

THE IMPORTANCE OF STRAIT COASTAL CITIES IN TERMS OF LANDSCAPE ARCHITECTURE: SUGGESTIONS FOR THE ÇANAKKALE CENTER

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ABSTRACT. The straits attract attention in terms of international trade and political relations all over the world. The Dardanelles Strait, which connects the Asian and European land masses and has attracted the attention of the whole world throughout history, and provides transportation to Istanbul from the Aegean, is strategically very important. In addition, it gives the city an identity with its physical geographic feature, visual landscape richness and historical cultural memory it provides to the region in terms of landscape architecture. For this reason, it is necessary to use species that will both reflect and support the city identity and are suitable for the city ecology in the coastal area design of the Çanakkale city center. This study was conducted based on this necessity. In the study, the importance of cities with a strait coast in terms of landscape architecture was revealed with the support of literature. The aim of the study is to examine and evaluate the current plant design of the strait coast, which is located in the city center and is called the “Old Kordon”, and to present suggestions. As a result of the study, it was determined that there were important functional and aesthetic problems in the plant design of this area according to the qualification of the area, and suggestions were made to eliminate these problems.

Keywords: *Dardanelles strait, ekology, landscape design, planting design, strait coastal*

INTRODUCTION

Straits are passages that provide sea transportation between different coastal and land parts, which are the way of passage between the sea and oceans in terms of geographical location and physical structure. With these aspects, they have taken a strategic role in the history of the world in terms of international trade and political relations [1; 2]. For this reason, the straits serve as a touchstone in the war history and fate of the countries they own.

Turkey is a country geographically surrounded by seas on three sides and on the transit route of three continents. It also has two important gorges. Turkey's Straits are "Territorial Straits" that connect the Black Sea and the Aegean Sea and unite the continents. These are the Istanbul and Dardanelles Straits that attract the attention of the whole world [3]. The Straits of Turkey is one of the longest natural and narrow waterways used for sea transportation in the world and has a length of 164 nautical miles [4]. With this location, social, economic, cultural, political and military relations can be established with transoceanic states [5].

The morphological structure of the gorges is described as follows: They are narrow, they have capes surrounded by hills that cannot be seen from behind, they have turns that make it necessary to change the route sharply. They have pressure changes with their shallows, mixed, irregular, strong, lower, upper and reverse currents [6]. With these qualities, Turkey is a waterway that is unique in the world in terms of geographical, geomorphological, natural and visual landscape values along with the surrounding region of the strait.

The urban areas located on the strait coast have an important vista. This situation leads to the concentration of social areas and recreation areas in the coastal region, and the interaction is quite large. This situation creates a point of attraction for residents of the entire region and provides economic returns. The relaxing effect of proximity to the water element on people increases the importance of the Bosphorus shore [7; 8]. For this reason, the Bosphorus shore is a point of attraction in terms of tourism [5]. All these features are also reflected in the identity of the city center of Çanakkale. For visitors to the region and city residents, the Bosphorus shore is the first area of attraction in terms of entertainment and rest.

Nowadays, coastal areas have started to become an intense center of attraction. Excessive construction, embankment works, faulty road constructions, unplanned recreation areas and uncontrolled human activities lead to irreversible environmental problems on the coasts. This situation negatively affects the coastal landscape. Therefore, landscape planning and design to be carried out in coastal areas should be compatible with the environment and sustainable. Taking into account the natural, social and cultural values of the coasts, it should be aimed to protect and develop the landscape value [9]. This principle should be handled much more carefully for the shores of the strait. Because they are ecologically sensitive areas. The fact that the wind effect is very intense and that they play an important role as a transportation axis should also be taken into account in landscape designs.

In coastal areas allocated as recreation areas or park areas, the use of plant species suitable for the climate and local vegetation is of great importance both for the protection of ecological balance and for providing an aesthetic that is compatible with nature. While this method of use offers positive contributions to human health, it also supports the protection of the natural structure of the environment [10].

