steepness were studied by Kondratyev (1969) in his book “Radiation in the Atmosphere.” He asserted that solar radiation on southern slopes significantly exceeds that on flat surface and even more on north slopes. Further he pointed out that in winter, steep south slopes receive the most direct radiation, and on the contrary, in summer the maximal amount of radiation will be received by comparatively less steep south-oriented slopes (Figure 21).

On the other hand, east and west slopes mostly receive solar radiation, during the mornings and afternoons, respectively. Olgyay (1963) and Gut and Ackerknecht (1993) asserted that preference in selection of the orientation should be the east rather than the west.

Furthermore, Gut and Ackerknecht (1993) declared that placing settlements on north slopes would avoid excessive exposure to sunlight and create natural shade (Figure 21). They concluded that at higher altitude, south exposure might be adequate for reasons of passive heating. Additional to their suggestions, Olgyay (1963) pointed out that south-easterly orientation was the most valuable, because radiation comes in the forenoon when the air is cooler. Besides, he added that east of south might distribute the heat more equally through the different seasons. However, the number of sunshine hours and the amount of available daylight need to be considered at the outset of designing a building.

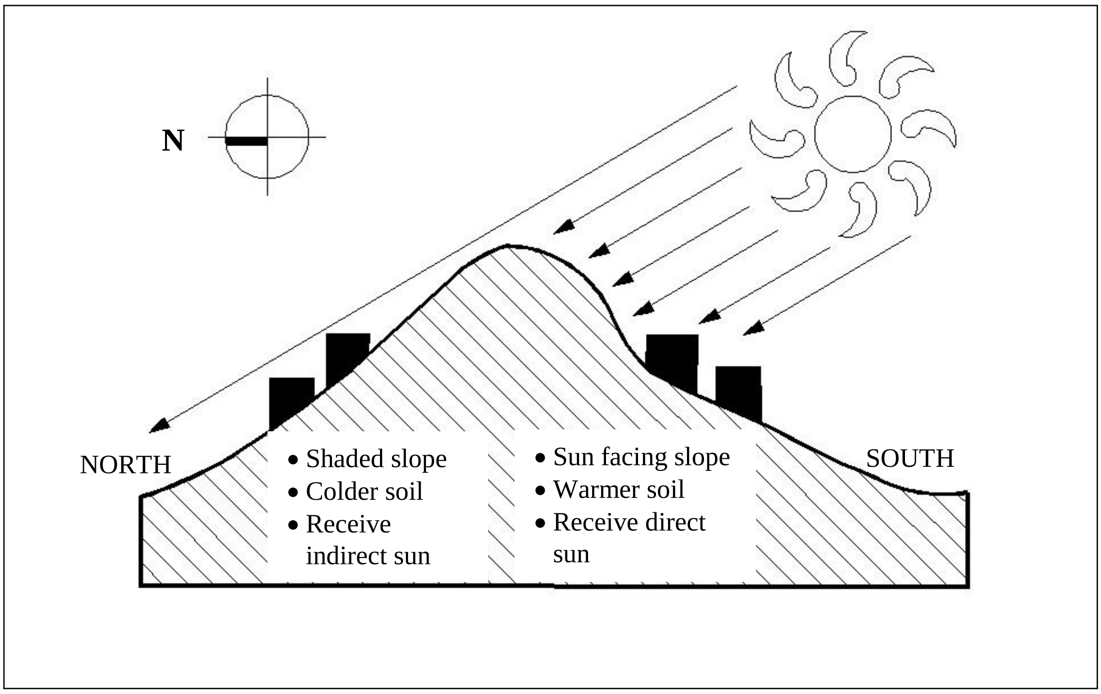


Figure 21 Sun-orientation of slopes (prepared by the author, adapted from Gut, Ackerknecht; 1993).

Furthermore, settlements should be carefully oriented regarding the prevailing winds. In Antalya, the prevailing wind directions are north-northwest and north according to their average annual speeds and frequency. However, more serious consideration is needed to achieve comfort levels during over- and under-heated periods. If the bioclimatic chart is superimposed on the wind charts of the region, desired breezes and unwanted winds could be evaluated.

As mentioned in the previous sections, the cooling requirement of Antalya during summer months is greater than most of the other cities in Turkey. Furthermore, according to bioclimatic chart (Figure 14) and the CDD index for Antalya (Figure 16), in summer, particularly in July and in August, winds are needed both for their cooling effect and counteracting vapour pressure. Breezes prevailing during this overheated period are shown in Table 8.

Table 8 Wind analyses for Antalya during overheated period (prepared by the author, depending on the data given in Table 18).

	June		**July**		**August**	
Wind pattern	**frequency**	**speed**	**frequency**	**speed**	**frequency**	**speed**
SSE	3919	3.1	4502	3.1	4280	3.2
S	3241	3.4	3411	3.4	3137	3.5
SSW	2313	3.2	2384	3.3	2330	3.5
NNW	5365	2.9	5242	3	4959	2.6

In analysing frequency, speed and direction of the winds during summer months, slopes facing south (S, SSW, and SSE) and north receive the most benefit from the cooling effect of summer breezes for the specific case of Antalya (Table 8). Additional to the interior spaces, recreation areas of hotel buildings, which are especially used during summer months, should be arranged according to these directions for maximization of air movement.

Although weather is mild during winter months in Antalya, the unwanted winds should be blocked as much as possible to minimize heating demands. Prevailing winds occurring during the under-heated period of the city are shown in Table 9.

Table 9 Prevailing winds occurring during the under-heated period (prepared by the author, depending on the data given in Table 18).

	December		**January**		**February**	
Wind pattern	**frequency**	**speed**	**frequency**	**speed**	**frequency**	**speed**
N	5683	2.8	6007	3.2	5031	3.2
NNW	8926	3	8722	3.3	7604	3.4

Table 9 indicates that the north-facing slopes (N and NNW) are exposed to the cold winds during winter. As noted previously, natural and built-up surroundings, such as vegetation, land forms or buildings in or near the site, can be utilized as shelters for the winds blowing from these directions. On the other hand, during under-heated periods, open spaces facing south can collect the sun in winter months.

Briefly, slopes facing south, preferably east of south are the most desirable ones in Antalya, for settlements in the context of both wind and sun. According to the series of analysis mentioned above, south oriented slopes give favourable results due to the protection from cold winter winds, exposure to the summer breezes and benefiting from winter sun.

- *Settlement pattern*

When planning settlements, open spaces and built forms should be in conjunction. Together they can affect heat loss or gain and modify air movements. Therefore, the pattern of urban forms can affect the comfort levels, the length of heating and cooling seasons and the amount of energy consumption.

Settlement patterns depend strongly on climate and are designed differently in each climatic zone. The pattern of streets and buildings, particularly their orientation, size and layout plays an essential role in heating, cooling, ventilation and day lighting requirements of buildings. In their book, "Sun, Wind & Light: Architectural Design Strategies" DeKay and Brown (2014) included a set of recommendations according to the priorities of distinct climates. Regarding the occupancy rates and likely months of operation of hotel buildings in Antalya, summer shade and summer wind are the main challenges to deal with. These are followed by winter sun. For the districts having similar climatic priorities with Antalya, DeKay and Brown (2014) suggested orienting streets 20-30º oblique to summer wind. Moreover, they recommended the arrangement of buildings by rotating from cardinal orientation for sun to enhance street shading. They declared the importance of east-west streets to benefit from winter solar access. The breezy and calm pedestrian ways between accommodation units can be created basing on DeKay and Brown's suggestions. Their cooling effect can be significant, particularly in hot and humid summer days. This pattern also provides air into the buildings for natural ventilation.

Besides, DeKay and Brown (2014) presented different alternatives for the height of buildings. Planning low-rise buildings with narrower facades along wide streets in the direction of prevailing wind were suggested in their book. Another alternative they presented was creation of an urban fabric that introduces taller buildings, elongated in the east–west direction. By minimizing east and west walls and additionally roof area, this pattern allows less summer solar gains while increasing winter gains (DeKay & Brown, 2014). Besides, high-rise buildings have the potential to cast large shadows. Shading by surrounding buildings can reduce heat gain and adjacent open spaces can have lower daytime temperatures.

Moreover, Özdemir (2005) recommended settlements that are homogenously distributed to promote prevailing winds in over-heated periods and take the advantage of winter sun radiation. These passive cooling strategies can help to reduce the energy consumption for air-conditioning.

With passive solutions, there is a potential for using open and semi-open spaces nearly throughout the year in Antalya. The multi-purpose open spaces, as street and courtyards should be designed to allow cross ventilation during overheated periods. Providing shading opportunities is also essential. The use of architectural devices such as verandas or arcades in semi-open exterior spaces can reduce solar radiation impact. On the other hand, these devices should be located so as not to prevent ventilation.

- *Hazards*

Erosion, flood and sandy winds could be assessed as primary hazards for the research area. For example, Belek forests, which are under the status of “conservation forest” planted principally to prevent dune erosion along the coastline of western and eastern parts of the tourism center (Kuvan, 2005; Güzenge, 2013).

In 1960s, in order to eliminate the threat of erosion on rich agriculture areas, the province of Serik was afforested with pine and eucalyptus trees. According to the recent forest management plan carried out in 2011, the forest area was planned as “forests with the purpose of tourism” because of the investments in tourism (Güzenge, 2013). Additional to the primary purpose of protection of soil and forest cover, the conservation forest supports tourism development with the use of trees in landscape design as architectural elements or natural tourist attractions.

The rainfall in Antalya has a strongly seasonal pattern. Between June and September almost no rainfall is seen in Antalya. The region tends to experience its greatest rains in winter months; hence, the risks of flood should be considered for these months. Precautions should be taken to prevent the damage resulting from stream floods in the area.

Furthermore, sandy winds can cause significant problems. These winds can also cause erosion on facades of the buildings. Resistant building materials are required for the elements that are exposed to the winds carrying sand. Where needed, special construction details should be planned. On the other hand, plants which act as windbreaks, such as sand lilies in Antalya, may curtail the bite of the sand carried with wind. Additionally, in Antalya there are sand dunes running parallel to the coastline directly inland from the beach. There need to be obstacles to prevent the moving sand grains. Planting coastal dunes with vegetation helps to stabilise them. These dunes provide shelters from the winds.

B) BUILDING DESIGN

Many factors affect the design of buildings. As part of a service sector, design of a hotel building should satisfy the needs of customers as well as correspond to their expectations with regard to comfort. The function and the organization of the spaces of the hotel, which have a major influence on its layout, shape and size, have to be clearly defined.

Some general principles on how to design a building using the natural ventilation, appropriate light and shading, passive solar gain, and cooling in order to maintain a good internal comfort will be dealt in the following sections. These are: (1) plan layout and organization of spaces, (2) shape and volume, and (3) colour selection.

- *Plan layout and organization of spaces*

Plan layout and space organization are keys to make use of daylight, effective heat gain, cooling and natural ventilation. This section mainly focuses on the strategies applicable to the climatic and environmental conditions of Antalya.

At basic level, many plan types exist according to their geometric shapes, varying from linear to curvilinear, symmetrical, circular, and so on. DeKay and Brown (2014) grouped plan forms into thin, thick and combination of these plans. According to their description, buildings with thin plans use primarily sidelighting, and buildings with thick plans usually require toplight in the form of atrium or skylight. Whereas Olgyay (1963) classified plan shapes regarding their directional orientation, such as plans with no orientation (circular), unilateral (facing one direction), bilateral (equally distributed spaces, facing two opposite directions), weighted (not equally distributed, additional weight is given to one direction), multilateral (facing several directions) plans (Figure 22).

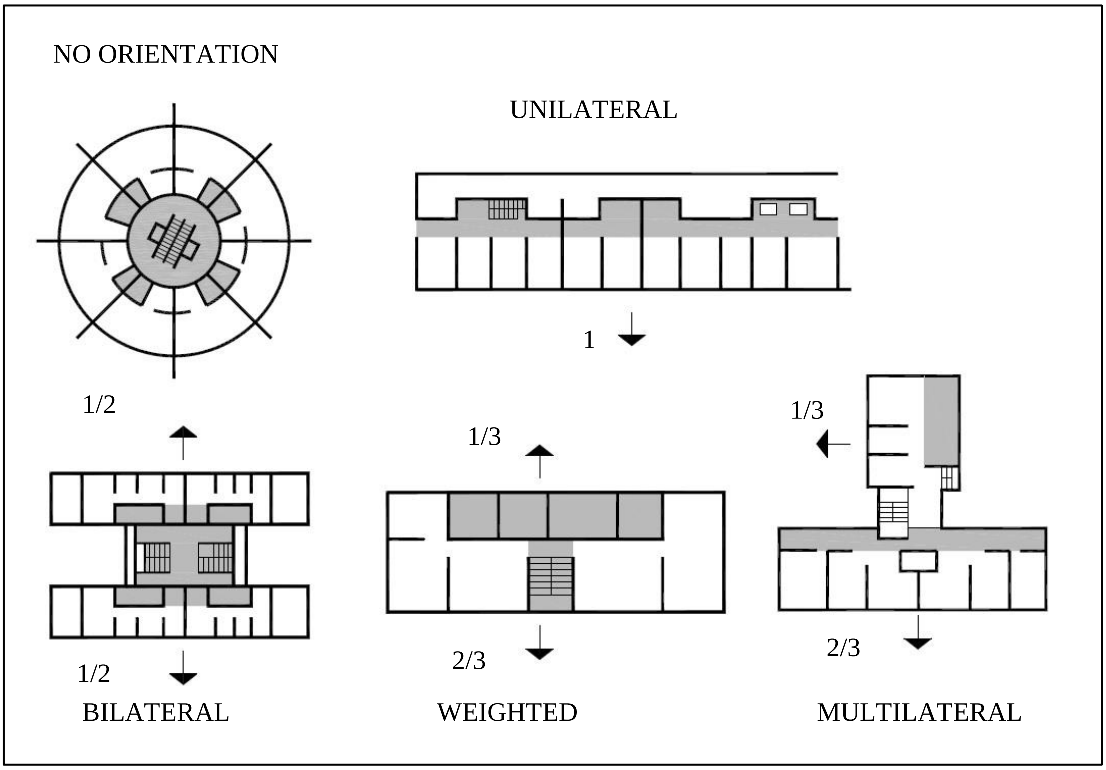


Figure 22 Building shapes with directional orientations (Adapted from Olgyay, 1963).

Olgyay (1963) pointed out that other plan shapes could be added to the above-mentioned ones. He also emphasized that, two buildings with the same floor plan shape, but differently arranged living spaces and windows would require diverse sun orientations. Hence, careful organization is needed to find the most appropriate orientation for each design. Table 10, based on the findings of Aronin (1953) suggests “sun orientations for various rooms in residential buildings above 35º latitude” (as cited in Olgyay, 1963, p. 62).

Table 10 Suggestion of Aronin (1953) about sun orientation for rooms (as cited in Olgyay, 1963, p. 62).

	N	NE	E	SE	S	SW	W	NW
Bedrooms	●	●	●	●	●	●	●	
Living				●	●	●	●	
Dining			●	●	●	●	●	
Kitchen			●	●	●	●		
Library	●	●						●
Laundry	●	●						●
Play				●	●	●	●	
Drying yd				●	●	●	●	
Bathrooms	●	●	●	●	●	●	●	●
Utility	●	●						●
Garage	●	●	●	●	●	●	●	●
Workshop	●	●						●
Terraces			●	●	●	●	●	
Sun porch				●	●	●	●	

DeKay and Brown’s (2014) categorization for thin and thick plan primarily depends on building’s daylight access. They developed effective strategies for thin buildings, in which light can reach the interior, mainly from one side. Their studies demonstrate that the optimal solution for the buildings with thin plans is the one that is elongated along an east- west axis. For the case of thick buildings, it is more difficult to bring daylight deeper into a building. Therefore, buildings with thick plans most often need an atrium or a top-light.

Additional to the daylight, a plan layout should allow appropriate ventilation and solar radiation. For example, visually well-defined and open to sky atriums and courtyards are desirable in hot regions for their energy performance. These spaces provide protection from excessive sunshine during the overheated periods, and from winds during the under-heated times (Özmehmet, 2005; Oktay, 2002). On the other hand, design solutions of these spaces should explore the possibilities of permitting natural ventilation.

Ulukavak Harputlugil (2009) also studied energy performance of three plan scheme, such as unilateral, multilateral and clustered plan. These plan schemes were utilized to examine the performance of school buildings in the different provinces of Turkey which have various climatic conditions. As a result of her analyses, clustered plan shape was the most appropriate one to reduce cooling requirements in Antalya. She interpreted that the success of the scheme depends on the equally distributed classroom zones between the north and south side of the building. Furthermore, she added that this scheme’s relatively less surface area compared to the others resulted in relatively less heat loss.

Another important consideration for plan layout and organization of space is zoning. The disposition of spaces and functions should relate to the occupancy patterns such as time of use, and the heating/ cooling requirements. One method is to cluster spaces with similar functions and needs. This allows control of the energy requirement of each zone separately. For example, spaces can be grouped into cooling or heating zones based on their requirements. Moreover, spaces can be zoned according to the time period each one is used. DeKay and Brown (2014) stated that this kind of zoning combines migration. They further clarified this combination as the following. People move to cooler areas in over-heated periods and to warmer places during under-heated periods of the season or the day. For example, in the hotel complex the restaurants with different orientation and elevation properties can be used for different hours (breakfast, lunch or dinner) or seasons.

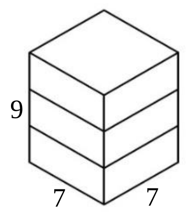
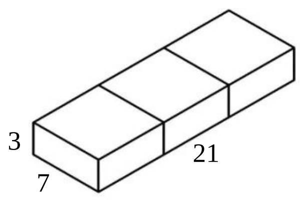
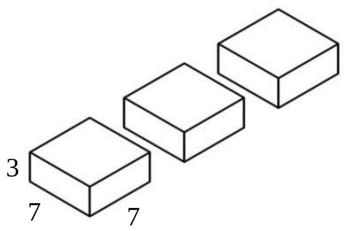
- *Shape and volume*

The shape of a building plays a significant role in ventilation, heat loss and heat gain. Accordingly, the most favourable building shape in terms of energy efficiency is the one, which has the minimum heat loss in winter and minimum heat gain in summer.

Naturally, the heat exchange between a building and its surroundings mainly depends on the exposed surfaces. The larger surface area means the greater heat gain or loss. So, the ratio of surface area to volume (S/V) is a significant indicator for heat exchange. Minimizing this ratio minimizes heat transfer (Gut & Ackerknecht, 1993).

The same principle can be applied when arranging buildings. Compact units with multiple stories, row or single detached will bring different results (Table 11). In sum, when lesser heat exchange between the interior and the exterior is desired, the ratio of S/V should be small (Gut & Ackerknecht, 1993).

Table 11 Surface area to volume ratio by differently arranged building units (prepared by the author).

		
S:350	S: 462	S: 546
V: 441	V: 441	V: 441
S/V: 0,79	S/V: 1,04	S/V: 1,23

When taken into account this rate, in terms of volume a cube, and in terms of the plan shape a square, can be considered as one of the most advantageous forms, following the circular plans. However, the analyses of Olgyay (1963) demonstrate that a house with a square plan is not the optimal shape in any location. On the other hand, he stated that this form was more efficient than all shapes elongated on the north-south direction. He concludes that, the most desirable form in every case was the one that was elongated on the east-west axis.

Regarding the specific climatic conditions of Antalya, Ömerca Akyol (2012) examined the passive design criteria for low-rise (h: 3.5 m) residential buildings by using Design Builder v3 simulation program. She worked with different plan forms that have the same volume and the same area. Five distinct geometries explored in her study were: a square, a rectangle, a T-shape, an L-shape and a cruciform (Figure 23). Their floor areas were nearly 100 m^2, and square one has a perimeter of 42m, while the others have the same perimeter, 52 m.

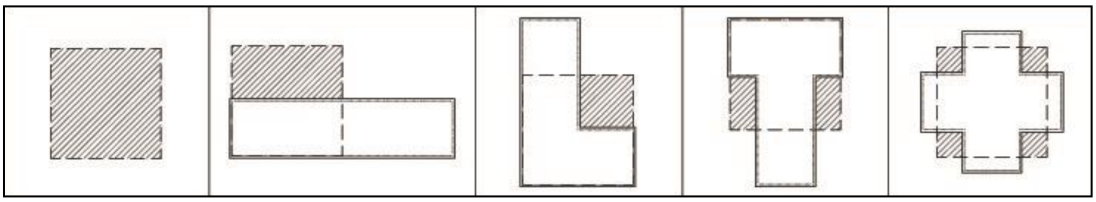


Figure 23 The plan typologies used in the study of Ömerca Akyol (2012).

The results of Ömerca Akyol (2012) study indicated that both the form and orientation of a building affected the heating demand, which is based on sensible heat loss and solar heat gain. The building with a square plan had the least surface area. Hence, the sensible heat loss of this shape was the lowest. Additionally, according to her analyses, the heating demand of a square planned building decreased %34. A building with a rectangular floor plan, which had more surface area than the square one, lost more heat. On the other hand, when elongated on an east-west axis, the same building was exposed to the most solar radiation. Therefore, the heating demand for this orientation and form was decreased as %41. The difference was relatively small between the T-shape and L-shape buildings with the same surface area. The decrease in their heating demand was 38 and 39%, respectively. The building with a cruciform floor plan gave the same result (34%) with the square one.

On the other hand, in summer months, the square planned buildings and the rectangular ones with the principal facade looking south had the lowest cooling demands, 7762 and 7681 kWh/year, respectively. There was no significant difference between the T-shape and L-shape buildings, cooling demands being 8441 for the former and 8684 for the latter. And with 9004 kwh/year, the cruciform had the most cooling demand (Ömerca Akyol, 2012).

Therefore, a building with a rectangular floor plan, elongated on an east-west axis is the most appropriate one for both cooling and heating loads. Moreover, maximization of the south-facing elevation gives the best results for all shapes to decrease cooling demands in summer months.

- *Colour selection*

The colour of a surface affects its reflectivity and heat absorption. For example, light colours tend to reflect sun impact and do not absorb heat well. On the other side, dark colours exposed to sunlight or solar radiation heat up quickly. Besides, they do not reflect light very well (Table 12 and Table 13).

Table 12 Daylight reflectance of colours (Brown & DeKay, 2001)

Colour	**Reflectance (%)**
White	80-90
Pale yellow & rose	80
Pale beige & lilac	70
Pale blue & green	70-75
Mustard yellow	35
Medium brown	25
Medium blue & green	20-30
Black	10

Table 13 Absorptivity and emissivity of surfaces with different colours (Givoni, 1998)

Colour	**Absorptivity**	**Emissivity**
Whitewash, new	0.15-0.2	0.9
White, dirty	0.3-0.35	0.9
Whitepaint	0.2-0.3	0.9
Grey, green, brown, light colours	0.4-0.5	0.9
Grey, green, brown, dark colours	0.7-0.8	0.9
Ordinary black paint	0.85-0.9	0.9

In his book “Climate Considerations in Building and Urban Design” Givoni (1998) referred to his experimentations done in 1976, for the case of Negev (30°30'N, 34°55'E). It is an arid region of Israel. The results of his study demonstrate that when the walls had white colour, the influence of orientation was very little. The deviations were less than 3°C for each orientation. This is because most of the impinging radiation was reflected away from the surface. However, in case of dark colours, the influence is very clear. Differences up to 23°C were observed in the temperature of grey painted walls facing the four cardinal directions.

According to his experimentations carried out in Negev, the wall facing west during July was the most sensitive one to the effect of orientation followed by east, south and north. On the other hand, in January, when heating is more desirable, southern walls received most radiations among the other directions. In both cases, January and July, absorption levels were calculated as 0.8, 0.5 and 0.2 for walls with dark, medium and light colours, respectively (Givoni, 1998).

Furthermore, the influence of the external colours of outer surfaces of a building, particularly roof and walls, was studied by Givoni (1994) for the case of Haifa (32°48'N, 34°59'E). It is a coastal city in Israel with a humid Mediterranean climate. According to the results of his study, when the walls were painted grey, the roof kept white and windows were closed; the indoor temperatures were constantly found to be higher than outdoor. On the other hand, the reverse happened during most of the daytime hours, when the walls were painted white. Hence, light coloured exteriors may pull down the interior air temperature to a considerable level.

Givoni (1994) also pointed out that, the effect of colour was at a maximum for the roof of a building. The results of his study demonstrated that in a desert, in summer, the difference in the maximum temperature of external surface varied between 30 to 40°C, for the white and black roof, respectively.

Selection of appropriate colours for interior spaces is also important for overall feeling of the space. Since, light colours have high reflection values; they improve the feeling of brightness in the space. Besides, Brown and DeKay (2001) recommended low contrast between window frame and its adjacent walls. Their suggestion can help to improve vision experience and to reduce glare.

The preference of reflective finishes is extremely important to increase the penetration of daylight into a building. Regarding its significance, the reflectivity of the interior surfaces was studied by Brown and DeKay (2001) as shown in Table 14. According to their findings, ceiling was the major interior light-reflecting surface. They concluded that, daylight penetration can increase up 70-80% from ceilings, 40–80% from walls and 20–40% from floors.

Table 14 Recommended finish reflectances (Brown & DeKay, 2001).

Surface	**Recommended reflectance (%)**
Ceilings	70-80
Walls	40-80
Floors	20-40

For the case of Antalya (36°53'N, 30°42'E), the outer surfaces, both the façade and roof, should be light coloured, preferably white to reflect solar radiation. It is a low-cost and energy-efficient way to reduce the heat gain during summer. Besides, the choice of the light colours in the pastel range with high reflectivity can give better results to avoid glare both inside and outside (Olgyay, 1963).

C) BUILDING COMPONENTS

To maintain a balanced and comfortable indoor climate, each building component has to perform in cooperation with the others. Each climatic zone has distinctly different design requirements. Hence, solutions should be considered on an individual basis instead of making generalization.

The following sections provide an overview of basic features of building components regarding their heat storage, absorption, emission, condensation, thermal insulation, time lag and reflectivity. These building components are listed as: (1) openings and windows, (2) shading devices, (3) walls, (4) roofs, (5) foundation and basement, (6) materials, and (7) mechanical equipment and technologies.

- *Openings and windows*

It is important to find the right balance between maximizing the benefits of natural lighting and ventilation, and minimizing the summer heat gain through glazed surfaces. Hence, the orientation and size of openings and windows and types of window glass merit careful consideration.

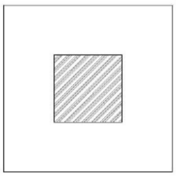
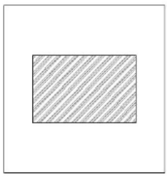
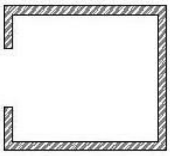
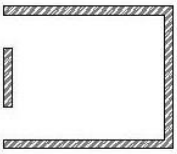
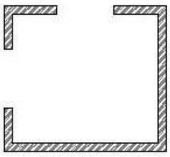
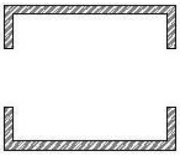
Penetration of solar radiation through windows and its influence on the indoor air temperature depends mainly on the orientation of the windows. In general, optimum sun-orientation reduces radiation to a minimum during the over-heated periods, while admitting adequate levels of solar radiation in the under-heated months. In the relevant literature, it was mostly recommended that main openings face north and south to accomplish this task. On the other hand, it was also suggested to minimize the size of the windows on the east and particularly west sides to reduce heat gains in the morning and afternoon (Olgyay, 1963; Gut & Ackerknecht, 1993; Givoni, 1994; Ulukavak Harputlugil, 2009).

Moreover, significant natural light streaming in from the windows and skylights can reduce dependence on artificial lighting and lower consumption of electricity. The depth and area of rooms and the position and size of windows have to be considered to admit the adequate light into the building. The right amount of illumination and even light distribution are important features for true visual comfort.

Besides, arrangement of openings and windows can allow air movement and cross ventilation to increase the rate of cooling, especially during the over-heated periods. DeKay and Brown (2014) prepared a table that demonstrates the relationship between the average interior air velocity and the size and arrangement of openings, when wind blows obliquely to the wall at angles between 45 to 90 degrees.

According to the Table 15, it is desirable to place two openings in two different walls to increase the air movement. With such a configuration, one window will be in a wind pressure zone and act as an inlet, and the other will be in the suction zone and act as an outlet (Givoni, 1994). For two openings placed in the opposite walls, the average interior air velocity is much higher, 35-65% than exterior wind velocity, because a high pressure zone will be created on one opening and low on the other (DeKay & Brown, 2014). However, this can be discomfortable and further is not very effective in terms of circulation of the air through the room. As the air moves directly from one side to the other, the influence of air flow would be less on the adjacent walls and the corners. In this respect, each room should preferably have at least two openings in the adjacent walls to deflect wind direction (Figure 24).

Table 15 The effect of window size and location on indoor air motion (Adapted from DeKay & Brown, 2014)

				
Window height as a fraction of wall height		1/3	1/3	1/3
Window width as a fraction of wall width		1/3	2/3	3/3
	Single opening	12-14%	13-17%	16-23%
	Two openings in the same wall	-	22%	23%
	Two openings in adjacent walls	37-45%	37-45%	40-51%
	Two openings in opposite walls	35-42%	37-51%	47-65%

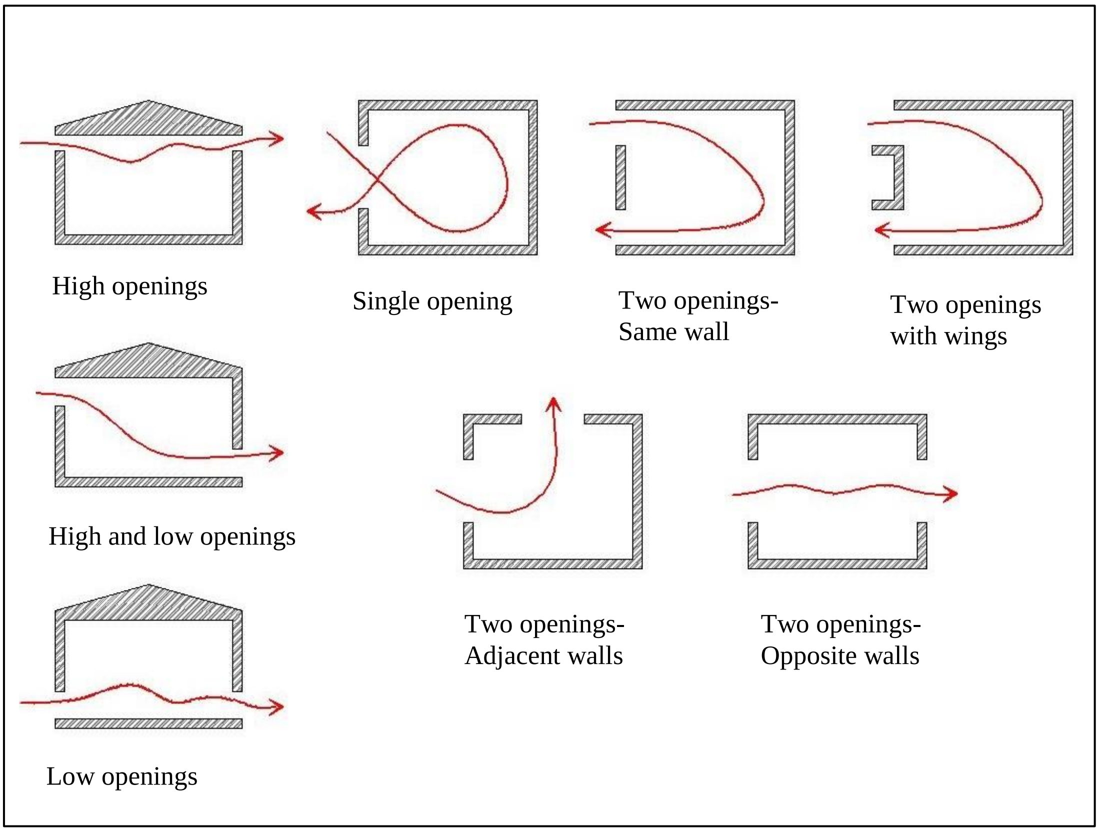


Figure 24 Various fenestration configurations (Adapted from DeKay & Brown, 2014).

The placement of the openings in the section of the building also influences the air movement. DeKay and Brown (2014) stated that instead of locating all openings near the ceiling or near the floor, deflecting airflow by two of these elevations would give better results (Figure 24). On the other hand, when there is only one exterior wall of a room, Gut and Ackerknecht (1993) recommended the placement of the opening asymmetrically in the facade, preferably at a high level where hot air accumulates. Asymmetric location also provides unequal pressure, and better airflow.

The size of openings is another parameter that affects indoor comfort conditions. Its effect on heat gain relies mainly on the orientation of the openings as previously mentioned. Furthermore, in terms of ventilation, its influence is related with the architectural possibilities of cross ventilation. According to the studies of Givoni (1994) for rooms with one window, its size had a small influence on internal airflow, particularly, when the wind blew perpendicular to the wall. On the other hand, he declared that if cross-ventilation was achieved through the building, enlarging windows would increase the rate of airflow and its interior speed.

Givoni (1994) suggested that when the wind blew obliquely, preferably ranging between 30 to 60 degrees to the opening, it would allow better ventilation. He also developed the idea of adding a wing wall to increase the pressure difference between the windows, which were exposed to oblique winds. This wing is a kind of vertical projection located on one side of the opening. He declared that, this kind of solution could provide effective cross-ventilation, even though the opening was nearly parallel to the wind direction.

In practice, it is not always possible to arrange two exterior walls/windows for a room and also to provide cross-ventilation, particularly for the case of large buildings. If it is not possible to ensure air movement, it is important to shade the windows and to use efficient glazing materials. The design of shading devices will be dealt within the next section. With regard to glazing, Ulukavak Harputlugil (2009) recommended the use of semi-permeable glazing, which is opaque to shortwave infrared while it is transparent to visible light for the case of Antalya.

- *Shading devices*

The total heat gain of a building depends on several conditions. One of them is solar gain through windows. Therefore, shading of windows has a great influence on minimizing this heat gain, especially in hot climates.

These devices should be carefully designed to provide efficient shading and to control heat gain in the buildings. Olgyay (1963) declared that the effectiveness of shading devices depends on several factors. These are: (1) the colour and material, (2) the location and (3) the specific arrangement of these elements.

As mentioned in the previous sections, the colour of a surface has an influence on the reflectivity of solar radiation. According to the results of Olgyay's (1963) survey, the preference of off-white surfaces gave 20% more shade protection than the black matte one for venetian blinds. Moreover, the aluminium blind was additionally 10% more protective. Furthermore, his study showed that the effect of colour was more pronounced for the roller shades; the off-white colour gives 40% more protection than the dark one. However, the difference was not so significant for inside curtains; the light colour gave 18% better results than the dark one (Olgyay, 1963).

The location of the shading device also affects the thermal performance of the buildings. According to the studies of Olgyay (1963), external shading devices reduce the solar heat gain more effectively than the interior ones. The exterior protecting devices intercept the solar rays, before they pass through the window of the buildings. However, the interior ones can only eliminate the radiant energy which can be reflected through the glass surface again. Moreover, some portion of energy is absorbed, convected and re-radiated into the building with this device. Depending on these facts, Olgyay (1963) concluded that the effectiveness of the shading elements increased if they were installed outside, than inside the glazing.

Furthermore, there are various patterns and methods for the arrangement of shading devices. They can be horizontal louvres, vertical fins and eggcrate, movable or fixed. The orientation of the façade has an important effect on the performance of these devices. The analyses of Olgyay (1963) indicated that the horizontal shading devices particularly protect southern orientations. On the other hand, he added that on east and west sides, the movable types might be utilized. According to the results of the research carried out by Givoni in Israel (latitude about 32º) the vertical fins, which were fixed, exhibited the worst performance both in summer and in winter (Givoni, 1998). Furthermore, he found out the same results with Olgyay (1963) for the southern windows. For northern windows, he suggested the use of vertical fins as an alternative to horizontal overhangs, particularly at the latitudes of 30 to 50º in the northern hemisphere. He declared that vertical fins could block the low sun coming from the northwest direction in the afternoon. He added that a single vertical fin on the west side of this window might give better results than two fins, mainly because the morning sun is often desired even in summer months.

- *Walls*

The intensity of the impinging solar radiation on a wall of a building changes throughout the year due to the changing position of the sun in the sky. In Antalya, the aim of orientation with respect to sun is to minimize solar exposure in summer and to maximize it in winter. Generally highest amount of solar radiation strikes the western and eastern walls in summer and the southern one in the wintertime. North-south orientation for the walls of the buildings enables highest solar radiation in winter and relatively lower radiation in summer.

For the case of Antalya, the exterior temperature is higher than interior temperature in summer. Hence, for this period of the year, it is important to reduce the heat gain and the cooling load of the building. Ulukavak Harputlugil (2009) recommended the use of wall construction with high thermal resistance. A thermal insulation with a high thermal resistance can be used as a construction layer within the buildings. Therefore, the insulation of the walls can minimize the flow of heat through the building envelope (Ömerca Akyol, 2012).

