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Botanical Gardens and Arboretums as Regards to Cultural Landscapes: Three Cases from Istanbul

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Abstract

The aim of the study is to examine Istanbul University Alfred Heilbronn Botanical Garden, Atatürk Arboretum and Nezahat Gökyiğit Botanical Garden as examples of cultural landscapes and to determine which cultural landscape criteria they reflect. Study areas were evaluated under UNESCO's criteria: World Heritage Cultural Landscape Classes, Natural and Cultural Landscape Criteria, Complementarity Criteria, and Authenticity Criteria. When the analysed areas are compared with each other according to the UNESCO Cultural Landscape Criteria, it is determined that Nezahat Gökyiğit Botanical Garden stands out with examples of cultural features among the cultural landscape criteria as a result of having two cultural landscape criteria (ii, v) as a result of the presence of Ertuğrul Monument constituting an 'example of monumental art' (ii) and the presence of Istanbul Mansion Garden constituting an 'example of human settlement representing a culture' (v). Alfred Heilbronn Botanical Garden and Atatürk Arboretum stand out with the natural features of the cultural landscape criteria.

Keywords: *Atatürk Arboretum, Istanbul University Alfred Heilbronn Botanic Garden, Nezahat Gokyigit Botanic Garden, UNESCO cultural landscape criteria.*

Kültürel Peyzajlar Bağlamında Botanik Bahçeleri ve Arboretumlar: İstanbul'dan Üç Örnek

Öz

Kültürel peyzaj örnekleri olarak İstanbul Üniversitesi Alfred Heilbronn Botanik Bahçesi, Atatürk Arboretumu ve Nezahat Gökyiğit Botanik Bahçesi'nin incelenerek hangi kültürel peyzaj kriterlerini yansıttıklarının belirlenmesi çalışmanın amacını oluşturmaktadır. Çalışma alanları UNESCO Dünya Mirası Kültürel Peyzajları Sınıfları, Doğal ve Kültürel Peyzaj Kriterleri, Kültürel Peyzajların Tamamlayıcı Kriterleri ve Kültürel Peyzajların Özgünlük Kriterleri kapsamında incelenerek,incelenen alanlar birbiriyle karşılaştırılmıştır. İncelenen alanlar UNESCO Kültürel Peyzaj Kriterlerine göre birbiriyle kıyaslandığında Ertuğrul Anıtı'nın varlığıyla ''anıtsal sanat örneği''ni teşkil etmesi (ii), İstanbul Konak Bahçesi'nin varlığıyla ''bir kültürü temsil eden insan yerleşimi örneği''ni oluşturması (v) sonucu iki kültürel peyzaj kriterine (ii, v) sahip olmasıyla Nezahat Gökyiğit Botanik Bahçesi'nin kültürel peyzaj kriterlerinden kültürel özelliğe sahip örneklerle ön plana çıktığı görülmektedir. Alfred Heilbronn Botanik Bahçesi ve Atatürk Arboretumu ise Kültürel Peyzaj kriterlerinin doğal özellikleri ile ön plana çıkmıştır.

Anahtar kelimeler: *Atatürk Arboretumu, İstanbul Üniversitesi Alfred Heilbronn Botanik Bahçesi, Nezahat Gökyiğit Botanik Bahçesi, UNESCO kültürel peyzaj kriterleri.*

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1. Introduction

Landscape refers both to natural and cultural features of an area and links people to nature recognizing their relation with their environs. The concept of "cultural landscape" has emerged from the expression of human interpretation of natural environment (Mitchell, Rössler, Tricaud & Tricaud, 2009). “Cultural landscape” embraces a diversity of manifestations of the interaction between humankind and its natural environment’ (Fowler, 2003).

Botanical gardens and arboretums are among the most exceptional examples of cultural landscapes due to their contribution to biodiversity, harboring endemic and natural species, harboring plant species that express cultural values and beliefs that are similar or different for each society, and being shaped according to the values of the society. The origin of the arboretum derives from the word arbor, which means "tree" in Latin, and the suffix -etum, which means "the area where certain plants are grown". Sites Areas where domesticated and exotic woody plants are exhibited together in ecologically suitable environments with diverse vegetation are called arboretums (Aydın, 2006).

The word botany comes from the Ancient Greek root botanikē βοτανικός, from the word botánē βοτάνη meaning "grass and self- growing plant", transferred into French as "botanique" with the combination of +ikos suffixes. Botanic gardens are characterised by the Botanic Gardens Conservation International (BGCI) as culmination where living plant collections are kept for the purposes of education, teaching, research, conservation and exhibition (BGCI, 2021). Trees, shrubs and all other plants forms are grown in botanical gardens, while, arboretums contain woody plant species (Wyman, 1947; Aydın, 2006; Olkay Şengün, 2011).

Encountered since ancient times, the purpose of botanical gardens is to obtain more economic and medical benefits besides on-site conservation. The first botanical garden was established by Aristotle in Athens in 350 BC to grow fruit trees, vegetables and medicinal plants used in medicine (Müminoğlu, Tahta & Aslan, 2018). Botanical gardens took their present form in Italy during the Renaissance where Botanical Gardens of Pisa near Bologna in 1543 and Padua in 1545 were set up (Önder & Konaklı, 2011).

When botanical gardens are analysed from past to present, their evolving role and settings are evident (Figure 1). In the 16th and 17th centuries, the focus was on growing medicinal plants for educational purposes at universities, while in the 18th and 19th centuries, the scientific and economic role of plants have been blended in exotic gardens. In the 20th and 21st centuries, botanic gardens have undertaken two main functions: conservation and education in response to biodiversity loss and climate change (Yuqi, Ignatieva & Gaynor, 2022).

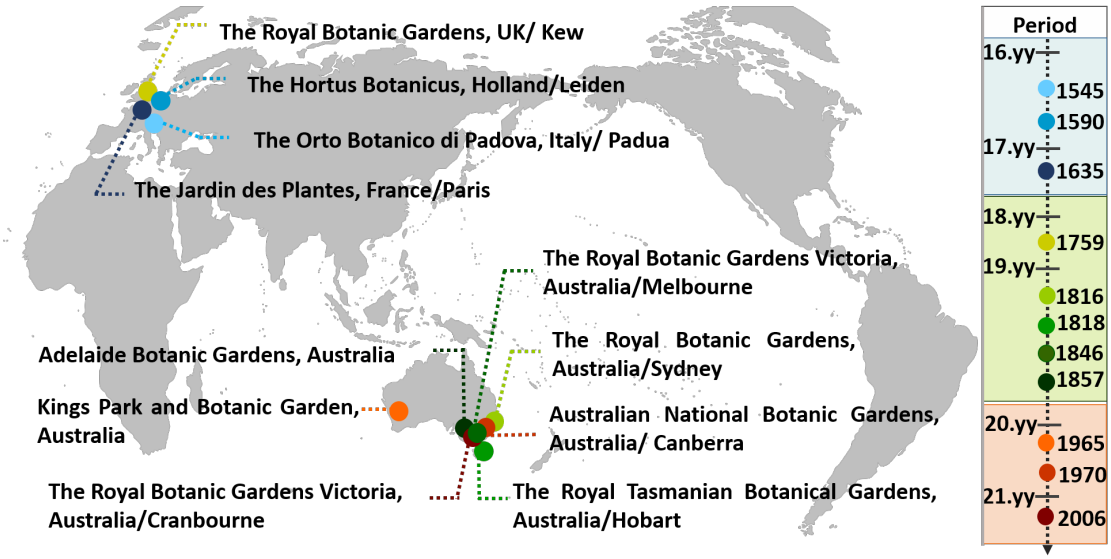

Figure 1. A representation of botanical gardens of different periods around the world (interpreted from McCracken, 1997; Lockwood, Wilson, Fagg & Cundall, 2001; Yuqi et al., 2022)

Through the time botanical gardens have enriched the urban environments and been integrated into urban planning by English style parks with curvilinear shapes, gentle rising hills, bright green lawns, flower beds and scattered groves (Ignatieva, 2010; Ignaiteva, 2011; Ignatieva & Ahrné, 2013; Müller, Ignatieva, Nilon, Werner & Zipperer, 2013).