In line with these qualities put forward in terms of the importance of the straits, it is necessary to take into consideration different factors such as geographical and ecological risks, as well as design and usage principles in terms of landscape architecture in settlements along the strait. Based on this fact, in this study, the importance of the strait shores in terms of landscape architecture was investigated and it was aimed to reveal the things that should be taken into consideration for correct planting in the “Old Kordon” region (city center) of the Dardanelles.

MATERIAL AND METHOD

The Dardanelles Strait connects the Sea of Marmara and the Aegean Sea and stretches in a northwest-southeast direction. The “Gallipoli Peninsula” forms the western side and the “Biga Peninsula” forms the eastern coast. The main material of the study is the Old Kordon area on the coast of the Dardanelles Strait. The length of the Old Kordon coastline is about 900 m [11] (Figure 1).



Fig. 1. The Location of the study area [developed from 12 and 13].

In the method of the study, firstly, information on the geographical, ecological and historical importance of the straits was given by conducting a literature review. In the second stage, the importance of landscape design on the shores of the strait was investigated, written and visual resources were evaluated. At the third stage, the vegetation and physical condition of the study area were examined and photographed on site. The natural features, climate structure and cultural characteristics of the Dardanelles strait coast were investigated, discussed and information was given. At the fourth and final stage, in order to create aesthetic and functional solutions in the use of the “Old Cordon” area in the city center, landscape plants were proposed for the preservation and development of the coastal visual and natural structure.

FINDINGS and DISCUSSION

Climate is one of the factors that should be considered first in order to determine the suitability of plants in a plant study conducted in a region to that region and to ensure the identification of suitable species if the species are not suitable. There is a strong relationship between plant design and climate. Because the growth and development processes of plants depend on climatic conditions. Factors such as temperature, precipitation amount and wind affect the growth rates of plants. In the course of time, plant compositions change according to these effects. The suitability of landscape plants in the study area was examined by taking into account the climatic factor.

The Dardanelles and its surroundings are transitional between the Mediterranean and Black Sea climates and are under the influence of the Marmara Climate. The average annual temperature in Çanakkale is 14.9 °C. The coldest month is January with 6.0 °C. According to the climate elements data of Çanakkale Meteorological Station, June-September period is the months when the average highest temperatures are experienced.

June-September average monthly temperatures did not fall below 15.6 °C. The annual precipitation amount in Çanakkale is 619.7 mm, while 39.9% of the precipitation falls in autumn, 37.4% in winter, 16.1% in spring and 6.6% in summer. The number of annual open days in Çanakkale is 122.2 days. The average duration of sunbathing is 7 hours and 19 minutes / day. The sunshine duration on the strait shores is around 11 hours. When the monthly average wind speed along the strait shores is reviewed throughout the year, it is seen that the lowest value belongs to June (3.3 m/sec) and the highest values belong to February and December (4.5 m/sec). The monthly average wind speeds at 14.00 are higher than all monthly average wind speeds at 07.00 and 21.00. The average wind speed gradually decreases starting from April and drops to 3.3 m/sec in June. However, it shows a gradually increasing value starting from July (except September) until the end of the year. It was determined that the intensity of the prevailing southwest wind on an annual basis was lowest in June (21.8 m/sec) and highest in February (38.7 m/sec). Although the wind blows from the northern (3 months), southern (1 month) and western (1 month) sectors in the May-September period, the fastest wind intensity in this period is 32.7 m/sec in September. When the average wind speed is examined according to directions, the highest value is 4.5 m/sec in the southwest direction in February and December. When the intensity of the fastest wind is examined according to their direction, the highest value is 38.7 m/sec in the southwest direction in February. On an annual basis, the wind blows mostly from the north along the strait coast [14]. Depending on changes in atmospheric pressure, winds in the Dardanelles are also affected by local effects. As in other parts of the Marmara Region, northerly winds are dominant in the strait. Among these winds, the northeast wind blows more frequently in summer and stronger in winter and is effective all year round. The northeast wind, which affects the west of Turkey in summer, is formed by air currents blowing from Western Anatolia towards the Black Sea and is seen more frequently, directed towards the southwestern structure of the strait. When the pressure in the Dardanelles remains constant, the northeastern wind can blow uninterruptedly and at the same strength for days [15; 14]. The extension of the Dardanelles and the characteristics of the landforms are directly effective in the formation of the dominant wind directions. While northeastern winds are the only dominant direction in the hot seasons, southerly winds dominate in the cold seasons [14]. According to these data, it is necessary to take planting design to protect the strait coast from the harmful effects of the sun in summer, as well as from strong winds from different directions every season. In addition, planting design principles such as harmony with structural areas, aesthetics, function should also be taken into account.