Furthermore, because of the priority of the region is minimizing the cooling load, thermal mass can be utilized to prevent over-heating of the structure (Ulukavak Harputlugil, 2009). On the other hand, Gut and Ackerknecht (1993) pointed out that thermal capacity structures gave better solutions in hot-dry regions. They declared that although it was still useful but may not be so effective in maritime areas in terms of ventilation. They alternatively recommended the use of high-rise buildings with light-weight constructions, which enables ventilation in the daytime.

- *Roofs*

The roof is one of the most critical parts of a building, because of receiving the majority of the solar radiation. Furthermore, its shading is much more difficult than walls and windows. Therefore, if not carefully planned and constructed, it can increase the cooling and heating loads of buildings.

Just like walls, roof construction with high thermal resistance should be preferred (Ulukavak Harputlugil, 2009). Roof insulation plays a significant role in reducing the consumption of energy for heating and cooling. According to the analysis of Ömerca Akyol (2012) in Antalya increasing the insulation thickness of the roof twice, reduce the annual energy demand by 6%. Likewise, Gut and Ackerknecht (1993) pointed out that insulation on the roof would reduce daytime surplus heat entering a building but can also reduce necessary heat loss at night; accordingly special care was required.

Ulukavak Harputlugil (2009) suggested careful detailing in roof construction to remove the heat from indoor air. Furthermore, she recommended the increase of ceiling height to allow living space to stay relatively cool depending on the fact that, warmer air tends to accumulate near the ceiling. Roof ventilation is considered as an important strategy for removal of excess moisture from attics, reducing the heating loads in daytime and allowing night cooling (Gut & Ackerknecht, 1993; Ulukavak Harputlugil, 2009).

Besides, Özmehmet (2005) made recommendations for buildings in Mediterranean climatic zones. In terms of roof form, she suggested the use of a sloped roof, which was adequately waterproofed instead of a flat one. She also recommended south-facing roof. Furthermore, south-oriented roof windows were suggested to bring sun deeper into the thick buildings or to the rooms on the northern facade.

- *Foundation and basement*

The heating and cooling demands of a building are greatly influenced by transmission heat losses through the ground. The earth has a significant effect on heat absorption. Therefore, particularly in summer, a substantial reduction of the heat load can be achieved by contacting the basement with the ground.

Due to their large thermal capacity, the foundation and basement influence the energy performance of buildings. Gut and Ackerknecht (1993) considered solid floor, stone burnt clay and tiles, concrete and earth as appropriate materials to balance indoor temperature.

Additional to the potential for heat loss during the over-heated period, the Ulukavak Harputlugil (2009) mentioned that the heavyweight nature of basement construction allowed storage of heat during the under-heated period for the case of Antalya. Furthermore, she recommended the location of thermal mass inside the building on the ground floor to regulate the internal temperature of the building.

- *Materials*

The careful analysis and selection of materials and their use in design have the potential to improve comfort as well as reducing life-cycle environmental impacts. The role of materials in improving thermal performance of facades, windows and roofs were dealt in the previous sections. In this section environmental aspects and potential impacts of a product throughout its life, in other words, the life cycle assessment of the materials will be dealt.

One of the main design considerations regarding material selection is reducing the amount of the materials needed in the initial construction phase and minimizing wastage and demand for new during operational phase. These can be achieved by strategies for durability, flexibility, low-maintenance and disassembly.

Additionally, choosing local materials and construction technics contribute to a region in many ways. One of them is the contribution to economic and social development by hiring regional companies and domestic workers. Furthermore, local availability of materials allows energy saving by reducing embodied energy and transportation costs. These also serve to environmental protection by reducing transportation-related air pollution.

Besides, choosing materials with low environmental impact is critical to the design of sustainable buildings. The material should not negatively impact non-renewable resources, environment or human and wildlife health. Moreover, their potential for reuse and recycling should be considered.

Çakmaklı (2007) analysed seven materials, which are commonly used in hotel buildings; levelling concrete, textile backed wallpaper, gypsum board, water- based paint, hardwood, brick and plaster. The evaluations were done according to their primary energy consumption, air pollution index, water pollution index, solid waste, weighted resource use and global warming potential. According to her analysis, the most damaging material was levelling concrete in the studied refurbishment works, which was followed by paint, plaster, brick, wallpaper, gypsum and hardwood.

Refurbishment of buildings also can deliver significant improvements in energy saving and environmental performance. This can reduce overall life-time costs than demolition or construction of a new building. Refurbishment of hotel buildings is necessary to maintain high-occupancy rates, service quality, customer satisfaction and market share. Çakmaklı (2007) studied life-cycle assessment of building materials in the hotel refurbishment projects in Ankara, Turkey. She stated that refurbishment projects may cause severe impacts such as large volume of waste generation and risks associated with discharge of various air pollutants. On the other hand, she pointed out that the refurbishment can be an opportunity to make a significant difference in the environmental impact of the hotel buildings. To achieve this goal she suggested choosing environmentally friendly construction materials and furnishings during the refurbishment process.

- *Mechanical equipment and technologies*

The preceding sections dealt with the early phases of the architectural design process. However, when the climate of the region surpasses the boundaries of passive design strategies, the mechanical equipment are required to maintain comfort conditions. Heating, ventilating and air conditioning (HVAC) systems should be considered from the preliminary design phase to integrate passive design strategies with active systems. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE, 2015) defined these systems as “the equipment, distribution systems, and terminals that provide, either collectively or individually, the processes of heating, ventilating or air-conditioning to a building or portion of a building.”

In an HVAC zone system, a unit of a building could be controlled at a single point, generally a thermostat. When the parts of the building have different orientation characteristics, operation period or occupancy rates, multiple systems can be used. The thermal loads of the separate zones can influence the selection of active systems. It is important to analyse the comfort requirements of the spaces regarding the occupants, activities taking place and likely hours of operation or particular hours of occupancy. The selection of central or local heating and cooling equipment should be considered according to the specific needs of these spaces.

Large buildings with multiple functions may prefer the usage of local or central systems. Hall and Giglio (2010) compared the advantages and disadvantages of both options. According to these authors, local heating/cooling systems are often simplest and lowest first-cost active systems and give occupants more individualized control. On the other hand, they pointed out that these systems negatively impact the aesthetic and spatial qualities of the buildings. The second alternative is the central system, which produces the required energy in one place (a center) and distributes it to each space according to their specific needs. Having a separate control point prevents disturbing the customers or activities for maintenance and occupying a space in each room (Grondzik, Kwok, Stein & Reynolds, 2010). Hall and Giglio (2010) declared that this system was more frequently preferred in new buildings.

In hotel buildings, especially in the large ones, some energy loss problems can be solved by central control and monitoring systems. For example, these systems can control the HVAC in an unoccupied room or a room with open windows. In addition, there are systems that can prepare the air quality or temperature before the customer enters his or her room.

The active systems might be necessary in severe climatic conditions, particularly for large-scale buildings. However, renewable energy remains as an alternative to fossil fuels to provide the source of energy supply. Some of the most common ones are solar energy, hydropower, wind, wave and geothermal power. Furthermore, renewable energy made available from biological materials such as biofuels, solid biomass and biogas.

The U.S. Energy Information Administration (USEIA, 2015) estimated that renewable-energy sources were about 11% of world energy consumption and projected to rise to 15% by 2040. These technologies are commonly utilized for large-scale electricity generation. Besides, they can convert renewable energy into useful outputs. For example, solar power systems, such as photovoltaics or concentrating solar power, convert sunlight into electricity. Additionally solar-energy utilization systems can provide space heating and cooling, domestic water heating and heat generation (Crook, Forster, Jones, & Crook, 2011; Grondzik, Kwok, Stein, & Reynolds, 2010).

On the other hand, many of these renewable-energy systems do have some negative impacts on their environment. Asdrubali, Baldinelli, D'Alessandro and Scrucca (2015) examined life cycle assessment of electricity production from renewable energies. They reviewed approximately 50 papers and more than 100 case studies regarding most common technologies such as solar (photovoltaics and concentrating solar power), hydro, wind and geothermal. According to their harmonized results, wind power turned out to be the renewable-energy technology with the lowest overall environmental impact. For example, this power had the lowest carbon dioxide emissions and embodied energy. On the contrary, the photovoltaic and geothermal power emerged as the renewable technologies with the highest overall environmental impact. The concentrating solar power gave better results than photovoltaic, geothermal and hydro-power nearly in all the impact categories analysed in their study.

Turkey has abundant renewable-energy resources, including solar, wind, hydropower, biomass and geothermal. According to Benli (2013) the Mediterranean region had great potential for solar and wind energy. He declared that a huge portion of the southwest region of the country was feasible for future wind turbine constructions. On the other hand, despite its rich potential, solar-energy generation is limited in Turkey. Benli (2013) pointed out that it was only realized by flat plate solar collectors, particularly in coastal part of Mediterranean region, to produce domestic hot water.

Lighting is another source of electricity consumption and greenhouse-gas emissions. Additional to the design strategies to utilize daylight, the current lighting technology also contributes to energy savings. Halonen and Tetri (2009) pointed out that energy efficiency of lighting installations could be enhanced by replacing inefficient light sources such as incandescent lamps, mercury lamps, T12 and T8 fluorescent lamps with CFLs (compact fluorescent lamps) or LEDs (light-emitting diode), high pressure sodium lamps, metal halide lamps and T5 fluorescent lamps; preference of controllable electronic ballasts with less losses; use of manual dimming, adjusting sensors, dimming according to daylight and better use of daylight.

In sum, integration of passive design with active systems can improve the performance of hotels and minimize their negative impacts on the environment. In new buildings, this can be employed as a strategy in the early stages of the design. On the other hand, the refurbishment of the hotel buildings can be an opportunity for introduction of cleaner energy solutions and utilizing from renewable energy sources that are discussed in this section.

3.2.2 Use of the questionnaire form

Within the light of literature survey on guidelines for sustainable design, and specific properties of Antalya, Table 16 is structured. In this table, a general evaluation is presented to summarize accumulated knowledge and to view the whole frame. Parameters of the survey questionnaire which is applied to the case studies are prepared depending on the critical evaluation of these design recommendations. Within the survey questionnaire, the traces for sustainable tourism criteria are searched under the headings of general information about the hotels, their architectural design, energy consumption and savings and other services.

Data utilized in Chapter 4 is collected mainly by this questionnaire and on-site surveys, face to face interviews with the representatives of the selected hotel buildings and the Ministry, observations and archival research such as policy documents, management plans, reports, drawings and photos.

Table 16 General design recommendations for Antalya (prepared by the author).

(A) Location and site planning	Transportation means and ways	Diversity of transport system (walking, cycling, public transport, etc.) Transportation alternatives (rent a car, travel agents, etc.) Accessible public transport options Parking options for visitors (garage, parking lot, shaded parking, etc.) Integration of transport system (such as linking bike and pedestrian access to transit and integrated transport) Preference of fuel-efficient and alternative fuel vehicles Inclusion of all affected people
	Topography	Flat and smooth lands experience little variation in climate Preference of middle to higher sides of slopes which are warm (thermal belts) for location Providing wind sheltering in winter Allowing more air movement and moderation of vapour pressure in summer
	Natural and man-made surroundings	Benefit from cooling effect of sea breezes especially during over heated periods Protection and preference of native vegetation Selection of trees with wide canopies and high trunks for their cooling effect Blocking cool winds by plants in winter Use of deciduous trees with a long bole on the east and west Use of evergreen plants on the north side Use of shrubs, bushes, and small trees on the south side Use of plants and grasses in open areas to moderate extreme temperatures. Preference of light colours and rough textures for ground surfaces Built-up surroundings can be used as windbreaks to minimize unwanted winds
	Orientation	Solar radiation: South and south-easterly orientation is the most valuable Preference of east rather than west Winds: Preference of slopes facing south (S, SSW, SSE) for the cooling effect of summer breezes North facing slopes (N and NNW) are exposed to cold winds during winter

Table 16 (continued)

(A) Location and site planning	Settlement patterns	Orienting streets 20-30º oblique to summer wind Rotation of buildings from cardinal directions to increase street shading Low-rise buildings in direction of prevailing wind High-rise buildings have the potential to cast large shadows Open spaces that are designed to allow cross ventilation during overheated periods Providing shading opportunities with semi-open exterior spaces, like verandas or arcades
	Hazards	Maintenance or recreation of native plants to prevent erosion Precautions should be taken to prevent the damage resulting from stream floods Resistant building materials, native plants or coastal dunes covered in grasses to provide shelter from sandy winds
(B) Building design	Plan layout and organization of spaces	Thin plans (sidelighted linear plans) that are elongated along E-W axis are the most valuable. Thick plans (complex plans, where sidelight alone cannot penetrate) need an atrium or a top-light for daylight. Clustered plan shape to reduce cooling requirements Zoning (cooling or heating requirements, time of operation)
	Shape and volume	Preferably a rectangular floor plan, elongated on E-W axis Maximization of south-facing elevation Larger surface area means greater heat gain and heat loss
	Colour selection	Light coloured exteriors (wall and particularly roof) may pull down the interior air temperature To reduce glare, low contrast between window frame and adjacent walls and choice of light colours in pastel range both inside and outside
(C) Building components	Openings and windows	Main openings facing north and south Minimize the size of window on east and particularly west Preferably at least two openings in the adjacent walls to deflect wind direction Deflecting airflow by locating openings at different elevations Asymmetrical location of openings provides better airflow Preferred placement of the opening at a high level where hot air accumulates If cross ventilation is possible, enlarging windows would increase the airflow Use of wing windows or windows oriented at 30-60º to the wind direction to provide effective cross ventilation Use of efficient glazing materials such as semi-permeable glazing

Table 16 (continued)

(C) Building components	Shading devices	Preference of light colours External shading devices are more effective to reduce solar gain For southern orientations, horizontal shading devices For east and west sides, movable types For northern windows, vertical fins
	Walls	Construction with high thermal resistance Use of thermal mass to prevent over-heating High-rise buildings with light-weight construction to provide ventilation
	Roofs	Construction with high thermal resistance Use of roof insulation
	Foundation and basement	Contacting the basement with the ground to reduce the heating load Usage of appropriate materials (solid floor, stone burnt clay and tiles, concrete and earth) Heavy-weight nature of basement construction allows storage of heat during the underheated period Location of thermal mass in ground floor to regulate internal temperature
	Materials	Reducing the amount of materials in construction phase Minimizing wastage, demand for new during operational phase Choosing local materials and construction technics Choosing materials with low environmental impact Choosing environmentally friendly construction materials and furnishings during refurbishment of hotels
	Mechanical equipment and technologies	Integration of passive design with active systems should be considered from the preliminary design phase For existing buildings refurbishment process can be an opportunity to introduce cleaner energy solutions and to utilize from renewable energy sources Selection of central or local heating and cooling equipment according to the specific needs of spaces Use of renewable energy systems (solar power, photovoltaic, geothermal and hydropower) Utilize from lighting technologies such as CFLs, LEDs, diming or adjusting sensors)

CHAPTER 4

CASE STUDY

4.1 Study Area

The research study employed the "case study design strategy." The case studies were selected from Belek Tourism Center, a village of Serik district which is located at 40 km east of Antalya (Figure 25). There are certain reasons for selecting Belek for research area. Among them the most significant one is its characteristic that establishes relationship between sustainable tourism with tourism development.

Figure 25 Location of the study area in Turkey (Adapted from http://tr.wikipedia.org/wiki/Serik, last visited on January 2015).

Belek is one of the most visited tourist destinations of Turkey. The records demonstrate that Antalya hosted 11.122.510 foreign visitors by the end of 2013 (Figure 26). The city accepted 32% of foreign tourists arrived in the country. While the number of foreign visitors was 6.047.168 in 2004, the number has exceeded 10 million since 2011 (Antalya İl Kültür ve Turizm Müdürlüğü, 2015).

Additional to the continuously growing number of tourists, there has been an on-going investment in hotel projects in Antalya. When the establishments with investment and operation licences are examined, it can be seen that maximum number of establishments are executed in Antalya, with 735 establishments in operation, and 72 in investment (Türofed, 2016).

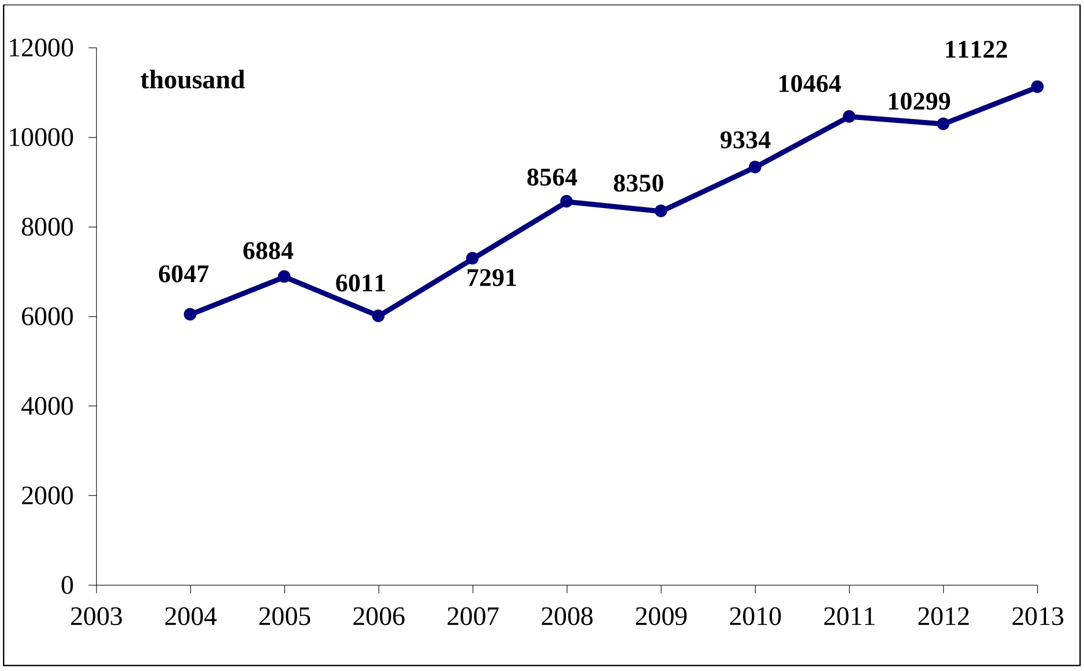


Figure 26 Foreign visitor arrivals to Antalya (prepared by the author depending on data from Antalya İl Kültür ve Turizm Müdürlüğü, 2015).

Additional to the continuously growing number of tourists, there has been an on-going investment in hotel projects in Antalya. When the facilities with investment and operation permissions are examined, it can be seen that maximum facilities are executed in Antalya (in operation: 173, in investment: 35, totally 208). The share of 5 star hotels is %37, and 4 star hotels %28 of the total room number in Antalya. The room capacity of 5 star hotels in Antalya is higher than not only İstanbul but also other popular destinations of Europe such as Barcelona, Paris, Rome and London (Türofed Turizm Raporu, 2013).

Additional to growing tourist demand for Belek due to its luxury hotel buildings and golf courses, it has also priorities for environmental protection. Belek Tourism Center is neighbouring Belek Special Environmental Protection Area (Figure 27) with 29 km coastal line shaped by coastal dunes. Moreover, within the borders of this protection area, there has been one of the most important sea turtle nesting sites, starting from Acısu River to Sarısu River. Because of the proximity of Belek Tourism Center to the special protection area, the environmental protection is much more important in this region. Additional to the sea turtles, wide sand dune areas, different soil types, Taurus Mountains, Mediterranean Sea, beach, forests, wetlands, regional characteristic plants, endemic animals and plants, range of bird species make the area very important in terms of biodiversity (Çevre ve Şehircilik Bakanlığı, 2015).

Figure 27 Belek Special Environmental Protection Area (Adapted from Çevre ve Şehircilik Bakanlığı, 2015)

4.2 Belek Tourism Investors Union

Belek Tourism Investors Union (BETUYAB) has been founded in 1989 to solve the infrastructure development problems of Belek Tourism Center with the cooperation of the private and public sector. In accordance with the requirement for the definite allocation, all the tourism investors who receive the land allocation have to be a member of the Union to establish sustainable tourism in the region. Within this goal, BETUYAB is responsible for the infrastructure investments (such as water supply, wastewater collection and treatment, solid waste management), nature and eco-tourism activities, conserving and measuring biological diversity, communication, transportation, and so on (BETUYAB, 2015). All these facilities are especially required for the development of tourism in the region. The aim and the activities of BETUYAB can be realized through cooperation between tourism investors, local communities, governmental and non-governmental associations and establishments.

4.3 Previous works related with research area

Antalya – Belek Tourism Center was dealt in several theses. In this section some of the previous studies with similar aspects will be evaluated.

Kızılgün Türksoy (2001) studied the prospects for eco-planning approach in rapidly changing coastal areas for Belek in her PhD study. In her study, she indicated that legislative texts have inconsistencies in their claims about conservation of natural resources. She declared that the concept of "protection - usage balance" constantly worked on behalf of "usage" side. Her analyses of land-use plans, and plan notes showed that agricultural areas, forests, and sand dunes are open to profit maximization mechanisms of capital circulation. She pointed out that natural environment was transformed silently into built environment through plan revisions at parcel level. Kızılgün Türksoy's thesis concludes with a new conceptualization of "the coast", in which it was anticipated as a co-existence with the sea and the land. She suggested that with coastal planning, sustainability and justice for both nature and society could be provided.

Almaç (2005) investigated the Belek area from its tourism development and spatial organisation in her master thesis. The role of small settlements in the tourism development scenarios of Turkey after 1980s, and inclusion of small settlements in the tourism policies were questioned referring to the Tourism Encouragement Law numbered 2634 and its Amended Law numbered 4957. She declared there has not been a comprehensive tourism planning approach after 1980s and there has been no part reserved for the small settlements types in tourism development scenarios for the case of Belek.

Another PhD thesis was written by Acar İnam (2009). She investigated the image of region in the context of sustainable tourism. The findings of her work revealed that due to economic and political reasons, the carrying capacity was exceeded and the region drifted away from sustainable tourism. Moreover, in 2010, together with

Erinsel Önder, İnam wrote an article on Belek and its departure from its commitment to sustainable tourism (Acar İnam, Erinsel Önder, 2010). This article assessed the previous plans and concluded that the carrying capacity in the tourism facilities and golf fields in the region was overwhelming and region was moving away from development of sustainable tourism.

Apart from the relevant work done in the same area, the present research deals with the architectural design of the hotel buildings awarded Green Star certification. In this context the sustainable design criteria and competence of certification program to measure the sustainability of the accommodation establishments are questioned.

4.4 The planning process of Belek Tourism Center

According to Kızılgün Türksoy (2001), the planning process dates back to 1959 with an international project. However, the first physical plan of the region, Ole Helweg Plan, was prepared by The Scandinavian Planning and Development Associates, on behalf of the State Planning Organization(SPO) in 1967 (SPO, 1969). Within this plan, Belek was selected as one of the most favourable sites for the first stage development. The bed capacity of the Belek region was defined as 5000 by the master plan for Antalya East (Kızılgün Türksoy, 2001). After this plan, the Serik-Manavgat-Alanya Environmental Master Plan was approved by Ministry of Public Works and Resettlement on 26.05.1981 (Almaç, 2005).

Antalya - Belek Tourism Center was declared as a tourism center in the 21.11.1984 dated and 18582 numbered Official Journal. After the declaration, the first 1/5000 scale master plan for Belek, which was called 'Belek Tourism Master Plan, was prepared by Ministry of Culture and Tourism and approved by Ministry of Public Works and Resettlement (Acar İnam, Erinsel Önder, 2010). Moreover, the capacity of Belek site was defined as 13000 beds, after it was declared as a tourism center (Almaç, 2005).

On 29.05.1990, a plan revision, with the title of "1/25000 scale Environmental Plan for the Eastern Antalya" was approved. Later on 18.12.1998, another revision in environmental master plan was prepared, which was named as 'Belek Revision' and approved by Ministry of Public Works and Resettlement. Afterwards, 1/25000 scale plan for Belek and environs "Environmental Master Plan Revision" approved by the same Ministry on 10.01.2002 (Almaç, 2005). The last arrangement was 1/25000 scale Eastern Antalya Environmental Master Plan - Belek Revision, which was approved on 25.11.2002. With the revisions made on this plan in 2004 and 2005, new golf fields were added and the bed capacity of the accommodations was increased to 48200 (Acar İnam, Erinsel Önder, 2010).

Additional to the above mentioned planning processes, there were also studies on conservation of environmental qualifications of Belek. The Institution of Special Environmental Protection has declared Belek as "Special Environmental Protection Area" on 22.11.1990 (Çevre ve Şehircilik Bakanlığı, 2015). After declaration, the institution approved "The Plan for Belek Special Protection Area" on 12.08.1993. The planning area, which was 11049,95 hectares, partly covers Serik, Tasagıl and Manavgat settlements (Almaç, 2005). Moreover, in 1996 "Belek Coastal Management Plan" was prepared by 'World Wildlife Fund' with the administrative support of Ministry of Tourism (Acar İnam, Erinsel Önder, 2010). This plan proposed some managerial protection decisions for local and national governmental bodies.

Although Belek's tourism development has been planned since 1950s, construction of massive hotel buildings and larges golf course areas had negative effects on nature. For example, according to a comprehensive study by Canbolat (2004) sea turtle nesting activity along the Mediterranean coast of Turkey, Belek had the greatest number of nests for Caretta caretta, however, the necessary conservation measures had not been implemented, especially for the reasons derived from tourism activities (intensive recreational activities, speed boats, daily or weekend usage), tourism facilities (hotels, secondary houses, beach huts), light pollution from residential areas and from vehicles and illegal sand extraction. Furthermore, WWF (2001a, 2001b) emphasised that degradation of ecosystem in Belek was originated from mass tourism, wrong planning decisions, construction of large-scale luxury resort projects on the beachfront, over capacity (presence of a large number of tourists and accommodation establishments), growing pollution and lack of community involvement.

4.5 Selected Hotel Buildings with Green Star

The majority of the hotel buildings with green star are located in Antalya. Moreover, Belek is one of the most visited touristic destinations, serving mass tourism facilities within all inclusive system in Antalya. In this thesis, four hotel buildings, which were awarded Green Star Certification in Belek Tourism Center, were selected for case studies.

The site visit was carried out in December 2013, and in the meantime, there were 5 hotel buildings awarded this certificate in Belek Tourism Center (Figure 28). One of these, Adam and Eve Hotel, was closed for refurbishment at the period the survey was done. Hence, case studies were carried out in four hotels, Limak Arcadia Golf & Sport Resort, Limak Atlantis Hotel, Xanadu Resort and Calista Luxury Resort, which were on operation between 05.12.2013 and 08.12.2013. Selected hotels were visited and survey questionnaires that were prepared before were directed to the authorized personnel of these hotels.

Figure 28 The research area (prepared by the author, adapted from Google Earth, image dated April 19, 2016. 36°51’33.61”N, 31°01’54.43”E. https://www.google.com/earth/download/ge/, last visited on September 2016).

4.5.1 CASE STUDY 1: LIMAK ARCADIA GOLF & SPORT RESORT

The first hotel building studied here was settled on a land that was allocated to the tourism investors by the Ministry (Figure 29). The land was declared as a conservation forest before the permission given for construction. It was allocated for the purpose of construction of a five-star holiday village with a capacity of 344 beds and a four-star hotel with 464 beds on 01.22.1989. Depending on the environmental plan revision for Belek on 25.11.2002, the investors requested for expansion of capacity to 1000 beds for clients and 200 beds for personnel.

The project was designed by Atölye T Mimarlık. Although its project was approved in 1989, the construction took some time and the establishment was opened to guests in September 1995. Although the preliminary project was a holiday village together with a hotel, during the long construction period, the investors decided to change the type of the establishment into a hotel building. According to the records of the Ministry of Culture and Tourism, this hotel has a “Four-Star Tourism Accommodation Establishment Certificate.” It has a capacity of 982 beds and a built-up area of 26.824 m^2, on the land of 94.000 m^2. Furthermore, the hotel has been awarded the “Green Star Certification” on 07.06.2013.

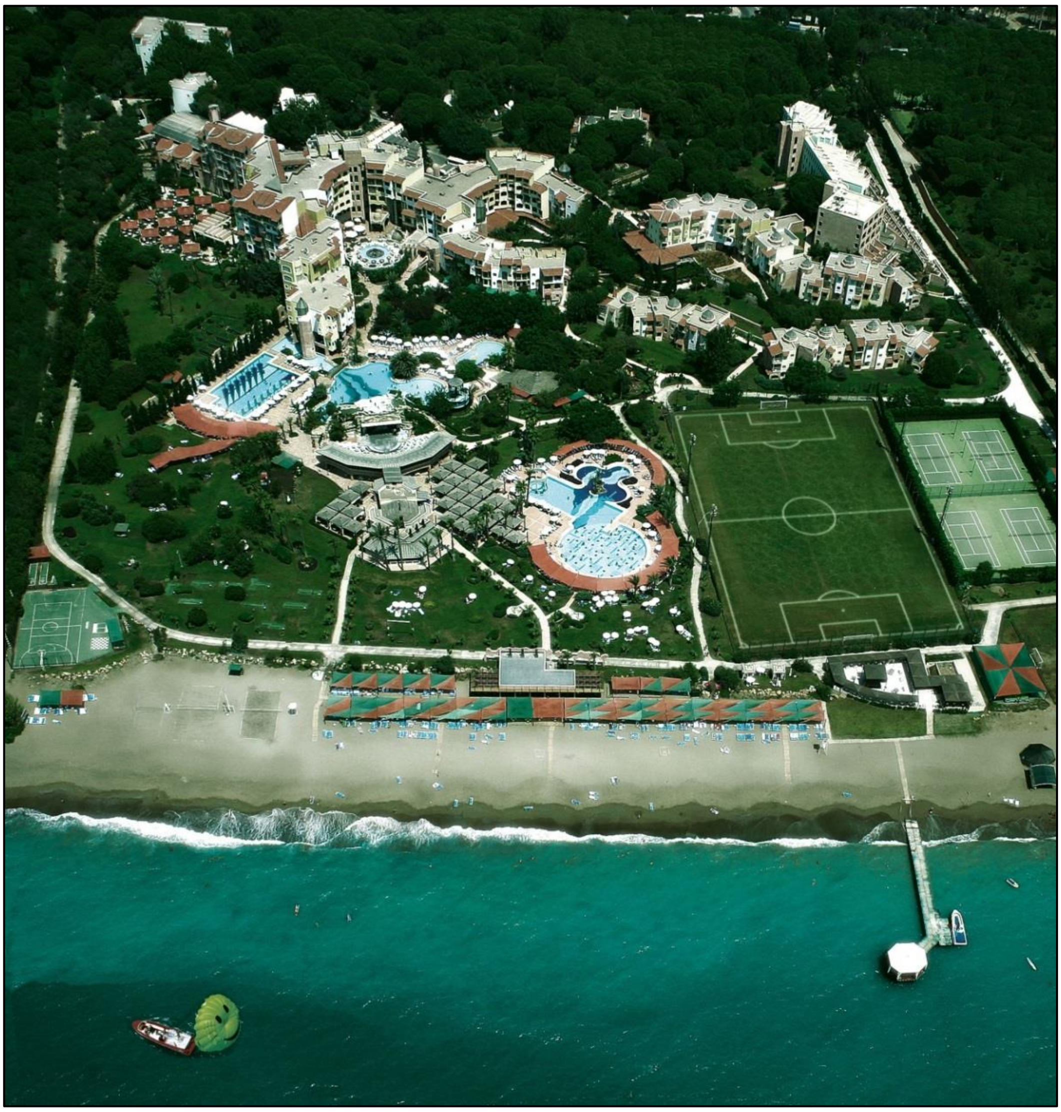


Figure 29 Aerial view of Limak Arcadia Golf & Sport Resort (http://limakhotels.com/arcadia/download/, last visited on August 2014)

As seen in Figure 30 and Figure 31, some necessary measures for the protection of trees were ignored when the construction work was conducted. Only some of the trees were protected by housing their roots that remained above or below the ground level during excavation activities into large concrete bowls. However, no protection was supplied by providing fences around the trees during the construction period. Moreover, machinery and workers were circulating within the tree protection zone and construction materials were stored in this zone.

Figure 30 A photograph from construction period (archieve of Ministry of Culture and Tourism).

Figure 31 A photograph from construction period (archieve of Ministry of Culture and Tourism).

The hotel belongs to a hotel chain which is managed by Limak Holding. Apart from tourism, the company works on various sectors from construction to energy, cement production, infrastructure projects, airport management and so on. Currently, Limak Holding owns and operates four hotels in Antalya, one in Ankara, two in İstanbul and one in Yalova (Limak, 2014). Two of the hotels in the chain, Limak Arcadia and Limak Atlantis located in Belek were selected for this study. Both of which have been awarded the Green Star Certification.

Like many hotels nearby, the hotel operates all year round. During peak season, from June to September, hotel occupancy exceeds 95%. The hotel provides an all-inclusive service system, in which services such as room services, breakfast, lunch, dinner, activities, entertainments, etc. are covered under a fixed price package.

In the following sections, the hotel will be evaluated through general design criteria, which was determined in 3.2.1. The issues related to the main topics of: (A) location and site planning, (B) building design, and (C) building components will be covered.

A) LOCATION AND SITE PLANNING

Within the data evaluated in the previous chapter, this topic is organized into the following sections: (1) transportation means and ways, (2) topography, (3) natural and man-made surroundings, (4) orientation, (5) settlement patterns and (6) hazards. In each section, the design criteria which were determined previously will be dealt in detail for the special conditions of the hotel building.

- *Transportation means and ways*

The hotel is situated 33km away from Antalya Airport, 43km from the city center, and about 900m from the center of Belek. There are various transportation alternatives including shuttles, taxis, and rent a car to access to these points from the hotel building.

Public transport options are limited with shuttles. There are two local shuttle stop close to the hotel building (Figure 32). Moreover, there are private shuttles hired by travel agents for transportation of the tourists. Additionally, the hotel provides free transportation for football teams which request to access football fields nearby.

A secure parking space is provided to the customers of the hotel. The parking lot is located on the north part of the land (Figure 33). In this part of the land, natural forest cover is protected, so that the existing trees provide effective shade for cars and individuals.

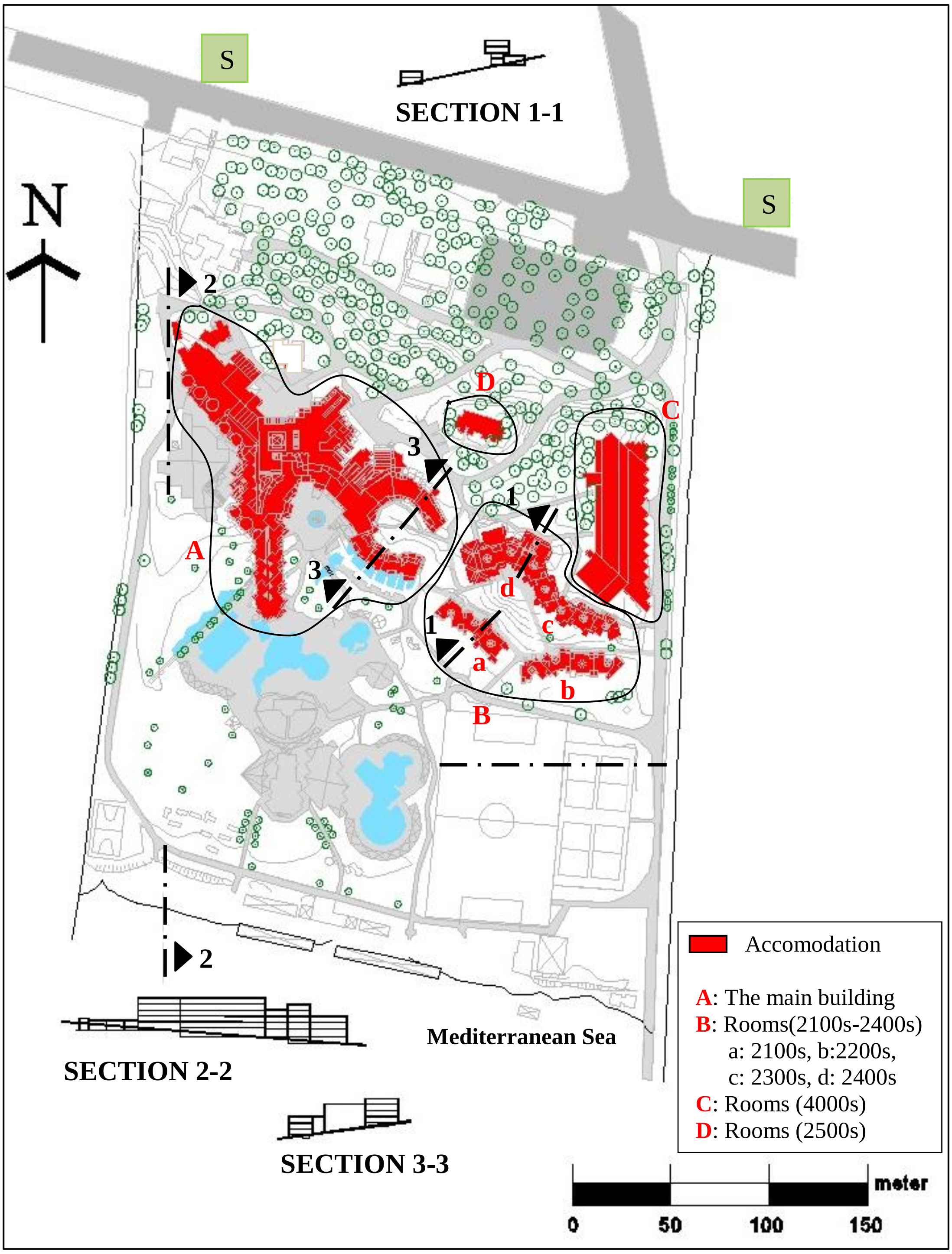


Figure 32 Site plan (redrawn by the author, adapted from the drawings in the archieve of Ministry of Culture and Tourism).