The first examples of botanical gardens in Türkiye were established during the Byzantine and Ottoman Empires for the cultivation of fruits and vegetables, especially medicinal plants (Müminoğlu et al., 2018). The Galata Palace Botanical Garden was set up in 1839 next to the "Mekteb-i tıbbiye Şahane" building where Galatasaray High School is located today, for the practical training of medicine and pharmacy students in botany courses (Küçüker & Üzen, 1998; Önder & Konaklı, 2011; Müminoğlu et al., 2018). Later on, Istanbul University Alfred Heilbronn Botanical Garden was found in 1935 (Küçüker, 2005; Müminoğlu et al., 2018). On the other hand, the first arboretum was started for scientific purposes in 1720 in Monceau Park, France (Sertkaya, 1997; Olkay Şengün, 2011). In Türkiye, it is the Atatürk Arboretum which established in 1949 under the auspices of Istanbul University Faculty of Forestry (Gültekin & Atik, 2000; Önder & Konaklı, 2011).

Botanical gardens and arboretums have scientific (research and conservation), educational (teaching, culture), recreational, ecological, social and cultural functions (Ekim, 1991; Perçin, 1997; Hepcan & Özkan, 2005; Olkay Şengün, 2011). They also constitute one of the important channels for tourism (Müminoğlu et al., 2018). Botanical gardens embody both exotic and native vegetation and strongly contribute to the formation of environmental awareness by providing information about plants, ecology and on-site learning and conservation for visitors of all age groups (Hepcan & Özkan, 2005).

Botanical gardens are among the world heritage cultural landscapes defined by UNESCO (United Nations Educational, Scientific and Cultural Organisation) since 1992. According to the International Union for Conservation of Nature (IUCN) cultural landscapes are combined works of nature and man and illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (Fowler, 2003; Rössler, 2006; Taylor, 2011; Osipova, Shi, Kormos, Shadie, Zwahlen & Badman, 2014; UNESCO, 2017). Kew Royal Botanic Garden (England), Singapore Botanic Garden (Singapore) and Padua Botanic Garden (Italy) are prominent examples listed in the UNESCO World Heritage Cultural Landscapes.

While a Kew Botanical Garden reflects British culture with its large meadows, ponds, sculptures, shaped plant labyrinths; Singapore Botanic Gardens with includes a rich variety of historic landscape features, plantings and buildings demonstrates the evolution of a British tropical colonial era with English Landscape Style 'pleasure garden'. Dedicated as world heritage site, the garden incorporates horticultural and botanical research, and plant conservation. World heritage Sítio Roberto Burle Marx botanical garden in Brazil, reflects elements of traditional Portuguese-Brazilian folk culture in its design focusing on tropical plants (UNESCO, 2024). Kirstenbosch National Botanical Garden (Cape Town) in South Africa, Montreal Botanical Garden in Canada, Royal Botanical Gardens in Australia, Nong Nooch Botanical Garden in Thailand, Dahlem Botanical Garden and Botanical Museum in Germany, Trauttmansdorff Castle and Botanical Gardens in Italy, Lutaret Alpine Botanical Graden in France, Karaca Arboretum and Bursa Botanical Park in Türkiye are some examples that potentially meet cultural landscape criteria and have important significance also at international scale.

In this study, the examples of Istanbul University Alfred Heilbronn Botanical Garden (AHBB), Atatürk Arboretum and Nezahat Gökyiğit Botanical Garden (NGBB), which provide important benefits for the city of Istanbul, were evaluated in the light of UNESCO World Heritage Cultural Landscapes criteria, and their natural and cultural heritage values as well as being important urban open green spaces were examined in the light of Cultural Landscapes Criteria.

2. Material and Method

The material of the study consists of AHBB, Atatürk Arboretum and NGBB, which is a member of the International Botanical Gardens Conservation Association (BGCI) in Istanbul, Türkiye (Figure 2). Located in the north-west of Türkiye as well as between Asia and Europe, Istanbul has the

characteristics of the warm and rainy climate and encourages diversity in vegetation and allows convenient settings for the adaptation of plant species brought from other regions to botanical gardens and arboretums.

Figure 2. Location of the study sites (Authors, 2024)

The study method is based on the comparative analysis of selected arboretums and botanical gardens in Istanbul based on the natural and cultural criteria for UNESCO world heritage sites.

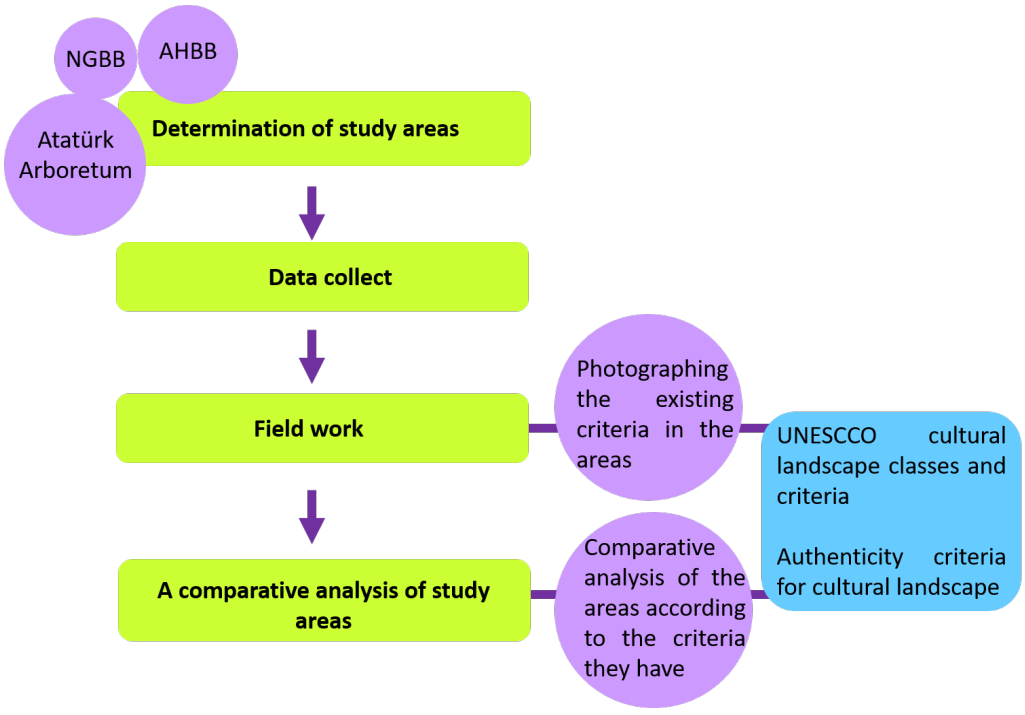

Figure 3. Flow chart of the research methodology (Authors, 2024)

The research method consists of 4 stages (Figure 3). In the first stage, the study areas were determined. In the second stage, data about the study areas were collected from sources such as articles, theses and books. In the third stage, the study areas were visited and photographed separately in the light of UNESCO's definition of cultural landscape categories and cultural and natural criteria (Table 1). In addition, botanical gardens and arboretums were evaluated and photographed in terms of authenticity criteria (Table 2), and their cultural and biocultural values were revealed. The land where AHBB is

located was transferred to Istanbul Mufti's Office in 2015 and is closed to visitors. Therefore, photographs for this study area were accessed via the internet. In the last stage, a comparative analysis of selected arboretums and botanical gardens in Istanbul was made on the basis of natural and cultural criteria for UNESCO world heritage sites.