The plants found in the study area are usually located in concrete pots (Figure 2). For this reason, the plants exhibited slow growth, and due to significant losses, replanting efforts were carried out. The cordon was structurally and vegetatively renewed during 2011–2012, and the trees currently present were planted during that period. However, from that time to the present, the green space texture has not been adequately developed, and the anticipated impact has not been achieved. Benches were designed around the planted trees to provide shaded seating possibility. While the sizes of the concrete pots vary, most contain a single tree, although some have two or three trees. Additionally, certain soil areas were left between the hard surface pavements to allow for planting. The fact that the potential of the green area and the types of trees used are insufficient for the quality of the area has not been able to create sufficient green tissue in the cordon. The qualities of the plants in the green area potential of the study area

were analyzed with the prepared table. This table includes the form, homeland, leaf condition, ecology and landscape usage characteristics of the plants used in the planting design. By seeing these features together, problems and deficiencies in their use in terms of landscape architecture in the area were identified.









Fig. 2. Plants in the study area (2024)









Stem bending is observed in plants due to the climate characteristics of the Dardanelles and the effect of strong winds, especially in winter and spring. At the same time, although approximately 10-15 years have passed since their planting, they have not had their genetic structure and dendrological characteristics. The strait climate has difficult conditions, especially during the winter months. This situation also affects the plants and their development slows down. When the characteristics of the plants in the study area are examined in Table 1, 6 plants that can serve as windbreaks were identified. However, since these are planted solitary, they cannot provide adequate protection. Although these plants are suitable for the windbreak function, it has been determined that they are not effective in the climatic conditions of the strait coast.





In the analysis of the plants in the study area, it is seen that only 7 species have evergreen characteristics. This situation leads to a significant decrease in the vegetative density of the area, especially during the winter months, and negatively affects the richness of the landscape. The large number of plants that shed their leaves during the winter season leads to a decrease in the green texture of the area. For this reason, it is necessary to increase the number of evergreen plants that can offer an aesthetic and dense green texture in landscape design during the winter season. The selection of climate resistant plant species will ensure that the study area has a healthy plant cover

throughout the year and a comfortable environment will be created. At the same time, the green area balance could not be achieved because the hard floor ratio was too high in the study area. This situation causes the inability to provide a sufficient cool, shade environment in the region, especially during the hot and humid summer months. The cordon is the area with the most intensive use in the summer months. However, the dense concrete floor strongly reflects the sun's rays, which causes the area to overheat.

Table 1. Characteristics of the plants found in the study area [created by taking advantage of 16].

Plant name	Family	Habitus	Type	Native range	Leaf retention status	Ecology	Use in landscape
<i>Acer negundo</i> L.	Sapindaceae		A	E	D	1, 2, 4, 5, 6	1, 3, 5, 6, 14
<i>Cercis siliquastrum</i> L.	Fabaceae		A	N	D	1, 3, 5	5, 6, 9, 11, 12, 13
<i>Cupressus arizonica</i> Greene.	Cupressaceae		A	E	E	1, 4, 5, 6	2, 3, 4, 6, 7
<i>Euonymus japonica</i> Thunb. 'Aurea'	Celastraceae		C	E	E	1, 4, 5, 6	2, 9, 10, 11
<i>Euryops pectinatus</i> (L.) Cass.	Asteraceae		D	E	D	1, 3, 5	4, 9, 10, 12
<i>Fraxinus excelsior</i> L.	Oleaceae		A	N	D	1, 3, 5, 6	3, 5, 7, 9, 14