Figure 33 The parking lot which is located on the north part of the land (taken by the author, December 2013).

As can be seen in the above mentioned examples, Belek region is largely dependent on motor vehicles for transportation. However, inside the land of the hotel, there are pedestrian roads, which are also used by bicycle riders. Furthermore, the hotel has three alternative fuelled vehicles. These are battery electric vehicles which run on electrical energy instead of traditional petroleum fuels. The vehicles are mostly used by the staff inside the land of the hotel for short distances at low speeds.

The Belek Municipality does not have public transportation options or any specialized arrangements for people with disabilities. However, inside the hotel building and its environment, there are several arrangements for inclusion of all people. This mainly depends on the provisions of "The Regulation Concerning the Certification and Qualities of Tourism Facilities". According to the 17^{th} article of this legislation, hotels having 80 or more rooms should arrange at least one room according to the needs of the people with disabilities. Moreover, the criteria specified with regulation for the entrance, elevators, bedrooms and bathrooms should be carried out. In this hotel, necessary arrangements mentioned in the regulation were made for transportation and use of people with disabilities, including main entrance, public toilets, one restaurant and some of the open air activities.

- *Topography*

The hotel building is located on a moderately sloping site between the access road and the Mediterranean Sea (Figure 32). The location and the topography allow good views of the sea.

From climatic aspect, the hotel is situated on the higher sides of the slope (Figure 34) which is considered to be relatively warm according to Olgyay (1963). In congruence with his suggestion, the higher sides of the slope are covered by vegetation. The trees are concentrated in this part of the terrain, which also act as wind shelters during winter. Furthermore, the location is appropriate to take advantage of the wind flow, particularly in summer to moderate excessive vapour pressure.

Figure 34 General view. (http://limakhotels.com/arcadia/download/, last visited on March 2015)

- *Natural and man-made surroundings*

The hotel building is settled on a land near seaside. Due to this location, the building may benefit from sea breezes which blow from Mediterranean Sea towards the land during the day. However this wind effect is limited especially from July to August, which are over-heated and relatively humid months (see Figure 14). Furthermore, the seabreezes are not adequate during summer nights, because the temperature difference is smaller between the sea and the land.

On the north side of the land, natural forest cover (particularly pinus pinea) was preserved (Figure 33 and Figure 35). These evergreen plants provide shade during summer. They also act as windscreens and break the force of the north wind, which is also the prevailing one during winter. It is in congruence with proposals of Özdemir (2005) for selection of trees for north direction. Vegetation on this side of the land is the site's natural cover rather than a deliberate decision. However, even protection of the native vegetation in this part of the land provides a cost effective energy saving both for winter and summer.

Figure 35 View of the north part of the land from the main building (taken by the author, December 2013).

On the west side of the land, there is no native vegetation remained. During the construction period, the original land cover was almost removed or destroyed. According to the new landscape design, the garden was generally left as a lawn. Besides, some palm trees and shrubs were planted (Figure 36). The manager of the hotel building said that this type of tree is selected to evoke exotic holiday images. However as mentioned before, these trees have a very limited cooling factor of %2 (Figure 20). The cooling and shading effect of trees is not used in this part of the terrain. However, the use of grass in open areas moderates extreme temperatures by absorbing insolation and reflecting less heat than asphalt or concrete surfaces.

Figure 36 Building on the west part of the land (taken by the author, December 2013).

The south side of the land is mainly left as open space. Only small bushes and several palm trees were planted (Figure 37). The bushes with low branches and the long and thin trunks of palm trees do not obstruct the sea view of the south-facing rooms of the hotel building. Additionally, large grass areas for sport activities were arranged near the seaside (Figure 29). The turf football field which is placed on the south is used particularly by professional football clubs. Also there are tennis courts, fields for archery, basketball, mini golf and beach volley, amphitheatre, aquapark and a swimming pool. These open space arrangements are basically based on the rules imposed by Coastal Law, which determines the construction prohibitions and the structures to be erected on coasts. Even though the main reasons for the landscape design of the south part of the land are providing an open sea view and above mentioned legal obligations, avoiding trees with large canopies, planting small bushes and leaving this part of the land as empty, enable south facing facades to take maximum advantage of the sun’s potential energy.

Figure 37 South part of the land (taken by the author, December 2013).

On the east side of the land, there is a pedestrian road following the boundary of the parcel. Different kinds of trees are planted along this way to screen the unwanted view of the lot-line wall and to create privacy (Figure 38). However, there are not enough effective shading possibilities for walls and windows of the hotel building, due to the low bole of these trees and their distance to the hotel.

Figure 38 Trees along the boundary line on the east side (taken by the author, December 2013).

Figure 39 A citrus tree nearby the main building (taken by the author, December 2013).

In between the blocks of the hotel, there are some pinus pineas. Besides, local native plants, such as sand lilies, erica, vitex, tamarix, olive tree, mimosa, banana, and citrus trees are used for landscaping (Figure 39). These plants are distributed randomly over the landscape.

As a conclusion, arrangement or orientation of planting was not generally made with the consideration of shading or natural ventilation purposes. However, protecting native vegetation in the north part brings advantages for energy saving and biodiversity. Even though it is limited, preference of native vegetation in some parts of the garden improves customer experience at least. In case of developing the landscape design of the hotel, providing an open sea view for hotel building was preferred rather than establishing sustainable design principles.

- *Orientation*

Depending on the analyses dealt in sub-section 3.2.1, south facing slopes gave favourable results for protection from cold winter winds, exposure to the summer breezes, benefiting from winter sun for Antalya. The hotel building is placed on this favourable location, at the middle of the south slope (Figure 40). Regarding the layout of the hotel, solar gain is advantageous; besides, excessive wind effects as well as cool air pools could be avoided. The slope receives the sunlight directly. It may be an advantage for the underheated periods (December, January and February) for passive heating. On the other hand, summer winds coming from south directions (SSW, S and SSE) helps to maintain cooling effect in over-heated periods. Furthermore, the pinus pinea trees prevent cold winter winds blowing mainly from N and NNW (Figure 33, Figure 35).

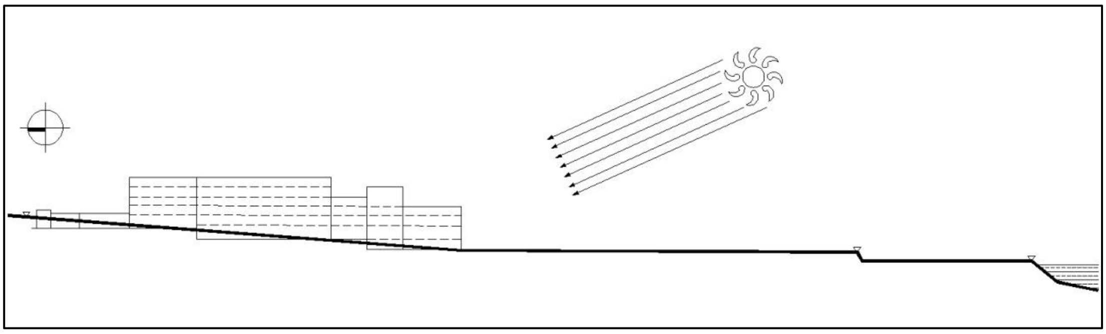


Figure 40 Orientation of the slope (prepared by the author).

- *Settlement patterns*

There is a complex form of settlement pattern in this case. The accommodation units lay together with the other services such as reception, halls, and restaurants in the main building. From this point, it has a compact form which has close physical relationships between different functions. On the other hand, there are other accommodation units with different heights and in the shape of arches or rectangles. Each block is dispersed through the land without a specific pattern (Figure 32, Figure 41).

Figure 41 A general view of the hotel building (prepared by the author, adapted from http://limakhotels.com/arcadia/download/, last visited on August 2014).

Particularly, the main building (Group A) has an irregular shape and an angled position. Because of this complex configuration, there is a lack of design consideration for ventilation and shading. Depending on the slope of the land, the building has four to six floors. This provides potential to cast shadow for adjacent opens spaces. There are some open spaces arranged nearby the main hotel building such as an open air restaurant and a cafeteria (Figure 42 and Figure 43).

Figure 42 An open air restaurant in the west side of the main building (http://limakhotels.com/arcadia/download/, last visited on February 2016).

Figure 43 A cafeteria in the south side of the main building (http://limakhotels.com/arcadia/download/, last visited on February 2016).

Group B has curved-shape undulating row buildings (Figure 32, Figure 41). They are organized to follow topography, so that the pedestrian ways and the blocks have southerly and south-westerly orientations. The buildings are nearly perpendicular to the prevailing wind directions. The first row of the accommodation blocks (with the numbers of 2100s and 2200s) act as air barriers for the winds blowing from Mediterranean Sea during summer. This configuration creates poor ventilation conditions for the pedestrian ways behind the blocks facing the prevailing winds. On the other hand, the moderately sloping land provides opportunity for maximizing the natural light as well as the view (see Section 1-1 in Figure 32). The two to four story south facades take the advantage of southern summer breezes and winter sunshine. On the other hand, the units on the west wing of the arch are exposed to afternoon heat gain.

Two of the accommodation units (Group C and D) were built after the investors' demand for expansion of the bed capacity had been approved by the Ministry. They are free standing units and do not form a pattern with the other buildings.

The trees planted throughout the land do not provide adequate shade for pedestrian ways. Only trees planted along pedestrian ways is on the west side of the land (Figure 44). However, they do not have much shading or cooling effect.

Figure 44 A pedestrian way on the west side of the land (taken by the author, December 2013).

Although there are plenty of outdoor activities in the hotel, there is not enough vegetation to provide shadow for the open areas and reduce the temperatures (Figure 45 and Figure 46). Palm trees and small bushes are generally used for landscaping. Moreover, a single row of pine trees are planted nearby one of the open pools (Figure 48). However, rather than shading the open spaces, they have aesthetic and functional concerns as area dividers with arcades along them.

Figure 45 Facilities for open air activities (taken by the author, December 2013).

Figure 46 The outdoor swimming pool (taken by the author, December 2013).

Figure 47 The arcade and the pine trees near the outdoor swimming pool (taken by the author, December 2013).

Figure 48 The arcade and the pine trees as area dividers (taken by the author, December 2013).

Pergolas are used in the land as permanent architectural features (Figure 49). They provide a sitting area for the snack bar. This configuration allows for sea breezes and daylight, additionally provides protection from the harsh glare of direct sunlight. Moreover, there are temporary canvas canopies installed around the pools to provide shade during summer (Figure 46).

Figure 49 The pergolas over snack bar (taken by the author, December 2013).

- *Hazards*

As dealt in 3.2.1, the Belek conservation forest was afforested by the Ministry of Forestry to prevent dune erosion long before the hotel was constructed. The forest on the north part of the land, which is located in the upper side of the slope, is well protected. This location is advantageous for both preventing the risk of erosion and the floods.

In this region, sandy winds often have to be considered, too. The sand dunes running parallel to the coastline are stabilized by planting vegetation on the sea coast (Figure 50). There are also mounts arranged in the lawn areas. These provide a functional shelter for the site against the sandy winds blowing from Mediterranean Sea. Additionally, planting of sand lilies near the coast provide extra protection for the area from these winds (Figure 51).

Figure 50 Coastal dunes planted with vegetation (taken by the author, December 2013).

Figure 51 Sand lilies near the coastal area (taken by the author, December 2013).

B) BUILDING DESIGN

Based on the data collected and evaluated in the previous chapter, this topic is organized into the following sections: (1) plan layout and organization of spaces, (2) shape and volume, and (3) colour selection. In each section, the design criteria which were determined previously will be dealt in detail for the special conditions of the hotel building.

- *Plan layout and organization of spaces*

The hotel is comprised of a wide range of services and functional units. These include service functions such as food supply and housekeeping, administrative functions, complementary and subsidiary functions which include food and beverage units, sports and recreation units, and the fundamental function of accommodation. Physical relation of these functions determines the configuration of the hotel building. This diversity in functions and space organization is reflected in a complex plan layout for this case.

The main hotel building (Group A) combines most of the functions of the hotel (Figure 32, Figure 41). On the ground floor, there are entrance hall, reception, lobby, meeting room with the capacity of 400 people, study rooms, foyer, bar and some accommodation units. Apart from accommodation units, the other spaces consolidate outtourist functions for more efficient operation and for direct access. Because of the multiple functions, this floor has a thick plan, spreading into a large area. For this reason, the architectural design of the hotel has employed both toplighting and sidelighting fenestration components for daylighting of the spaces such as lobby and their adjacent areas. However, some of the skylights were covered later on because of the insulation problems (Figure 52). This arrangement caused the use of artificial lighting even during the daytime. The construction technology was probably not advanced enough when the hotel was built. Since then, the hotel had a refurbishment process, but the management preferred to cover the toplight over the lobby with a plastic material instead of a double layered glazing, for increased insulation.

Figure 52 The toplight over the lobby is covered with a plastic material (taken by the author, December 2013).

The slope of the terrain provides opportunities for direct access to the first and second basement floors of the main hotel building. On the first basement floor, there are American bar with the capacity of 80 people, restaurant with the capacity of 530 people, gym, shops, coiffeur and accommodation units. On the second basement, there are Turkish hamam, sauna, steam bath, massage room, indoor swimming pool, beauty center, disco, shops, American bar with the capacity of 70 people, game room, kids club and accommodation units. Because of the complex plan characteristics of these floors, toplighting components were used. However, some of the skylights were also covered (Figure 53) just like the example of the lobby, while some others are still used as they were designed (Figure 54). Additionally, the indoor swimming pool is illuminated by natural daylight through sidelight and toplight fenestration (Figure 55).

Figure 53 The toplight over the restaurant is covered with a plastic material (taken by the author, December 2013).

Figure 54 The toplight is arranged so as to protect an existing tree (taken by the author, December 2013).

Figure 55 The sidelight and toplight fenestration in the swimming pool (taken by the author, December 2013).

On the first, second, third and fourth floors of the main building, there are accommodation units. The units have linear plans. The rooms are located on one side of the corridor. The corridors are furnished with multiple windows and exposed to the daylight on one side, hence supply fresh air and significant natural ventilation. However, because of the complex and irregular shape of the building, the rooms and the corridors are not oriented towards any particular direction.

There are also accommodation units (Group B) in the curved-shape row buildings (Figure 32, Figure 41). Plans of these buildings are characterized by having rooms on both sides of the corridor. The corridors are illuminated by daylight through toplight components (Figure 56). These blocks mainly have a southerly and south-westerly orientation. Among these blocks, the best oriented one is the block having the rooms with the number of 2200s. This block is clearly elongated along E-W axis. On the other hand, some of the rooms of the other blocks are facing west and exposed to afternoon heat gain, because of the plan layout of these blocks.

Figure 56 External view of the accommodation units (2200s) (taken by the author, December 2013).

The accommodation units (Group C) on the east part of the land are elongated in S-N axis (Figure 32, Figure 41). These units have linear plans and the rooms are on one side of the corridor. The corridors have numerous windows on the west side, hence exposed to the daylight and solar radiation coming from this direction (Figure 57). The west facing wall and windows of the corridors receive the highest intensities of radiation, particularly during the over-heated periods and increase the cooling load of the building. The rooms are arranged in an angled position and face southeast, which is one of the desirable directions.

Figure 57 The wall and the windows facing west (Group C) (taken by the author, December 2013).

The accommodation units (Group D) in between the forest area have one of the most favourable locations (Figure 32, Figure 41). The block is elongated along E-W axis. Plans of these buildings are characterized by having rooms on both sides of the corridor. The corridors are illuminated by daylight through toplight components.

The buildings in the hotel complex are divided into zones, basically rooms and public spaces. Moreover, the public spaces with similar system requirements for heating or cooling and time of operation are grouped and combined. Internal circulation and relationship to other departments also play important roles in configuration of these spaces. For example, on the second basement, wet spaces with similar system requirements and time of operation such as Turkish hamam, sauna, steam bath, massage room, and indoor swimming pool are clustered. Preparation facilities such as dressing rooms, clothing storage, shower facilities and toilet facilities which are required for the mentioned spaces are placed on this floor. Moreover, these preparation units have direct access from outdoors and can serve the tourists who want to use outdoor swimming pools. Furthermore, on the ground floor, the spaces such as meeting room, study rooms, foyer, and bar are grouped together.

- *Shape and volume*

Compact rectangles, arches and modified triangles have been used in the hotel complex. As previously dealt in the sections of “settlement pattern” and “plan layout and organization of spaces” there is no design principle for orienting the building to a particular orientation. Hence, there is no effort to maximize the south-facing elevation of the buildings.

The low-rise buildings (two to three floors) and relatively high-rise buildings (four to six floors) are settled in the terrain together. The higher buildings (Group A) receive much radiant heat, and obstruct the flow of wind to neighbouring buildings. Since it has a greater exterior wall area because of its complex shape, this building is exposed to greater heat gain and heat loss. Among all the buildings in the hotel complex, only two of the blocks (2200s and 2500s) have a rectangular plan, elongated on E-W axis.

- *Colour selection*

Light colours such as white (with %80-90 reflectance), pale yellow (with %80 reflectance) and pale beige (with %70 reflectance) were used for the building envelope (Figure 58). Moreover, the flat roof has a layer of pebbles which have the colour of light grey and white (Figure 59). The eaves over the balconies are covered with tiles. These tiles have a light colour in pastel range. By selection of light colours, more solar radiation is reflected and the heat gain is reduced from the exterior walls and particularly the roof.

As seen in Figure 58 and Figure 59, pale yellow is used in window frames of the rooms. The laminate floor of the rooms has creamy white colour of maple wood. The ceiling and the walls are both white in colour (Figure 60). The low contrast between window frame and adjacent walls reduces the effect of glare. The similar colour selections are observed for the corridors (Figure 61).

In the restaurant and lobby, the window frames are black in colour. The restaurant has grey walls, dark blue and white ceiling and beige floor (Figure 62). The lobby has beige walls and floor, and white and dark blue ceiling (Figure 52). The colours used in these spaces are generally pastel in range apart from the dark blue parts of the ceiling. They do not make the space feel brighter and lighter as the whitewashing does. On the other hand, the interior walls, ceiling and floors of these spaces do not have colours that are of high contrast with the dark coloured window frames.

Figure 58 Exterior walls of the main building (taken by the author, December 2013).

Figure 59 Flat roof (taken by the author, December 2013).

Figure 60 Colour selection for rooms (taken by the author, December 2013).

Figure 61 Colour selection for corridors (taken by the author, December 2013).

Figure 62 Colour selection for the restaurant (taken by the author, December 2013).

C) BUILDING COMPONENTS

Within the data evaluated in the previous chapter, this topic is organized into the following sections: (1) openings and windows, (2) shading devices, (3) walls, (4) roofs, (5) foundation and basement, (6) materials, and (7) mechanical equipment and technologies. In each section, the design criteria which were determined previously will be dealt in detail for the special conditions of the hotel building.

- *Openings and windows*

Because of the complexity of settlement pattern and irregular shape of the accommodation units, which were discussed previously, the openings of the structures do not face any particular direction. There is therefore, no tendency to arrange the main openings so as to face south or north. Additionally, the main building (Group A) and the accommodation units called 4000s (Group C) have long walls facing easterly and westerly directions and have multiple windows on these facades (Figure 41). These windows have a greater effect on energy consumption; particularly they increase the cooling energy demand, in comparison with the ones facing north and south.

Majority of the hotel rooms do not have two exterior walls or windows. This mainly depends on the plan type and function of the accommodation units. For this type of rooms it is not possible to provide cross ventilation. On the other hand, there are some accommodation units, located in the corner of buildings with two openings (Figure 63). Since they have windows on two adjoining sides, this arrangement supplies a considerable quantity of light and ventilation to these rooms. However, there is no design consideration to minimize the east and west windows or to maximize the ones on south and north sides. There are various configurations for openings, even on the same facade facing the same direction (Figure 64). The windows are arranged in the plans of the hotel rooms without any fixed rules, but they are generally placed in the center of the walls of the rooms in the vertical direction.

Figure 63 Various window types on the facades of the building (taken by the author, December 2013).

Figure 64 Various opening configurations on the same facade (taken by the author, December 2013).

All of the fenestrations in all buildings of the hotel complex have double glazing. These double glazed windows consist of two layers of glass which have a layer of inert gas sealed between them. The airtight construction of these windows creates thermal insulation, and reduces heat transfer.

- *Shading devices*

The shading devices are limited for this hotel building. Only balconies and eaves are used as architectural elements which provide shade (Figure 64). They are used in different hotel units without any particular rule or shape.

As decorative elements, curtains provide privacy as well as light and glare protection from the sun. For thermal insulation, heavy drapes and tulle curtains closing rather tightly against the window frame are used. The curtains and the tulles are kept closed in vacant rooms of the hotel in order to reduce heat gain especially during over-heated summer days. These interior shading devices are generally much cheaper to install and is easy to use and control. However, they are not as efficient as exterior shading solutions to reduce solar heat gain. Because there is no exterior protection, the solar radiation strikes the glazing with no outside interference, penetrating into the room, causing the curtains to heat up, and from there, heating up the space by long-wave radiation and conduction. Although, their thermal performance is limited, curtains can provide visual comfort by eliminating glare. They enable occupants of the room to regulate the amount of direct sunlight entering the space.

- *Walls*

Reinforced concrete frames infilled with brick masonry are used in the hotel buildings. There is therefore, use of dense materials and thermal mass. In winter, this thermal mass absorbs and keeps the heat that is allowed to penetrate the spaces (either hotel rooms or halls) during the day, and releases it at night when the surrounding air begins to get cooler. In summer, any heat that penetrates into these spaces during the day can be absorbed by the thermal mass to prevent over-heating. Although cross-ventilation is not possible for the majority of the rooms, the thermal mass should be cooled by airflow to control internal temperature especially at night, when the heat is released back into the room. The use of these dense materials on the walls could ensure a more stable and comfortable interior temperature if there was heat insulation. However, the buildings in the hotel complex do not have any wall insulation. Hence, their thermal resistance is very low.

- *Roofs*

The flat roof and the gable roof with eaves were used together in the hotel complex (Figure 65). A concrete plate was used in both types of roofs. While the flat roof had a layer of pebbles, the gable roof was covered with roof tiles that are typically hollow and half-cylindrical in shape, made out of clay. Both of the roofs have heat insulation; hence they have high thermal resistance.

Both of the roofs are suitable for Antalya, where rainfall is seasonal and snow is unlikely to occur. Gable roofs with overhanging eaves facilitate rainwater run-off. On the other hand, the flat roofs are enclosed on its outer sides by parapets to control the precipitation. The gravel or the pebble layer is a typical part of flat-roof system, which acts as filters for the roof drains. Both of the roof types used in the hotel have water insulation as well.

Figure 65 The roofs of the hotel complex (http://limakhotels.com/arcadia/download/, last visited on August 2014).

- *Foundation and basement*

All off the basement floors of the buildings in the hotel complex are in contact with the ground. Because of the slope of the land, the hotel was built partially below grade, with earth covering one or more sides of it. This arrangement ensures the reduction of the heating load of the buildings.

Concrete, which has thermal mass properties, is used in the construction of the basement walls and floors. The elevational bermed design of the main building (Group A) allows passive solar gain through thermal mass of the basement floor. The walk-out basement floor of the main hotel building opens to southeast and southwest. The exposed front of the hotel allows the daylight through windows facing south directions and heats the basement. Heavy-weight nature of basement construction allows storage of heat particularly during the underheated period. Additionally, this thermal mass regulates the interior temperature of the hotel.

- *Materials*

As mentioned in the previous sections, the construction phase of the hotel took a long time. There is no information gathered about the design decisions for material selection during this process. However, the managers declared that during the operational phase, they preferred to select materials that are durable, flexible, warranted (for maintenance) and modular. This allows minimizing demand for renewing. For minimizing wastage, they declared that used furniture and materials are donated to the charity institutions.

Additionally, local materials such as red bricks are used on the exterior and interior walls (Figure 66 and Figure 67). The use of these materials as cladding materials increased the thickness of the wall. Their good thermal storage capacity stabilizes indoor temperature. For example, the interior spaces, such as the lobby of the hotel cladded with this material remain cooler during the day and warmer at night (Figure 68). Furthermore, the managers declared that they are hiring regional companies and domestic workers for their refurbishment projects.

Figure 66 The outdoor dining area of the Chinese restaurant
(http://limakhotels.com/arcadia/download/, last visited on August 2014).

Figure 67 The interior walls of the restaurant
(http://limakhotels.com/arcadia/download/, last visited on August 2014).

Figure 68 The lobby of the hotel
(http://limakhotels.com/arcadia/download/, last visited on August 2014).

When selecting materials and furnishings, the environmental impacts of materials were not generally considered carefully. Levelling concrete, paint, plaster, brick, wallpaper, gypsum, and hardwood were widely used materials in this hotel. However, some materials such as eco-friendly indoor and outdoor paint were preferred for usage in buildings. These materials were generally selected during refurbishment process of the hotel building.

- *Mechanical equipment and technologies*

The hotel was constructed in a period when technological progress in energy savings was low in Turkey. The hotel building has some refurbishment process to satisfy current requirements and to improve energy performance and comfort.

Some measures are taken to reduce the energy consumption of buildings to improve internal comfort. These include insulation of boilers, hot-water tanks, waterpipes, and valves, installation of highly efficient boilers and new technologies such as frequency inverter and heat recovery system, use of exchangers generating hot water, selection of central and local heating and cooling equipment according to the specific needs of the spaces, use of energy efficient lighting fixtures, installation of motion or light sensitive illumination systems in the corridors and common places. However, the renewable energy systems are not installed in the hotel complex.

4.5.2 CASE STUDY 2: LIMAK ATLANTIS HOTEL

The second hotel building studied here belongs to the same hotel chain of the Limak Holding with the previous hotel (Section 4.6.1) evaluated (Figure 69). The land was declared as a conservation forest before the permission given for construction. It was allocated to the tourism investors by the Ministry to make investments for tourism purposes in accordance with the relevant legislations. The Land Allocation Commission approved the definite allocation of the forest land to the investors on 21.12.1999 for the purpose of construction of a first class holiday village with a capacity of 200 beds and a four-star hotel with 346 beds.

The architectural project was designed by Atölye T Mimarlık, like the previous hotel. The project was approved in 2000 and the hotel was opened to guests in April 2002. Although the preliminary project was a holiday village with a hotel, the investors decided to change the type of the establishment to a hotel building. According to the records of the Ministry of Culture and Tourism, this hotel has a “Five-Star Tourism Accommodation Establishment Certificate.” It has a capacity of 750 beds and a built up area of 39.000 m^2, on a land of a 54.000 m^2. Furthermore, this hotel has been awarded the “Green Star Certification” on 07.06.2013.

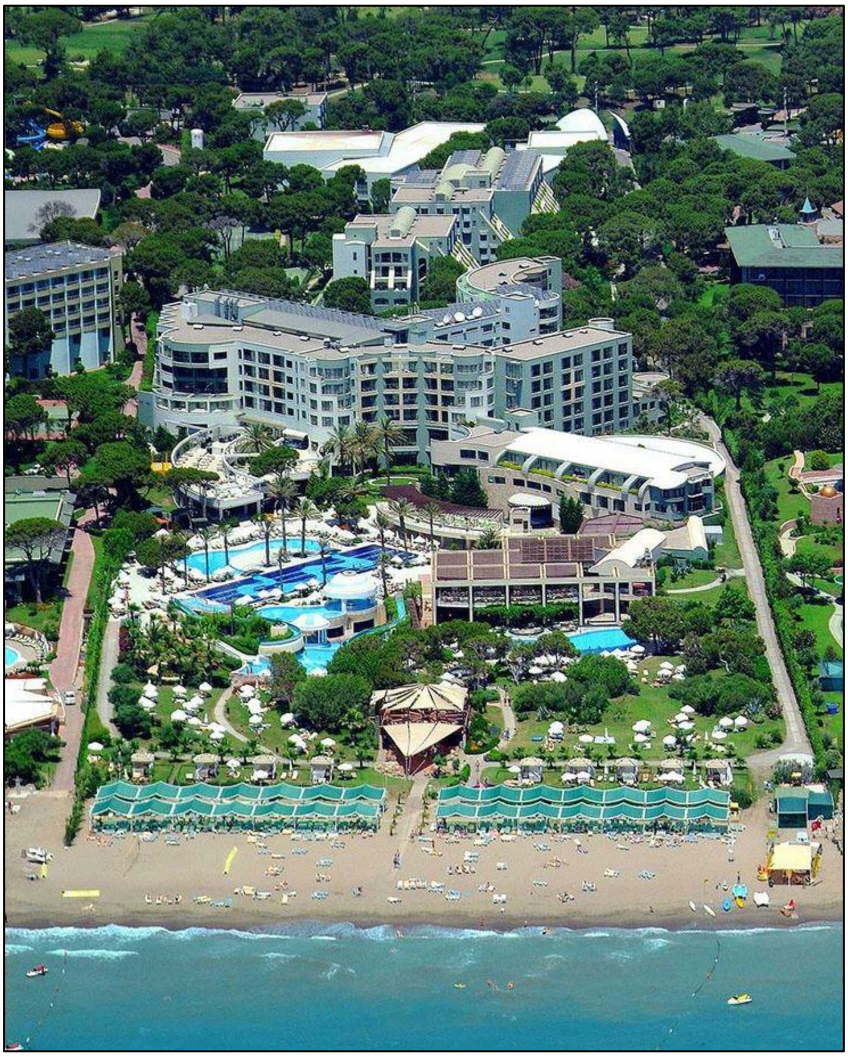


Figure 69 A general view of Limak Atlantis Hotel (www.mngturizm.com, last visited on August 2014).

As seen in Figure 70 and Figure 71, necessary measures for the protection of trees were ignored when the construction work was conducted. A considerable part of the existing trees were removed or damaged as the excavation work was done (Figure 72). The remaining trees were not protected during the construction work. Moreover, machinery and workers were circulating within the tree protection zone and construction materials were stored in that area.

Figure 70 A photograph from construction period (archieve of Ministry of Culture and Tourism).

Figure 71 A photograph from construction period (archieve of Ministry of Culture and Tourism).

Figure 72 Excavation work (archieve of Ministry of Culture and Tourism).

As the hotel belongs to the same hotel chain with the first one, they are generally managed in a similar manner. The hotel operates all year round. During peak season, from June to September, hotel occupancy exceeds 95%. The hotel provides an all-inclusive service system, in which services such as room services, breakfast, lunch, dinner, activities, entertainments, etc. are covered under a fixed price package.

In the following sections, the hotel will be evaluated through general design criteria, which was determined in 3.2.1. The issues related to the main topics of: (A) location and site planning, (B) building design, and (C) building components will be covered.

A) LOCATION AND SITE PLANNING

Within the data evaluated in the previous chapter, this topic is organized into the following sections: (1) transportation means and ways, (2) topography, (3) natural and man-made surroundings, (4) orientation, (5) settlement patterns and (6) hazards.

- *Transportation means and ways*

The hotel is situated 37km away from Antalya Airport, 46km from the city center, and 3,4km from the center of Belek. There are various transportation alternatives including shuttles, taxis, and rent a car to access to these points from the hotel building.

Public transport options are limited with shuttles. There is one local shuttle stop close to the hotel building (Figure 73). Moreover, there are shuttles hired by travel agents for transportation of regular tourists.

A secure parking space is provided to the customers of the hotel. The parking lot is located on the north part of the land. In this part of the land, natural forest cover is not very well protected; because of that there are no shading opportunities for vehicles and pedestrians in the carpark (Figure 74).

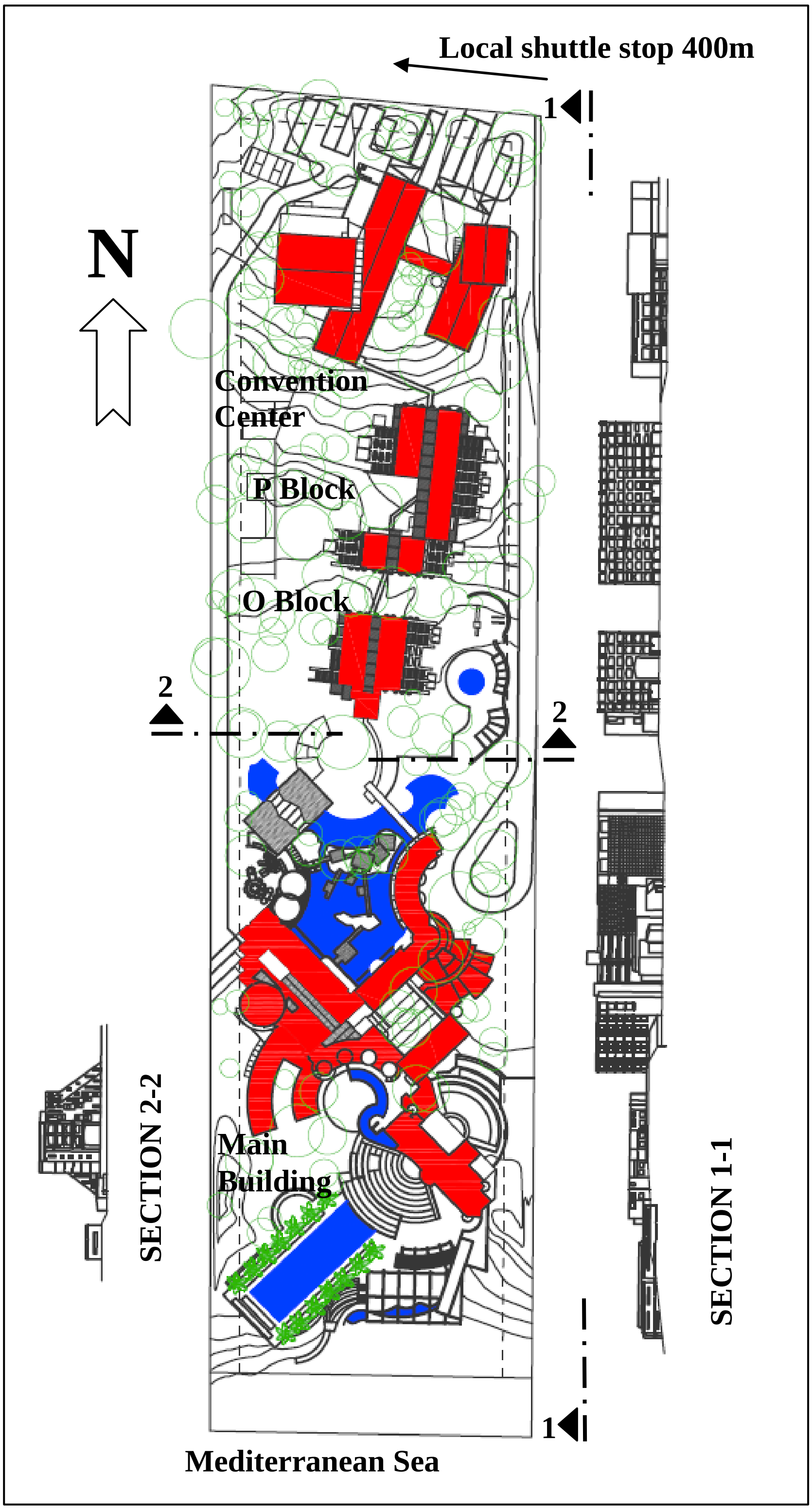


Figure 73 Site plan (redrawn by the author, adapted from the drawings in the archieve of Ministry of Culture and Tourism).

Figure 74 The parking lot in the north portion of the site (taken by the author, December 2013).

Belek region is largely dependent on motor vehicles for transportation. Inside the land of the hotel, there are pedestrian roads. There is no path or way in the use of bicyclists within the land. Furthermore, the hotel has only one alternative fuelled vehicle (a battery electric vehicle), which is mainly used by the staff inside the land of the hotel for short distances at low speeds.

Although there are no public transportation options or any specialized arrangements for the people with disabilities in Belek region, inside the hotel building and its environment, there are several arrangements for inclusion of all people. As mentioned in the first case, this mainly depends on the legislation of tourism facilities, and the fact that it is an obligation for the hotels which was certified by the Ministry of Culture and Tourism. In this hotel building, necessary arrangements mentioned in the legislation were made for transportation and use of people with disabilities, including main entrance, public toilets, one restaurant and some of the open air activities.