Table 1. UNESCCO cultural landscape classes and criteria (Fowler, 2003; Rössler, 2006; WHC, 2008)

UNESCO Cultural Landscape Categories		
1. Easily Definable Landscapes (*2a. Relict (or Fossil) Landscapes; 2b. Landscapes in Development)*		
2. Organically Formed Landscapes		
3. Composite Cultural Landscapes		
	Cultural	***Natural***
UNESCO Cultural Landscape Criteria	**i.** Reflecting the work of a talented artist **ii.** To have left a mark on a cultural region in the world during a period of time and to have greatly influenced developments in the fields of monumental arts, architecture, or urban planning and landscape design **iii.** Carrying a unique proof of a civilisation or cultural tradition that lived in ancient times, **iv.** Being a unique example of a building form or landscape indicating one or more important stages in human history **v.** Being an important example of traditional human settlement or land use representative of a culture: in particular, being under threat of irreversible degradation **vi.** The existence of artistic or written works of universal value that are directly or indirectly linked to events or living traditions	**vii.** Contain outstanding natural phenomena and sites or have unique natural beauty **viii.** To represent one of the important developmental stages of the earth and world history, such as geologic, geomorphologic and physiographic formations that are effective in the development of surface forms **ix.** To represent important ecological and biological processes that influence the formation of terrestrial, freshwater, coastal and marine ecosystems and plant and animal communities **x.** Contain habitats important for in situ conservation of biodiversity, such as endangered species.
Other Complementary Criteria	**B –** Areas with mostly large buildings, **C-** Past and present life styles/land uses are an important part of the landscape **F-** Farming / agricultural activities have been the main element in the past or present landscapes **G-** Decorative parks / gardens as a basic element **I-** Industrial areas **L-** Elements that form the identity of a community **P-** Landscape areas shaped by local settlement **R-** Areas where religious / sacred sites are located **Ra-** Stone art (ancient reliefs or sculptures) **S-**Site of a battle or an archaeological monument **T-** Defined landscape areas such as village, towns **Wi-** Irrigation canals or other water structures	**Jf-** Forest, afforestation areas **M-** Landscape areas with a mountain fragment in it **N-** Landscape areas with a Nature Park or containing a Nature Park **W-** Water forms part of the landscape **Wl-** Landscape areas with part of a lake **Wr-** Landscape areas with a part of rivers **Ws-** Landscape areas with a part of the sea

Table 2. Authenticity criteria for cultural landscape (Engelhardt & Rumball Rogers, 2009; Taylor, 2011; Atik & Tülek, 2013; Atik & Tülek, 2016)

Location and Settlement	**Design and Form**	**Use and Function**	**Spiritual Values**
• Area • Applications • "Sense of place" • Ecological location • Landforms • Surrounding environment • Living materials • Degree of protection	• Spatial arrangements • Design • Material • Building techniques • Handicrafts • Engineering • Layer / geoscience • Regional networks	• Users • Using • Unions • Changes in usage over time • Spatial distribution of use • Usage effects	• Artistic İnteractions • Values • Spirit • Emotional ties • Religious context • Historical impacts • Sounds, smells, tastes • Creative process

3. Findings and Discussion

3.1. Istanbul University Alfred Heilbronn Botanical Garden (AHBB)

The establishment of AHBB corresponds to the period of university reform in Türkiye. Ord. Prof. Dr Alfred Heilbronn, was invited to Istanbul during the 2nd world war, where he established the Istanbul University Botanical Garden in 1935 with the contributions of the university administration and his friends. In 2003, the garden was renamed 'Istanbul University Alfred Heilbronn Botanical Garden' (Güner, 2006; Küçüker, 2011; Erkılıç, 2019). The garden consists of 4 terraces overlooking the Golden Horn of Bosphorus (Figure 4), and is divided into 6 sections as systematic of plants, stone garden, medicinal plants, plants of Türkiye, experimental areas and arboretum with an area of 15,000 m² (Yılmaz, 2017; Erkılıç, 2019).

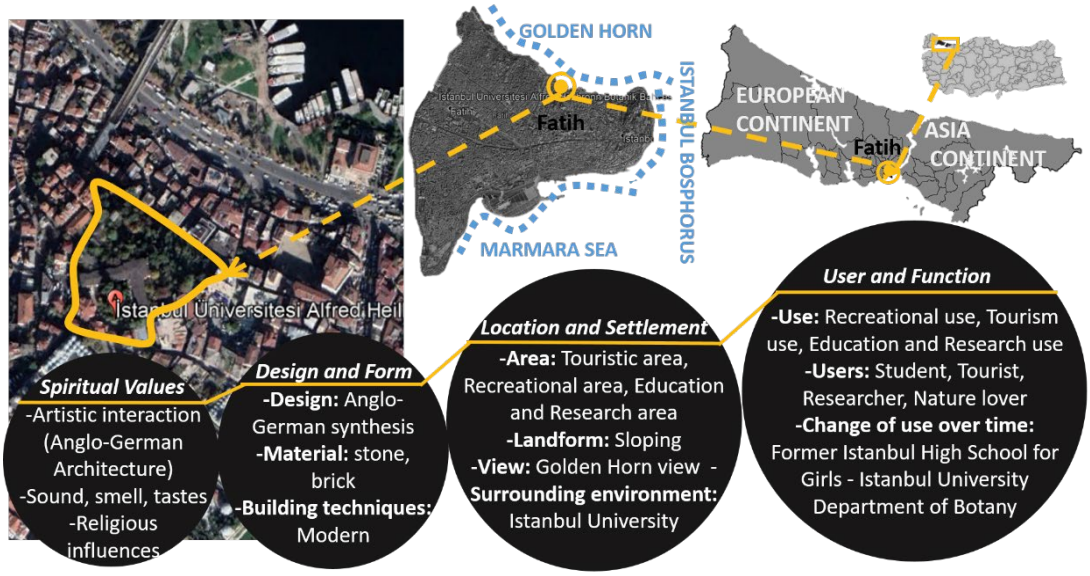

Figure 4. Istanbul University Alfred Heilbronn Botanical Garden with authentic features (Authors, 2024)

The AHBB has 6 greenhouses (research, cactus, orchid, rainforest, tropical fruit, cycas) and 23 ponds (Figure 5) (Bayçu, Yazgan & Üzen, 2013). In the open areas, there are 400 woody plant species including trees and shrubs, 3500 herbaceous plants from 160 families as well as rare and endemic plants from the flora of Türkiye. A total of 6000 native and non-native plant species are on display in the garden besides 2500 exotic species contained in greenhouses from different tropical regions. In addition to the herbarium; seed bank, botanical library and botanical research laboratories are dedicated to the ex situ conservation and propagation of bulbous plants at risk in Anatolia (Bayçu et al., 2013; Erkılıç, 2019).

