NATURAL AND CULTURAL TRACES OF THE FLORA OF ISTANBUL

İSTANBUL FLORASININ DOĞAL VE KÜLTÜREL İZLERİ

Bahar BAŞER

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Kentin bitki örtüsü, kent ekolojisi, peyzaj tarihi, İstanbul

ABSTRACT

Istanbul is the largest metropolis of Turkey, as well as its main economic capital, and core of industrial and financial development center. Beyond the great historical and cultural values it possess, especially because of its unique location as a transition zone between the Mediterranean and Euro-Siberian, the diverse landscape characteristics of Istanbul also effect the diversity of its plant species and richness. The city has shown high potentials for biological diversity and native habitats, due to its location on the transition point of different climatic regimes between Middle Europe and Mediterranean regions.

This study investigates natural and cultural processes effecting the floral composition of Istanbul's city-scape and nature-scape by overlapping the different dimensions of this complex metapolis. These include historical and social dimensions as well as ecologic, functional, aesthetic and horticultural factors affecting the plant species composition in and around urban environment. The study consists of three parts: (1) explanation of the general ecological characteristics affecting natural and cultural vegetation, (2) human influences on the flora of Istanbul: thresholds in the historical process, and (3) different green landscape characteristics in urban landscape.

ÖZET

Türkiye'nin en büyük metropolü olan İstanbul kenti, aynı zamanda bütün ülkenin sanayi ve finansal gelişim merkezi olma özelliğine sahiptir. Kenti sembolize eden tarihi ve kültürel değerlerin önemi yanında, Akdeniz ile Avrupa-Sibirya fitocoğrafya bölgeleri arasındaki geçiş zonunda konumlanışı ve farklı peyzaj özelliklerine sahip olması nedeniyle, kentin floral zenginliği ve biyolojik çeşitliliği de dikkate değer niteliktedir. İstanbul Orta Avrupa ile Akdeniz iklim rejimleri arasındaki geçiş noktasında bulunması nedeniyle biyolojik çeşitlilik ve doğal habitatların yaşam alanlarının çeşitliliği bakımından önemli bir potansiyele sahiptir. Bunun yanında tarih boyunca üzerinde yaşayan çeşitli medeniyetler İstanbul'a kültürel açıdan ölçülemeyecek derecede zenginlik katmıştır. Bu kültürel etkileşim, çeşitli zamanlarda kente getirilen ve dikilen bitki türlerinin çeşitliliğini de etkilemiştir.

Bu çalışma, gerek tarihsel ve sosyal, gerekse ekolojik, işlevsel, estetik ve hortikültürel faktörler gibi bitki türü çeşitliliğini etkileyen farklı boyutları bir arada ele alarak, İstanbul'da yaşayan bitki türlerinin çeşitliliğini ve farklı tür kompozisyonlarının oluşmasını etkileyen doğal ve kültürel süreçleri incelemektedir. Bu kapsamda araştırma üç bölümde ele alınacaktır; (1) İstanbul'un florası üzerine etkili olan ekolojik özellikler (2) İstanbul florası üzerindeki insan etkileri: tarihsel süreçte kentin bitki örtüsünü etkileyen eşikler (3) kentin bitki örtüsünün şekillendirdiği farklı peyzaj tipolojileri.

INTRODUCTION

In our age, with increasing demand of living in the cities the quality of urban green spaces has gained importance. Trees in woodlands, parks and gardens, and aligning streets and squares are the most important elements of such green areas (Konijnendijk et al. 2005).

The green elements of the cities are witness of the changing process of urban landscapes because they can live longer than us. The social, economic and cultural alterations affect the vegetation cover on urban green spaces as well as the environmental factors. With the growth of cities, natural and rural landscapes are replaced by the urban land-uses and designed green spaces which are planted with native or exotic plant species. Especially in the last few decades, urbanization process has created irreversible and rapid changes in the vegetation cover in and around cities. As a result of environmental degradation and loss of natural forests, afforestation in urban spaces and protection of urban trees are very important actions held by the local authorities.

Since city environment has been shaped by anthropogenic influences, the structure of urban flora displays different characteristics from the natural landscapes. In comparison with natural habitats, urban environment has reflected rich potentials in terms of diversity of plant species (Sukopp 2008), because urban green spaces are meeting place of natural and cultural flora. The historical background of green spaces and culturally significant plant species should be considered when planning and managing the urban flora. In order to provide culturally coherent and ecologically sustainable urban vegetation, potentials of existing plant species in urban environment and change in species diversity, should be analyzed and monitored consistently.