- *Topography*

The area of the study has nearly-level land with very gentle slope (%0-5). The relatively flat character of the land contributes to the relatively uniform climatic conditions throughout the terrain.

The terrain is located near the seaside. The effects of its location will be dealt in the following chapter. Because of the area's flat topography, the coastline is subject to flooding and erosion. Additionally, the natural vegetation was mainly destroyed by the built-up areas of the hotel. The coastline is nearly unprotected due to the absence of natural protection (e.g. pinus pineas forests) and more exposed to the hazardous events (see the section “hazards”).

- *Natural and man-made surroundings*

The hotel building is settled on a land near seaside. Due to this location, the building may benefit from sea breezes which blow from Mediterranean Sea towards the land during the day. The summer breezes have a relieving effect on humans. However, this effect is limited especially from July to August, which are over-heated and relatively humid months (see Figure 14). Furthermore, the sea breezes are not adequate during summer nights, because the temperature difference is smaller between the sea and the land. Additional to these limitations, the built up area of the hotel complex restricts the air flow. Particularly, the main hotel building acts as a windshelter and do not allow the summer breezes to pass through. Hence, only the main hotel building may benefit from the cooling effect of sea breezes.

The natural forest cover (particularly pinus pinea) could not be preserved properly on the terrain of the hotel. The hotel is a five-star hotel with a large capacity and the land of the hotel is relatively small. The high ratio of the construction area to land area affected the protection of the natural vegetation in a negative way. Not only the buildings but also the open spaces such as outdoor swimming pools and the snack restaurants caused concretization of the green spaces.

From north part to south part of the land, there are convention center, accommodation units (O and P Blocks) and main hotel building, respectively. Moreover, there are open spaces in-between the buildings and between main hotel building and the Mediterranean Sea (Figure 73).

The natural forest cover is partly protected on the surroundings of the convention center and the accommodation units (O and P Blocks). The type of the trees is not deliberately selected according to orientation. However, even protection of the native vegetation in this part of the land provides a cost effective energy saving. They provide shade during summer. Together with the built up structures they act as wind shelters for the rest of the land and break the force of north wind, which is the prevailing in winter (Figure 73, Figure 75).

Figure 75 The trees in between the accommodation units (taken by the author, December 2013).

The main building and the open spaces around it, occupy a considerable part of the land. They were laid out from the eastern to western property line. Hence, the natural vegetation was generally damaged by these built-up areas. One the other hand, there are some limited green spaces. For example, there are few trees along the eastern and western property lines and some palm trees on the south part of the land and few pinus pineas in-between the blocks (Figure 76, Figure 77). However, their effect for shading, cooling or ventilation is not adequate.

Figure 76 Palm trees planted in front of the south facade of the main building (taken by the author, December 2013).

Figure 77 Few pinus pineas that remained in-between the blocks (taken by the author, December 2013).

As in the first case evaluated in this study, the south side of the terrain is mainly left as open. The floor of garden in front of the main building was covered with lawn. The use of grass in open areas moderates extreme temperatures. Besides, several palm trees and bushes were planted in this garden (Figure 76). On the other hand, the sun terraces and outdoor swimming pools have concrete flooring which reflects more heat than grass areas. There are also several palm trees planted on these open air areas (Figure 78). The long and thin trunks of these trees do not obstruct the sea view of the south-facing rooms of the hotel building. Additionally, aquaparks, amphitheaters and open air restaurants were arranged near the seaside (Figure 73). The configuration of these open spaces is basically based on the rules imposed by Coastal Law, which determine the construction prohibitions and the structures to be erected on coasts. Even though the main reasons for the landscape design of the south part of the land are providing an open sea view and obeying above mentioned legal obligations, their consequences such as avoiding trees with large canopies, planting small bushes and leaving this part of the land as empty, enable south facing facades to take maximum advantage of the sun's potential energy.

Figure 78 The palm trees on the south part of the land (taken by the author, December 2013).

Additional to the above mentioned considerations, palm trees were planted to evoke exotic holiday images. These plants were firstly imported from foreign countries. The manager of the hotel declared that a harmful insect which is not native to Turkey entered the region through the import of palm plants. After this evidence, they preferred to use palms cultivated in Turkey. These plants are widely used as ornamental plants rather than climatic considerations.

Besides, some local native vegetation is randomly planted over the landscape. These are sand lilies, rose bay, banana, citrus and orange trees (Figure 79). Even though it is limited, preference of native vegetation in some parts of the garden improves customer experience at least.

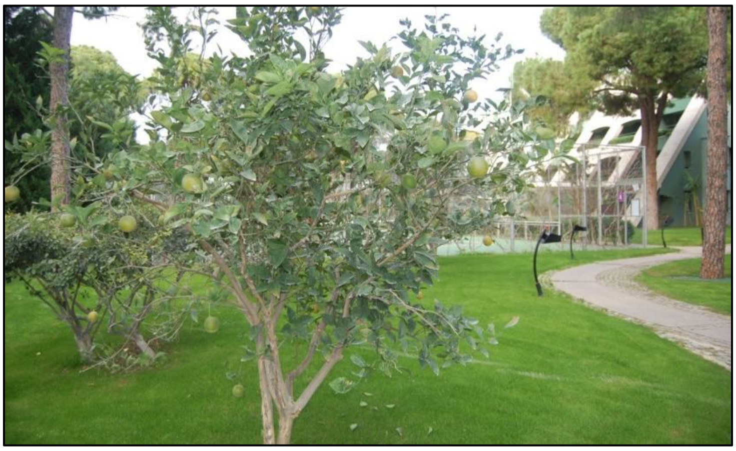


Figure 79 A citrus tree inbetween the blocks (taken by the author, December 2013).

As a conclusion, arrangement or orientation of planting was not generally made with the consideration of shading or natural ventilation purposes. In case of developing the landscape design of the hotel, providing an open sea view for hotel building was preferred rather than establishing sustainable design principles.

- *Orientation*

As previously dealt in the "topography" section the area of the hotel complex has a nearly-level land with a very gentle slope. Although the land slope is less than 5 %, it is directed to south. Therefore, the hotel complex is placed on a location where the solar gain is advantageous. The slope receives the sunlight directly. It may be an advantage for the underheated periods (December, January and February) for passive heating.

Regarding the wind patterns and prevailing winds, the location is favourable, too. Summer winds coming from south directions (SSW, S and SSE) helps to maintain cooling effect in over-heated periods. However, the massive built up structure of the main building blocks these relaxing winds. Although the orientation is suitable in terms of climatic aspects, the design of the hotel does not take the advantage of these conditions. On the other hand, during underheated periods cold winter winds blow mainly from N and NNW. The pinus pinea trees and the solid masonry walls of convention center which are on the north part of the land prevent winds blowing from these directions (Figure 73).

- *Settlement patterns*

There is a complex form of settlement pattern in this case. In the main building, the accommodation units lay together with the other services such as reception, halls, and restaurants. From this point, it has a compact form which has close physical relationships between different functions. On the other hand, other accommodation units as well as the convention center are dispersed through the land without a specific pattern.

Particularly, the main building has an irregular shape and an angled position. Because of this complex configuration, there is a lack of design consideration for ventilation and shading. The building has four to six floors. Various wings with various heights provide potential to cast shadow for adjacent opens spaces.

There are two open spaces arranged nearby the main hotel building. These are also used as outdoor sitting areas as the extension of the lobby. One of them is on the north part of the main building (Figure 80). An ornamental pool is placed close to the open air sitting area. This space accommodates small bushes, pinus pineas and plants around the pool, which create a natural setting. The space is surrounded by north-easterly and north-westerly oriented walls. The large surface area of the ornamental pool is shaded by these walls. This pool may help to pull down the air temperature. On the other hand, it can increase the evaporation rate and humidity levels. In over-heated periods, particularly from July to August, in which the humidity level and air temperatures are high, this pool is likely to cause higher level of discomfort. Hence, this configuration does not suit this (Mediterranean) region.

Figure 80 The ornamental pool and the open air sitting area (taken by the author, December 2013).

The other open space arranged nearby the main hotel building is on the northeast side (Figure 81). This patio is surrounded on four sides by the walls of the main hotel building. Thus, it is considerably isolated from the outdoor climatic conditions. The patio is named as winter garden by the hotel management and it is generally used through this period. This is due to the blockage of the prevailing north winds by the walls of the hotel in winter. On the northeast side of the patio, there is a one story block. Hence, solar radiation can reach the open air area, particularly from morning to noon. On the other hand, the daytime air temperature might be dropped through undesired shading in winter. The patio is mainly shaded by the surrounding walls and the pinus pineas in it. These trees have high trunks with wide canopies. They are evergreen plants; hence they reduce incoming daylight and sun in winter. Besides, the canopy of the pinus pineas can effectively reduce the amount of the solar radiation striking the patio's ground during over-heated period. They can decrease the temperature of the patio by mixing the relatively cool air of the area with the warmer air flowing over the surrounding roofs of the buildings. By this way, it helps to maintain a relatively cool indoor air temperature by reducing the heat gain of the buildings. In sum, during winter the patio serves as a pleasant protected open air area and in summer as a passive cooling building feature. Both of the open spaces reduce noise pollution and improve the quality of experience of visitors.

Figure 81 The patio which is called winter garden (taken by the author, December 2013).

The trees planted throughout the land do not provide adequate shade for pedestrian ways. Palm trees were generally planted along these ways and they do not have much cooling effect (Figure 82). On the other hand, some remaining pinus pineas near these paths provide better shade, because of their large canopies (Figure 83).

Figure 82 Palm trees planted along pedestrian ways (taken by the author, December 2013).

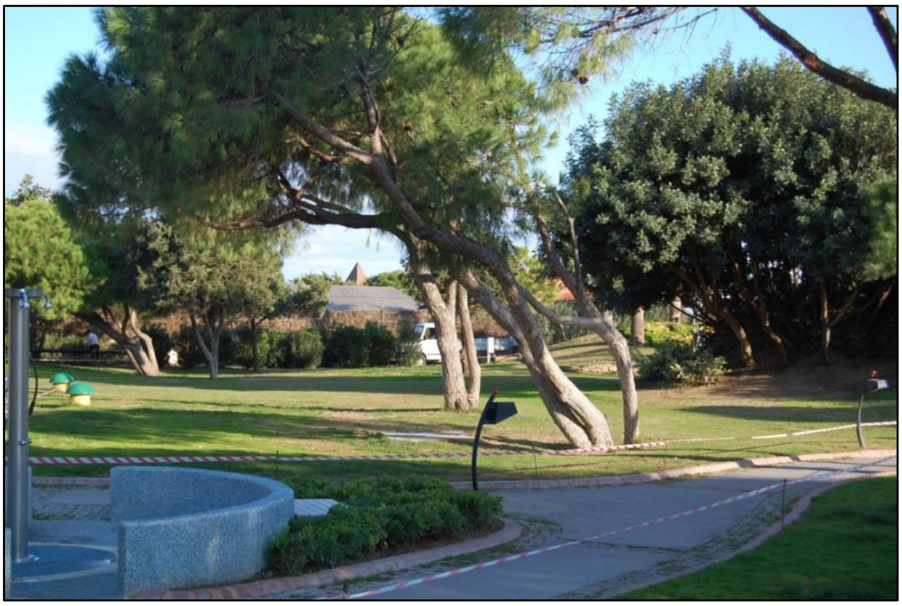


Figure 83 Pinus pineas near a pedestrian way (taken by the author, December 2013).

Throughout the land there are some semi-open exterior spaces arranged as arcades and verandas. The arcades are generally used to link the accommodation units (Figure 84). They provide shade and shelter for the pedestrian ways or open space areas they covered (Figure 85). There is also a veranda in the garden of the hotel which is served as a snack bar (Figure 86). Moreover, pergolas are used as permanent architectural features, which provide an open air sitting area for the snack bar and the restaurant (Figure 87). While these pergolas let sea breezes and daylight penetration, they also provide protection from the harsh glare of direct sunlight. All of these features create an opportunity to use the open and semi-open spaces almost all through the year.

Figure 84 Arcade between the main block and the accommodation unit (taken by the author, December 2013).

Figure 85 Arcade over the open air areas (taken by the author, December 2013).

Figure 86 A freestanding veranda in the garden of the hotel (taken by the author, December 2013).

Figure 87 The pergolas over open air restaurant (taken by the author, December 2013).

- *Hazards*

Antalya receives rainfall mostly during November to March period, with a monthly average of 173 mm, and most of it vanishes as run off. However, the concretization of the land may probably worsen natural ground water absorption or storage over time. Additional to depletion of groundwater, aquifers may face the threat of contamination from sewage. Eventually, the water resources may face the threat of pollution. The unrestrained urbanization is also likely to increase the flooding potential with the loss of green areas. As dealt in the topography part, flat topography of the area may also increase the risk of flooding and erosion.

Another threat in the region is the sandy winds blowing from the Mediterranean Sea. However, there are no sand dunes along the coastline. The only measure taken for sandy winds is planting sand lilies and small bushes near the coast (Figure 88).

Figure 88 Sand lilies and small bushes along the coastline (taken by the author, December 2013).

B) BUILDING DESIGN

Based on the data collected and evaluated in the previous chapter, this topic is organized into the following sections: (1) plan layout and organization of spaces, (2) shape and volume, and (3) colour selection.

- *Plan layout and organization of spaces*

The hotel building is comprised of a wide range of services and functional units. The diversity in functions and space organization is reflected in a complex plan layout like the first hotel evaluated in this study.

The main hotel building combines most of the functions of the hotel. On the ground floor, there are entrance hall, reception, lobby, meeting rooms, patisserie, shops, gym, fitness center, Turkish hamam, sauna, massage room, steam bath, coiffeur, foyer, bar, multipurpose halls, personnel units and restaurant. On the other hand, spaces such as disco, game room, bowling hall and multipurpose halls which can be illuminated by artificial means are located on the basement floor (Figure 89).

Figure 89 The multipurpose hall located on the basement floor (taken by the author, December 2013).

On the first, second, third and fourth floors of the main building (Figure 90), there are accommodation units. Because of the complex plan layout of the hotel, various plan types were employed together. When considering their shapes, linear and curvilinear plans were used. On the other hand, according to their directional orientations, plan type of the accommodation units is multilateral, in which each wing of the plan faces different directions. Some of the wings (1, 3, 4 and 5) have rooms located on one side of the corridor. The corridors of these wings are designed with multiple windows and exposed to the daylight on one side, hence supply fresh air and significant natural ventilation. Moreover, some of the wings (2 and partially 6) have plan characterized by a corridor having rooms on two sides and multiple atria. These atria and their surrounding are illuminated by daylight through toplight components. In sum, the rooms and the corridors of the main building are not oriented towards any particular direction because of the complex and irregular shape of the layout.

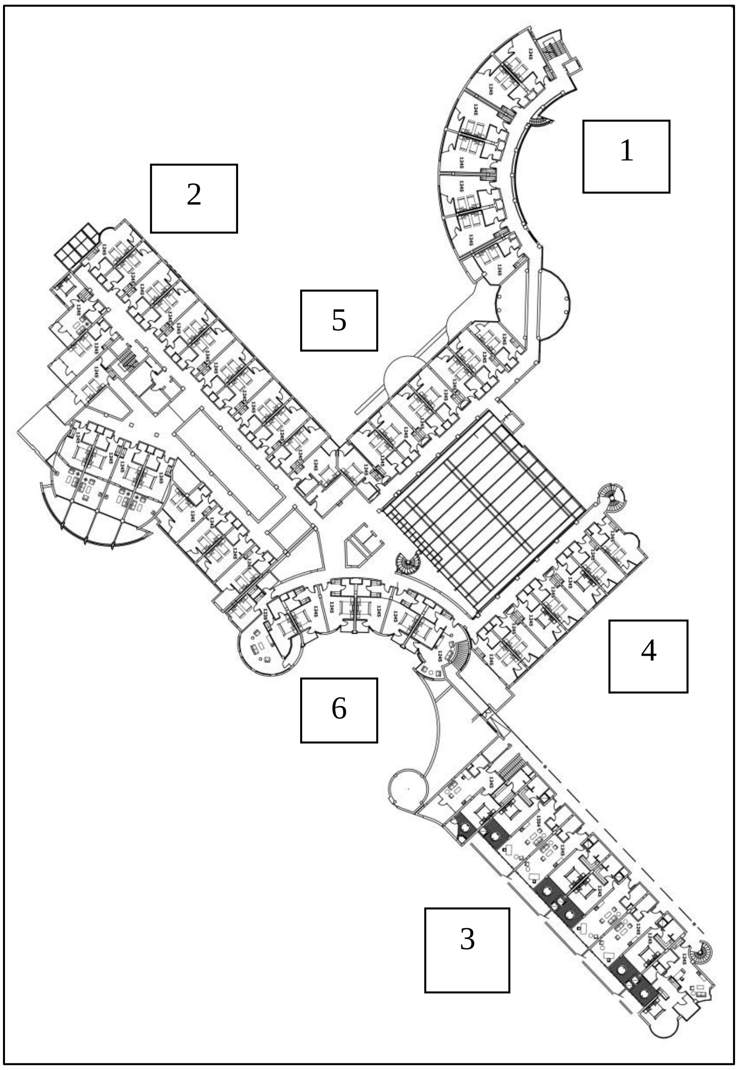


Figure 90 A floor plan of accommodation units in the main building (archieve of Limak Atlantis Hotel Management).

The accommodation units called O and P blocks have similar plan layouts. These blocks are thicker than the dimensions that can support side lighting. Hence, multiple atria are used to provide light to the interiors. They are used both for lighting adjacent corridors and providing light to the indoor plants (Figure 91, Figure 92).

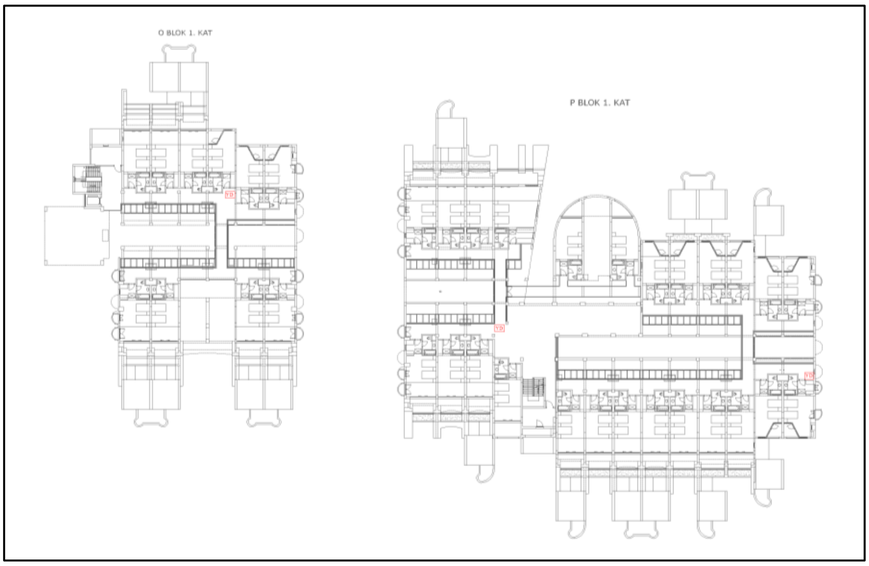


Figure 91 First floor plans of the O and P blocks (archieve of Limak Atlantis Hotel Management).

Figure 92 Indoor plants on the basement floor of the O Block (taken by the author, December 2013).

In principle, the buildings comprising the hotel complex are divided into zones, basically rooms and public spaces. Moreover, the public spaces which require similar heating or cooling systems and time of operation are grouped and combined. Internal circulation and relationship to other departments also play important roles in configuration of these spaces. For example, on the ground floor, spaces with similar system requirements and time of operation such as Turkish hamam, sauna, steam bath, massage room, gym, and fitness center are clustered together. Moreover, the multipurpose halls and their foyer and bar are grouped next to each other. Furthermore, the indoor and the outdoor swimming pools are placed on the same floor. Hence, the preparation units such as dressing rooms, clothing storage, showers and toilet facilities can serve the tourists who want to use these pools.

- *Shape and volume*

Rectangles, arches and modified triangles have been used in the hotel complex. Among all the buildings in the hotel complex, none of them is elongated on E-W axis. As previously dealt in the sections of “settlement pattern” and “plan layout and organization of spaces” there is no design principle for orienting the buildings to a particular orientation. Hence, there is not an effort to maximize the south-facing elevation of the buildings.

Generally, the buildings in the terrain are high-rise type, with five to seven floors. These buildings receive much radiant heat and obstruct the flow of wind to neighbouring buildings and their surroundings. Particularly, the main building has a large exterior wall area because of its complex shape. Therefore, this building is exposed to greater heat gain and loss.

- *Colour selection*

Light colours such as white (with %80-90 reflectance), pale green (with %70-75 reflectance) and pale beige (with %70 reflectance) were used for the building envelope (Figure 75, Figure 76, Figure 93). The concrete flat roofs have a layer of pebbles which have the colour of light grey and white. Moreover, the roof of one of the wings of the main hotel is white in colour (Figure 69). By selection of light colours, more solar radiation is reflected and the heat gain is reduced from the exterior walls and particularly from the roof.

Figure 93 The northeast elevation of the main building (taken by the author, December 2013).

As seen in Figure 94, the hotel rooms are furnished with wall to wall carpeting which is cream in colour. The walls are also in cream and the ceiling is in white. These light colours have high reflection values. On the other hand, black is used in window frames of the rooms. The high contrast between window frame and adjacent walls tends to increase the effect of glare. However, most of the hotel rooms have balconies which provide shade, hence reduce glare. The similar colour selections are observed for the corridors (Figure 95). The white colour for the walls of the corridor increases the feeling of brightness while creating glare when used together with dark coloured window frames.

Figure 94 Colour selection for rooms (taken by the author, December 2013).

Figure 95 Colour selection for corridors (taken by the author, December 2013).

In the lobby and the restaurant the colour selections are the same. The window frames and the adjacent walls are black in colour, thus reduce glare. On the other hand, the ceilings and the floors are white. The preference of this colour can increase the penetration of daylight into these spaces.

Figure 96 Colour selection for the restaurant (taken by the author, December 2013).

Figure 97 Colour selection for the lobby (https://www.tripadvisor.co.uk/, last visited on February 2016).

C) BUILDING COMPONENTS

Within the data evaluated in the previous chapter, this topic is organized into the following sections: (1) openings and windows, (2) shading devices, (3) walls, (4) roofs, (5) foundation and basement, (6) materials, and (7) mechanical equipment and technologies.

- *Openings and windows*

Because of the complexity of settlement pattern and irregular shape of the main hotel building, its openings do not face any particular direction. There is therefore, no tendency to arrange the main openings so as to face south or north.

The accommodation units, which are called as O and P blocks are elongated along S-N axis, hence the openings of these rooms are facing east and west. This configuration may lead to an increase in energy consumption; particularly for the cooling energy demand of these buildings. Besides, these buildings have atria having a glazed roof which provide light to the interior (Figure 98). Solar radiation that penetrates through the glass roof may cause discomfort in these buildings especially during the overheated period. Moreover, these glazing units on the roof are fixed, so that natural ventilation through stack effect is not possible. On the other hand, the type of the atria within these buildings is linear (Figure 91). Therefore, when the main entrance doors of the accommodation blocks are opened, cross ventilation can take place (Figure 99).

Figure 98 The atria of the accommodation units, looking upwards (taken by the author, December 2013).

Figure 99 One of the entrance doors of the accommodation units (taken by the author, December 2013).

Throughout the land, most of the hotel rooms do not have two exterior walls or windows. Of course, this mainly depends on the plan type and function of the accommodation units. For this type of rooms, it is not possible to provide cross ventilation. On the other hand, the rooms located in the corner of buildings have two openings. Since they have windows on two adjoining sides, this arrangement supplies a considerable quantity of light and ventilation to these rooms.

Particularly in the main building, there are various configurations for openings. The windows of the hotel rooms are arranged without any fixed rules, but they are generally placed in the center of the walls of these rooms in the vertical direction.

All of the fenestrations used in all buildings of the hotel complex have double glazing. These double glazed windows consist of two layers of glass which have a layer of inert gas sealed between them. The airtight construction of these windows creates thermal insulation, and reduces heat transfer.

- *Shading devices*

Shading the windows is one of best ways to reduce the glare and unwanted heat gain. However, the use of shading devices for sun control is limited for this hotel. In the main building, majority of the rooms have balconies which can provide shade for interiors. However, these are not oriented to a particular direction. Furthermore, most of the large glazed surfaces of this building do not have solar control devices (Figure 100). In hotel rooms, decorative curtains are used for reducing glare (Figure 76). Heavy drapes and tulle curtains closing rather tightly against the window frame are utilized for thermal insulation. These curtains and tulles are generally kept closed to reduce heat gain in vacant rooms and some of the spaces having large glazing surfaces. However, curtains and tulles as interior shading devices are not as efficient as the exterior ones to reduce solar heat gain. Although their thermal performance is limited, they can provide visual comfort by eliminating glare. They enable occupants of the room to regulate the amount of direct sunlight entering the space.

Figure 100 The southeast corner of the main building (taken by the author, December 2013).

In the O and P block different types of balconies are used (Figure 101, Figure 102). These balconies and solid parapet walls near some of them can be counted as architectural elements which provide shade for these blocks. Particularly, the solid parapet walls do not perform well, because the windows are facing the unwanted east or west directions, while the vertical parapets block the desirable north and south orientations (Figure 91, Figure 102).

Figure 101 The balconies on the South elevation of the P Block (taken by the author, December 2013).

Figure 102 The parapet walls near the balconies of the P Block (taken by the author, December 2013).

- *Walls*

Reinforced concrete frames infilled with brick masonry are used all through the hotel buildings (Figure 70, Figure 71). Therefore, we may say that the construction is mainly made of dense materials and thermal mass. In winter, this thermal mass absorbs and keeps the heat that is allowed to penetrate the spaces (either hotel rooms or halls) during the day, and releases it at night when the surrounding air begins to get cooler. In summer, any heat that does penetrate into these spaces during the day can be absorbed by the thermal mass to prevent over-heating. Although cross-ventilation is not possible for the majority of the rooms, the thermal mass should be cooled by airflow to control internal temperature especially at night, when the heat is released back into the room. The use of these materials on the walls can ensure a stable and comfortable interior temperature. However, the buildings in the hotel complex do not have any wall insulation. Hence, their thermal resistance is very low. On the other hand, a construction work to install thermal insulation to the exterior of the walls has been started during the site study of this thesis (Figure 103).

Figure 103 The construction work to install thermal insulation (taken by the author, December 2013).

- *Roofs*

The roofs of the hotel are generally flat (Figure 69). Concrete is used for most of the roofs, which were covered with heat and water insulation. Flat roofs have high thermal resistance in general.

The pitched roof of the indoor swimming pool is supported by lightweight steel trusses (Figure 104). The design of this roof construction enabled the increase of the ceiling height. Since, the fixed structure of the toplight fenestration cannot provide roof ventilation; the excess moisture of the pool is removed through side fenestrations.

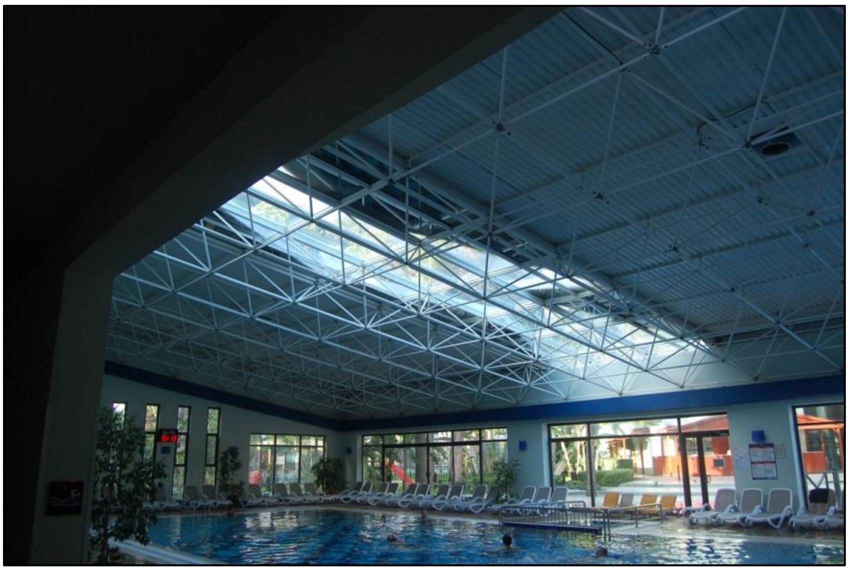


Figure 104 The roof of the indoor swimming pool (taken by the author, December 2013).

- *Foundation and basement*

The basement floors of the buildings in the hotel complex contact with the ground. In the construction of the basement walls and floors, concrete, which has thermal mass properties, is used. Heavy-weight nature of basement construction allows storage of heat particularly during the underheated period. Additionally, this thermal mass regulates the interior temperature of the hotel.

- *Materials*

There is no information gathered about the design decisions for material selection during construction period. However, the managers declared that during the operational phase, they preferred to select materials that are durable, flexible, warranted (for maintenance) and modular. This allows minimizing demand for renewing. For minimizing wastage, they declared that used furniture and materials are given to charity institutions which collect and redistribute such goods.

It is my impression that the environmental impacts of materials were not considered in selecting materials and furnishings. Levelling concrete, paint, plaster, brick, wallpaper, gypsum, and hardwood are among the widely used materials in this hotel. There is no eco-labeled building material used in the complex.

- *Mechanical equipment and technologies*

The hotel was not designed with the idea of integration of passive and active systems. However, during the refurbishment process the managers decided to install HVAC and renewable energy systems.

Some measures are taken to reduce the energy consumption of buildings to improve internal comfort. These include insulation of boilers, hot-water tanks, waterpipes, and valves, installation of highly efficient boilers and new technologies such as frequency inverter and heat recovery system, use of exchangers generating hot water, selection of central and local heating and cooling equipment according to the specific needs of the spaces, use of energy efficient lighting fixtures, installation of motion or light sensitive illumination systems in the corridors and common places.

Furthermore, one of the renewable energy systems is installed in the hotel complex. There are 380 flat plate solar collectors installed on flat roofs of the complex to produce domestic hot water. At least 50 % of the hot water used in the hotel is generated from this renewable energy source.

4.5.3 CASE STUDY 3: XANADU RESORT

The third hotel building studied here was settled on a land that was allocated to the tourism investors by the Ministry (Figure 105). The land was declared as a conservation forest before the permission given for construction. It was allocated on 20.05.1992 for the purpose of construction of a first class holiday village with a capacity of 650 beds. Depending on the 1/1000 scale Implementation Master Plan Revision for Acısu district on 19.10.1993, the area of the land expanded from 83.000m^2 to 127.000m^2. The investors requested for expansion of capacity to 1000 beds and changing the establishment type to a hotel. Although they took the permission for 1000 beds from the Ministry, the investors preferred to construct a hotel with 890 beds. The built-up area of the hotel is 37.000 m^2, on the land of 127.000 m^2.

The architectural project was designed by ÜÇMİM Mimarlık Tic. Ltd. Şti. The project was approved in 1995, and the hotel was opened to guests in 2000. A Spa center, which was designed by Syntax Group in 2005, was added to the hotel complex in 2006. According to the records of the Ministry of Culture and Tourism, the hotel has a “Five-Star Tourism Accommodation Establishment Certificate.” Furthermore, the hotel has been awarded the “Green Star Certification” on 28.06.2010.

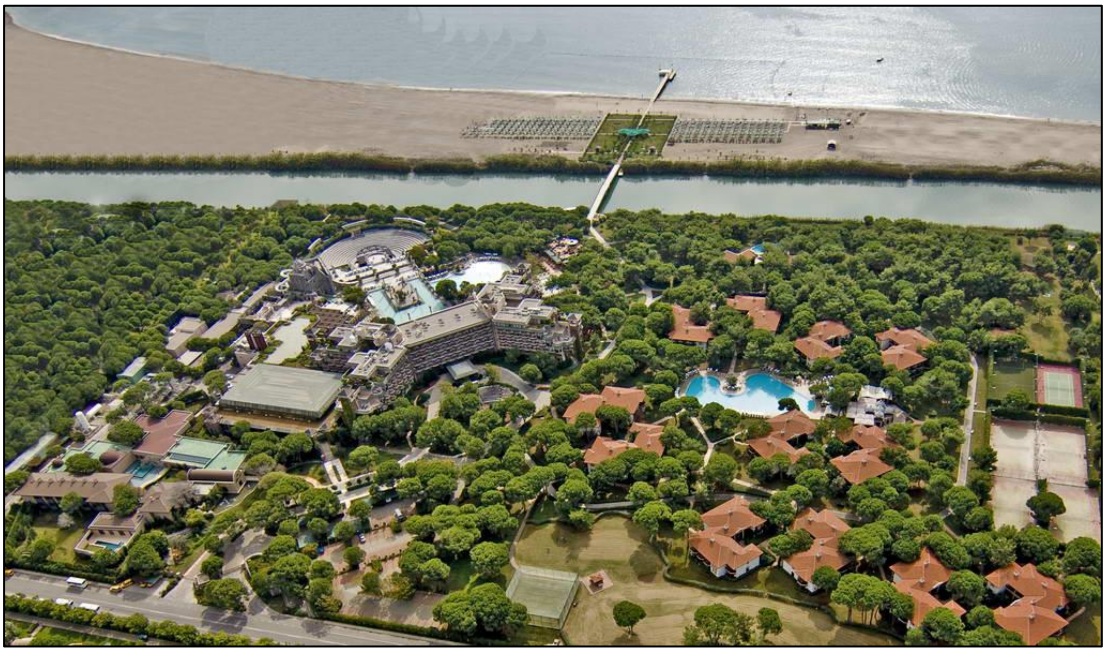


Figure 105 A general view of Xanadu Resort Hotel (www.sagitariotravel.ro, last visited on August 2014).

As is seen in Figure 106, necessary measures for the protection of trees were ignored when the construction work was conducted. No protective fence was installed around the trees during the construction work. Moreover, the construction materials were stored in the tree protection zone.

Figure 106 A photograph from construction period (archieve of Ministry of Culture and Tourism).

The hotel is managed by a limited company and operates nearly all year round. It is generally closed from January to March for annual maintenance. During peak season, from June to September, hotel occupancy is 80-90%. The hotel provides an all-inclusive service system, in which services such as room services, breakfast, lunch, dinner, activities, entertainments, etc. are covered under a fixed price package.

In the following sections, the hotel will be evaluated through general design criteria, which was determined in 3.2.1. The issues related to the main topics of: (A) location and site planning, (B) building design, and (C) building components will be covered.

A) LOCATION AND SITE PLANNING

Within the data evaluated in the previous chapter, this topic is organized into the following sections: (1) transportation means and ways, (2) topography, (3) natural and man-made surroundings, (4) orientation, (5) settlement patterns and (6) hazards.

- *Transportation means and ways*

The hotel is situated 39km away from Antalya Airport, 49km from the city center, and 7km from the center of Belek. There are various transportation alternatives including shuttles, taxis, and rent a car to access to these points from the hotel building.

Public transport options are limited with shuttles. There is one local shuttle stop close to the hotel building (Figure 107).There are also private shuttles hired by travel agents for transportation of the tourists. The hotel provides free transportation for tourists to two golf courses, close by.