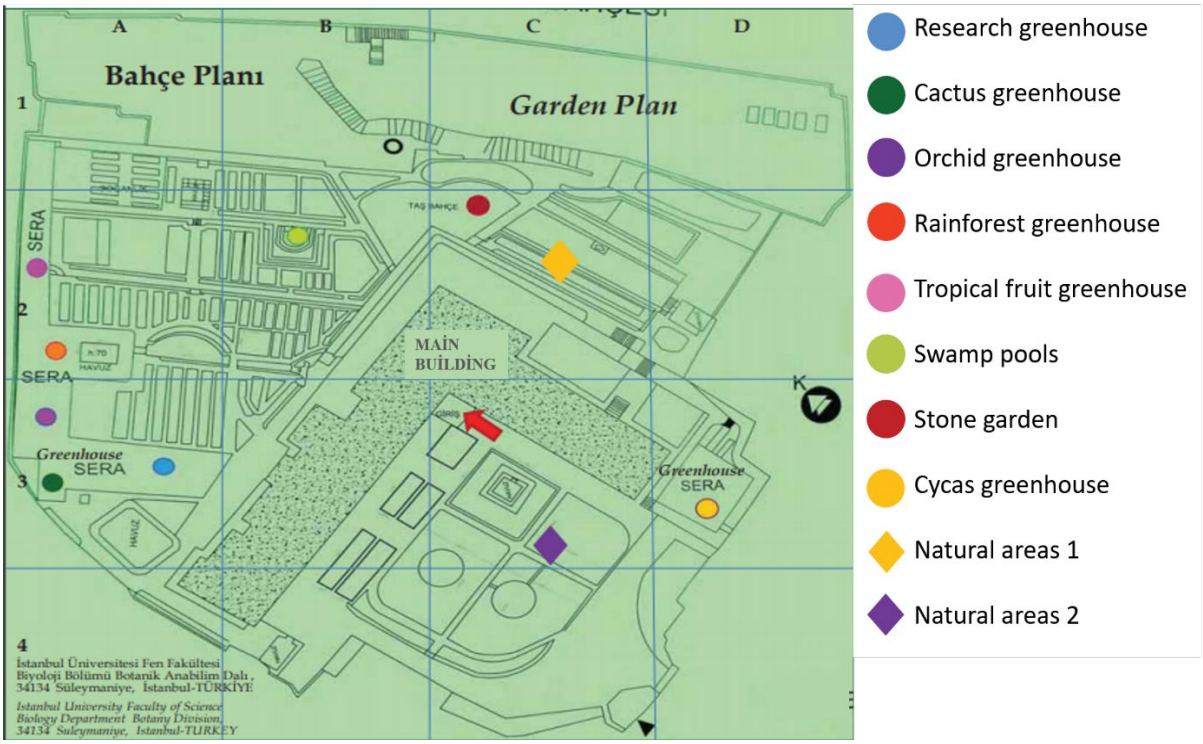

Figure 5. Plan of Alfred Heilbronn Botanic Garden (Bayçu et al., 2013)

Regarding to UNESCO criteria, AHBB has the feature of ''(x) containing habitats important for the protection of biological diversity in situ, such as endangered species'' due to its sections for the protection of rare and endemic taxa of Istanbul and both for the protection and reproduction of endangered bulbous plants that unique to Anatolia. As a result of the coexistence of a large number of natural and endemic plant species in the garden, with combined natural and aesthetic beauty fulfils the natural criteria of cultural land ''(vii) containing extraordinary natural phenomena and areas or having unique natural beauty and aesthetic value'' (Figure 6).

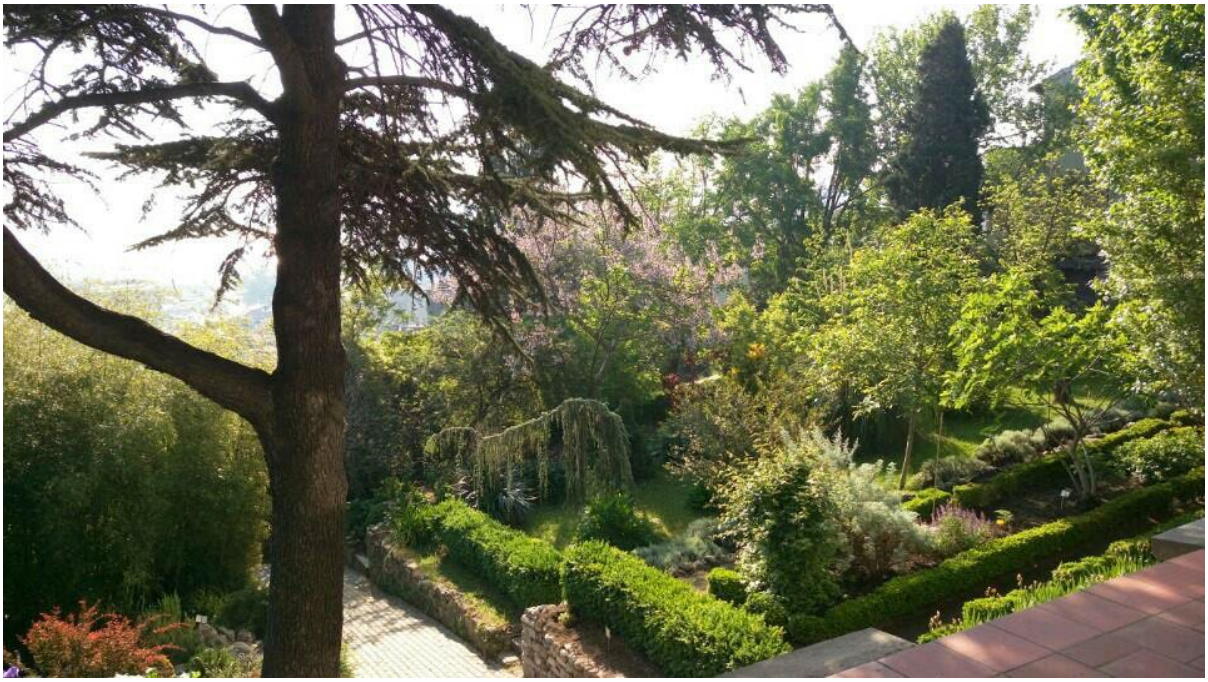

Figure 6. AHBB, which has unique natural beauty and aesthetic value (Parlak, 2016)

The presence of ponds and water in the garden where aquatic plants, water lilies and marsh plants are grown reflects the W - Water as an integral part of the landscape, and serves habitat for most plants,

adds aesthetic value and contributes to biodiversity by attracting many wildlife species such as butterflies, birds, etc (Figure 7).

Figure 7. Presence of ponds and water in AHBB where aquatic plants, water lilies and marsh plants are grown (Parlak, 2016)

AHBB has a spectacular a view of the Golden Horn of Bosphorus with regard to authentic criteria of location and settlement (Figure 8). Its location in the historical peninsula of Istanbul, the most visited area the city shows that the site has been potentially preferred for tourism and recreation. Until recently, the garden was affiliated with the Botany Department of Istanbul University and its proximity encouraged education, training and practice, especially for departments such as biology and botany. However, the land where the garden is located is now owned by the Istanbul Mufti's Office.