<i>Ginkgo biloba</i> L.	Ginkgoaceae		A	E	D	1, 3, 5	1, 3, 14
<i>Lagerstroemia indica</i> L.	Lythraceae		A	E	D	1, 3, 5	1, 4, 9, 12, 14
<i>Magnolia grandiflora</i> L.	Magnoliaceae		A	E	E	1, 4, 5, 6	1, 4, 5, 9, 12
<i>Morus indica</i> L.	Moraceae		A	E	D	1, 4, 5	4, 8, 9
<i>Nandina domestica</i> Thunb.	Berberidaceae		C	E	E	1, 4, 5	4, 9, 10, 13
<i>Nerium oleander</i> L.	Apocynaceae		B	N	E	1, 3, 5	2, 7, 8, 10, 11, 12
<i>Platanus orientalis</i> L.	Platanaceae		A	N	D	1, 4, 5, 6	1, 4, 5, 6, 7, 8, 14
<i>Populus alba</i> L.	Salicaceae		A	N	D	2, 4, 5, 6	3, 4, 5, 6, 7, 8, 9

<i>Thuja occidentalis</i> L.	Cupressaceae		B	E	E	1, 4, 5, 6	2, 3, 4, 6, 7, 8
<i>Tilia tomentosa</i> Moench.	Tiliaceae		A	N	D	1, 3, 5, 6	1, 3, 5, 8
<i>Ulmus glabra</i> Huds.	Ulmaceae		A	E	D	1, 2, 4, 6	1, 5
<i>Washingtonia filifera</i> H.Wendl.	Palmae		A	E	E	1, 4, 5, 6	1, 6

***Type:** A: Tree B: Shrub C: Bush D: Ground cover, climber; **Native Range:** N: Native E: Exotic; **Leaf Characteristic:** E: Evergreen D: Deciduous; **Ecology:** 1: Temperate climate 2: Continental climate 3: Frost-sensitive 4: Frost-tolerant 5: Full sun 6: Partial sun 7: Shade; **Landscape Use:** 1: Focal point, 2: Hedge plant, 3: Background planting, 4: Enclosure, 5: Shade provision, 6: Roadside planting, 7: Windbreak, 8: Dust and noise control, 9: Guiding, 10: Erosion control, 11: Soil improvement, 12: Effective with flower appearance, 13: Effective with fruit appearance, 14: Autumn color.



CONCLUSIONS AND RECOMMENDATIONS







Today, the part of the Dardanelles Strait in the city center is an important recreation area both for urbanites and for those who visit the city. It is an area that affects users in terms of its natural resources and beauty, the appearance of mountains descending with gentle lines to the strait, its coastal views and its historical cultural significance. It also has structural elements that have left their mark on different periods of history. With its coastal views, walking paths and seating areas, the Old Cordon meets the daily needs of urbanites for sightseeing and recreation, while allowing visitors to experience the history and culture of the city. However, the number, quality and design of the existing landscape plants in the Old Cordon, both cannot create a comfortable space for users and cannot fully respond to the recreation needs of the intensive user audience. According to the results of the analysis, there are 5 plant species that have the effect of their flowers, and they cannot create enough volume because they are planted one by one. There are 2 effective plants with the appearance of their fruits. There are 5 effective plants with an autumn appearance, and the insufficient number of them does not provide a sufficient aesthetic appearance in autumn.






Plant design should be made in accordance with climatic and wind conditions that will increase the aesthetic value by maintaining the ecological balance in the work area. Thus, the Old Cordon can achieve a more attractive and sustainable landscape structure for both urban residents and visitors. In this direction, plant proposals that will revive the landscape of the Old Cordon area and adapt to climatic conditions are presented in Table 2. Since the 10 plants on the list are evergreen, increase the aesthetic value of the area with their leaf and flower characteristics, and at the same time are suitable for different landscape functions, they will contribute to the herbal diversity of Eski Kordon. The use of these plants will give the area vitality for four seasons, reduce the negative effects of wind and sun, and provide a more comfortable environment for users. Additionally, the 6 plants in the table, such as *Olea europaea* L., have been selected from the natural vegetation of Çanakkale. These plants will contribute to reflecting the local identity of Çanakkale in the study area.