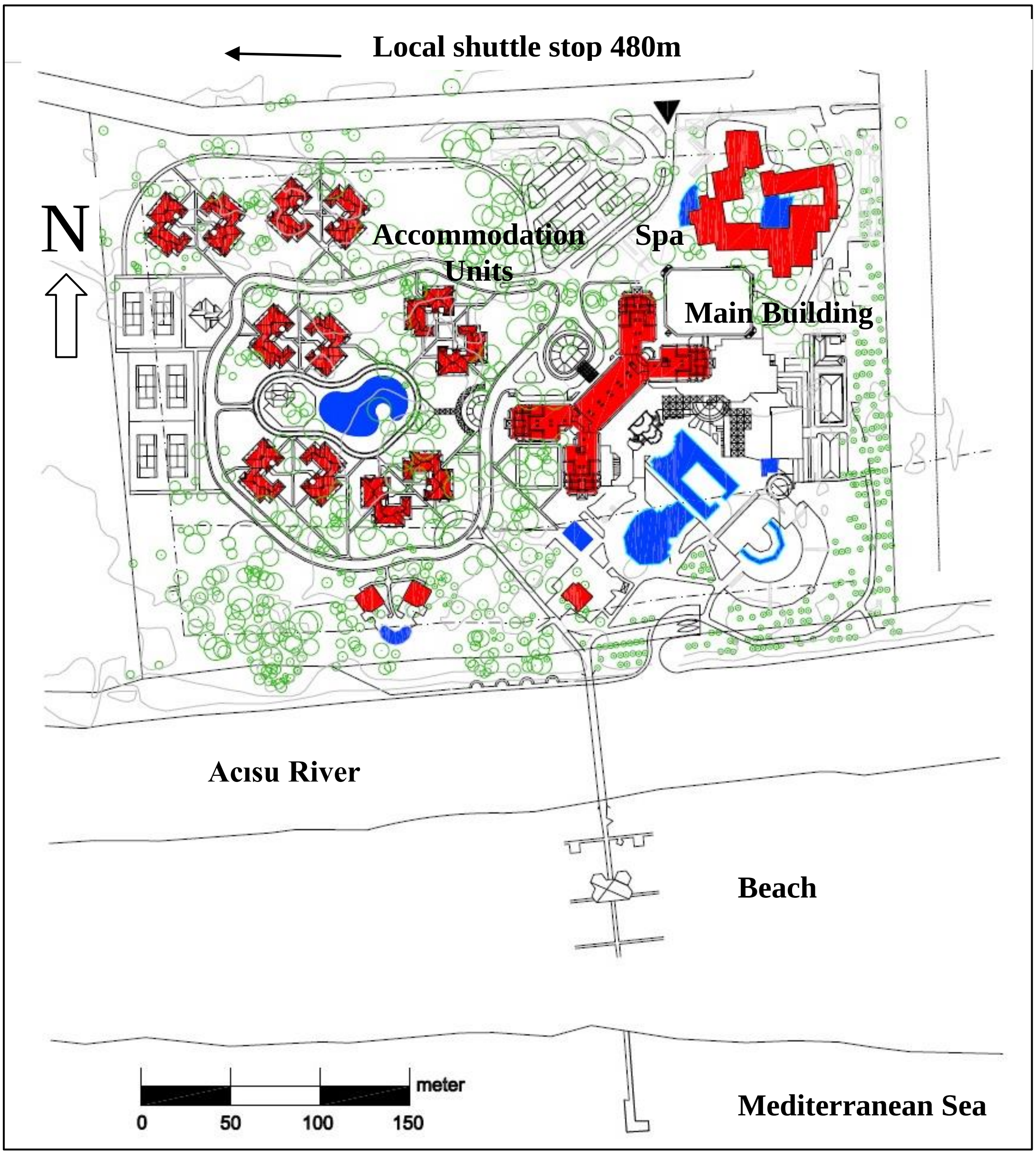


Figure 107 Site plan (redrawn by the author, adapted from the drawings in the archieve of Ministry of Culture and Tourism).

A secure parking lot located on the north part of the land is provided to the customers of the hotel (Figure 108). In this part of the land, existing trees together with canvas canopies provide effective shade for cars and individuals.

Figure 108 The parking lot located on the north part of the land (taken by the author, December 2013).

Belek region is largely dependent on motor vehicles for transportation. Inside the land of the hotel, there are pedestrian roads. Furthermore, the hotel has six alternative fuelled vehicles (battery electric vehicles), which are mainly used by the staff inside the land of the hotel for short distances at low speeds (Figure 109).

Although there are no public transportation options or any specialized arrangements for the people with disabilities in Belek region, inside the hotel building and its environment, there are several arrangements for inclusion of all people. As mentioned in the previous two cases (Section 4.6.1 and 4.6.2), such arrangements are obligations for hotels certified by the Ministry.

Figure 109 Alternative fuelled vehicles (taken by the author, December 2013).

- *Topography*

The hotel was settled on a land with a very gentle slope (%0-5). The relatively flat character of the land contributes to the relatively uniform climatic conditions throughout the terrain. This terrain is located on the north side of the Acısu River. The effects of its location will be dealt in the following section.

- *Natural and man-made surroundings*

The land of the hotel is neighbouring Belek Special Environmental Protection Area (Figure 110). Particularly, the sandy beach which can be accessed via a footbridge from the hotel is also a nesting ground for rare loggerhead sea turtles. The trees on the south part of the land can act as a natural barrier to artificial light originating from hotel complex. Therefore, these trees can be an effective solution for preventing artificial lights which can disorient hatchlings and hinder their ability to find the sea and deter mother loggerhead turtles from choosing appropriate nesting locations (Verutes et al., 2014). The hotel managers also declared that they turn off hotel's beachfront lights during sea turtle nesting season. On the other hand, the use of the beach by the visitors of the hotel for sunbathing, watersports, beach bar and similar touristic facilities affect the sea turtle nesting population in a negative way. This situation was not unique to this hotel but also regarded a general threat for Belek region by Canbolat (2004) who has studied sea turtle’s nesting activity along the Mediterranean coast of Turkey.

Figure 110 The location of the hotel (prepared by the author, adapted from Google Earth, image dated April 19, 2016. 36°50’21.56”N, 31°07’18.95”E. https://www.google.com/earth/download/ge/, last visited on June 2016).

The hotel sits within the natural pinus pinea forest that borders the Acısu River flowing through Belek. Due to the location of hotel near large water surfaces as the Acısu River and Mediterranean Sea, the building may benefit from breezes which blow from sea towards the land during the day. However, natural forest cover preserved on the south part of the land acts as windscreen and partially obstructs the free flow of the cooling breezes (Figure 111). On the other hand, these trees together with the natural cover provide protection against wind-blown sand (see also the section “hazards”).

Figure 111 The view of south part of the land from the bridge (taken by the author, December 2013).

On the east part of the land, the natural forest cover was generally affected by the large construction areas of the main building, Spa center and the open space areas such as outdoor swimming pools, amphitheatre and snack bars (Figure 107). Apart from these built up structures, the natural forest cover is protected on this side of the land.

The native vegetation is mostly protected on the west part of the terrain. The low rise accommodation units were designed to integrate into the natural landscape (Figure 112). Particularly, the southwest part is still covered in its native plant habitat; hence indigenous insects and birds can be observed in the garden of the hotel. Moreover, the north part of the land is mainly covered with grass and trees. This kind of vegetation in open areas can help to moderate extreme temperatures.

Figure 112 Trees and accommodation units on the west part of the land (taken by the author, December 2013).

- *Orientation*

As previously dealt in the “topography” section, the area of the hotel complex has a nearly-level topography with a very gentle slope. The land slope is less than 5 %, and it is directed to south. Therefore, the hotel complex is placed on a location where the solar gain is advantageous. The slope receives the sunlight directly. It may be an advantage for the underheated periods (December, January and February) for passive heating.

Regarding the wind patterns and prevailing winds, the location is favourable too. However, the vegetation in the south part of the land blocks the relaxing summer winds coming from this direction. On the other hand, the forest cover on the north part is beneficial to block the cold winter winds.

- *Settlement patterns*

The land is divided into two parts according to the settlement patterns. On the east part of the land there is a compact settlement, while the settlement on the west is scattered (Figure 105, Figure 107).

Different functions with close physical relations (such as accommodation units, reception, halls and restaurants) comprise the compact form of the main building. This X-shape building has 6 floors which provide potential to cast shadow over adjacent open spaces. However, only an open air restaurant is arranged nearby the building. The Spa Center is also located on the east part of the land (Figure 107, Figure 113). Although designed later, it has physical connection with the main building. The units of the Spa Center were arranged around a patio, which is elongated on an E-W axis. The walls of the units provide shade to outdoor sitting areas and the pool in the patio. Due to its evaporative cooling effect, the pool helps to decrease the air temperature in the vicinity. On the other hand, it somewhat increases the humidity levels. Therefore, this configuration does not suit well to the characteristics of Mediterranean region, which has high humidity levels and air temperatures in summer months.

Figure 113 Floor plan of Spa Center (http://v2.arkiv.com.tr/, last visited on August 2014).

On the west side of the lot, there are low rise accommodation units, which are dispersed through the land. Particularly, the trees near these accommodation units cast shadows on the roofs and facades of the buildings (Figure 112). Protection of the natural vegetation, especially the pinus pineas, provides effective shading for the pedestrian ways and gathering areas (Figure 114).

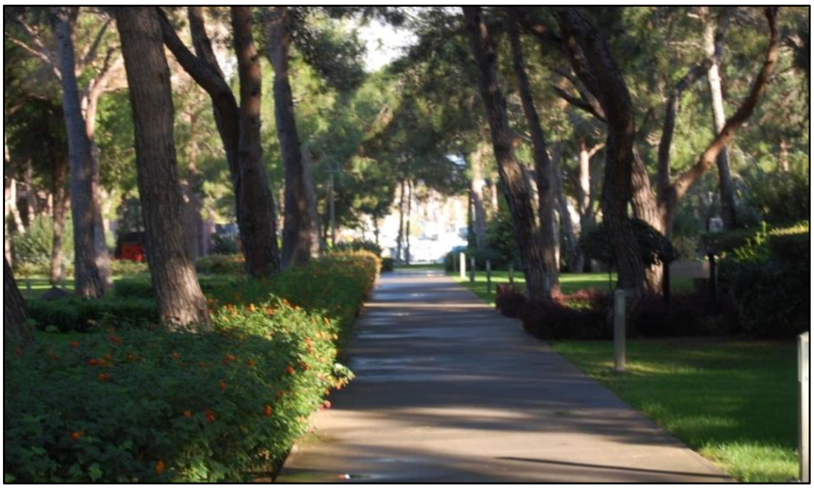


Figure 114 A pedestrian way on the west side of the land (taken by the author, December 2013).

- *Hazards*

The flat topography of the area and its proximity to Acısu River may increase the risk of flooding and erosion. Another threat in the region is the sandy winds blowing from the Mediterranean Sea. Maintenance and recreation of native plants in the terrain is one of most effective precautions to prevent these threats.

B) BUILDING DESIGN

Based on the data collected and evaluated in the previous chapter, this topic is organized into the following sections: (1) plan layout and organization of spaces, (2) shape and volume, and (3) colour selection.

- *Plan layout and organization of spaces*

The main building is comprised of a wide range of services and functional units. The diversity in functions and space organization is reflected in a complex plan layout. There are restaurants, patisserie, bars, fitness center, indoor swimming pool, shops and conference halls as well as reception and lobby at the entrance and mezzazine floors of this building. On the first, second, third and fourth floors of the main building, there are accommodation units (Figure 115). When considering their shapes, linear plans were used in the accommodation units of main building. On the other hand, according to their directional orientations, plan type of the accommodation units is multilateral, in which each wing of the plan faces different directions. Each wing has a plan characterized by a corridor having rooms on two sides. The rooms of the main building are not oriented towards any particular direction because of the X-shape of the layout.

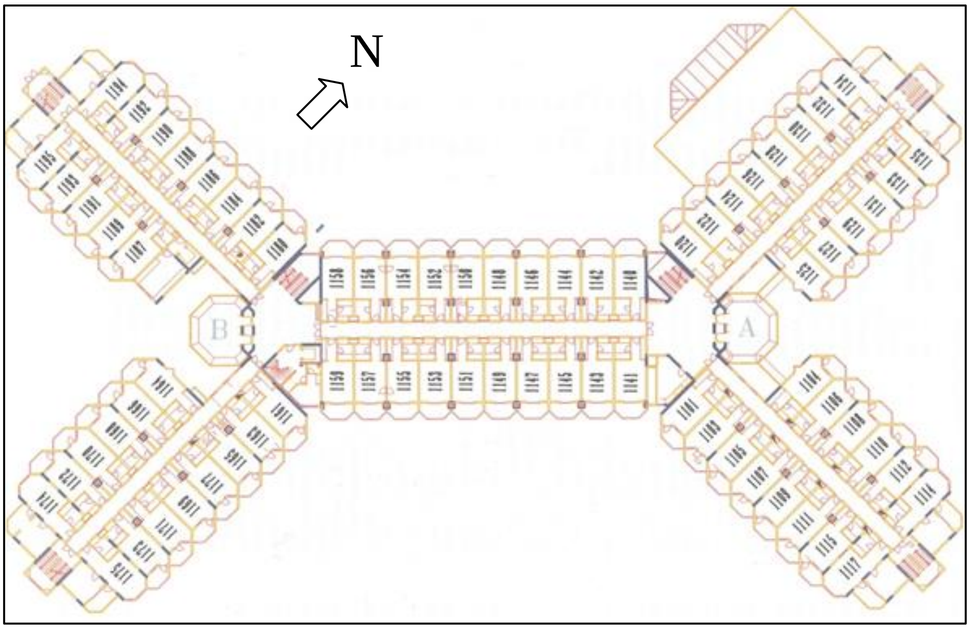


Figure 115 First floor plan of the main building (archieve of Xanadu Resort Hotel Management).

The low rise accommodation units have a C-shape layout (Figure 116). The rooms are located on one side of a corridor. Since these corridors are semi-open, they can supply fresh air and significant natural ventilation. These units are positioned on the land with different angles (Figure 107) and each wing of the C-shape faces different directions. Therefore, the rooms and the corridors are not oriented towards any particular direction.

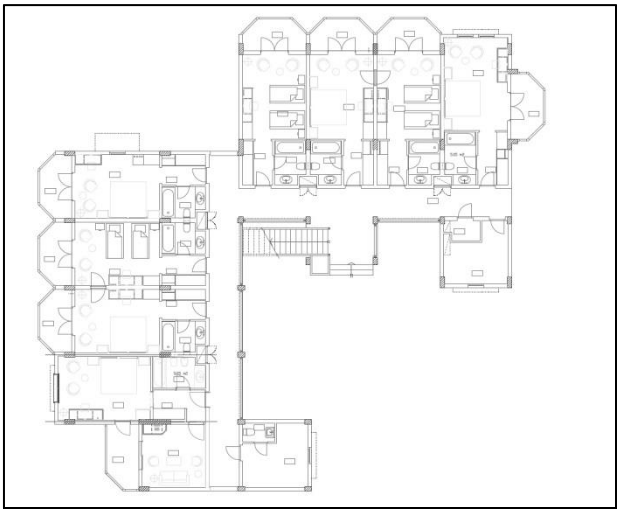


Figure 116 A floor plan (+0.00) of low rise accommodation units (archieve of Xanadu Resort Hotel Management).

In principle, the buildings comprising the hotel complex are divided into zones, basically guest rooms and public spaces. Moreover, the public spaces which require similar heating or cooling systems and time of operation are grouped and combined. Internal circulation and relationship to other departments also play important roles in configuration of these spaces. Spaces are efficiently used by locating support spaces so that they can be shared by adjacent functional areas. For example, the conference halls, their foyer, restaurants, lobby and the carpark are grouped next to each other.

These adjacencies are based on a functional program. Furthermore, the indoor and outdoor swimming pools are placed on the same floor. Hence, the preparation units such as dressing rooms, clothing storages, showers and toilet facilities can serve tourists who want to use these pools.

- *Shape and volume*

As previously dealt in the sections of "settlement pattern" and "plan layout and organization of spaces" there is no design principle for orienting the buildings to a particular direction. Hence, there is not an effort to maximize the south-facing elevation of the buildings.

The main building is a high-rise type, with six floors. Because of its large exterior wall area, this building receives more radiant heat and it is exposed to greater heat gain and loss. On the other hand, its X-shape layout provides self-shading surfaces that may decrease the direct solar radiation gain. The low rise accommodation units have U-shape layout with two floors. Therefore, they have less heat gain and loss.

- *Colour selection*

Light colours such as pale yellow and pale rose (with %80 reflectance) were used for the building envelope (Figure 117). Moreover, the flat roof has a layer of pebbles which have the colour of light grey and white. By selection of light colours, more solar radiation is reflected and the heat gain is reduced from the exterior walls and particularly from the roof.

As is seen in Figure 118, the ceiling and the walls of the rooms are white in colour while window frames are cream. All rooms are furnished with wall to wall carpeting which is also cream in color. The low contrast between window frame and adjacent walls reduces the effect of glare within the spaces. A similar colour selection is observed in the corridors.

Figure 117 North-west elevation of the main building (taken by the author, December 2013).

Figure 118 Colour selection for the rooms of the main building (taken by the author, December 2013).

The lobby, spa center, and the foyer of the conference hall have cream window frames (Figure 119). They have cream and pale rose walls, white ceiling and beige-coloured floors. The preference of these light colours can increase the penetration of daylight into these spaces.

Figure 119 The foyer of the conference hall (taken by the author, December 2013).

C) BUILDING COMPONENTS

Within the data evaluated in the previous chapter, this topic is organized into the following sections: (1) openings and windows, (2) shading devices, (3) walls, (4) roofs, (5) foundation and basement, (6) materials, and (7) mechanical equipment and technologies.

- *Openings and windows*

There is no tendency to arrange the main openings so as to face south or north in the main building or in the low rise accommodation units.

Majority of the hotel rooms in the main building do not have two exterior walls or windows. Of course, this is mainly due to the plan type and function of the accommodation units. For this type of rooms, it is not possible to provide cross ventilation. On the other hand, the rooms located in the corner of buildings have two openings. Since they have windows on two adjoining sides, this arrangement supplies a considerable quantity of light and ventilation to these rooms.

On the other hand, the low rise buildings have the opportunity to provide cross ventilation. However, there is no design consideration to minimize the number of windows exposed to the east and west or to maximize the ones on the south and north sides.

The Spa Center has an E-W elongated patio, surrounded on four sides by the walls of this building (Figure 113). The main openings on these walls are facing north and south (Figure 120). Moreover, the size of windows on the east and west were minimized (Figure 121). Furthermore, there are opportunities for cross ventilation within this building. In addition, openable large window surfaces help to increase the airflow inside.

Figure 120 The openings on the north wall facing the patio (taken by the author, December 2013).

Figure 121 West elevation of the Spa Center (http://v2.arkiv.com.tr/, last visited on August 2014).

All fenestrations in all buildings of the hotel complex have double glazing. These double glazed windows consist of two layers of glass which have a layer of inert gas sealed between them. The airtight construction of these windows creates thermal insulation, and reduces heat transfer.

- *Shading devices*

Shading the windows is one of best ways to reduce the glare and unwanted heat gain. However, the use of shading devices for sun control is quite limited for this hotel. In the main building, majority of the rooms have balconies which can provide shade for interiors. However, rooms are not oriented to a particular direction. Furthermore, most of the large glazed surfaces of this building do not have solar control devices. In hotel rooms, decorative elements such as curtains are used for reducing glare. Heavy drapes and tulle curtains closing tightly against the window frames are utilized for thermal insulation. These curtains and tulles are generally kept closed to reduce heat gain in vacant rooms and some of the spaces having large glazing surfaces. However, curtains and tulles as interior shading devices are not as efficient as the exterior ones to reduce solar heat gain. Although their thermal performance is limited, they can provide visual comfort by eliminating glare. They enable occupants of the room to regulate the amount of direct sunlight entering the space.

- *Walls*

Concrete panels and andesite stone cladding were used for construction of the walls. Therefore, we may say that the construction is mainly made of dense materials and thermal mass. Particularly in summer, this thermal mass can be utilized to prevent overheating. Moreover in winter, it absorbs and keeps the heat that is allowed to penetrate the spaces during the day, and releases it at night when the surrounding air begins to get cooler. The use of these materials on the walls can ensure a stable and comfortable interior temperature.

The hotel managers stated that, because of the andesite stones used on the walls, they did not need to insulate the walls with other materials. The result of the survey of Tufan and Kun (2014) indicated similar findings. They found out that andesite had a high thermal insulation performance with its low thermal conductivity and high porosity values. Due to the presence of air in its pores, this material could decrease thermal conductivity and add insulation property to the walls (Tufan & Kun, 2014).

- *Roofs*

The roofs of the hotel are generally flat. Concrete is used for most of the roofs, which were covered with heat and water insulation. Flat roofs have high thermal resistance in general.

- *Foundation and basement*

The basement floors of the buildings in the hotel complex are in direct contact with the ground. In the construction of the basement walls and floors, concrete, which has thermal mass properties, was used. Heavy-weight nature of basement construction allows storage of heat particularly during the underheated period. Additionally, this thermal mass regulates the interior temperature of the hotel.

- *Materials*

There is limited information gathered about the design decisions for material selection during construction period. The managers declared that during the operational phase, they preferred to select materials that are durable, flexible, warranted (for maintenance) and modular. This allows minimizing demand for renewing. For minimizing wastage, they declared that used furniture and materials are given to charity institutions which collect and redistribute such goods.

Designers preferred to use pink andesite stone for the cladding on the building envelope. This natural stone is one of the popular materials used as thermal insulators in Turkey (See also section “walls”). Additional to its thermal performance, choosing this local material contribute to region in many ways. Some of them are, contribution to economic and social development of the region, reducing transportation costs, embodied energy and transportation related air pollution.

Apart from selection of andesite stone, environmental impacts of the materials were not considered well. Levelling concrete, paint, plaster, brick, wallpaper, gypsum, and hardwood are among the widely used materials in this hotel. Moreover, there is no eco-labelled building material used in the complex.

- *Mechanical equipment and technologies*

The hotel was not designed with the idea of integration of passive and active systems. However, during the refurbishment process the managers decided to install HVAC systems. Moreover, some measures are taken to reduce the energy consumption of buildings to improve internal comfort. These include insulation of boilers, hot-water tanks, waterpipes, and valves, installation of highly efficient boilers and new technologies such as heat recovery system, use of exchangers generating hot water, selection of central and local heating and cooling equipment according to the specific needs of the spaces, use of energy efficient lighting fixtures, installation of motion or light sensitive illumination systems in the corridors and common places.

4.5.4 CASE STUDY 4: CALISTA LUXURY RESORT

The fourth hotel building studied here was settled on a land that was allocated to the tourism investors by the Ministry (Figure 122). The land was declared as a conservation forest before the permission given for construction. It was allocated for the purpose of construction of a five-star hotel with a capacity of 1000 beds in 2004. The built-up area of the hotel is 75.000 m2, on the land of a 97.000 m^2

Architectural project of this establishment was obtained in a differed method from the previous three hotels. Owners of the hotel wanted an environmentally friendly project on their land and they arranged an architectural competition. The selected project was designed by GMP (Gerkan, Marg & Partner). The interior design is prepared by Solana Interior Architecture. The project was completed in 2005 and the hotel was opened to guests in 2007.

According to the records of the Ministry of Culture and Tourism, this hotel has a “Five-Star Tourism Accommodation Establishment Certificate.” It has become the first accommodation establishment to achieve the Green Star Certification on 26.02.2009.

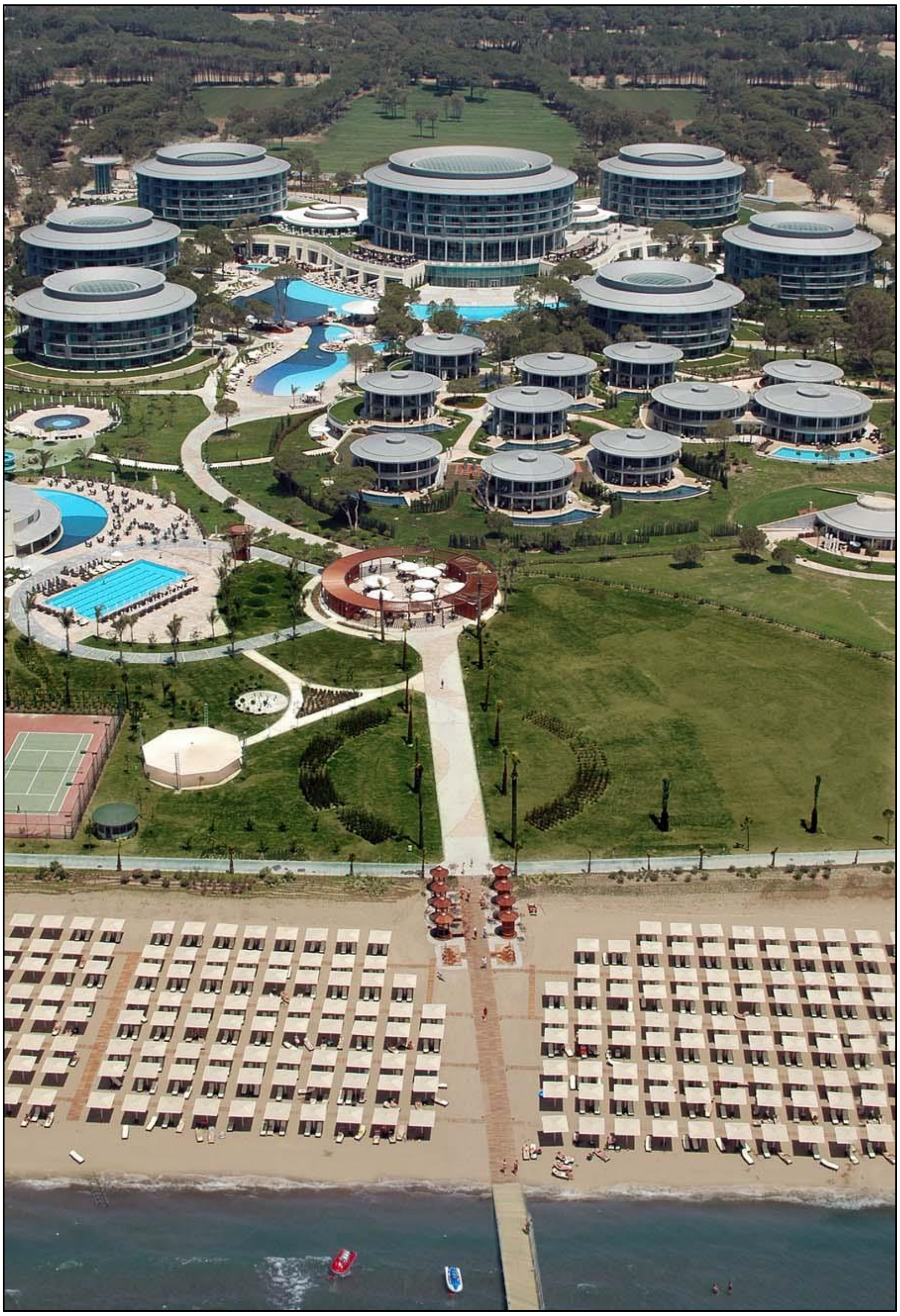


Figure 122 A general view of Calista Luxury Resort Hotel (http://v3.arkitera.com/, last visited on January 2014).

The construction process was not documented by the Ministry or the hotel management. Hence, necessary information about the measures taken for protection of trees during the construction period could not be gathered. However, comparison of the land in terms of conservation of forest areas could be made by using the data from Google Earth (See also the section “natural and man-made surroundings”).

The hotel is managed by a limited company and operates all year round. During peak season, from June to September, hotel occupancy exceeds 95%. The hotel provides an all-inclusive service system, in which services such as room services, breakfast, lunch, dinner, activities, entertainments, etc. are covered under a fixed price package.

In the following sections, the hotel will be evaluated through general design criteria, which was determined in 3.2.1. The issues related to the main topics of: (A) location and site planning, (B) building design, and (C) building components will be covered.

D) LOCATION AND SITE PLANNING

Within the data evaluated in the previous chapter, this topic is organized into the following sections: (1) transportation means and ways, (2) topography, (3) natural and man-made surroundings, (4) orientation, (5) settlement patterns and (6) hazards.

- *Transportation means and ways*

The hotel is situated 27km away from Antalya Airport, 35km from the city center, and about 4km from the center of Belek. It is located in the Tasiburun area and accessed by a lane running across golf courses from Turizm Road which is linking to the main resorts in the region. There are various transportation alternatives including shuttles, taxis, and rent a car to access to these points from the hotel building.

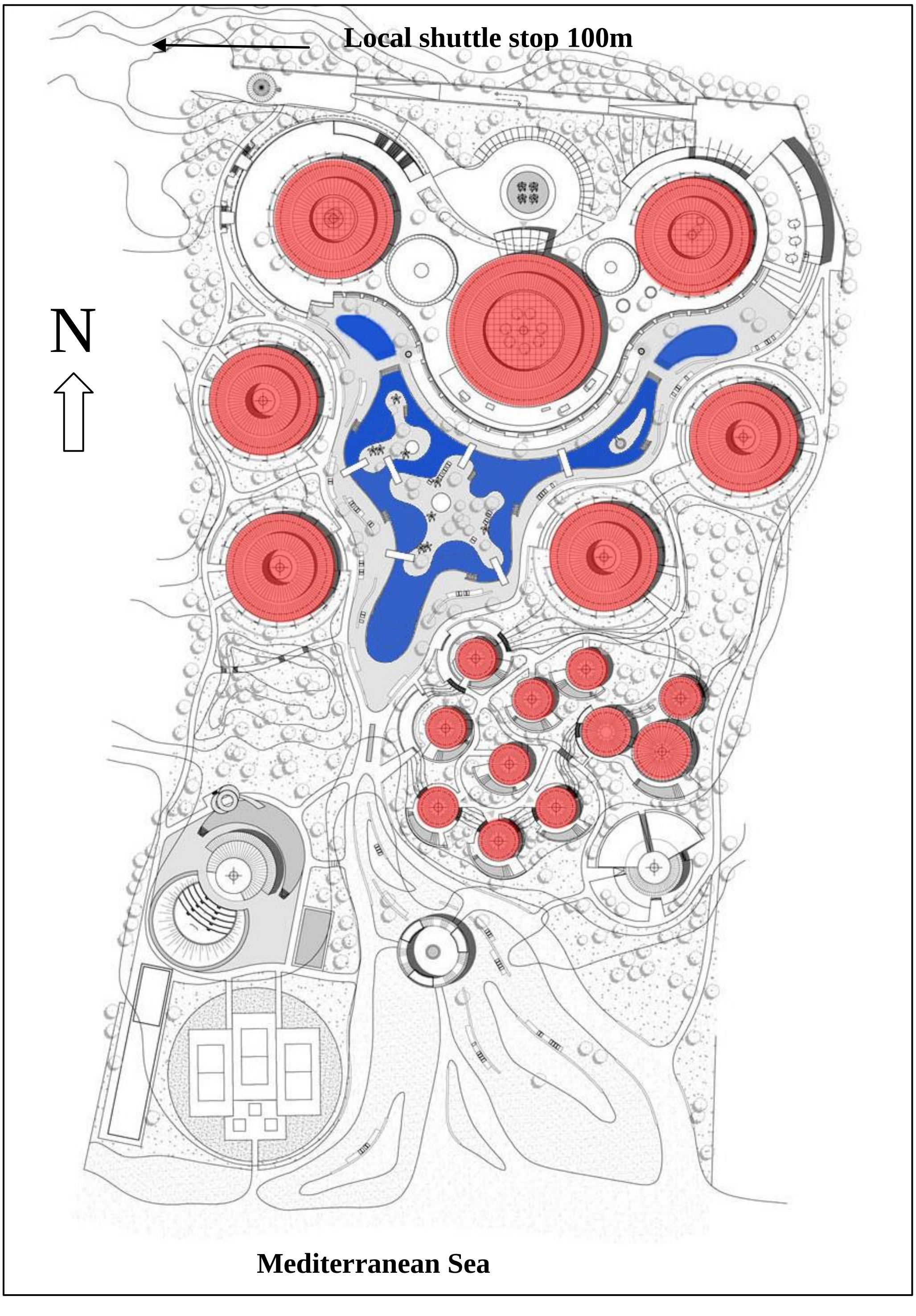


Figure 123 Site plan (http://v3.arkitera.com/, last visited on January 2014).

Public transport options are limited with shuttles (Figure 123). There is one local shuttle stop close to the hotel building. Moreover, there are private shuttles hired by travel agents for transportation of the tourists. Additionally, the hotel provides free transportation to golf courses nearby.

A secure parking space is provided to the customers of the hotel. The parking lot is located on the north part of the land. In this part of the land, natural forest cover is not very well protected; hence, there are no shading opportunities for vehicles and pedestrians in the carpark.

Belek region is largely dependent on motor vehicles for transportation. Inside the land of the hotel, there are pedestrian roads. There is no path or way in the use of bicyclists within the land. The hotel has 21 alternative fuelled vehicles. These are battery electric vehicles which run on electrical energy instead of traditional petroleum fuels. The vehicles are mostly used by the staff inside the land of the hotel for short distances at low speeds.

Although there are no public transportation options or any specialized arrangements for the people with disabilities in Belek region, there are several arrangements for inclusion of all people in the hotel building and its environment. As mentioned in the previous two cases (Section 4.6.1, 4.6.2 and 4.6.3), such arrangements are obligations for hotels certified by the Ministry.

- *Topography*

The area of the project has nearly-level land with very gentle slope (% 0-5). The relatively flat character of the land contributes to the relatively uniform climatic conditions.

- *Natural and man-made surroundings*

The hotel building is settled on a land near seaside. Due to this location, the building may benefit from sea breezes which blow from Mediterranean Sea towards the land during the day. The summer breezes have a relieving effect on humans. The built up area of the hotel complex designed to allow free air flow in summer. The scattered settlement on the south part of the land, provide air circulation and benefit from cooling effect of sea breezes. However, this effect is limited especially from July to August, which are over-heated and relatively humid months. Furthermore, the sea breezes are not adequate during summer nights, because the temperature difference is smaller between the sea and the land.

Aerial photographs of this particular part of Belek taken in 2003 and 2013 were obtained from Google Earth. Since the construction period of the hotel was after 2003, it is possible to compare the situation of the land in terms of vegetation and forests (Figure 124, Figure 125).

Figure 124 An aerial photograph. (Adapted from Google Earth, image dated May 16, 2003. 36°51’23.61”N, 31°01’58.55”E. https://www.google.com/earth/download/ge/, last visited on August 2014).

Figure 125 An aerial photograph. (Adapted from Google Earth, image dated June 1, 2013. 36°51’23.61”N, 31°01’58.55”E. https://www.google.com/earth/download/ge/, last visited on August 2014).

As is seen in Figure 124 and Figure 125, the main building was constructed on the northern part of the land, where there used to be a dense forest area. Unfortunately, this forest cover could not be preserved after the construction of the hotel. Hence, the possible benefits of trees for summer shading and winter wind protection could not be utilized on this part of the land. The large open entrance and carpark area provides free air movement. Remaining trees on this part have limited effects for wind control. Therefore, the built-up structure (the main building) settled in the northern part is exposed to prevailing winter wind. On the other hand, this building itself acts as a wind barrier for the buildings located on the south part in winter. Furthermore, it benefits from cooling summer breezes.

Although there is a large outdoor swimming pool and some accommodation units located on the central part of the land, there is also an effort to protect the existing trees. The lagoon-shaped swimming pool was bordered by remaining pinus pineas. Moreover, some of these trees are protected on an island in the pool. Furthermore, the low rise accommodation units were designed to integrate into the natural landscape.

The south side of the land is mainly left as open space. Moreover, the land is generally left with its original topography and the mounts in the terrain are covered with grass. Also there are tennis courts, open, semi-open air restaurants, beach bar, amphitheatre, and kid's playground here. These open space arrangements are basically based on the rules imposed by Coastal Law. Although the main reasons for the landscape design of the south part is compulsory, this provides an open sea view to the complex. Leaving this part of the land as empty and planting small bushes enable south facing facades quite advantageous in terms of sun's potential energy in winter and sea breezes in summer.

In between several blocks of the hotel, there are some pinus pineas. Besides, the managers consulted local gardening specialists and landscape designers for selecting plants ideally grown in the local area. As a result various endemic plants such as sand lilies, pomegranate, banana, lemon, acca, mandarin, Serik pear and rosemary were grown in the land. Preference of native vegetation in the gardens improves tourist experience. Moreover, there is a "kitchen garden" with herbs and vegetables. This arrangement has positive benefits, both in terms of cost and perceived menu quality, while providing tourists with local, authentic tastes at meal-times. It is also an effective way of communicating the broader sustainability values of the hotel management.

As a conclusion, arrangement or orientation of planting was not generally made with the consideration of shading or natural ventilation purposes. However, there are efforts such as; protecting existing trees especially at the central part of the land, and receiving consultancy service on local plants for landscaping and cuisine.

- *Orientation*

As previously dealt in the “topography” section the area of the hotel complex has a nearly-level land with a very gentle slope. Although the slope of the land is less than 5 %, it is directed to south. Therefore, the hotel complex is placed on a location where the solar gain is advantageous. The slope receives the sunlight directly. It may be an advantage for the underheated periods (December, January and February) for passive heating.

Regarding the wind patterns and prevailing winds, the location is favourable, too. Summer winds coming from south directions (SSW, S and SSE) helps to maintain cooling effect in over-heated periods. The settlement pattern is suitable for taking advantage of these relaxing winds. On the other hand, in winter the main building is exposed to winter winds.

- *Settlement patterns*

Scattered blocks and compact settlement is used together in this case. The architects designed a free standing composition of 19 cylindrical accommodation units. There are 7 large rotundas with guestrooms as well as 8 small apartment villas.

Main building is composed of three large rotundas which are linked by ground and basement floors. This six to eight-storey building provides shadow over adjacent open spaces such as the outdoor sitting areas for the lobby and the entrance of the hotel.

The other four large three to four-storey rotundas and 8 small two-storey villas are arranged in the land. Existing pinus pineas between these blocks were protected. Therefore, these trees cast shadow on the roofs and facades of these buildings.

The specific mix and arrangements of various cylindirical buildings may block the prevailing winter winds but may introduce relatively little resistance to the air flow in summer. The accommodation units of different heights and volumes are located in parallel strips from north to south. On the northern part of the terrain, the highest and longest building (the six to eight-storey main building) was placed, which can act as a wind shelter for winter winds blowing from the north. Then relatively smaller and lower accommodation units (the three to four-storey rotundas) were located. These are progressively more open to southerly summer winds and more protected from the winter winds. At the south, the most advantageous part of the land, two-storey apartment villas were located. Such composition of building types and settlement pattern provide possibilities for ventilation and natural lighting.