Figure 8. Golden Horn view from AHBB (CNN, 2017)

In reference to design and form the Botany Department building in the garden was built in accordance with the western modern architecture during the republic period and symbolizes the foundation of the Turkish Republic. Although the garden was designed in an Anglo-Saxon synthesis since British scientists took part in its design and planning in cooperation with German scientists.

Looking at AHBB in terms of use and function the garden presents attractions for tourism and recreation for visitors and tourists, besides opportunities for education and research for departments of medicine, biology, landscape architecture. The building of the Department of Botany located in the garden, was former Istanbul High School for Girls, and was used for education.

3.2. Atatürk Arboretum

Following the visit the Des Barres and Vilmorin Arboretums in France in the 1949, upon the suggestion of Prof. Dr. Hayrettin Kayacık, Isyanbul University Faculty of Forestry and the General Directorate of Forestry in Bahçeköy started to work jointly to designate an arboretum in 38 hectares land bordering the Büyükdere - Bahçeköy - Kemerburgaz road as the Arboretum Site (Yaltırık, 1988; Güner, 2006; Olkay Şengün, 2011) (Figure 9).

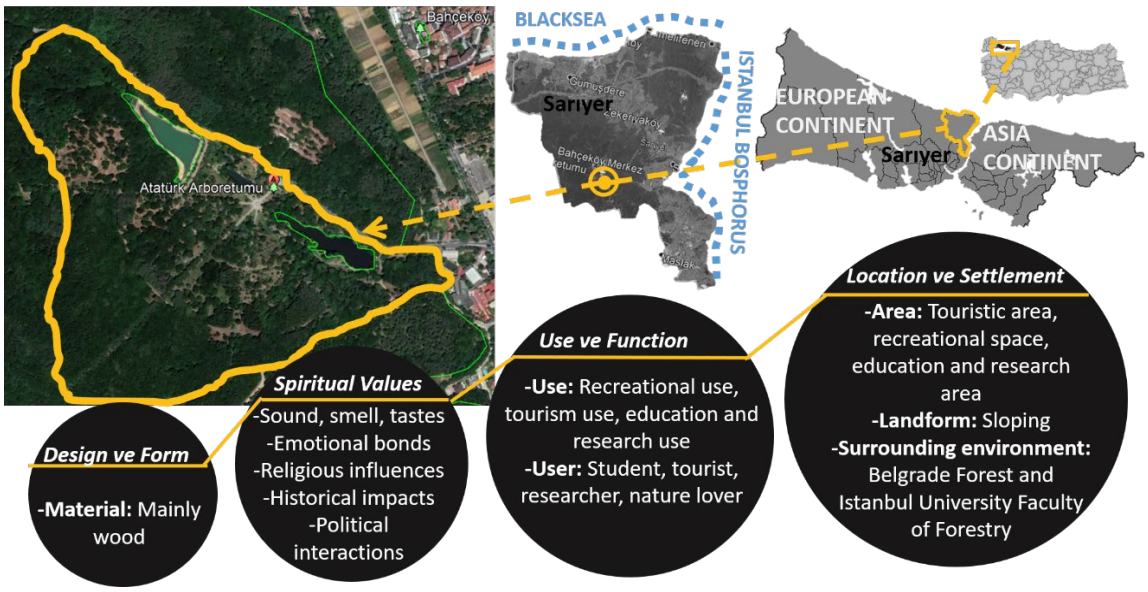

Figure 9. Atatürk Arboretum with authentic features (Authors, 2024)

M. Camille Guinet, one of the inspectors of the Botanical Garden of Sorbon University was invited to Istanbul to prepare project of arboretum arrived in Istanbul at 1958 and started to work. Work continued intermittently between 1959 and 1961. However, due to lack of funds needed, the plan was left unfinished. Only a draft preliminary plan of the arboretum with the roads, plant parterres and sections allocated for special tree groups was completed (Figure 10). The arboretum was renamed the Atatürk Arboretum in 1982 as part of the 100th anniversary celebrations of Atatürk's day of birth (Yaltırık, 1988; Güner, 2006; Olkay Şengün, 2011).

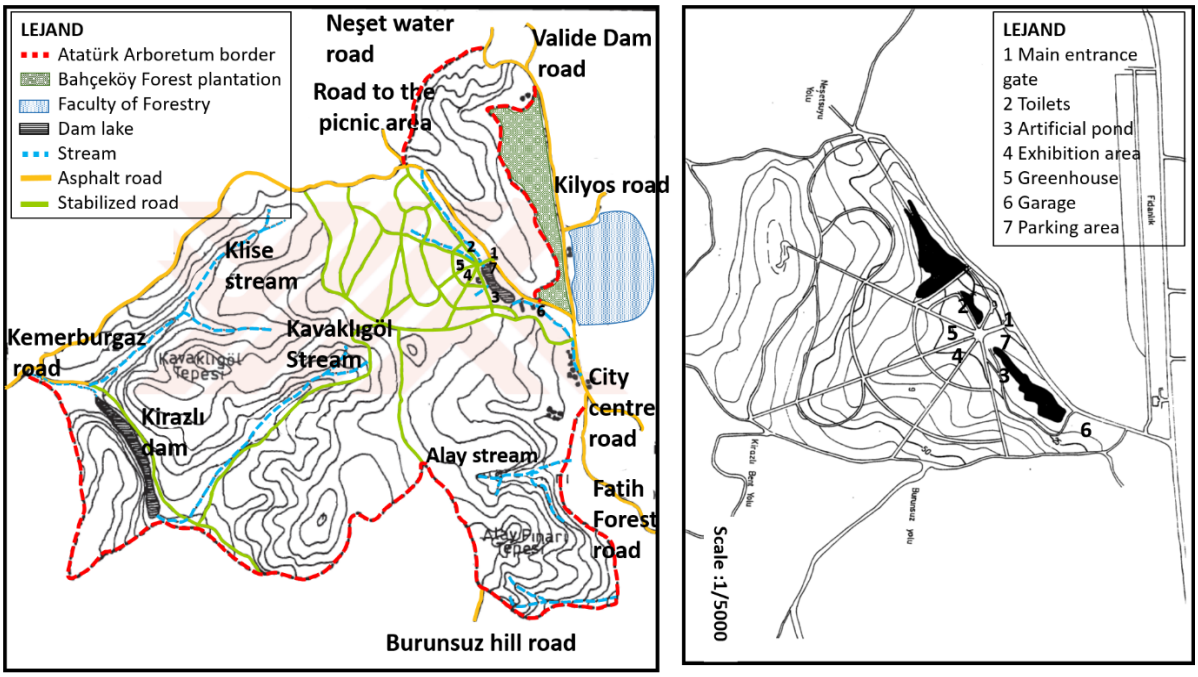

Figure 10. Location and plan of Atatürk Arboretum (Şat, 2002; Olkay Şengün, 2011)

Referring to UNESCO criteria, Atatürk Arboretum as the characteristic (vii) contain outstanding natural phenomena and sites or have unique natural beauty with high plant diversity including both native and exotic species as well water landscapes created by the pond in the arboretum (Figure 11). It also (ix) represents important ecological and biological processes by having a freshwater ecosystem, influencing the formation of animals such as frogs, turtles, fish, ducks, swans and plant communities such as Taxodium distichum in the arboretum.