The climbing plants proposed in Table 2 will wrap around elements such as raised beds on hard surfaces, creating mobility and green texture. Underneath these, shaded seating units should be designed, which will not obstruct users' views but will provide a more comfortable environment for recreational needs. To increase the density of planting in the area, the number of plants should be increased, and it is necessary to support the area with short trees, shrubs, and bushes in a way that does not block the view of the strait. To soften the hard concrete surface of the area, it is essential to enhance the green texture.

Table 2. The recommendation that can be used in the study area is the properties of plants [created by taking advantage of 16].

Plant name	Family	Habitus	Type	Native range	Leaf retention status	Ecology	Use in landscape
<i>Arbutus unedo</i> L.	Ericaceae	 [17]	B	N	E	1, 4, 5, 6	1, 2, 7, 10, 12, 13
<i>Campsis radicans</i> L.	Bignoniaceae	 [18]	D	E	D	1, 4, 5, 6	2, 3, 4, 12

<i>Catalpa bignonioides</i> Scop.	Bignoniaceae	 [19]	A	E	D	1, 3, 5, 6	1, 4, 5, 7, 12
<i>Cupressus macrocarpa</i> Hartw. 'Goldcrest'	Cupressaceae	 [20]	B	E	E	1, 4, 5, 6	1, 2, 4, 7
<i>Cupressus sempervirens</i> var. <i>Pyramidalis</i>	Cupressaceae	 [21]	A	E	E	1, 3, 5, 6	2, 3, 4, 6, 7, 8
<i>Juniperus horizontalis</i> Moench. 'Glauca'	Cupressaceae	 [22]	C	E	E	2, 4, 5, 6	1, 2, 8, 10
<i>Laurus nobilis</i> L.	Lauraceae	 [23]	B	N	E	1, 4, 5, 6	2, 7, 8, 10, 11
<i>Ligustrum japonica</i> Thunb.	Oleaceae	 [24]	B	E	E	1, 4, 5, 6	3, 5, 6, 7, 8, 12

<i>Melia azedarach</i> L.	Meliaceae	 [25]	A	E	D	2, 4, 5, 6, 7	5, 6, 7, 8, 9, 12, 13
<i>Olea europaea</i> L.	Oleaceae	 [26]	A	N	E	1, 4, 5	1, 2, 3, 6, 7, 9, 10
<i>Parthenocissus quinquefolia</i> (L.) Planch	Vitaceae	 [27]	D	E	D	1, 3, 5	1, 3, 7, 14
<i>Pyracantha coccinea</i> Roem.	Rosaceae	 [28]	B	N	E	1, 4, 5	2, 4, 6, 7, 8, 9, 10, 13
<i>Viburnum tinus</i> L.	Caprifoliaceae	 [29]	C	N	E	1, 4, 5, 6	1, 2, 3, 4, 6, 7, 8, 9, 12

*Type: A: Tree B: Shrub C: Bush D: Ground cover, climber; Native Range: N: Native E: Exotic; Leaf Characteristic: E: Evergreen D: Deciduous; Ecology: 1: Temperate climate 2: Continental climate 3: Frost-sensitive 4: Frost-tolerant 5: Full sun 6: Partial sun 7: Shade; Landscape Use: 1: Focal point, 2: Hedge plant, 3: Background planting, 4: Enclosure, 5: Shade provision, 6: Roadside planting, 7: Windbreak, 8: Dust and noise control, 9: Guiding, 10: Erosion control, 11: Soil improvement, 12: Effective with flower appearance, 13: Effective with fruit appearance, 14: Autumn color.

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