The trees planted after the construction of the buildings together with the existing pinus pineas provide adequate shade for pedestrian ways. Particularly, the pinus pineas around the outdoor swimming pool and that are in the island at the center of the pool provide effective shading for the tourists using these open areas.

- *Hazards*

Flat topography of the area and the stream water flowing through the land towards the sea may increase the risk of flooding and erosion. As a precaution, stone walls were used to channel the existing stream to protect the terrain from flooding (Figure 126). Hotel management is keen about cleaning the stream from pollutants that were thrown in the urban area and carried to the sea. Maintenance and recreation of native plants in the terrain is another effective precaution taken by the hotel management to prevent such threats.

Figure 126 The stream flowing through the land (taken by the author, December 2013).

In this region, sandy winds often have to be considered, too. The sand dunes running parallel to the coastline are stabilized by planting vegetation on the sea coast. There are also mounts arranged in the lawn areas. These provide a functional shelter for the site against the sandy winds blowing from Mediterranean Sea. Additionally, planting of sand lilies near the coast provide extra protection for the area from these winds

E) BUILDING DESIGN

Based on the data collected and evaluated in the previous chapter, this topic is organized into the following sections: (1) plan layout and organization of spaces, (2) shape and volume, and (3) colour selection.

- *Plan layout and organization of spaces*

The main hotel building combines most of the functions of the hotel. The tourists are accommodated in luxury rooms and suites in three rotundas which have four storeys. These buildings are accessed via a central atrium with galleries running around them. On the ground floor of the central rotunda (Figure 127), there are double height lobby and the reception hall with glass-walls which offer spectacular views from the outdoor swimming pool and the sea. In front of the large floor-to-ceiling windows of the atrium, a wide stairway extends down to the main restaurant. Spa centre, gymnasium, conference rooms, multipurpose halls, disco, bar, technical rooms and a garage are located on the basement floor (Figure 128).

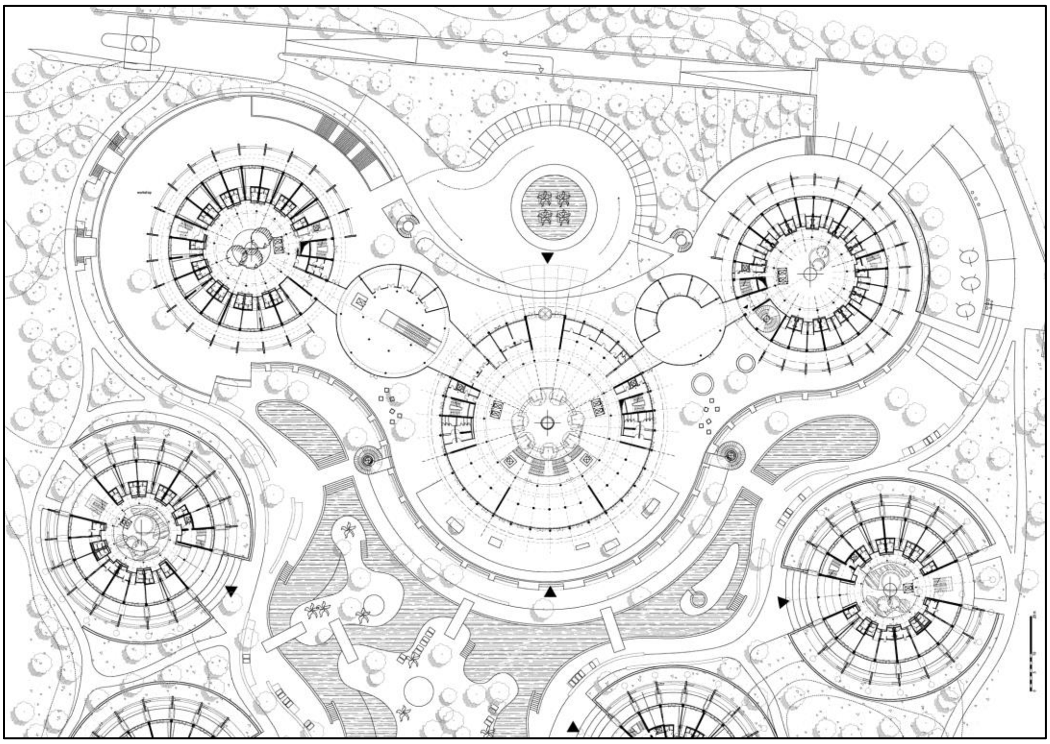


Figure 127 The ground floor of the main building (http://v3.arkitera.com/, last visited on January 2014).

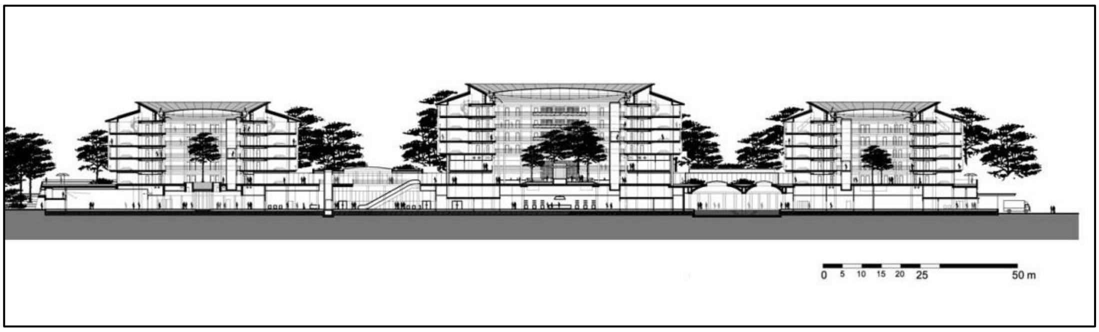


Figure 128 A cross section from the main building (http://v3.arkitera.com/, last visited on January 2014).

The accommodation units and the other service spaces in main building has a thick plan. The central atria and their glass roofs support side lighting to provide light to the interior of the accommodation blocks. They are used both for lighting adjacent corridors and providing light to the indoor plants (Figure 129, Figure 130). Moreover, due to the complex plan characteristic of basement floor, toplighting components were used to support sidelighting (Figure 131). Additionally, the indoor swimming pool in the same floor is illuminated by natural daylight through sidelight and toplight fenestration.

Figure 129 The central atrium of the main building (taken by the author, December 2013).

Figure 130 One of the atria of the main building (taken by the author, December 2013).

Figure 131 The toplight over the foyer in basement floor (taken by the author, December 2013).

As seen in the conceptual project (Figure 127, Figure 128) and photographs from the main building (Figure 129, Figure 130) there are some differences between the preliminary idea and the implemented project, especially with respect to the conservation of trees. In the conceptual project, pinus pineas were seen in atriums, however in the current situation, there are big potted plants instead.

Additional to the main building, there are eight two-storey, cylindrical villas available for individual tourists. Five of them are arranged as twin villas, which are semi-detached sharing a swimming pool (Figure 132). Three of them are single villas, which are separated from each other and have their own swimming pools. All of the rooms have terrace or balcony. They are exposed to the daylight, can supply fresh air and significant natural ventilation.

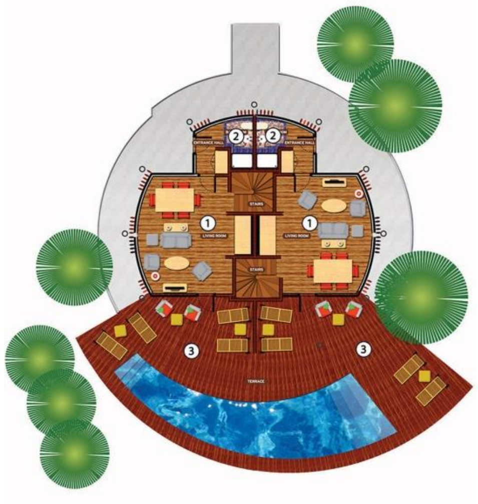
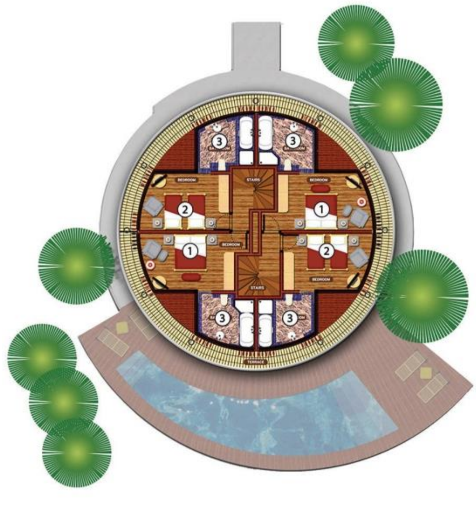
	
Ground Floor	First Floor

Figure 132 Plans of twin villas (www.calista.com.tr, last visited on January 2014).

Moreover, there are four large rotundas which have similar layout plans with the accommodation units of the main building (Figure 133). Each room is accessed by a central roofed atrium with galleries running round. The bathrooms are positioned to the inner courtyard, while the rooms are opened to the ceiling-high balconies on the outside.

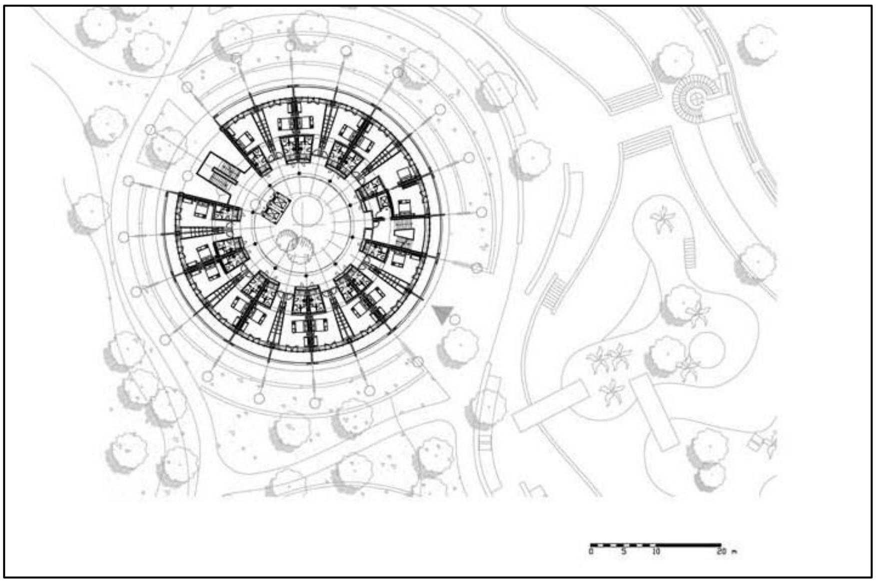


Figure 133 A floor plan of the large rotundas (http://v3.arkitera.com/, last visited on January 2014).

Due to the circular floor plan, the rooms and the corridors of the accommodation units are not oriented towards any particular direction.

- *Shape and volume*

In this example, circular buildings with different height and volume were used throughout the land. A building with such floor plan gives least exterior surface area. Therefore, lesser heat exchange between the interior and the exterior takes place. However, as dealt in the methodology part, this form is not an optimal solution for any location. Due to their shape, these buildings have no orientation, and could not maximize the benefits of the south facing elevation.

Apart from the circular buildings, there is a two-storey building which connects the accommodation blocks of the main building. This building has a free-form elongated mainly on east-west axis. This building has large south façade, which may decrease cooling demands in summer and heating demand in winter.

- *Colour selection*

White concrete (with %80-90 reflectance) and large glass facades were used for the building envelope. Roofs are covered with zinc plates which have pale grey color. By selection of light colours, more solar radiation is reflected and the heat gain is reduced from the exterior walls and particularly from the roof.

The rooms are furnished with wall to wall carpeting which is cream in colour. The walls are also cream and the ceilings are white. Pale grey is used in window frames. These light colours have high reflection values. The low contrast between window frame and adjacent walls reduces the effect of glare. The corridors have white walls and ceilings and colourful wall to wall carpeting.

Figure 134 Colour selection for rooms (taken by the author, December 2013).

In the restaurant and lobby, the window frames are also pale grey in colour. The restaurant has beige walls and floor, and white ceiling (Figure 135). The atrium lobby has white walls, a colourful wall to wall carpeting (Figure 129). It is topped with a glass roof with pale grey frames. Apart from the colour of the lobby carpet, the colours used in these spaces are generally light in nature. The corridors and the lobby are heavily used circulation spaces. Therefore, the medium to darker-medium colours with patterns may be more functional to hide soiling and staining.

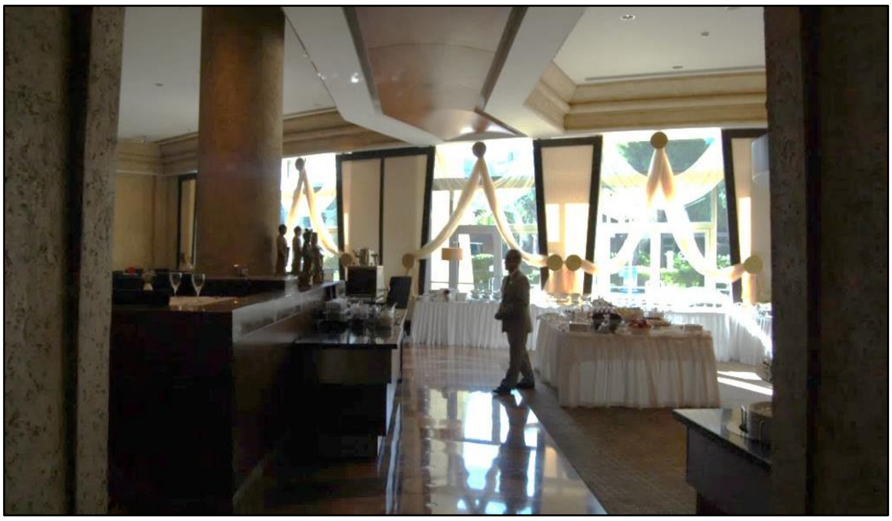


Figure 135 Colour selection for the restaurant (taken by the author, December 2013).

F) BUILDING COMPONENTS

Within the data evaluated in the previous chapter, this topic is organized into the following sections: (1) openings and windows, (2) shading devices, (3) walls, (4) roofs, (5) foundation and basement, (6) materials, and (7) mechanical equipment and technologies.

- *Openings and windows*

Due to their circular shape, most of the buildings in the hotel complex have no orientation, and could not maximize the benefits of the south facing elevation. The hotel rooms in the main building and in the dispersed large rotundas do not have two exterior walls or windows. Of course, this mainly depends on the plan type and function of the accommodation units. For this type of rooms, it is not possible to provide cross ventilation. On the other hand, the rooms located in apartment villas have multiple openings, which supply a considerable quantity of light and ventilation to these rooms. Cross ventilation is possible and the large openings of these rooms may increase the airflow.

All of the rooms are glazed across their entire width of the facade. Moreover, there are glass sliding doors which provide access to large balconies. The highly insulated window and the sliding doors systems are combined with shading devices such as large louvre blades. Additionally, the curtains are kept closed in vacant rooms.

The two-storey building which links the accommodation blocks of the main building is elongated mainly on east-west axis. This building has large openings facing south. Because of the slope of the land, only the ground floor of this building has windows on the north side. Especially technical services and garage area, where there is no need for natural daylight, are located on the basement floor in the northern area of the property. Plan of the building allowed minimizing the size of the windows on east and west.

- *Shading devices*

Vertical solar shading devices together with balconies are used on the facade of the Calista Luxury Resort (Figure 136). Light colours such as pale grey for louvre blades and white for balconies were used. Both are external shading devices, which are effective to reduce solar gain. The balconies are separated from one another by metal screens alternating with vertical louvre blades. Each louvre blade was mounted on a rail so that it can rotate around its own vertical axis. These devices can manipulate sun rays and natural light penetration while reducing thermal load in summer.

Figure 136 Facade of the main building (taken by the author, December 2013).

- *Walls*

The hotel is designed as a reinforced concrete frame building, in which the exterior skin and structure had become dissociated. This construction type allowed complete glazing of the facades. There are no exterior walls, hence no thermal mass in this project. The use of lightweight construction is suitable to provide natural ventilation.

- *Roofs*

The characteristic of the hotel layout is the use of central atria which are covered with steel truss structures with polygonal glass features. The glazing system has thermal insulation as well as reflective surfaces on the insulating strip to decrease energy losses due to thermal radiation. Moreover, concrete is used in the monopitched roofs (Figure 128), which were covered with heat and water insulation.

Figure 137 The roof of the atrium in the main building (taken by the author, December 2013).

To prevent undesired thermal gain arising, a monopitch roof was used so that accumulation of hot air could escape from the eaves. The main building may achieve comfort levels by means of natural ventilation in which the stack effect of warm air, rising up to the atrium and drawing fresh air from the surrounding rooms. Moreover, the glazing roof may deliver high levels of daylight to the interior, keeping artificial light usage to a minimum. This arrangement enhances energy efficiency, creates a healthy indoor environment and offers sky views.

- *Foundation and basement*

The basement floors of the buildings in the hotel complex are in contact with the ground. In the construction of the basement walls and floors, concrete is used. The walk-out basement floor of the main hotel building opens to south. Since it is partly bermed, it allows passive solar gain through thermal mass. The exposed front of the hotel allows the daylight through windows facing south directions and heats the basement. Heavy-weight nature of basement construction allows storage of heat particularly during the underheated period. Additionally, this thermal mass regulates the interior temperature of the hotel.

- *Materials*

The use of new materials and constructive technologies transformed the aesthetic and functional aspects for this hotel complex. The skeleton frame structure allowed larger windows that offer transparency, daylight penetration, visual integration and extensive view. Windows supported by exterior devices contribute to the energy profile, minimizing heat loss and maximizing passive solar gain. Hence, comfort could be enhanced while saving energy.

When selecting materials and furnishings, the environmental impacts of materials were generally considered. They preferred to select materials that are durable, flexible, warranted (for maintenance) and modular. This allows minimizing demand for renewing. Materials with low environmental impact are preferred. However, the materials and the construction technology were imported. For minimizing wastage, the hotel managers declared that used furniture and materials are donated to the charity institutions.

- *Mechanical equipment and technologies*

The hotel was designed with the idea of integration of passive and active systems. Detailed information can be found under the sections of "o*penings and windows", "shading devices", "walls", "roofs"* and *"materials".* Moreover, measures to reduce the energy consumption of buildings to improve internal comfort are decided to be implemented at the planning stage of the design. These include insulation of boilers, hot-water tanks, waterpipes, and valves, installation of highly efficient boilers and new technologies such as heat recovery system, use of exchangers generating hot water, selection of central and local heating and cooling equipment according to the specific needs of the spaces, use of energy efficient lighting fixtures, installation of motion or light sensitive illumination systems in the corridors and common places.

CHAPTER 5

ASSESSMENT AND CONCLUSION

This chapter presents a comparison and evaluation of the hotel samples based on the weaknesses and strengths of each case. Furthermore, aforementioned hyphothesis will be tested. Finally, this chapter will offer some suggestions for decision makers such as policy makers and executives, hotel managers and architects.

5.1 Assessment

This study presents a comprehensive analysis of the general properties of selected hotel buildings. This analysis will include a comparison of the sample according to their class (star-rating), land characteristics, site planning principles, the nature of built-up area, measures taken during the construction work, the methods of obtaining their architectural projects, period of operation and package types offered.

All hotel buildings used in this study were settled on forest lands that were allocated to the tourism investors by the Ministry. All hotels evaluated owned a five star hotel certificate, except for the first one which owns a four-star. According to their built-up areas, they can be sorted in descending order as, Case Study 4(75.000m^2), 2(39.000m^2), 3(37.000m^2) and 1(26.824m^2), whereas according to their land area the order is as Case Study 3(127.000m^2), 4(97.000m^2), 1(94.000m^2) and 2(54.000m^2). Moreover, according to their floor area ratio they can be sorted in descending order as: Case Study 4 (0.77), 2 (0.72), 3 (0.29) and 1 (0.285). Additional to its highest floor area ratio, Case Study 4 has the highest capacity for guest rooms. Case Study 2 has also a large built-up area while its land is relatively small. The high floor area ratio of these two hotels affected the protection of the natural vegetation negatively.

Based on the photographs of the first three hotels used in the study, one can argue that adequate measures were not taken for tree protection during the construction work. Moreover, in these hotels, tree protection zones were affected negatively by delivery and storage of building materials and circulation of machinery and workers. No photographs could be gathered from the construction period of the hotel in Case Study 4. However, its aerials photos obtained from Google Earth, which were taken before and after construction, provide data on landscape changes over time. These show that the north part of its land with high tree density was destroyed by the vast area of entrance/parking lot and the main building.

All of the hotels evaluated here are large-scale projects with long construction periods. Particularly, there was a significant variation in the construction duration of the hotel buildings in Case Study 1 and 3 which were both built in 90s. Case Study 1 had the longest period, 6 years (1989-1995), from authorization to completion, followed by Case Study 3 with five years (1995-2000.) The delay of opening for these two hotels might be due to several factors, such as lack of experience in hotel constructions, the scale of the project, improper planning and construction techniques and inadequate supply of qualified labour, appropriate material or equipment. External factors such as site conditions and regulations might have also led to an increase in the construction time. Among the cases evaluated here, the minimum length of time to launch the hotel, after obtaining authorization from the Ministry for their design was shown as 2 years. This applies to the hotels examined in Case Study 2 and 4, the former was designed in 2000, and the latter in 2005.

The methods of obtaining architectural projects of these hotels were also varied. For Case Study 1, 2 and 3, the owners have made contracts with separate bodies for the design and construction of the projects. Since the owners of the first two hotels are construction firms, they carried out the construction process by themselves. On the other hand, the hotel examined in Case Study 4 showed difference from the others in terms of its obtaining method. The investors chose the project through a competition with an aim of acquiring a project that was in harmony with the nature. It was designed later than the other case studies evaluated in this thesis and has started with the idea of sustainable design at its planning phase. Due to the investors' concerns for acquiring an environmentally friendly design, it can be said that awareness in environmental issues was started to be observed, at least from the investors' side.

The hotels evaluated in this study operate nearly all year round. Only the hotel in Case Study 3 is closed from January to March for annual maintenance in general. During peak season, from June to September, all of these hotels' occupancy rates exceed 80%. Additionally, they all provide all-inclusive service system, in which services such as room services, breakfast, lunch, dinner, activities, entertainments, etc. are covered under a fixed price package. Considering the hotels' large capacity and their service type, all hotels can be classified as mass tourism resorts.

5.1.1 Hyphothesis testing

In this part, the sub hyphotheses and the main hypothesis which were determined in the introduction will be tested. They will be assessed through the sequence presented in the previous chapter.

A) LOCATION AND SITE PLANNING

The sub hypothesis that will be tested for this section is determined as "H1: When the location or setting of the hotel buildings or settlements are first chosen, area-specific conditions such as accessibility, landscape structure and character, the bioclimatic needs and hazardous conditions of the Belek region are considered."

- *Transportation means and ways*

All of the evaluated hotels are very near to the center of Belek. There are various transportation alternatives including shuttles, taxis, and rental cars to access to major points such as Antalya airport, city center and center of Belek from the hotels.

Although Belek region is largely dependent on motor vehicles for transportation, inside the land of the hotels, all hotels have pedestrian roads, one of which is also used as a bike road (Case Study 1). All hotels have private shuttles managed by the travel agents to provide transportation for the tourists. Additionally, free transportation is provided for the football teams which request to access football fields nearby in Case Study 1 and to access golf courses in Case Study 4.

All have alternative fuelled vehicles but with varying numbers; 3, 1, 6, and 21, in Case Study 1 to 4, respectively. Although there is a significant variation in the number of vehicles, all have the same purpose of providing transportation for the staff within the hotel's area to improve the speed of service. Even though, they have a limited use, these battery electric vehicles which run on electrical energy instead of traditional petroleum fuels help to reduce the total number of motor vehicle trips.

Although there are no public transportation options or any specialized arrangements for the people with disabilities in the Belek region, all four hotels in this study provide several facilities and arrangements for inclusion of all people inside the hotel buildings and their surroundings. The arrangements are mainly made to comply with the regulations and the obligations that apply to hotels which were certified by the Ministry. Necessary arrangements in the legislation were made to ensure easy access to spaces and activities in and around the buildings. Consideration of these arrangements in planning process serves comprehensive and inclusive planning.

- *Topography*

All hotel buildings evaluated in this study were settled on nearly-level lands with very gentle slopes (%0-5) except for the first hotel building. For those with less sloped ground, the relatively flat character of their lands contributed to the relatively uniform climatic conditions throughout their terrain. Hence, there is no significant microclimatic variation caused by this topographical feature. On the other hand, the hotel in Case Study 1 was located on a moderately sloping site. It was situated on the higher sides of the slope which is considered to be warm. Moreover, the trees concentrated in the north part of the terrain of this hotel acted as wind shelters during winter. Furthermore, the location of this hotel was appropriate to take advantage of the wind flow, particularly in summer to moderate excessive vapour pressure.

- *Natural and man-made surroundings*

All hotel buildings evaluated were near seaside. Due to this position, the buildings benefit from sea breezes which blow from the sea towards the land during the day. However, this wind effect may be insufficient for comfort especially from July to August, which are considered as over-heated and relatively humid months in this area. Furthermore, the sea breezes may not be adequate during summer nights, because the temperature difference is smaller between the sea and the land.

All four hotel buildings are settled on lands that are very near to Belek Special Environmental Protection Area. Moreover, the hotel in Case Study 3 has an access to the sandy beach, which is also a nesting ground for rare loggerhead sea turtles, defined in this special environmental protection area. Because of its proximity to this area, some precautions were taken, such as protection of the trees on the beachfront to deter the negative effects of artificial light originating from hotel and to turn off the lights during sea turtle nesting season. On the other hand, the use of the beach by the visitors of the hotel for sunbaths, watersports, beach bar and similar touristic facilities affect the sea turtle nesting population in a negative way. Beyond this hotel, the impact of tourism development on sea turtle’s nesting activity is a general problem for Belek region.

The original flora of the sites is often negatively affected by construction of hotel buildings. Although limited in population, the positive effects of the maintenance of native plants are also observed in the selected hotels. Particularly in Case Study 1, protecting native vegetation in the north part of hotel’s land brought advantages for energy saving and biodiversity. As dealt in the above, protection of the vegetation in the south part of the land in Case Study 3 has positive contribution to sea turtles. Moreover, native vegetation on southeast part of this hotel provides food and shelter for a variety of birds and insects. These two hotels have the lower floor area ratios than the hotels in Case Study 2 and 4. In hotel no. 2, natural forest cover was partly protected in-between the buildings. In hotel no. 4, the most forested area of the land (its north part) was damaged by the construction of the main building. Besides, native plants, such as sand lilies, erica, citrus trees are used for landscaping of these four hotels. Even though, these plants are distributed randomly over the landscape, they improve customer experience at least. Apart from native vegetation, all hotels evaluated have lawn areas which can help to moderate extreme temperatures. Especially, the south parts of the lands of the hotels were mainly left as open spaces. These open space arrangements are mainly based on the rules imposed by the Coastal Law, which determines the construction prohibitions and the structures to be erected on the coasts. The main reasons for the landscape design of the south part of the land are to provide an open sea view and to comply with the mentioned legal obligations. However, avoiding trees with large canopies, planting small bushes and leaving these parts of the lands as empty, enable south facing facades to take maximum advantage of the sun's potential energy. In case of developing the landscape design of the hotels, to prove an open sea view for the hotel buildings seem to be preferred, rather than establishing sustainable design principles on their sites.

- *Orientation*

South facing slopes gave favourable results for protection from cold winter winds, exposure to the summer breezes, benefiting from winter sun in Antalya. The hotel in Case Study 1 was placed at the middle of the south slope, which is a favourable location. Additional to receiving the sunlight directly, the layout of the hotel and the vegetation helps to benefit from the cooling effects of winds in summer, and prevent from the cold winds in winter. The slopes of the lands of the other three hotels are less than 5%, but they are oriented to south which is a favourable direction. Although their orientations are suitable in terms of climatic aspects, in Case Study 2 and 4, the layout and massive structure of the main buildings prevent to take the advantages of their locations. In Case Study 2, the main building prevents relaxing south winds as opposed to Case Study 4 which is exposed to cool north winds.

- *Settlement patterns*

The hotel buildings examined in Case Study 1 and 2 are owned by the same company and designed by the same architect. They both have complex form of settlement patterns. Their main buildings have compact forms which have close physical relationships between different functions, while the other units are dispersed through the land without a specific pattern. The main buildings in Case Study 3 and 4 also show compact settlement patterns. However, the auxillary buildings of these hotels are scattered throughout their lands in more specific patterns.

The pedestrian ways of hotels in Case Study 1 and 2 were not properly shaded by trees. However, in Case Study 3, protection of the natural vegetation, especially the pinus pineas provide effective shading for the pedestrian ways and gathering areas. In Case Study 4, the trees planted according to the landscape design together with the existing trees provide adequate shade for the open areas. In Case Study 1 and 2, it is observed that shading opportunities are provided through temporary or permanent features such as pergolas, canvas canopies, verandas and arcades. These features create an opportunity to use the open and semi-open spaces almost throughout the whole year in these hotels.

- *Hazards*

In Case Study 1, protected forested area in the northern side of the slope of the land prevents the risk of erosion and the floods. Additionally, the sand dunes, mounts in the lawn areas and sand lilies planted provide a shelter for sandy winds. In Case Study 2, the flat topography and concretization of the land increase the risk of flooding and erosion. For sandy winds, only sand lilies and small bushes are planted near the coast as a precaution. In Case Study 3, the flat topography and proximity to Acısu River may increase the risk of flooding and erosion. Maintenance and recreation of native plants in the terrain is one of most effective precautions to prevent these threats and also sandy winds. In Case Study 4, additional to flat topography, the stream water flowing through the land may cause hazards. The stone wall built to channel this stream and the native plants around are measures taken for such threats. Moreover, the sand dunes, mounts in the lawn areas and sand lilies planted provide a shelter for sandy winds for this hotel.

Depending on the results of these comparisons, the previously determined hypothesis "H1" is tested. In terms of accessibility, the hypothesis is partly supported, because the measures taken inside the land and buildings could not be integrated with transportation system of Belek region. As for topography, all have favourable conditions. However, particularly the planning in Case Study 2 and 4 could not properly take advantage of it. Moreover, settlement patterns and landscaping are developed according to designers' sense of aesthetics and the necessities of function instead of bioclimatic needs. Finally, regarding hazardous conditions, almost all hotels took some precautions. But, in Case Study 2, these precautions are not adequate.

B) BUILDING DESIGN

The sub hypothesis that will be tested for this section is determined as "H2: Hotel buildings are designed with the consideration of natural ventilation, appropriate light and shading, passive solar gain, and cooling in order to maintain a good internal comfort in Belek."

- *Plan layout and organization of spaces*

All of the hotels evaluated here are comprised of a wide range of services and functional units. This diversity in functions and space organization is reflected in complex plan layouts. All have main buildings which combine most of the function of the hotels. Particularly their ground floors have thick plans, which employed both toplighting and sidelighting fenestration components for daylighting. However, in Study 1, the coverage of some skylights because of the insulation problems caused the use of artificial lighting even during the daytime. All hotels have well illuminated accommodation units. Hotels in Case Study 1, 2 and 4 used toplighting and sidelighting in their different spaces. However, the hotel in Case Study 3 only employed sidelighting fenestrations.

All hotels evaluated here are divided into zones, basically as rooms and public spaces. Moreover, the public spaces which require similar heating or cooling systems and time of operation are grouped and combined. This allowed control of the energy requirement of each zone separately and ensured appropriate indoor climatic conditions in different parts of the buildings.

- *Shape and volume*

In Case Study 1, 3 and 4, low rise and high rise buildings are used together. The main building in Case Study 2 has a high-rise type, which receives much radiant heat and because of its plan layout it obstructs the flow of wind to neighbouring buildings and surroundings. None of the four hotels examined here had an effort to maximize the south-facing elevation.

- *Colour selection*

The façades and roofs of the evaluated hotels are light coloured. By selection of light colours, more solar radiation is reflected and the heat gain is reduced from the exterior walls and particularly the roof. There is low contrast between window frames and adjacent walls of buildings in Case Study 1, 3 and 4. The high contrast was observed only in the hotel examined in Case Study 2, which increased the effect of glare particularly in its corridors. In all four hotels, light colours in the pastel range are preferred inside, which increased the levels of daylight in these spaces.

Depending on the results of these comparisons, the previously determined hypothesis “H2” is tested. Unfortunately, the hypothesis in general is not supported. Although they are all exposed to daylight and fresh air, the hotel buildings are not oriented towards any particular direction. Hence, their plan layouts are not appropriate for effective heat gain, cooling and ventilation. Moreover, there are no design considerations for shape and volume of these buildings to reduce heat loss in winter or heat gain in summer. Factors such as function, logical arrangement of spaces, circulation routes and aesthetic decisions of the architects played a major role in the design of these complex buildings. Therefore, the zoning of the buildings which is directly related with function and organization of spaces might have been easily employed in all examples. Apart from these, all cases are generally successful in terms of colour selection.

C) BUILDING COMPONENTS

The sub hypothesis that will be tested for this section is determined as “H3: Hotels in Belek, have building components that are designed to maintain a balanced and comfortable indoor climate.”

- *Openings and windows*

The openings of the hotels evaluated here do not face any particular direction. Therefore, there is not a clear tendency to arrange the main openings so as to face south or north. Majority of the hotel rooms do not have two exterior walls or windows. This mainly depends on the plan type and function of the accommodation units. For this type of rooms it is not possible to provide cross ventilation. However, in Study 3, the low rise accommodation units have the opportunity to provide cross ventilation. Moreover, in the Spa Center of Case Study 3, main openings face north and south, the size of windows on the east and west are minimized, and there are opportunities for cross ventilation and hence, openable large window surfaces help to increase the airflow inside. In Case Study 4, the two-storey building which links the accommodation blocks of the main building is elongated on east-west axis. This building has large openings facing south. Technical spaces are located on north and the size of the windows on east and west are minimized. In Case Study 1 and 2, there is no design consideration to minimize the east and west windows or to maximize the ones on south and north sides of buildings.

All fenestrations used in buildings examined in Case Study 1, 2 and 3 have double glazing, which enables thermal insulation, and reduces heat transfer. On the other hand buildings in Study 4 have a special glazing material, which is highly insulated and combined with sun shading.

- *Shading devices*

Shading devices employed in buildings are generally limited in Case Study 1, 2, and 3. In this group, balconies and eaves are used as architectural elements to provide shade. Additionally, curtains were employed inside as decorative elements to provide privacy as well as light and glare protection from the sun. Additional to balconies, in buildings examined in Case Study 2, there are solid parapet walls as architectural elements which also provide some shade. However, these parapets do not perform well, because they do not provide shade for unwanted west and east directions. On the other hand, vertical solar shading devices together with balconies are used on the facade of the buildings in Case Study 4. Moreover, these shading devices are movable and can rotate around their vertical axe and have light colours.

- *Walls*

Buildings examined in Case Study 1 and 2 were constructed out of reinforced concrete frames infilled with brick masonry. However, these buildings do not have any wall insulation. Hence, their thermal resistance is very low. Buildings in Case Study 3 employed concrete panels and andesite stone cladding for construction of their walls. The construction is mainly composed of dense materials and thermal mass. Moreover, due to the presence of air in its pores, andesite stones decrease thermal conductivity and add some insulation to the walls. Buildings in Case Study 4 were designed as reinforced concrete frame buildings which allowed for fully-glazed façades. Therefore, in this group of buildings light weight construction and multiple openings were used which helped to ease the ventilation inside.

- *Roofs*

Buildings examined in Case Study 1, 2 and 3, the roof constructions are mainly made of dense materials and have thermal mass. Their roofs also have heat and water insulations. On the other hand, buildings in Case Study 4 have light weight constructions over the atria of the buildings. The glazing system of the roof has thermal insulation as well as reflective surfaces on the insulating layer to decrease energy loss due to thermal radiation. Moreover, concrete is used in the monopitched roof of the buildings in Case Study 4.

- *Foundation and basement*

All of the basement floors of the evaluated hotels are in contact with the ground. Concrete, which has thermal mass properties, is used in the construction of the basement walls and floors of these buildings. Additionally, because of the slope of their lands, the hotels in Case Study 1 and 4 were built partially below grade, with earth covering one or more sides. This arrangement ensures the reduction of the heating load of the buildings. Furthermore these two hotels have walk-out basement floors which open to south. The exposed front facades of these hotels allow the daylight through windows facing south directions and heat the basement.

- *Materials*

There is no information gathered about the design decisions for material selection of buildings in Case Study 1, 2 and 3. It is my impression that the environmental impacts of materials were not generally considered in selecting materials and furnishings for these cases. However, buildings in Study 1 employed local materials such as red bricks and in Case Study 3, the pink andesite stones. They both helped to improve the thermal performance of the buildings. In Case Study 4, new materials with low environmental impacts were preferred. However, the materials of this hotel were imported.