Figure 11. Plant diversity in the arboretum and the water landscapes created by the pond (Authors, 2024)

Atatürk Arboretum is located in a 345 hectare of forest just in the southeast of the Belgrade Forest, Sarıyer one of the most important natural site in Istanbul metropolitan area. Accordingly, Jf - Forest, afforestation areas and Wl - Landscape example where lake or lakes are part of the landscape are the prominent features. In addition, the ecological diversity in the arboretum by the presence of many flora and fauna species offer an on-site-open laboratory and since Kirazlıbent, a natural park (Yener 2021), is located within the boundaries of the arboretum, it has the characteristic of landscape areas with N- Natural park or containing natural areas that evidently form the characteristic of N - Natural Park (Figure 12).

Figure 12. Landscape area with forest and part of the lake (Authors, 2024)

In terms of authenticity, location and settlement, Atatürk Arboretum has a setting of sloping land. Walking paths in the arboretum, that organically link with Belgrade Forest are a great importance in the north of Istanbul.

Great diversity of species in such landscapes create beautiful scenes throughout the year with the seasonal colours of vegetation are used as touristic and recreational ground by inhabitants of the city as well as by nature lovers and photographers (Figure 9).

In terms of design and form, the design of the buildings in the arboretum and the piers on the ponds resemble the foundation of the site.

In terms of use and function, Atatürk Arboretum has multifunctionality of being a collection of woody plants, hotspot of ecological diversity, a tourist and recreation site in such a metropolitan city.

Founded in 1949 on an area of 38 hectares, the arboretum today hosts 2000 different plant taxa from different corners of the world on an area of 296 hectares. The main basis for the establishment of the arboretum was to enable scientific research, development and observations on *Quercus ssp.* and the overall Fagaceae family. For this aim, an area of 2.5 hectares, is reserved as an oak area. An oak project was established and saplings grown from seeds sent from different countries were planted on site and a large collection of 100 oak taxa was created. The theme and form of 'Oak' was also used in the design of the arboretum and a fountain in the shape of an acorn is located in the arboretum square. Besides a diverse set of oaks, Pinaceae collections are also given special attention.

In addition ornamental plants, dwarf conifers, native of the Belgrade Forest, species from Cupressaceae, Altingiaceae, Ginkgoaceae, Sapindaceae, Magnoliaceae, Ericaceae, Styracaceae, Malvaceae, Rosaceae, Betulaceae families and *Acer ssp.* are among the species commonly seen in the arboretum (İstanbul Orman Bölge Müdürlüğü, Bahçeköy Orman İşletme Müdürlüğü, Atatürk Arboretumu, 2013). The arboretum could be visited with a membership system. In 2011 it was partially open to visitors only for weekends, but in 2013, fully open to visitors for weekdays and weekends. The Arboretum is an operation chiefdom under the Bahçeköy Forest Management Directorate of the General Directorate of Forestry, Istanbul Regional Directorate of Forestry. It is managed by an advisory board with the scientific authority of the Faculty of Forestry of Istanbul University and the administrative authority of the General Directorate of Forestry (Atatürk Arboretumu, 2024). Arboretum has the functional property of being used for educational purposes for the applied courses of the departments such as Landscape Architecture and Forest Engineering of the Faculty of Forestry of Istanbul University, also by the institutions affiliated to the Ministry of Agriculture and Forestry (Figure 9).

The variety of plants (fragrant, fruit-bearing, etc.) in the arboretum attracts wildlife species such as birds and insects thus meet the characteristics of sound, smells and tastes, from spiritual value, while the tranquility and calmness of nature reflects such interactions between people and urban environment. The presence of some species as Ginkgo biloba, Prunus serrulata, Cupressus sempervirens, Platanus orientalis, Salix babylonica, Cupressus sempervirens, Fagus orientalis, Pinus nigra, Quercus sp. in the arboretum shows the presence of cultural heritage qualities with myths and intangible values (Figure 9). In Turkish culture, Platanus orientalis symbolizes long life and power with its large leaves, height and crown and outstanding forms, while in Greek culture, Quercus sp. represents endurance and strength. Cupressus sempervirens stricta is the reminiscent of the minaret of the mosque towards to the sky, symbolise reaching the God, evoking death and used extensively in cemeteries (Özarslan, 2003; Güneroğlu, Şahin & Aktürk, 2018).

3.3. Nezahat Gökyiğit Botanical Garden (NGBB)

NGBB was established in 1995 for the memory of Nezahat Gökyiğit with an initial planting and afforestation plan and opened for the public in 2002 as a first private botanical garden in Türkiye (NGBB, 2021). NGBB, a member of BGCI (Botanic Gardens Conservation International), is typically located in an intersection of a highway (Figure 13). Botanical garden consists of eight islands, namely Central Island, Ertuğrul Island, Mesire Island, Istanbul Island, Arboretum Island, Oak Island, Anatolia Island and Thrace Island (Figure 14).

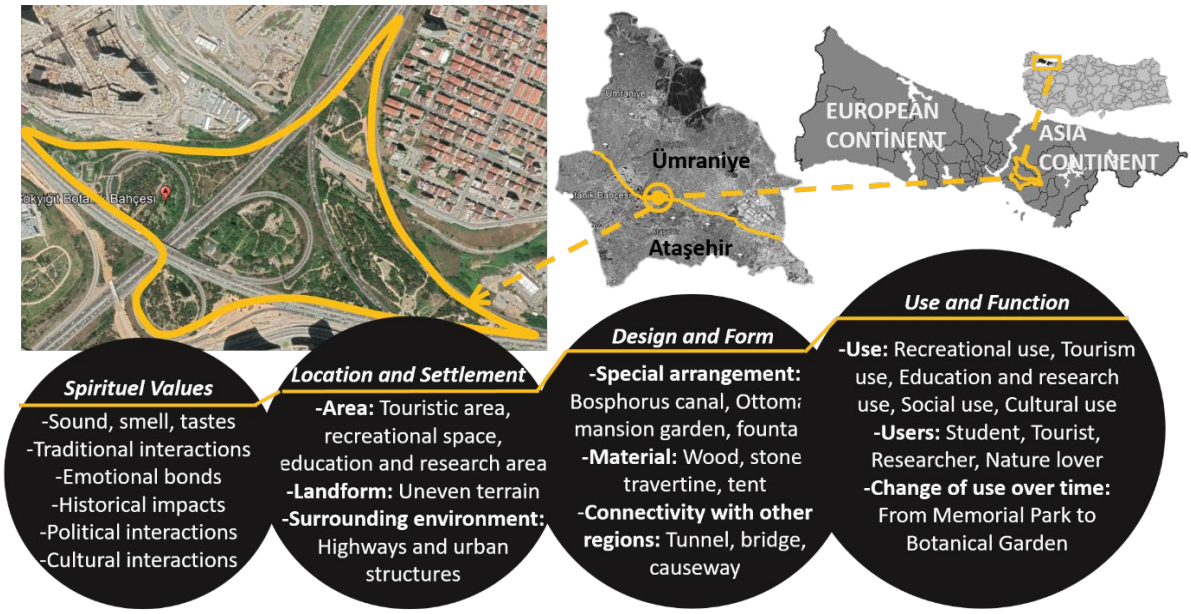

Figure 13. Nezahat Gökyiğit Botanical Garden with authentic features (Authors, 2024)