- *Mechanical equipment and technologies*

Buildings examined in Case Study 1, 2 and 3 were not designed with the idea of integration of passive and active systems. They have some refurbishment process which include insulation of boilers, hot-water tanks, waterpipes, and valves, installation of highly efficient boilers and new technologies such as frequency inverter and heat recovery system, use of exchangers generating hot water, selection of central and local heating and cooling equipment according to the specific needs of the spaces, use of energy efficient lighting fixtures, installation of motion or light sensitive illumination systems in the corridors and common places. Additionally, buildings in Case Study 2 have employed flat plate solar collectors installed on flat roofs to produce domestic hot water. On the other hand, buildings in Case Study 4 were designed with the idea of integration of passive and active systems.

Depending on the results of these comparisons, the previously determined hypothesis "H3" is tested. In terms of glazing materials in the fenestration systems and thermal mass characteristics and insulation type of roofs, foundation and basements, this hypothesis is supported. However, when considering the orientation and size of the openings and windows, it is hard to state that there is a careful design consideration for a balanced and comfortable indoor climate, particularly for the buildings in Case

Study 1 and 2. These two examples even do not have heat insulation on walls. Besides, some relatively more favorable arrangements are observed in the buildings of Case Study 4 and the Spa center of Case Study 3, as mentioned above. These are relatively new projects which were designed by foreign architectural firms in 2005. The differences observed in these two projects may depend on availability and advancement of new materials and construction technics and the expansion of awareness on sustainable design after 2000s throughout the world.

Lastly, the main hypothesis that will be tested is determined as “Sustainable design criteria are employed carefully in hotels of Belek, which has several Green Star certified hotels and has priorities for nature conservation in Turkey.”

As dealt in Chapter 2, the relations between architectural design and sustainability were not clearly identified and the implementation of the subject in practice is still problematic even in developed countries. Even though Turkey was a late comer to the field of tourism and sustainability; she tried to adapt the developments and arguments.

Turkey's economic success and fast adaptation to capitalist order is undeniable. Mass tourism, which is generally commemorated with 3S, remains the biggest share of the tourism industry in the country. In Belek, forests are given to the investors for the purpose of construction of accommodation establishments. The hotel buildings evaluated here were placed in conservation forest lands. They served to mass tourism with high capacities and attempted to use the land with this purpose. As dealt in Chapter 2, how to make mass tourism as sustainable as possible is a challenge that we have to face. Green Star Certification Programme which is carried out by Ministry of Culture and Tourism is an important initiative in this respect.

Belek is one of frontrunners in the number of accommodation establishments awarded the Green Star Certification. However, the Green Star Certification cannot clearly indicate that a hotel has a sustainable design. Although it comprises criteria determined under the title of “Ecological Architecture”, it is mainly related with sustainable management systems. Since hotels examined here were awarded Green Star certificate, and were run with related management practices and operational data, Green Star itself does not guarantee to enhance sustainable design.

Although all hotels evaluated here are awarded Green Star, particularly the first three hotels were not planned with sustainable design criteria. However, it is found that each has some positive contributions to their environments. For example, the findings from Case Study 1 Hotel show that a major part of the natural forest cover in the north part of the land was protected; in Case Study 2 Hotel renewable energy systems were installed; in Case Study 3 Hotel it was preferred to protect the forest cover rather than using the whole capacity that was allowed by the Ministry. Only Case Study 4 Hotel was planned with sustainable design criteria. Moreover, the investors decided to acquire a hotel with sustainable design and opened a competition with this aim. Despite its many positive aspects dealt above, Case Study 4 with its huge capacity damaged a considerable part of the forested area on its land.

Although all of the evaluated examples showed a positive attitude toward sustainable tourism, the pace of their adoption and implemention is slow. In the light of the discussions made above, the main hypothesis is partly supported, but needs to be revised. It should be “Sustainable design criteria are considered important but not employed carefully in Belek, which has several Green Star certified hotels and has priorities for nature conservation in Turkey”. After testing the hypotheses determined in the introduction, the table below summarizes the findings.

Table 17 Summary of the results (prepared by the author).

CRITERIA \ NUMBER OF CASE STUDY			CASE STUDY 1	CASE STUDY 2	CASE STUDY 3	CASE STUDY 4
General Information	Type	Hotel	●	●	●	●
		Holiday village				
		Other				
	Class	1 Star				
		2 Star				
		3 Star				
		4 Star	●			
		5 Star		●	●	●
	Land area (m^2)	50.000-60.000m^2		●		
		60.000-100.000m^2	●			●
		100.000-150.000m^2			●	
	Built-up area (m^2)	20.000-40.000m^2	●	●	●	
		40.000-60.000m^2				
		60.000-80.000m^2				●
	Construction periods	Short (<3 years)		● 2000-2002		● 2005-2007
		Long (>3 years)	● 1989-95		● 1995-2000	

Table 17 (continued)

CRITERIA			NUMBER OF CASE STUDY	CASE STUDY 1	CASE STUDY 2	CASE STUDY 3	CASE STUDY 4
General Information	Period of Operation	Seasonal				•	
		All year		•	•		•
	Occupancy Rates	January-March	Over 75%	•	•		
			50-75%				•
			25-50%				
			Less than 25%				
			Closed			•	
		April- June	Over 75%	•	•		•
			50-75%			•	
			25-50%				
			Less than 25%				
			Closed				
		July-September	Over 75%	•	•	•	•
			50-75%				
			25-50%				
			Less than 25%				
			Closed				
		October-December	Over 75%	•	•		
			50-75%			•	•
			25-50%				
			Less than 25%				
			Closed				

Table 17 (continued)

CRITERIA				NUMBER OF CASE STUDY	CASE STUDY 1	CASE STUDY 2	CASE STUDY 3	CASE STUDY 4
(A) Location and site planning	*Transportation means and ways*	Distance	Airport	<10 km				
				10-50 km	●	●	●	●
			Antalya	<10 km				
				10-50 km	●	●	●	●
			Belek	Too close <5 km	●	●		
				Close 5-10 km			●	●
			Sea	0 km	●	●		●
				< 200 m			●	
		Walking			●	●	●	●
		Cycling			●			
		Number of alternative fuelled vehicles			3	1	6	21
		Public transport			●	●	●	●
		Private transport			●	●	●	●
		Parking lot with shading opportunities			●		●	
		Accessibility for all			●	●	●	●

Table 17 (continued)

CRITERIA / NUMBER OF CASE STUDY			CASE STUDY 1	CASE STUDY 2	CASE STUDY 3	CASE STUDY 4
(A) Location and site planning	*Natural and man-made surroundings*	The forest management plan	●	●	●	●
		Landscape plan with the consideration of shading or natural ventilation purposes			●	●
		Use of local vegetation and endemic species in later planting activities	●	●	●	●
		Conservation of sand dune areas	●		●	●
	Orientation	Use of water features including outdoor swimming pools	●	●	●	●
		South facing slope	●	●	●	●
		North facing slope				
		East facing slope				
		West facing slope				
	Settlement patterns	Complex	●	●	●	●
		Compact	●	●	●	●
		Scattered	●	●	●	●
		Semi-open exterior spaces	●	●		
	Hazards	Maintenance and recreation of native plants to prevent erosion	●		●	●
		Precautions for sandy winds	●		●	●
		Precautions for stream (if there is any) floods				●

Table 17 (continued)

CRITERIA				NUMBER OF CASE STUDY	CASE STUDY 1	CASE STUDY 2	CASE STUDY 3	CASE STUDY 4
(B) Building design	*Plan layout and organization of spaces*	Complex plan layout			•	•	•	•
		Accommodation units	Plan shapes	Linear		•	•	
				Curvilinear	•	•		
				Circular				•
			Directional orientations	No orientation				•
				Unilateral				
				Bilateral				
				Multilateral	•	•	•	
		Zoning			•	•	•	•
	Shape and volume	Circular						•
		Rectangle			•	•	•	
		V-C-L-U Shape			•	•	•	
		Irregular			•	•		
		Low rise (one to three)			•	•	•	•
		High rise (four to six)			•	•	•	•
	Colour selection	Light coloured exterior walls			•	•	•	•
		Light coloured roofs			•	•	•	•
		Low contrast between window frames and adjacent walls			•		•	•

Table 17 (continued)

CRITERIA \ NUMBER OF CASE STUDY			CASE STUDY 1	CASE STUDY 2	CASE STUDY 3	CASE STUDY 4
(C) Building components	*Openings and windows*	Main openings facing south and north			● SPA	● Main building
		Minimizing east and west windows			● SPA	● Main building
		Double glazing	●	●	●	
		Special glazing				●
	Shading devices	Decorative elements such as curtains	●	●	●	●
		Balconies	●	●	●	●
		Exterior shading devices				●
	Walls	Thermal mass	●	●	●	
		Light weight construction				●
		Heat insulation			●	●
		Thermal resistance			●	●
	Roofs	Thermal mass	●	●	●	
		Light weight construction				●
		Thermal resistance	●	●	●	●
		Heat insulation	●	●	●	●
		Water insulation	●	●	●	●

Table 17 (continued)

CRITERIA / NUMBER OF CASE STUDY			CASE STUDY 1	CASE STUDY 2	CASE STUDY 3	CASE STUDY 4
(C) Building components	*Foundation and basement*	In contact with the ground	•	•	•	•
		Built partially below grade	•			•
		Walk-out basement floors open to south	•			•
	Materials	Use of local materials	•		•	
		Exported materials				•
		Materials with low environmental impact				•
	Mechanical equipment and technologies	Integration of passive and active systems				•
		Installation of new technologies	•	•	•	•
		Renewable energy		•		

5.2 Conclusion and Recommendations

As dealt in the first chapter this study focuses on a response to the need for developing guidelines for architectural design of hotel buildings to achieve sustainable tourism rather than wider scope of sustainability of Antalya or Belek. In this section firstly a general overview to the research area are given, and then some suggestions for decision makers like policy makers and executives, hotel managers and some recommendations for designers are given.

Belek is an interesting example to observe Turkey's efforts to adapt changes in the field of tourism and its sustainability. The preliminary targets of the plans of this tourism center were to protect areas with high tourism potential and to ensure sector specific development and planning. However, it seems to move away from its initial considerations. The capacities of accommodation establishments were increased. There were problems in legal arrangements relating with uncontrolled development of the region. Moreover, transportation means are not adequate, particularly for pedestrians, cyclists, transit riders, and people of all ages and disabilities in the region.

Contribution of all the stakeholders, increasing public awareness in sustainable issues and implementation of the theoretical works should be carried out. The findings of this research indicate that although there is a considerable interest in the field of sustainable tourism, it is not adequately adopted or implemented by the stakeholders. Firstly, the policy makers should have a strong will to implement the decision they have taken for sustainable development. Moreover, hotel managers and the investors should give importance to conservation of environment and more generally adopt sustainable tourism principles. Misconceptions about the costs of sustainable design and construction among investors should be eliminated. Adequate monitoring and evaluation tools should be employed to conduct cost- benefit analysis from the side of hotel managers. Level of interest and participation in the subject among the tourists, travel agents, employees and locals should be increased.

Architects, city planners and landscape designers have a vital role to implement sustainable tourism. Sustainable design criteria should be integrated to the hotel buildings during their planning process to achieve better energy performances and comfort levels. As dealt before, Green Star certification is awarded to only existing accommodation establishments which have tourism "operation" licence from the Ministry. The current criteria was developed in 2008 should be revised periodically to reflect current developments and changes in national or international legislation. Moreover, a new certification focusing on sustainable design should be prepared for "investment" licenced accommodation establishments. This kind of certification may allow the companies to make appropriate investment decisions and to call for projects which consider sustainable designs criteria. Moreover, this may lead architects to integrate passive design features such as appropriate orientation, natural ventilation, solar control, use of daylight at the beginning of their projects.

In this thesis, general sustainable design recommendations for Antalya, Table 16, is structured. In this table, a general evaluation is presented to summarize accumulated knowledge and to view the whole frame. In Turkey only a specific geographic area, Belek is examined. Therefore, apart from current and similar circumstances, the results may not be the benchmark for locations outside. Further studies should be carried out for different contexts and places.

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APPENDIX A

CLASSIFICATION FORM FOR GREEN STAR

T.C. KÜLTÜR VE TURİZM BAKANLIĞI
YATIRIM VE İŞLETMELER GENEL MÜDÜRLÜĞÜ

ÇEVREYE DUYARLI KONAKLAMA TESİSLERİ İÇİN SINIFLANDIRMA FORMU (YEŞİL YILDIZ-ÇEVREYE DUYARLI TESİS SİMGESİ)

TESİSİN ADI : ....

TESİSİN ADRESİ : ....

TELEFON – FAKS : ....

E-POSTA, İNTERNET SİTESİ : ....

MEVCUT TÜRÜ VE SINIFI : ....

BELGE TARİH VE NO : ....

BELGE SAHİBİ : ....

MÜDÜR : ....

ALINAN PUAN : ....

SINIFLANDIRMA FORMUNUN AMAÇ VE KAPSAMI

Sürdürülebilir turizm kapsamında, çevrenin korunması, çevre bilincinin geliştirilmesi, turistik tesislerin çevreye olan olumlu katkılarının teşvik edilmesi ve özendirilmesi amacıyla, 1993 yılında Bakanlığımızca “Turizmde Çevreye Duyarlılık Kampanyası” başlatılmıştır.

Günümüzde, küresel ısınmanın artmasıyla birlikte, çevre bilinci ve çevreye duyarlılık çalışmaları da önem kazanmaktadır. Dünyada yaşanan söz konusu gelişmelere koşut olarak, uluslar arası kabul gören kriterler ve diğer gelişmeler de dikkate alınmış ve çevreye duyarlı konaklama işletmeleri için mevcut olan sınıflandırma formu güncelleştirilerek bu form hazırlanmıştır.

Bu form turistik konaklama işletmelerindeki çevreye duyarlı yapılaşmanın, işletmecilik özelliklerinin ve diğer yönleriyle çevreye olan olumlu katkılarının teşvik edilmesi ve çevre bilincinin geliştirilmesi amacıyla hazırlanmıştır.

Yatırım ve inşaat aşamasında aranılan nitelikler, konaklama işletmesinin inşaat aşamasından itibaren çevreye duyarlı olarak tasarlanmasını, planlanmasını ve işletmeye açılmasını sağlamayı amaçlamaktadır.

Form içeriğinde bulunan kriterler enerji, su, çevreye zararlı maddelerin tüketiminin ve atık miktarının azaltılmasını, enerji verimliliğinin arttırılmasını, yenilenebilir enerji kaynaklarının kullanımının teşvik edilmesini, konaklama işletmelerinin yatırım aşamasından itibaren çevreye duyarlı olarak planlanmalarını ve gerçekleştirilmelerini, tesisin çevreye uyumunu, çevreyi güzelleştirici düzenleme ve etkinlikleri, ekolojik mimariyi, çevreye duyarlılık konusunda bilinçlendirmeyi, eğitim sağlanmasını, ilgili kurum ve kuruluşlarla işbirliği yapılmasını kapsamaktadır.

Bu form çevreye duyarlılık konusunda çalışma yapan turistik işletmelerin talebi üzerine ve formun uygulama esaslarında belirlenen temel kriterlere sahip olan konaklama tesislerine uygulanacaktır. Asgari puanlar, konaklama işletmelerinin kapasiteleri ve çevreye olan etkileri dikkate alınarak, işletmelerin tür ve sınıflarına göre belirlenmiştir.

Konaklama işletmelerinin bu formda bulunan bütün kriterleri yerine getirmesinin uygulanabilir olmadığı düşüncesiyle, tesislerin tür ve sınıfları dikkate alınarak, asgari puanlar formda bulunan bütün kriterlerin puanlarının toplamı olan azami puandan düşük tutulmuştur. Böylece, işletmelere temel kriterler dışında kalan, diğer kriterler arasında seçim yapma imkanı sağlanmıştır.

SINIFLANDIRMA FORMUNUN UYGULAMA ESASLARI

1- Bu form turistik işletmelerin talebi üzerine uygulanacaktır.

2- Formun uygulanmasında, puanlar sıfırdan başlamakta olup, her kriter için azami puanlar belirtilmiştir.

3-Yıldızlı konaklama tesislerinin bu formda belirlenen asgari puanları aşması durumunda plaketlerinde sınıfını gösteren yıldızlar yeşil renkli düzenlenecektir. Ayrıca plaket üzerinde "Çevreye Duyarlı Tesis" ibaresi yer alacaktır.

4- Temel Kriterler: (Formda * işareti ile belirtilmektedir)

Bu formda yer alan ve aşağıda belirtilen temel kriterlerin yerine getirilmesi durumunda tesis değerlendirmeye alınacaktır.

a) İşletmelerin çevre politikası ve eylem planının olması.

b) Tesiste eylem planını uygulayacak özel bir yetkilinin olması veya işletmede uygulamadan sorumlu bir yetkili ile birlikte, bu hizmetin bir uzmandan veya uzman firmadan alınması.

c) İşletme tarafından, çevre bilincinin artırılması, çevresel tedbirlerin ve eylem planının uygulanmasını temin etmek için personele eğitim verilmesi.

d) Çevreye duyarlı atık su planının bulunması.

e) Turizm konaklama işletmesinde kullanılan tüm tesisat, teçhizat ve donanımların koruyucu bakım ve onarımının periyodik olarak yaptırıldığına dair kayıtların tutulması.

f) İşletmenin, su tüketimi, ısıtma ve soğutma için enerji tüketimi, elektrik tüketimi ve genel enerji tüketimi konusunda verileri toplaması ve izlemesi (Kapalı alan m^2 başına veya geceleme başına enerji tüketimi, aylık, üç aylık ve yıllık raporların hazırlanması ve dosya halinde saklanması).

g) İşletmede kullanılan kimyasal maddelerin (hacim ve/veya ağırlık olarak) izlenmesi ve verilerin toplanması (Kapalı alan m² başına veya geceleme başına tüketim, aylık, üç aylık ve yıllık raporların hazırlanması ve dosya halinde saklanması).

h) Tesiste ortaya çıkan atık miktarının (hacim ve/veya ağırlık) izlenmesi ve verilerin toplanması (Kapalı alan m² başına veya geceleme başına tüketim, aylık, üç aylık ve yıllık raporların hazırlanması ve dosya halinde saklanması).

5- Çevreye duyarlı olarak faaliyet gösteren tesiste;

-İşletmenin çevre politikası ve eylem planına uygun olarak yaptığı tüm faaliyetlere ilişkin hazırlanan yıllık rapor,

-Bu formda ayrıntılı olarak belirtilen, kullanılan tesisat, teçhizat ve malzemelerin çevreye duyarlı olduğuna, bakımlarının düzenli yapıldığına ve tesiste yapılan çevreye duyarlı çalışmalara ilişkin üretici firmanın faturası, raporu, tanıtım broşürü, bakım yapan firmanın faturası, raporu, ilgili kurum ve kuruluşların yazısı, mühendislik, mimarlık raporu, ilgili meslek kuruluşunun raporu vb. evrak,

-Çalışan personelin çevreye duyarlılık konusunda eğitim programı, sertifikaları, personele ve müşterilere dağıtılan ve ilan edilen doküman,

-Çevreye duyarlılık konusunda sivil toplum kuruluşları, ilgili kurum ve kuruluşlarla yapılan işbirliği, koordinasyon çalışmalarına ilişkin evrak, güncelleştirilerek bir dosya halinde tutulur (Bu formda aranılan nitelikleri kanıtlayacak tüm doküman bu dosyada bulundurulur. Gerekli görülmesi halinde değerlendirme çalışması sırasında ilave evrak istenebilir).

A- GENEL YÖNETİM

		PUAN
1*	İşletmelerin çevre politikası ve eylem planının olması,	5 puan
2*	Eylem planının uygulanması;	
	Uygulayacak özel bir yetkilinin olması (Konusunda eğitim almış, Çevre Mühendisi, Enerji Verimliliği Uzmanı, Biolog, Ziraat Mühendisi vb.),	10 puan
	Bu hizmetin bir uzmandan veya uzman firmadan alınması (İşletmede uygulamadan sorumlu bir yetkili ile birlikte),	7 puan
3*	İşletmenin, su tüketimi, ısıtma ve soğutma için enerji tüketimi, elektrik tüketimi ve genel enerji tüketimi konusunda verileri toplaması ve izlemesi (Kapalı alan m² başına veya geceleme başına enerji tüketimi, aylık, üç aylık ve yıllık raporların hazırlanması ve dosya halinde saklanması),	5 puan
4*	İşletmede kullanılan kimyasal maddelerin (hacim ve/veya ağırlık olarak) izlenmesi ve verilerin toplanması (Kapalı alan m² başına veya geceleme başına tüketim, aylık, üç aylık ve yıllık raporların hazırlanması ve dosya halinde saklanması),	5 puan
5*	Tesiste ortaya çıkan atık miktarının (hacim ve/veya ağırlık olarak) izlenmesi ve verilerin toplanması (Kapalı alan m² başına veya geceleme başına tüketim, aylık, üç aylık ve yıllık raporların hazırlanması ve dosya halinde saklanması),	5 puan
6	İşletmenin uluslararası kabul gören çevre yönetim sertifikalarına sahip olması (EMAS, ISO 14000, ISO 14001, Mavi Bayrak gibi), (Her sertifika 3 puan)	Azami 9 puan
7	Tesise hizmet veren veya mal tedarik eden ana firmaların en az bir tanesinin çevre yönetim sertifikasına sahip olması (EMAS, ISO 14001 gibi),	3 puan

8	İşletmenin enerji ve su tüketimini hesaplamak ve izlemek için ilave sayaç ve ölçü aletleri kullanılması, (Mutfak, çamaşırhane, konaklama üniteleri, bahçe, teknik üniteler vb. her biri 2 puan, toplam 6 puanı geçemez)	Azami 6 puan
9	İşletmenin çevreye duyarlılık çalışmalarının ödül kazanması,	(2 puan)
10	Yerel yönetim veya idareler veya yörede bulunan diğer tesislerle çevreye duyarlılık konusunda ortak çalışma ve etkinlikler düzenlemek,	(5 puan)
11	Çevre koruma organizasyonlarına düzenli olarak katkıda bulunmak veya bu organizasyonlara düzenli olarak katılmak (Dernek, vakıf, vb.), (Her biri 2 puan, toplam 6 puanı geçemez.)	Azami 6 puan
12*	Turizm konaklama işletmesinde kullanılan tüm tesisat ve donanımların (enerji, ısıtma, havalandırma, iklimlendirme ekipmanları, bulaşık, çamaşır makineleri, buzdolapları, asansörler vb.) koruyucu bakım ve onarımının periyodik olarak yetkili servise veya konusunda eğitim almış uzman kişilere yaptırılması,	(5 puan)
13	Isıtma kazanının ve brülörün yılda en az bir defa periyodik olarak bakımının yetkili kişilere yaptırılması ve kazan bacasından açığa çıkan emisyonların yetkili kuruluşlar tarafından ölçülüp raporlanması,	(5 puan)

B- EĞİTİM

14*	İşletme tarafından, çevre bilincinin artırılması, çevresel tedbirlerin ve eylem planının uygulanmasını temin etmek için personele periyodik olarak eğitim verilmesi,	(5 puan)
15	Personelin olası su sızıntılarının belirlenmesi ve hemen önlem alınması konusunda eğitilmesi,	(2 puan)

16	İşletme personelinin, deterjan ve dezenfektanları kullanırken paketlerinde veya kutularında önerilen kullanım miktarlarını aşmamaları ve kullanım yöntemleri konusunda eğitilmeleri,	(2 puan)
17	Tesisin mutfak ve teknik bölümlerinde kullanılan cihazların tasarruflu ve verimli kullanılması konusunda personele eğitim verilmesi,	(2 puan)
18	Misafirlere tesise gelişte, resepsiyonda çevreye duyarlılık politikası ve alınan önlemler hakkında bilgi verilmesi, çevresel politika için destek istenmesi ve müşterilerin katılımının sağlanılması,	(3 puan)
19	Çocuk misafirlere yönelik çevreye duyarlılık konusunda eğitim ve etkinliklerin yapılması,	(3 puan)

C- TESİSİN YATAK ODALARINDAKİ DÜZENLEMELER

20	Misafirlere, odalarda kolayca görebilecekleri bir yerde çevreye duyarlılık çalışmalarının yazılı, görsel-işitsel olarak duyurulması (Gazete, dergi, broşür, kapalı devre kanal vb.),	(2 puan)
21	Misafirlerin, tesisin çevreye duyarlılık çalışmaları hakkında görüşlerinin alınması ve değerlendirilmesi (anket vb.),	(3 puan)
22	Soğutma ve havalandırmanın (klima vb.), pencere ve kapıların açılması durumunda otomatik kapanması,	(4 puan)
23	Soğutma ve havalandırma sistemlerinde otomatik kapatma bulunmayan tesislerde, müşterilere kapı ve pencerelerin açılması halinde, soğutma ve havalandırmanın kapatılmasını hatırlatan bilgilendirme,	(1 puan)
24	Odalarda elektrik sisteminin, müşteri odadan ayrıldığında otomatik olarak kapanması(Enerji tasarruf sistemi),	(6 puan)
25	Enerji tasarruf sistemi bulunmayan tesislerde, müşterilere odadan çıkarken elektrikli cihazların (televizyon, klima vb.) ve ışıkların kapatılmasını hatırlatan bilgilendirme,	(1 puan)

26	Odalarda ısıtma ve soğutmanın kontrollü olması,	
	Merkezi kontrollü sistem	(5 puan)
	Bağımsız ayar sistemi (termostat)	(3 puan)
27	Odada yer alan cihaz ve makinelerin(minibar, buzdolabı, tv, split klima vb.) yüksek verimli ve az elektrik tüketecek teknolojide olması, (Her biri 2 puan, toplam 6 puan)	Azami 6 puan
28	Oda aydınlatılmasında az enerji tüketen aydınlatma elemanlarının kullanılması,	(2 puan)
29	Odalarda kullanılan cihazların (buzdolabı, minibar, vb.) yüksek verimle ve az enerji harcayacak şekilde; güneş ışığı, ısı kaynakları gibi etkilerden uzak ve cihazın havalandırması sağlanacak şekilde yerleştirilmesi,	(2 puan)
30	Misafir bulunmayan odalarda perde veya güneşliklerin kapalı tutulması,	(1 puan)
31	Duş başlıkları ve musluklarda, akan suyun tasarrufuna yönelik özel armatürlerin kullanılması (Fotoselli, ayarlı, hava karışımlı başlıklı vb. su tüketimi dakikada 12 litreyi aşmayan),	(4 puan)
32	Rezervuarların her kullanımda 6 litre veya daha az su harcaması (Farklı miktarda su akışını sağlayan veya su akışını durdurabilen ayarlı rezervuarlar),	(4 puan)
33	Tüm banyolarda duş teknesi veya derinliği azaltılmış küvet kullanılması,	(2 puan)
34	Banyo ve tuvaletlerde suyun tasarruflu kullanılması konusunda müşterilerin bilgilendirilmeleri,	(2 puan)
35	Misafirlerden, olası su sızıntılarını işletmeye bildirmelerinin istenilmesi,	(2 puan)
36	Odalarda tek kullanımlık (şampuan, sabun, duş bonesi, bardak, tabak, çatal bıçak takımları vb.) malzemelerin kullanılmaması,	(4 puan)

37	Tuvaletlerde çöp kutularının bulunması ve müşterilerin çöplerini tuvalet yerine çöp kutularına atması yönünde bilgilendirilmeleri,	(2 puan)
38	Tesiste sigara içilmeyen odalar;	
	-Odaların en az %50 sinin sigara içilmez olması,	(5 puan)
	- Odaların en az %20 sinin sigara içilmez olması,	(2 puan)
39	Yatak odalarında, atıkların ayrılması hakkında bilgilendirmenin yapılması,	(2 puan)
40	Aynı misafir için yastık kılıfı, çarşaf, nevresim ve havluların misafirlerin isteğiyle değiştirileceği konusunda bilgilendirilmeleri,	(6 puan)
41	Misafirlerin, konaklama işletmesine ve diğer turistik yerlere toplu taşım araçlarıyla en kolay nasıl ulaşabilecekleri konusunda bilgilendirilmeleri,	(2 puan)
42	Misafirlerin, çevre koruma tedbirleri, bio-çeşitlilik ve çevre hakkında bilgilendirilmesi,	(2 puan)

D-TESİSİN ÇEVREYE UYUMU, ÇEVREYİ GÜZELLEŞTİRİCİ DÜZENLEME VE ETKİNLİKLER

43	Tesisin emsalinin (Toplam inşaat alanının toplam arsa alanına oranı);	
	0,20 veya daha az olması,	(8 puan)
	0,30 olması,	(6 puan)
	0,40 olması,	(4 puan)
	0,50 olması,	(2 puan)
44	Peyzaj düzenlemesi ve ağaçlandırma,	(5 puan)
45	Tesisi oluşturan yapıların görsel olarak doğa ile uyumlu olması,	(5 puan)

46	Tesisin çevrede bulunan tarihi, doğal ve kültürel değerlerin korunmasına katkıda bulunmasına yönelik etkinlikler,	(5 puan)
47	Çevrede bulunan vahşi veya evcil hayvanların korunması, sağlık, bakım ve beslenmeleri ile ilgili çalışmaların yapılması,	(2 puan)
48	Tesis bahçesinde, envanteri bulunan endemik bitkilerin korunması ve ekosistemin bozulmaması için özen gösterilmesi,	(2 puan)

E-EKOLOJİK MİMARİ

49	Tesisin mimari tasarımının özel (çevreye duyarlı) olması,	(10 puan)
50	Tesisin mimari yapısının, konumunun ve yapı elemanlarının doğal havalandırmayı sağlayacak şekilde olması,	(6 puan)
51	Tesisin ısı yalıtımının iklim şartlarına uygun, minimum enerji ile yeterli soğutma ve ısıtma imkânı sağlayacak şekilde olması,	(5 puan)
52	Tesis dış cephesinde kullanılan camlar;	
	Yazın ısının içeri girmesini engelleyecek geçirgenliği kontrol eden, kışın ise ısı kaybını azaltan özel cam,	(3 puan)
	Çift cam,	(2 puan)
53	Bina dış cephesinde güneşi kontrol eden yapı elemanlarının bulunması,	(2 puan)
54	Tesisin inşaatının yapılacağı arazinin amenajman planının yaptırılması, inşaat sırasında çevreye zarar verilmemesi için önlemlerin alınması, tesisin inşasında kullanılan yapı elemanları, malzemelerin çevreye duyarlı olanlarının seçilmesi ve yapılan çalışmaların belgelendirilmesi (Amenajman planı, film, fotoğraf vb. belge),	(10 puan)
55	Tesisin çevreye en az zarar verecek şekilde yapılmış olması (ÇED Raporu istenir.),	(2 puan)
56	Çevreye duyarlı boya- cila, kurşunsuz cam vb. kullanılması (Çevre etiketli), (Her biri 2 puan, toplam 4 puan)	Azami 4 puan

F- ENERJİ

a) Tesiste Enerji Verimliliği ve Tasarrufuna Yönelik Önlem ve Çalışmalar

57	Binaların giriş kapılarında rüzgarlık veya hava perdesi bulunması,	(2 puan)
58	Tesisin genel mahallerinde ısıtma ve soğutmanın otomatik kontrollü (termostat) olması,	(4 puan)
59	Tesiste kullanılan cihaz ve makinelerin (Isıtma kazanı (boiler), merkezi klima (Chiller vb), soğuk oda, dolap, çamaşır yıkama ve kurutma makinesi vb.) yüksek verimli ve az elektrik tüketecek teknolojide olması, (Her biri 2 puan)	Azami 6 puan
60	Tesiste az enerji tüketen aydınlatma elemanlarının kullanılması,	(2 puan)
61	Tesisin iç ve dış aydınlatmasının, konunun uzmanı kişilerce hazırlanan proje doğrultusunda, mahal ve alanların kullanım amacına göre, gereği kadar yapılması,	(4 puan)
62	Tesiste (Koridorlar, bahçe, teknik üniteler, personel mahalleri vb.) harekete veya ışığa duyarlı aydınlatma sistemlerinin kullanılması,	(4 puan)
63	Bahçe vb. açık alan aydınlatmalarında kullanılan aydınlatma elemanlarının, ışığın gökyüzüne gitmesini engelleyecek şekilde düzenlenmesi,	(2 puan)
64	Tesisin mutfak ve teknik bölümlerinde kullanılan cihazların (soğuk oda, buzdolabı motorları, merkezi klima cihazları vb.) yüksek verimle ve az enerji harcayacak şekilde; güneş ışığı, ısı kaynakları gibi etkilerden uzak ve cihazın havalandırması sağlanacak şekilde yerleştirilmesi,	(5 puan)

65	Tesisin bütünü dikkate alındığında önemli ölçüde enerji tasarrufu sağlayacak frekans invertörü, ısı geri kazanım sistemi veya ısı pompası gibi yeni teknolojilerin kullanılması, (Her biri 10 puan toplam 30 puan)	Azami 30 puan
66	Tesisin sıcak su üretiminde eşanjör cihazının kullanılması,	(2 puan)
67	Merkezi ısıtma sistemi olması,	(2 puan)
68	Merkezi ısıtma sisteminin ihtiyaca uygun olarak kullanılabilmesi amacıyla, binanın bölümlere ayrılarak ısıtılabilmesi imkanı,	(2 puan)
69	Tesiste elektrik, ısıtma ve soğutma sağlanmasında yeni teknolojilerin kullanılması;	
	Trijenerasyon sistemi,	(15 puan)
	Kojenerasyon sistemi,	(10 puan)
70	Tesiste enerji kullanımında hibrit sistem bulunması,	(5 puan)
71	Saunada zaman kontrol paneli bulunması,	(2 puan)
72	Çamaşırların doğal yollarla kurutulması (Kapalı mahalde veya görüntü kirliliği yaratmayacak şekilde açık alanda),	(2 puan)
73	Genel mahallerde servis hazırlığı yapan personelin elektriği tasarruflu kullanmasını sağlayan aydınlatma donanımının bulunması,	(2 puan)

b) Tesiste Güneş, Rüzgar, Jeotermal, Hidro, Dalga Enerjisi, Biogaz vb. Yenilenebilir Enerji Kaynağı Kullanımı

74	Havaya fazla miktarda sera gazı veren kömür veya ağır petrol ürünleri (sülfür oranı %0,2'den fazla olan) gibi kaynakların enerji olarak kullanılmaması,	(5 puan)
75	Yenilenebilir enerji kaynaklarından elektrik sağlanması; (Enerjiyi sağlayan firmadan yenilenebilir enerjini kaynağını ve oranını gösteren bir yazının alınması halinde değerlendirilir) (Yenilenebilir enerjinin tesis bünyesinde sağlanması halinde 2 puan ilave edilir)	
	Kullanılan toplam elektrik miktarının tamamının yenilenebilir enerji kaynağından sağlanması,	(20 puan)
	Kullanılan toplam elektrik miktarının %50 sinin yenilenebilir enerji kaynağından sağlanması,	(10 puan)
	Kullanılan toplam elektrik miktarının %20 sinin yenilenebilir enerji kaynağından sağlanması,	(4 puan)
	Kullanılan toplam elektrik miktarının %10 unun yenilenebilir enerji kaynağından sağlanması,	(2 puan)
76	Tesiste ısıtma sisteminde kullanılan enerjinin yenilenebilir enerji kaynaklarından sağlanması (Elektrik haricinde; Güneş paneli, jeotermal vb.);	
	Tamamının yenilenebilir enerji kaynağından sağlanması,	(20 puan)
	%50 sinin yenilenebilir enerji kaynağından sağlanması,	(10 puan)
	%20 sinin yenilenebilir enerji kaynağından sağlanması,	(4 puan)
	%10 unun yenilenebilir enerji kaynağından sağlanması,	(2 puan)

77	Tesiste soğutma sisteminde kullanılan enerjinin yenilenebilir enerji kaynaklarından sağlanması (Elektrik haricinde; Deniz suyu, güneş vb.);	
	Tamamının yenilenebilir enerji kaynağından sağlanması,	(20 puan)
	%50 sinin yenilenebilir enerji kaynağından sağlanması,	(10 puan)
	%20 sinin yenilenebilir enerji kaynağından sağlanması,	(4 puan)
	%10 unun yenilenebilir enerji kaynağından sağlanması,	(2 puan)
78	Tesisin temiz sıcak su ihtiyacının yenilenebilir enerji kaynaklarından sağlanması (Elektrik haricinde; Güneş paneli, jeotermal vb.);	
	Tamamının yenilenebilir enerji kaynağından sağlanması,	(20 puan)
	%50 sinin yenilenebilir enerji kaynağından sağlanması,	(10 puan)
	%20 sinin yenilenebilir enerji kaynağından sağlanması,	(4 puan)
	%10 unun yenilenebilir enerji kaynağından sağlanması,	(2 puan)

G-SU

79	İşletmelerin, yerel idareler tarafından hazırlanan su kullanma koruma planına uygun olarak su kullanması (Tesisin bu plana uygun olarak su kullandığına ilişkin ilgili idare yazısı aranır),	(5 puan)
80	Genel ve personel duş ve tuvaletlerinde bulunan duş başlıkları ve musluklarında, akan suyun tasarrufuna yönelik özel armatürlerin kullanılması (Fotoselli, ayarlı, hava karışımlı başlıklı vb. su tüketimi dakikada 12 litreyi aşmayan),	(2 puan)