Figure 14. Plan of Nezahat Gökyiğit botanical garden (NGBB, 2021)

Monuments on Ertuğrul Island, in memory of the 527 sailors aboard the Ertuğrul Frigate, that sank in a storm on the return from Japan during the reign of Abdülhamit II, indicates the presence of (II) having left a mark in a cultural region in the world in a period and having greatly influenced the developments in the field of monumental arts (Figure 15a). Based on 18th century Ottoman style, the Istanbul Mansion Garden design in NGBB has significantly influenced both urban planning and landscape design with regard to plants and elements used, where transformation of both native and endemic plant species given special attention. Accordingly, as the garden includes all the structural and vegetative features of Istanbul mansion gardens, that were common in the 18th century Ottoman period but which are quite rare today, reflect (v) being an important example of traditional human settlement or land use representative of a culture (Figure 16).

a **b** **c**

Figure 15. a. Ertuğrul Frigate Monument (Göçebe, 2018), **b** and **c.** NGBB's plant diversity (Authors, 2024)

Figure 16. Istanbul mansion gardens in the 18th century Ottoman period at NGBB (Authors, 2024)

Ottoman garden in NGBB symbolizes G- Areas with decorative gardens as the main element with standing and flowing waters and flower parterres with vegetative features especially tulips and cypress trees of 18th century mansion gardens (Figure 16). Ottoman marquee with grand tent used by a sultan or grand vizier on the same island is the case L- landscape elements that form the identity of a community creating an example of nomadic lifestyle (Figure 17). The presence of a water bend on Oak Island shows Wi- irrigation channels or other water structures by creating a mini dam where rainwater is collected to help irrigate the garden. Nypheum pools on Anadolu and Merkez islands, the Bosphorus canal on Istanbul island and the fountains of the 18th century Istanbul meets W - water forms part of the landscape (Figure 18 and Figure 19).

Figure 17. Ottoman marquee on Istanbul Island (Authors, 2024)

Figure 18. Water bend on Oak island and Nypheum pools on Merkez and Anadolu islands (Authors, 2024)

Figure 19. Bosphorus canal and the fountains of the 18th century Istanbul (Authors, 2024)

Referring to its location, NGBB is an exceptional case as the first botanical garden to be established between motorway junctions and in the heart of public transport between Ümraniye and Ataşehir directions in İstanbul. Although the garden is located in the middle of the transport network, it is a kind of barrier to shield noise and air pollution with well maintained and diverse vegetation (Figure 15b and c).

In terms of setting, the undulating topography with ups and downs offers landscape diversity. On cultural bases an educational and scientific research area with its library provide seminars, courses and workshops for students and educators, publications such as magazines and books, and exhibitions of plants. The fact that NGBB is also visited by tourists reflects the Japanese-Turkish cultural interaction, especially on Ertuğrul Island.

The fact that the garden is located on the transportation network of the city of Istanbul and reveals the important contribution to the urban open green space system in terms of its location and functions and offer easily accessible open green spaces for the public in the middle of highway and high-rise buildings of urban fabric (Figure 13).

In terms of design and form NGBB has authentic special arrangements such as the Bosphorus Canal symbolizing the Bosphorus, the Ottoman Mansion Garden and the fountains located here, the bamboo labyrinth on the promenade island, the Ertuğrul Martyrs Monument, and the rock garden. In terms of materials, wood was used in the pergolas, stone was used mainly in the Ottoman mansion on the island of Istanbul, tents were used in the Ottoman marquee and travertine was used in the fountains in this

area. Since the garden is located between the islands between the highways, the connections between these islands are provided by tunnels, bridges and passages.

In terms of use and function NGBB is authenticity character with bamboo labyrinth for children and discovery garden on the promenade island; educational use with seminars, training, courses and workshops; research use with the presence of library, publications and species conservation projects; social, cultural and tourism use with the organization of exhibitions and festivals. In addition, the garden was established as a memorial park and later converted into a botanical garden, indicating a change in use over time (Figure 13).

In terms of spiritual values, the Japanese Cherry saplings donated by the Japanese Sakura Foundation at the 115th anniversary of the Ertuğrul Frigate Disaster, and planted in memory of each sailor, and the Frigate Monument reflect the historical and political interactions between Türkiye and Japan in terms of spirit and expression. The fact that the Sakura trees symbolize love and passion in Japanese culture, which shows the existence of emotional ties from spiritual values, and the festivities organized in Japan representing the arrival of spring and renewal, and the fact that the festivals organized in Japan are also organized in the botanical garden shows the existence of cultural interaction among intangible cultural heritage qualities. The fact that the spiritual value attributed to these trees is a Japanese tradition again shows the traditional interaction feature of spiritual values. In addition, the fact that the garden attracts many creatures with its plant diversity makes it possible to experience many sounds, smells and tastes (Figure 13).

4. Conclusion and Suggestions

Botanical gardens have been recognized as signage of nature and social wealth in many countries (Hepcan & Özkan, 2005). In addition they have great contribution to urban green network supporting urban ecosystems and urban biodiversity. Referring to botanical gardens, urban design and planning approaches have been adopted all over the world (Ignatieva & Ahrné, 2013) to extend ecological dimensions of the cities. Ultimately, botanical gardens play an important role in preserving the identity of the city and passing it down from generation to generation.

With their multiple functions and features, botanical gardens and arboretums have great values for megacity Istanbul. Arboretums and botanical gardens respond to the needs of people working in this city where life is very busy. They provide opportunities and space for spending time in nature, in particular for children growing up in the city bonding with plants and animals, learning about nature.

Atatürk Arboretum is a kind of escape from the chaotic mess of İstanbul metropolis especially on weekends, which serves as a habitat with the large part of the Belgrade forest that contributing to the protection for many animal species such as roe deer and squirrels. From an educational point of view, Atatürk Arboretum hosts students for some courses at Istanbul University Faculty of Forestry, serving as a living lab for national and international studies on many woody species, but especially on oaks. NGBB offers possibilities for the inhabitants of Istanbul to get in touch with nature together with rich plant diversity, recreation areas, playgrounds for children.

With a number of prominent species of *Astragalus beypazaricus, Astragalus yildirimli, Rhaponticoides mykalea, Pyrus serikensis, Tulipa sprengeri baker, Iris aschersonii*, NGBB serves ex-situ conservation, contributing biodiversity in the urban ecosystem.

NGBB offers seminars, trainings, courses and practices in order to raise awareness of the community of the city in particular for school children. Located in the historical peninsula, which is one of the touristic hot spots in the city and surrounded by universities and institutions, AHBB provides the chances for both learning and exploration of many plant species and contact with nature in the heart of the İstanbul. In addition, AHBB contributes to the green patches such as Gülhane Park, the Garden of the Faculty of Law of Istanbul University, and the Garden of Topkapı Palace in the historical peninsula, which has a very dense settlement pattern.

The need for arboretums and botanical gardens along with urban green spaces has increased even more due to the recent Covid-19 pandemic. Arboretums and botanical gardens have made a great

contribution to reduce stress and provide psychological relief during and after Covid times (Önder & Polat, 2012; Ortaçeşme, Yıldırım & Zeğerek, 2020). For this reason, presence and accessibility of arboretums and botanic gardens are of vital for cities with a dense structural texture such as Istanbul.