81	Genel tuvaletler ve personel tuvaletlerinde rezervuarların her kullanımda 6 litre veya daha az su harcaması (Farklı miktarda su akışını sağlayan veya su akışını durdurabilen ayarlı rezervuarlar),	(2 puan)
82	Genel duş ve tuvaletlerde suyun tasarruflu kullanılması konusunda misafirlerin ve personelin bilgilendirilmeleri,	(1 puan)
83	Genel tuvaletlerde çöp kutularının bulunması ve müşterilerin çöplerini tuvalet yerine çöp kutularına atması yönünde bilgilendirilmeleri,	(1 puan)
84	Pisuvarlarda suyun akıtıldığı sistemin otomatik (fotoselli) olması,	(2 puan)
85	Su kaçaklarının izlenmesi ve giderilmesine özen gösterilmesi,	(2 puan)
86	Yeşil alanların gün ışığı etkili olmadan önce veya gün ışığı etkisini kaybettikten sonra sulanması,	(2 puan)
87	Atık suların iyileştirilmesi;	
	İşletmenin merkezi arıtma sistemine bağlı olması,	(4 puan)
	İşletmenin kendine ait atık su arıtma sisteminin bulunması (Mevzuata uygun kriterlere sahip olması ve kriterlere uygun çalıştığının belgelendirilmesi şartıyla),	(2 puan)
88*	Atık su planı;	
	Konaklama işletmelerinin, yerel idarelerin hazırladığı çevreye duyarlı atık su planına uymaları,	(4 puan)
	Yerel idare tarafından onaylanmış tesise ait çevreye duyarlı atık su planı olması (Yerel idarenin atık su planının olmaması halinde),	(2 puan)
89	Yağmur sularının veya arıtılmış atık suların temizlik ve içme haricinde (bahçe sulaması ve/veya tuvalet rezervuarlarında) kullanılması, (Her biri 2 puan, toplam 4 puan)	Azami 4 puan
90	Deniz suyundan içme veya kullanma suyu elde edilmesi (Yerel idarenin izni olması halinde),	(10 puan)

91	Su tasarruflu çamaşır ve bulaşık makinelerinin (Çevre etiketli) kullanılması,	(4 puan)
92	Mutfakta ve bahçede kullanılan suların otomatik olarak kapanmasını sağlayan zaman ayarlı sistem,	(2 puan)
93	Bahçe sulamasında, gereksiz su tüketimini engelleyen damlama, fıskiye vb. teknolojilerin kullanılması,	(4 puan)
94	Golf sahaları, ormanlık alanlar gibi sulanması gereken geniş alanları bulunan tesislerde bilgisayar kontrollü özel sulama sistemlerinin kullanılması,	(4 puan)

H- DETERJANLAR, DEZENFEKTANLAR VE TEHLİKELİ KİMYASAL MADDELER

95	Dezenfektanların hijyen gerekliliği halinde kullanılmaları,	(2 puan)
96	Çevreye duyarlı deterjan ve dezenfektanların kullanılması (Çevre etiketli),	(4 puan)
97	Yüzme havuzlarında uygun hijyenik sonuç için minimum miktarda dezenfektan kullanan otomatik dozaj sisteminin kullanılması,	(4 puan)
98	Uygun mahallerde kimyasal maddeler kullanılmaksızın temizlik yapılması (mekanik temizlik, mikrofiber vb.),	(2 puan)
99	Bahçelerinin organik tarım esaslarına uygun olarak düzenlenmesi ve bakımının yapılması,	(2 puan)
100	Haşere ile mücadelede insan sağlığına ve çevreye zarar vermeyen ilaçların kullanılması veya doğal tedbirlerin (Sinek tutucu, yapışkanlı kağıt, balık vb.) alınması	(2 puan)

I- ATIKLAR

101	Artan sağlıklı günlük yiyeceklerin hayır kurumlarına (Bakım evleri, yurtlar, hayvan barınakları vb.) verilmesi, bu konuda ilgili kurum ve kuruluşlarla işbirliği yapılması,	(5 puan)
102	Müşterilerin atıkları ayırabilmeleri için tesisin uygun yerlerinde yeterli kutu bidon sağlanması,	(2 puan)
103	Personel tarafından zararlı atıkların (Yağ filtreleri, boya, florasan ampuller, toner, mürekkep, soğutma ekipmanları, piller, ilaçlar, tıbbi atıklar vb.) diğerlerinden ayrılması (Yerel idareden zararlı atıkların ayrıştırılması hizmetinin verildiğine ilişkin yazı alınır.), (Her biri 2 puan, toplam 10 puan)	Azami 10 puan
104	Atıkların personel tarafından çeşitlerine (plastik, kağıt, cam vb.) ayrılması (Ayrıştırılan atıkların yerel idare veya firmalarca değerlendirildiğinin tespiti halinde puan verilir), (Her biri 3 puan, toplam 9 puan)	Azami 9 puan
105	Organik atıkların ayrılması ve değerlendirilmesi(kompost, biogaz vb.),	(4 puan)
106	Yerel idare tarafından atıkların ayrıştırılması hizmeti verilmemesi halinde, yerel idarelere bu hizmetin verilmesi amacıyla talepte bulunulması,	(2 puan)
107	Yerel idarelerin atıkları toplama imkânının bulunmaması halinde atıkların yerel idare tarafından uygun bulunan yerlere taşınması (Yerel idarenin konuya ilişkin yazısının bulunması halinde değerlendirilir.),	(2 puan)
108	Genel duş ve tuvaletlerde, ortak alanlarda tek kullanımlık (şampuan, sabun, duş bonesi, bardak, tabak, çatal bıçak takımları vb.) malzemelerin kullanılmaması,	(4 puan)
109	Tek kullanımlık içecek kutularının (teneke vb.) sunulmaması, bunun yerine cam şişe, postmix, premix vb. ürünlerin kullanılması,	(4 puan)

110	Tek kullanımlık paketlerin (tereyağ, reçel, bal, peynir vb.) kahvaltı için kullanılmaması,	(4 puan)
111	Yağ ayrıştırıcılarının tutucularının kullanılması, kullanılan yağların toplanması, mevzuata uygun bir şekilde imhası veya değerlendirilmesi,	(5 puan)
112	Kullanılmış eşyaların ve malzemelerin satılması veya hayır kurumlarına bağışlanması,	(2 puan)

J- DİĞER HİZMETLER

113	Yerleşim alanı büyük olan golf, tatil köyü vb. tesisler içerisindeki ulaşımın çevreye sera gazı vermeyen araçlarla sağlanması,	(2 puan)
114	Misafirlerin kullanımı için bisiklet imkanının sağlanması,	(2 puan)
115	Tuvalet kağıtlarının ve/veya ofis kağıtlarının çevreye duyarlı tip kağıtlardan kullanılması,	(4 puan)
116	Tesisin idari işlerinde kağıt tüketimini en aza indirecek elektronik yazışma, adisyon, fatura vb. sistemlerin kullanılması,	(3 puan)
117	Tesiste çevre etiketli eşyaların kullanılması (yastık, çarşaf, masa örtüsü, mobilya, çamaşır makinesi, bulaşık makinesi, buzdolabı, elektrik süpürgesi, ampul, vb.), (Her biri 2 puan, toplam 10 puanı geçemez)	Azami 10 puan
118	Menüde belirtilen yemeklerden, en az iki çeşit yemeğin ve bir çeşit içeceğin organik tarım metotlarıyla üretilen ürünlerden hazırlanması,	(2 puan)
119	En az iki yerel yiyecek ürününün kahvaltı ve öğünlerde sunulması,	(2 puan)

120	Tesisin orman içinde veya yanında olması durumunda yangın için gerekli önlemlerin alınması (Gözlem, alarm, ihbar, gerekli cihazlar teçhizat, personelin eğitimi, yerel idare ile işbirliği),	(5 puan)
121	Açık ve kapalı mahallerde gürültü kirliliği konusunda alınacak önlemler;	
	Gürültüsüz cihazların kullanımı,	(2 puan)
	Tesisat mahallerinin, müzik yayını yapılan mahallerin yalıtımının yapılması,	(4 puan)
	İnsan sağlığına uygun desibellerde ses yayını yapılması,	(2 puan)
	Gürültü kaynağının perdelenmesi,	(4 puan)
122	Bu formda yer almayan, çevreye duyarlılık çalışmalarına ilave katkı sağlayan faaliyetler veya teknoloji, sistem veya cihazların kullanılması, (Her biri 3 puan)	Azami 9 puan

ASGARİ PUAN TABLOLARI

TATİL TESİSLERİ

SINIFI	ASGARİ PUAN	ALDIĞI PUAN
5 YILDIZLI TATİL KÖYÜ	330	
5 YILDIZLI OTEL	300	
4 YILDIZLI TATİL KÖYÜ	280	
4 YILDIZLI OTEL	230	
3 YILDIZLI OTEL	170	
1 -2 YILDIZLI OTEL-DİĞER KONAKLAMA TESİSLERİ	140	

ŞEHİR TESİSLERİ

SINIFI	ASGARİ PUAN	ALDIĞI PUAN
5 YILDIZLI OTEL	250	
4 YILDIZLI OTEL	200	
3 YILDIZLI OTEL	170	
1 -2 YILDIZLI OTEL-DİĞER KONAKLAMA TESİSLERİ	140	

....

isimli tesis, ... tarihinde yapılan çevreye duyarlı konaklama işletmeleri için sınıflandırma formu uygulamasında, ………….. puan almıştır.

Arz olunur.

APPENDIX B

QUESTIONNAIRE FORM

KILAVUZ KRİTERLER
1. BÖLÜM

GENEL BİLGİLER

Tesisin ismi :

Adresi :

Telefon – Fax :

E-posta, internet sitesi :

Sınıfı : ☐ 1 Yıldız ☐ 2 Yıldız ☐ 3 Yıldız
☐ 4 Yıldız ☐ 5 Yıldız

Mülkiyet durumu : ☐ Tahsisli ☐ Şahsi mülkiyet
☐ Şirket ☐ Zincir tesis:

☐ Diğer

İşletme Müdürü :

Çevre Sorumlusu :

Çalışma dönemi : ☐ Sezonluk ☐ Tüm yıl

Sezonluksa süresi:

Doluluk oranları

Ocak-Mart:

☐ % 75’in üzeri ☐ % 50-75 ☐ % 25-50 ☐ % 25’den az ☐ Kapalı

Nisan-Haziran:

☐ % 75’in üzeri ☐ % 50-75 ☐ % 25-50 ☐ % 25’den az ☐ Kapalı

Temmuz-Eylül:

☐ % 75’in üzeri ☐ % 50-75 ☐ % 25-50 ☐ % 25’den az ☐ Kapalı

Ekim-Aralık:

☐ % 75’in üzeri ☐ % 50-75 ☐ % 25-50 ☐ % 25’den az ☐ Kapalı

2. BÖLÜM

Mimari tasarım

<u>Planlama:</u>

Bulunduğu bölge : ☐ Kent Merkezi ☐ Karayolu Üstü

☐ Deniz/Göl Kenarı ☐ Dağ Tesisi

☐ Ormanlık alan

Kent merkezine uzaklık (km) :

Ulaşım : ☐ Otobüs ☐ Minibüs

☐ Taksi ☐ Ücretli servis ☐ Ücretsiz servis

☐ Rent a car

☐ Bisiklet ☐ Yürüyüş

☐ Motorlu olmayan araçlar

<u>Yönlenme</u>

☐ Kuzey-Güney ☐ Doğu-Batı

☐ Güneybatı-Kuzeydoğu ☐ Güneydoğu-Kuzeybatı

Ana cephenin güneye baktığı oran:

<u>Peyzaj düzenlemesi ve ağaçlandırma</u>

☐ Çevresel Etki Değerlendirmesi (ÇED) Raporu

☐ Amenajman Planı

☐ Mevcut ağaçlar/bitki örtüsünün korunması

☐ Sonradan dikilen ağaçlarda yerel bitki örtüsü kullanımı

☐ Tesis bahçesinde endemik bitkilere yönelik düzenleme

☐ Kumullar korunması

☐ Batı yönünde ağaç dikilmesi

☐ Güney yönünde yapraklarını döken ağaç dikilmesi

☐ Kuzey yönünde yapraklarını dökmeyen bodur ağaçların dikilmesi

☐ Su öğesi kullanımı

☐ Açık alan aydınlatma elemanlarının, ışığın gökyüzüne gitmesini engelleyecek şekilde düzenlenmesi

☐ Bisiklet, yürüyüş yolları

☐ Tesisin orman içinde veya yanında olması durumunda yangın için gerekli önlemlerin alınması (Gözlem, alarm, ihbar, gerekli cihazlar teçhizat, personelin eğitimi, yerel idare ile işbirliği)

☐ İnşa aşamasında çevreye olumsuz etki yapılmaması

Deniz kaplumbağalarının korunmasına yönelik düzenlemeler

☐ Kumsala büfe, restoran vb sabit tesisler kurulması

☐ Kumsaldan görülebilen ışıkların perdelenmesi veya kumsaldan görünmeyecek durumda düzenlenmesi

☐ Yüksek dalga boylu (kırmızı, sarı) veya düşük basınçlı sodyum lambalarının kullanılması

Çevreyle uyum

☐ Ölçek ☐ Malzeme ☐ Biçim

☐ Doku ☐ Teknik

☐ Tarihi, doğal, kültürel yapı ile ilişki

☐ Eğime oturuyor mu?

☐ Manzara hakimiyeti

<u>Bina özellikleri</u>

Mimarı :

İnşaatın tamamlanma tarihi :

İşletmeye açılma tarihi :

İnşaat (İç mekan) kaç yılda bir yenilendiği:

İnşaatın en son yenilendiği tarih :

<u>Otel büyüklüğü</u>

Toplam inşaat alanı **:**

Toplam arsa alanı **:**

Kışın ısıtılan alan **:**

Emsal **:** ☐ 0,20 veya daha az olması

(Toplam inşaat alanının ☐ 0,30 olması ☐ 0,40 olması

toplam arsa alanına oranı) ☐ 0,50 olması

Misafir oda sayısı **:**

Misafir yatak sayısı **:**

Kat sayısı (Bodrum katlar dahil) **:**

Kat yükseklikleri **:**

Personel sayısı **:** Daimi çalışan personel sayısı:

Mevsimlik çalışan personel sayısı:

Personel yatak sayısı **:**

Salonların toplam alanı **:**

(toplantı, çok amaçlı salon)

Kapasite **:**

Doğal aydınlatma: ☐ Binaların önünde engel olmaması

☐ Aydınlatma ihtiyacı yüksek olan yerlerin kuzey ve/veya güneye yönlenmesi

☐ Çatı penceresi ☐ Atrium/avlu ☐ Cam ev (Kış bahçesi)

☐ Diğer…….

Doğal havalandırma: Hakim rüzgar yönü kuzey

Açık mekanların kuzey yönde tasarlanması

☐ Baca etkisi ☐ Atriumlu ☐ Merdiven kovası

☐ Çapraz havalandırma Binanın uzun cephesi hakim rüzgar (kuzey) yönüne dik mi?

☐ Çatı boşluğun havalandırılması ☐ Çatı penceresi

Gölgeleme ☐ Çatı saçakları ☐ Güneş kırıcılar
☐ Balkon/teras ☐ Ağaç

Yerleşim:

☐ Bağımsız ☐ Tek duvarı bitişik
☐ İki duvarı bitişik ☐ Tek kütle ☐ Dağınık yerleşim

Binanın biçimlenmesi:

☐ Dairesel ☐ Kare ☐ Dikdörtgen (doğu-batı aksı)
☐ V-C-L-U Şeklinde

☐ Kompakt ☐ Avlulu/Atriumlu

Binanın bölümlere ayrılması :

☐ Isıtma/soğutma niteliğine göre mekanların zonlara ayrılması
☐ Genel kullanım mekanları, dolaşım alanları güney cephesine yerleştirilmesi
☐ Penceresiz mekanların binanın kuzey cephesine yerleştirilmesi
☐ Depo, ıslak hacimler, servis mekanları doğu veya batı cephelerine yerleştirilmesi

Konstrüksiyon sistemi : ☐ Taş yığma, ☐ Betonarme ☐ Çelik
☐ Ahşap yığma/ahşap karkas, ☐ Tuğla yığma

Birden fazla seçenek işaretlenebilir

Duvarlar:

☐ Prefabrik paneller ☐ Tuğla yığma ☐ Taş yığma
☐ Ahşap ☐ Giydirme cephe

Çatı:

☐ Marsilya ☐ Alaturka ☐ Toprak ☐ Çimento

Dış cephede renk seçimi

☐ Açık renk ☐ Koyu renk ☐ Ara renk

Çatıda renk seçimi

☐ Açık renk ☐ Koyu renk ☐ Ara renk

İç mekanlarda renk seçimi (Doğrudan güneş alan mekanlarda değerlendirilecek)

Odalar	☐ Duvar…………..	☐ Zemin…………..
Lobi	☐ Duvar…………..	☐ Zemin…………..
Salonlar	☐ Duvar…………..	☐ Zemin…………..
Lokanta	☐ Duvar…………..	☐ Zemin…………..
Diğer	☐ Duvar…………..	☐ Zemin…………..

Eko-etiketli malzeme kullanımı:

☐ Boya (İç/dış) ☐ Cila ☐ Kurşunsuz cam

☐ Diğer………………………………………………………. ☐ Yok

<u>Odalar</u>

Banyo

☐ Küvet ☐ Derinliği azaltılmış küvet ☐ Duş

Kaplama malzemesi odalar ve banyolar için değerlendirilecek

Odalar:	**Banyolar:**
Zeminde	Zeminde
Duvarda	Duvarda
Tavanda	Tavanda

<u>Enerji kaybına yönelik önlemler</u>

Duvar Yalıtımı : ☐ Var ☐ Yok

Varsa;

☐ İçerden ☐ Dışarıdan ☐ Boşluklu duvar

Çatı yalıtımı : ☐ Var ☐ Yok

Pencereler ve çatı ışıklıkları:

☐ Tek cam ☐ Çift cam ☐ Üç katlı cam

☐ Özel cam (Seçici geçirgen, düşük emisyonlu cam, renkli cam vb.)

Pencerelerde güneş kontrolü

☐ Güneş kırıcı elemanlar ☐ Sabit ☐ Hareketli

☐ Yatay ☐ Dikey

☐ Jaluzi ☐ Kepenk

Giriş kapıları:

☐ Rüzgarlık ☐ Hava perdesi ☐ Döner kapı

3. BÖLÜM
ENERJI TÜKETIMI VE TASARRUFU

<u>Enerji tüketimi</u>

a. Elektrik

Kullanım yeri: ☐ Isıtma ☐ Soğutma ve havalandırma

☐ Sıcak su ☐ Aydınlatma

Yıllık toplam elektrik tüketimi: (kWh/MWh/GWh)

b. Kömür

Kullanım yeri: ☐ Isıtma ☐ Soğutma ve havalandırma

☐ Sıcak su ☐ Aydınlatma

Yıllık toplam kömür tüketimi: (kg/ton)

c. Sıvılaştırılmış petrol gazı (LPG)

Kullanım yeri: ☐ Isıtma ☐ Soğutma ve havalandırma

☐ Sıcak su ☐ Aydınlatma

Yıllık toplam LPG kullanımı: (m3/L/kWh/kg)

d. Doğalgaz

Kullanım yeri: ☐ Isıtma ☐ Soğutma ve havalandırma

☐ Sıcak su ☐ Aydınlatma

Yıllık toplam doğalgaz kullanımı: (m3/L/kWh/kg)

e. Ağır yağlar (Mazot vb.)

Kullanım yeri: ☐ Isıtma ☐ Soğutma ve havalandırma

☐ Sıcak su ☐ Aydınlatma

Yıllık toplam ağır yağ kullanımı: (m3/L/kg)

f. Hafif yağlar (e.g., benzin, gazyağı, dizel)

Kullanım yeri: ☐ Isıtma ☐ Soğutma ve havalandırma

☐ Sıcak su ☐ Aydınlatma

Yıllık toplam hafif yağ kullanımı:

(m3/L/kg)

g. Biokütle: ahşap talaş, kütük, briket, organik atıklar vb.

Kullanım yeri:

☐ Isıtma ☐ Sıcak su

Yıllık toplam biokütle kullanımı: (kg/ton)

<u>Enerji tasarrufu</u>

Isıtma ve sıcak su:

☐ Merkezi ısıtma sistemi olması

☐ Kazanların, sıcak su tanklarının, su borusu, vana vb. yalıtımı

☐ Yüksek verimli kazanlar

☐ Sıcak su üretiminde eşanjör cihazının kullanılması

Aydınlatma:

☐ Düşük enerjili aydınlatma kullanımı (Otelin en azından % 50'sinde)

☐ Koridorlarda ve genel mahallerde otomatik aydınlatma kontrolü (Fotoselli, ses veya hareket sensorlu)

Isı yalıtımı var mı? ☐ Evet ☐ Hayır

Enerji verimli ekipmanların/teknolojilerin kullanımı:

☐ frekans invertörü

☐ Isı geri kazanım sistemi

☐ Isı pompası gibi yeni teknolojilerin kullanılması

☐ Trijenerasyon, kojenerasyon sistemlerin kullanılması

☐ Hibrit sistemlerin kullanılması

Yenilenebilir enerji

☐ Güneş panelleri (ısıtma ve sıcak su) ………………………………………………

☐ Güneş pilleri……………………………………………………………………….

☐ Rüzgar…………………………………………………………………………

☐ Jeotermal………………………………………………………………………

☐ Hidro……………………………………………………………………………..

☐ Dalga enerjisi…………………………………………………………………….

☐ Biyogaz …………………………………………………………………………….

Su tasarrufu

Banyo, duş ve tuvaletlerde akan suyun tasarrufuna yönelik özel armatürlerin kullanılması

☐ Müşteri banyolarında

☐ Genel duş ve tuvaletlerde

☐ Personel mahallerinde

4.BÖLÜM
DİĞER HİZMETLER

Açık ve kapalı mahallerde gürültü kirliliği konusunda alınacak önlemler;

☐ Tesisat mahallerinin, müzik yayını yapılan mahallerin yalıtımının yapılması,

☐ Gürültü kaynağının perdelenmesi (Peyzaj, yatak odalarından uzak düzenleme vb.)

Önerilen paket programlar:

☐ Her şey dahil sistem

☐ Tam pansiyon

☐ Yarım pansiyon

☐ Oda&kahvaltı

☐ Diğer …………………………..

Yukarıda yer almayan çevreye duyarlılık çalışmalarına ilave katkı sağlayan faaliyetler veya teknoloji, sistem veya cihazların kullanılması

☐

☐

☐

APPENDIX C

METEOROLOGICAL DATA

Table 18 Long-term monthly average meteorological data of Antalya from 1960 to 2012 (Antalya Regional Directorate of Meteorology, personal communication, September 19, 2014)

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
07 Local- Average temperature (°C)	7.4	7.5	9.6	13.9	19.3	24.8	27.4	26.3	22	17	12	9
14 Local- Average temperature (°C)	14	14.3	16.7	19.8	23.9	28.6	32	32.1	29.5	25.3	20	15.5
21 Local- Average temperature (°C)	8.9	9.6	12	15.2	19.3	23.8	26.9	26.7	23.3	18.6	13.5	10.3
Average temperature (°C)	9.8	10.3	12.6	16	20.4	25.3	28.3	28	24.6	19.9	14.7	11.3
Average of the days with average temperature more than 5°C	29.6	26.8	30.8	30	31	30	31	31	30	31	30	30.7
Average of the days with average temperature more than 10°C	15.9	16.5	26.1	29.8	31	30	31	31	30	31	28.3	22.2
Average of maximum temperatures (°C)	14.9	15.4	17.9	21.2	25.6	30.9	34	33.9	31	26.6	21	16.5
Average of minimum temperatures (°C)	5.9	6.1	7.9	11	15	19.5	22.6	22.4	19.1	15.1	10.5	7.4
Day with the maximum temperature	4	26	24	30	22	28	12	9	16	2	1	11
Year with the maximum temperature	1971	1966	1991	2001	1960	1981	2000	2001	1994	1991	1992	2005
Maximum temperature (°C)	23.9	25.9	28.2	33.2	38	41	45	43.3	41.2	37.7	33	25.4
Average of the days with maximum temperature more than 30 °C	0	0	0	0.4	4.3	16.5	25.7	28.4	17.8	4.7	0.1	0
Average of the days with maximum temperature more than 25 °C		0	0.5	4.1	16	28.3	31	31	29.7	22.1	3.2	0
Average of the days with maximum temperature more than 20 °C	0.4	1.2	7.2	18.6	29.6	30	31	31	30	29.9	20	3.2
Average of the days with maximum temperature less than -0.1 °C	0	0	0	0	0	0	0	0	0	0	0	0
Maximum daily temperature range (°C)	18	17.2	19.5	21	20.7	20.6	22.5	20.9	21.8	24	19.5	18.5

Table 18 (continued)

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
Day with the minimum temperature	18	15	1	11	15	1	13	18	29	30	14	7
Year with the minimum temperature	1964	2004	1985	1997	1980	1991	1982	1975	1992	2003	1988	1982
Minimum temperature (°C)	-3.4	-4	-1.6	1.4	6.7	11.1	14.8	15.3	10.6	4.9	0.8	-1.9
Average of the days with minimum temperature less than -0,1 °C	0.9	0.7	0.1	0	0	0	0	0	0	0	0	0.2
Average of the days with minimum temperature less than -3 °C	0	0	0	0	0	0	0	0	0	0	0	0
Average of the days with minimum temperature less than -5 °C	0	0	0	0	0	0	0	0	0	0	0	0
Average of the days with minimum temperature less than -10 °C	0	0	0	0	0	0	0	0	0	0	0	0
Average of the days with minimum temperature less than -15 °C	0	0	0	0	0	0	0	0	0	0	0	0
Average of the days with minimum temperature less than -20 °C	0	0	0	0	0	0	0	0	0	0	0	0
Average of the days with minimum temperature more than 20 °C	0	0	0	0	1.4	12.6	26.8	26.7	11.2	1	0	0
Average of the days with minimum temperature more than 15 °C	0	0	0.1	2	15.6	28.8	31	31	28.8	16.5	2	0.2
Average of the days with minimum temperature more than 10 °C	2.7	2.5	7.4	19.6	29.9	30	31	31	30	29.9	17.7	6.6
Average of the days with minimum temperature more than 5 °C	19.4	18.7	26.4	29.8	31	30	31	31	30	31	28.3	24.3
Average seawater temperature (°C)	17	16.2	16.5	17.7	20.6	24.1	27.1	28.2	27.2	24.7	21.6	18.8
Maximum seawater temperature (°C)	20.2	18.9	19.2	21.5	26.2	27.8	31.1	30.5	30.1	27.9	25.6	29.3
Minimum seawater temperature (°C)	13.3	13.8	0	0	16	19.3	22.2	24	24.4	0	16.6	15.2

Table 18 (continued)

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
07 Local- Average relative humidity (%)	70.5	71	70.8	70.2	65.7	54.7	53	55.7	57.2	62.8	69.2	71.9
14 Local- Average relative humidity (%)	53.4	52.9	53.9	56.5	57.3	52.5	49.6	50.3	48.7	47.9	50.7	54.8
21 Local- Average relative humidity (%)	72.6	72	73.9	76	76.9	70.8	68.8	71.8	71.4	71.2	74	74.3
Average humidity (%)	65.5	65.3	66.2	67.6	66.6	59.3	57.1	59.3	59.1	60.6	64.6	67
Minimum humidity (%)	4	8	4	3	6	7	6	2	5	3	4	11
Average vapour pressure(hPa)	8.3	8.4	9.8	12.3	16.1	19	21.6	22.2	18.3	14.2	11.2	9.3
07 Local- Average cloudiness	5.1	5.2	4.9	4.5	3.4	1.7	1.2	1	1.3	3.1	4.2	5.1
14 Local- Average cloudiness	5.5	5.6	5.4	5.5	4.7	3.1	2	1.9	2.3	3.9	4.7	5.6
21 Local- Average cloudiness	4.6	4.6	4.2	4.1	3.2	1.8	1	0.9	1.2	2.4	3.3	4.4
Average cloudiness	5.1	5.1	4.8	4.7	3.8	2.2	1.4	1.3	1.6	3.1	4.1	5
Average number of clear days	7.4	6.4	7.1	6.2	8.5	16.2	21.7	22.7	20.5	13.9	9.9	7.5
Average number of cloudy days	15.9	15.1	18.1	19.6	20.4	13.5	9.3	8.3	9.2	15	16.2	16.4
Average number of overcast days	7.7	6.8	5.8	4.1	2	0.4			0.3	2.1	3.9	7.1
Average total hours of sunshine per day (hour-minute)	5.18	5.49	6.51	8.03	9.55	11.4	12.04	11.33	10.58	8.05	6.3	5.59
Average global sun intensity (cal/cm²)	195.4	265.7	367.5	449.4	531.1	590	581.2	529	450.7	326.9	224.9	170.6
Maximum daily total sun intensity (cal/cm²)	1.15	1.33	1.74	1.89	1.73	1.76	1.55	1.46	1.41	1.36	1.12	1.04

Table 18 (continued)

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
07 Local- Total average precipitation (mm)	93.3	56.4	37.9	18	9.4	1.8	1	0.5	3.9	29	52.8	100.6
14 Local- Total average precipitation (mm)	60.6	40.4	28.7	17.6	7.8	2.2	1.2	0	2.9	20.1	41.9	73.4
21 Local- Total average precipitation (mm)	57.1	42.8	29.6	14.8	11.2	3	0.7	1.1	3.6	21.2	47	59
Total average precipitation (mm)	214.4	155.8	98	54.1	30.5	7.3	2.7	1.8	12.5	70.8	144.1	251.2
Maximum precipitation (mm)	331.5	232.8	161.1	142.4	73	43.2	41.8	27.8	52.2	195.1	220.2	228.6
Average of the days with more than 0.1 mm of precipitation	11.8	10.9	9	7.1	5.2	2.4	0.6	0.5	1.9	5.4	7.5	11.6
Average of the days with more than 10 mm of precipitation	5	4	2.7	1.8	0.8	0.2	0.1	0	0.4	1.9	3	5.3
Average of the days with more than 50 mm of precipitation	1.4	0.9	0.4	0.2	0.1	0	0	0	0	0.3	0.9	1.7
Number of snowy days	0.1	0.2	0.1	0	0	0	0	0	0	0	0	0
Number of days with snow cover	0	0	0	0	0	0	0	0	0	0	0	0
Maximum snow depth (cm)	5	0	0	0	0	0	0	0	0	0	0	0
Average of number of days with fog	0.1	0.2	0.2	0.4	0.4	0.2	0.5	0.2	0.1	0	0	0.2
Average of number of days with hail	0.4	0.5	0.3	0.2	0	0	0	0	0	0.2	0.2	0.4
Average of number of days with hoarfrost	0.4	0.3	0	0	0	0	0	0	0	0	0	0.4
07 Local-Average wind speed (m/sec)	3.6	3.5	3.1	2.5	2.1	2.8	2.7	2.4	2.4	2.7	2.9	3.4
14 Local-Average wind speed (m/sec)	3.7	4.1	4.2	4.3	4.2	4.4	4.4	4.4	4.2	3.5	3.2	3.4
21 Local-Average wind speed (m/sec)	3.2	3.2	2.6	2.1	1.6	1.5	1.3	1.3	1.7	2.2	2.6	3

Table 18 (continued)

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
The total frequency of winds (N- oriented)	6007	5031	5242	4521	4025	3617	3556	4046	4605	5314	5795	5683
Average wind speed (N- oriented) (m/sec)	3.2	3.2	2.9	2.5	2.4	2.8	2.7	2.4	2.5	2.6	2.7	2.8
The total frequency of winds (NNE- oriented)	3873	3086	3006	2831	2795	2489	2650	2847	3146	3443	3553	3843
Average wind speed (NNE- oriented) (m/sec)	2.5	2.5	2.3	2.1	2	2.2	2.1	2	2	2.2	2.2	2.3
The total frequency of winds (NE- oriented)	1442	1119	1290	1412	1178	1257	1359	1562	1516	1270	1337	1569
Average wind speed (NE- oriented) (m/sec)	2.2	2.2	2.1	2	1.7	1.7	1.7	1.6	1.8	1.9	1.8	2
The total frequency of winds (ENE- oriented)	886	975	1116	1068	927	978	1142	1470	1336	1072	1154	1075
Average wind speed (ENE- oriented) (m/sec)	2	2	1.8	1.8	1.6	1.7	1.5	1.6	1.7	1.8	1.8	1.8
The total frequency of winds (E- oriented)	471	522	529	785	700	799	926	1002	638	481	478	534
Average wind speed (E- oriented) (m/sec)	2	2.1	1.8	1.9	1.8	1.8	1.6	1.6	1.7	1.7	1.6	1.8
The total frequency of winds (ESE- oriented)	592	626	782	1080	1361	1585	1695	1756	950	618	599	702
Average wind speed (ESE- oriented) (m/sec)	2.4	2.2	2.2	2.2	2.1	2.2	2	2	1.9	1.7	1.9	2.3
The total frequency of winds (SE- oriented)	971	906	1320	1681	1976	2269	2127	2054	1364	1102	824	997
Average wind speed (SE- oriented) (m/sec)	3.4	3.1	2.9	3	2.8	2.9	2.6	2.7	2.5	2.5	2.7	3.7
The total frequency of winds (SSE- oriented)	1577	1754	2914	3094	4173	3919	4502	4280	3489	2169	1529	1565
Average wind speed (SSE- oriented) (m/sec)	3.5	3.3	3	3.1	3.1	3.1	3.1	3.2	2.9	2.5	2.5	3.2

Table 18 (continued)

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
The total frequency of winds (S- oriented)	1780	2182	2917	3383	3473	3241	3411	3137	3391	2809	1925	1365
Average wind speed (S- oriented) (m/sec)	3.5	3.5	3.4	3.4	3.3	3.4	3.4	3.5	3.4	2.8	2.4	3.3
The total frequency of winds (SSW- oriented)	1358	1493	2329	2221	2319	2313	2384	2330	2374	2437	1862	1124
Average wind speed (SSW- oriented) (m/sec)	2.7	2.8	3.1	3	3	3.2	3.3	3.5	3.2	2.6	2.1	2.4
The total frequency of winds (SW- oriented)	548	431	586	622	678	651	553	553	473	671	710	509
Average wind speed (SW- oriented) (m/sec)	2.2	2.2	2.8	2.4	2.3	2.4	2.4	2.7	2.7	2.2	1.8	2
The total frequency of winds (WSW- oriented)	368	316	381	530	599	397	414	393	332	482	550	392
Average wind speed (WSW- oriented) (m/sec)	2	2	2	1.7	1.7	1.6	1.4	1.8	2.1	1.9	1.7	1.9
The total frequency of winds (W- oriented)	350	347	252	334	334	346	234	298	194	264	248	386
Average wind speed (W- oriented) (m/sec)	2.1	2.2	1.6	1.5	1.4	1.2	1.2	1.2	1.4	1.7	1.5	1.9
The total frequency of winds (WNW- oriented)	1111	1061	964	867	974	966	893	826	838	1072	1046	1510
Average wind speed (WNW- oriented) (m/sec)	2.5	2.5	2.3	2.1	1.8	2	2	2	1.9	2.1	2	2.4
The total frequency of winds (NW- oriented)	4500	4159	3936	3165	2724	2916	2891	2745	3055	4019	3630	4545
Average wind speed (NW- oriented) (m/sec)	3.2	3.2	3	2.6	2.2	2.8	3	2.6	2.6	2.6	2.5	2.9
The total frequency of winds (NNW- oriented)	8722	7604	7186	5943	5445	5365	5242	4959	5777	7518	8276	8926
Average wind speed (NNW- oriented) (m/sec)	3.3	3.4	3.1	2.7	2.4	2.9	3	2.6	2.6	2.7	2.8	3
Average pressure (hpa)	1010.7	1009.5	1008	1006.2	1005.6	1003.1	1000	1000.8	1004.8	1008.5	1010.8	1010.9
Maximum pressure (hpa)	1028.6	1024.1	1023.5	1019.1	1015.8	1012	1007.2	1007.4	1013.9	1019.6	1023.3	1025.7
Minimum pressure (hpa)	980.4	988.5	986.2	990.2	993.7	993	990.4	994.2	995.5	996.4	989.9	989.5

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MS	Gazi University, Architecture	2006
BS	Gazi University, Architecture	2003
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WORK EXPERIENCE

Year	Place	Enrollment
2011- 2016	International Standards Organization (ISO)	Project Leader
2006-Present	Ministry of Culture and Tourism	Tourism Controller
2004-2006	Ministry of Culture and Tourism	Tourism Expert
2002-2004	Private architectural offices	Architect

FOREIGN LANGUAGES

Advanced English.

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Movies, gardening, trekking, swimming.