Botanical gardens and arboretums are shaped by the geographical conditions; climate, location and cultural features of the country. The protection and reproduction of plant species and endemics in the arboretums and botanical gardens in particular, reflect the principles of UNESCO cultural landscape criteria, with the presence of plants with mythological value in the society, the presence of cultural history as well as functional visual elements like fountains and other cultural reflections such as the sakura site in NGBB. Botanical gardens can also host memorial gardens that help to remember and perpetuate events in history that are important to society and raise awareness of the past (Demir, Pouya & Demirel, 2016), such as the memorials erected on NGBB's Ertuğrul Island in memory of the sailors who died on the Ertuğrul Frigate and the Japanese Cherry saplings planted in memory of each sailor.

However, priorities in biodiversity protection and our cultural values attached to the public green spaces may change over time in line with our needs. For this reason, botanical gardens and arboretums established in the same city differentiate.

In this study, NGBB, AHBB and Atatürk Arboretum in Istanbul province were evaluated in terms of natural and cultural criteria for the UNESCO cultural landscapes. Interpreting the foundation, development, and planning of botanical gardens in Türkiye from past to present would be helpful multiple functions, their characteristics and their role in the most populated city of Istanbul such as education, research, tourism, recreation and also signpost of the country.

NGBB stands out with examples of cultural features among the UNESCO Cultural Landscape Criteria as a result of having two cultural landscape criteria (ii, v) as a result of the presence of Ertuğrul Monument constituting an 'example of monumental art' (ii) and the presence of Istanbul Mansion Garden constituting an 'example of human settlement representing a culture' (v).

On the other hand, AHBB fits the criteria for the protection of biodiversity such as endangered species as a result of having sections for the protection of rare and endemic taxa of Istanbul and bulbous plants under risk in Anatolia (x), and the combination of natural and aesthetic beauty as a result of the combination of many natural and endemic plant species in the garden (vii). Atatürk Arboretum, on the other hand, potentially meets criterion vii due to the aesthetic appearance created by the natural and endemic plant diversity around the pond in the garden, and criterion ix of representing important ecological and biological processes by influencing the formation of animals such as frogs, turtles, fish, ducks, swans and plant communities such as Taxodium distichum in the arboretum by having a freshwater ecosystem.

As a result, NGBB has cultural characteristics among the cultural landscape criteria because it was established to serve many purposes and the garden was created by land reclamation. Atatürk Arboretum and AHBB, on the other hand, have natural features among the cultural landscape criteria since their purpose of establishment was to serve the higher education of the universities in the neighbourhood and they have natural areas (Table 3).

Table 3. A comparative analysis of AHBB, Atatürk Arboretum and NGBB as regard to cultural landscape characteristics

Cultural Landscape Features	**AHBB**	**Atatürk Arboretum**	**NGBB**
Cultural Landscape Category	Easy to Identify	Easy to Identify	Easy to Identify
Natural-Cultural Criteria	vii, x,	Vii, ix	ii, v,
Complementary	W	Jf, N, Wl	G, L, Wi, W
Authentic Features	**Location and Settlement**	**Location and Settlement**	**Location and Settlement**

	-Area: Touristic area, Recreational area, Education and Research area **-Landform:** Sloping **-View:** Golden Horn **Surrounding environment:** Istanbul University **Design and Form** **-Design:** Anglo-Sakson synthesis **-Material:** stone, brick **-Building techniques:** Modern **Use and Function** **-Use:** Recreational use, Tourism use, Education and Research use **-Users:** Student, Tourist, Researcher, Nature lover **-Change over time:** Former Istanbul High School for Girls -Istanbul University Department of Botany **Spiritual Values** -Artistic interaction (Anglo-German Architecture) -Sound, smell, tastes -Religious influences	**-Area:** Touristic area, Recreational space, Education and Research area **-Landform:** Sloping -**Surrounding environment:** Belgrade Forest and Istanbul University Faculty of Forestry **Design and Form** **-Material:** Mainly wood **Use and Function** **-Use:** Recreational use, Tourism use, Education and Research use **-Users:** Student, Tourist, Researcher, Nature lover **Spiritual Values** -Sound, smell, tastes -Emotional bonds -Religious influences -Historical impacts -Political interactions	**-Area:** Touristic area, Recreational space, Education and Research area **-Landform:** Uneven terrain **- Surrounding environment:** Highways and urban structures **Design and Form** **-Special arrangement:** Bosphorus canal, Ottoman mansion garden, fountain... **-Material:** Wood, stone, travertine, tent -**Connectivity with other regions:** Tunnel, bridge, causeway **Use and Function** **-Use:** Recreational use, Tourism use, Education and research use, Social use, Cultural use **-Users:** Student, Tourist, Researcher, Nature lover **-Change over time:** From Memorial Park to Botanical Garden **Spiritual Values** -Sound, smell, tastes -Emotional bonds -Historical impacts -Political interactions -Cultural interactions -Traditional interactions

As a result, the reflections of the cultural interaction in the botanical gardens that has existed in many parts of Istanbul from the past to the present. For example, Sakura festival in spring held in NGBB is typically evoking such interaction between city and botanical gardens. In some cases, architectural remains dated to special design can be added value to sites. Foundation of AHBB began in the old Istanbul Girls' High School built by a synthesis of British and German design. NGBB was a memorial garden when it was first established and added by further design elements of Ottoman Mansion Garden. It may offer opportunities for the city of Istanbul and its citizens in strengthening the city image, recognizing destinations.

Regarding biocultural dimensions NGBB, Atatürk Arboretum and AHBB emphasize how the historical and cultural identity of the city is reflected in the landscape. The presence of native and endemic plants also helps to explore Türkiye's richness in terms of floristic diversity. NGBB expresses landscape design patterns of Turkish culture with fountains, bridges, pergolas, river elements, plant parterres decorated by tulips and roses. The transformation of the tunnels that provide passage between the sections in the garden into various exhibitions such as the introduction of trees and plants in Istanbul with photographs, the use and meanings of plants in Turkish culture from the past to the present is a successful example of how each site can be utilised appropriately. The presence of rich woody plants in Atatürk Arboretum shows that Istanbul has a suitable for many species, and it is a good example of which plant species can be grown in the landscape from the past to the present.

The fact that AHBB is surrounded by cultural context such as Istanbul University and Süleymaniye Mosque on the historical peninsula, framing the view of the Golden Horn Strait with beautifully decorated garden, allows us to see not only the historical and cultural texture can be combined finely.

Different design approaches ranging from the republican period to western modern architecture structure and the garden designed in the Anglo-Saxon synthesis, together with the historical environment have high value.

The arboretums and botanical gardens can contribute positively to the education in the universities in the city by providing learning environmental, practice, documentation as well training courses, events, exhibitions, and publications. Istanbul is a metropolis where urbanization highly intense. For this reason, botanical gardens and arboretums are of vital importance and greater role in protection of biodiversity in urban environment and ex-situ conservation for many plant species.

NGBB, Atatürk Arboretum and AHBB potentially comply with the number of the UNESCO's World Heritage Cultural Landscape criteria. However besides their cultural, scientific, historic, educational, biological characteristics these three sites are highly important for the inhabitants of Istanbul metropolis as well as the city itself as the crucial part of urban ecosystem.

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