This study investigates that natural and cultural process effecting the floral composition of Istanbul's city-scape and nature-scape through overlapping the ecological and historical dimensions of this complex metapolis.

The aim of the study are to show how ecological conditions as well as cultural influences and urbanization process affect plant diversity and thus how these factors change the green structure and landscape image of a metropolis in terms of species richness and amount of green spaces in the urban pattern.

The study consists of three parts:

(1) explanation of the general ecological characteristics effecting natural and cultural vegetation,

(2) human influences on the flora of Istanbul: thresholds in the historical process,

(3) typology of green landscape characteristics in urban landscape.

Supported by an extensive literature research, the advantages of the opportunities in plant biodiversity will be emphasized. Furthermore, the changes in vegetation layer through time and potentials of the native species in urban landscape will be evaluated. According to the landscape ecological and cultural factors which have affected the urban green structure and floral characteristics of Istanbul, different landscape typologies determined in the urban pattern of the city. The differences among these typologies have been delineated using characteristic sections, pictographic plans and site images in the last section of the paper.

NATURAL AND CULTURAL CHARACTERISTICS OF ISTANBUL'S VEGETATION COVER

Istanbul is the main economic capital, and core of industrial and financial development center of Turkey. Furthermore, throughout history the city has always been the capital of every civilization that settled there, embracing both "Western" and "Eastern" cultures.

Beyond the great historical and cultural values, which have symbolized the city, because of its unique location as a transition zone between the Mediterranean and Euro-Siberian, the diverse landscape characteristics of the city also affects its biodiversity and species richness. In this part of the study, firstly ecologic, functional and horticultural factors and secondly historical, social and cultural dimensions affecting the plant species composition in and around urban environment will be investigated.

URBAN CHARACTERISTICS OF THE STUDY AREA

Forming a transition between the Balkan Peninsula and Anatolia, the Province of Istanbul is a connection point between European and Asian continents (Fig.1). The province is bordered by high summits of Kocaeli Mountain Ranges in the East, by Marmara Sea in the South and waterline of Ergene Basin in the West (Istanbul Metropolitan Planning Report 2005).

Istanbul covers an area of 480,577 ha. (5712 km ^{2}) which has the characteristics of a sloping topography formed by hills, valleys and river basins. The city has been divided into two parts by the Bosphorus strait lying between the Black Sea and the Marmara Sea. The green structure of the city is mainly defined by the north forests which cover 2.164 km^2 area representing 40% of the whole city, and built areas expand along the south coasts on both sides of the Bosphorus (Istanbul Metropolitan Planning Report 2005).

As a result of growing urban population with migration from rural Anatolia, the city expanded through an uncontrolled process since 1970s (Fig. 2). Because of the influx of migration, built areas have overwhelmed the north forests and the ecological resources of the city. Today, 15 percent of the Turkey's population lives in Istanbul (13 million), which is equal to the population of 37 cities in the country. If the current population growth continues, the number of inhabitants in Istanbul would increase to 19 million in 2020 (Istanbul Metropolitan Planning Report 2005). As being the socio-economic center of Turkey, Istanbul acts as a black hole in terms of migration from other cities due to the economic and financial problems of the country. Further, the population density and business activities have a much higher ratio than the average of the country, overloading the carrying capacity of the city on a daily basis; as well as, the unbridled urban expansion creates serious and non-returnable pressures on natural resources even on the city itself (Başer and Eşbah 2010).

VEGETATION CHARACTERISTICS OF ISTANBUL

Landscape Ecological Characteristics Effecting Istanbul's Vegetation

Istanbul has a quite complex structure because of its different geographic features. Therefore, as well as several ecological components affecting vegetation cover, the relationships among them also must be considered. Here, the factors directly affecting plant growth such as geomorphology, climate, soil and hydrology and potential natural vegetation of Istanbul will be explained in detail.

The city's current geomorphologic structure that shaped by the relationships of climate, geology and hydrology directly affects urban development and also land use. Topographic and geomorphologic view of Istanbul and its environs present the results of very long and complex evolutionary process (Erinç 1974). As a result of a series of geologic movements, the terrain of Istanbul shows an eroded peneplain structure.

Istanbul lies on the lands of Kocaeli (on Asia) and Catalca (on Europe) Peninsulas divided by the Bosphorus. These plateaus originally are erosional surfaces and carved into pieces by dense valley networks. Catalca-Kocaeli Plateau has a dome like structure along the NW-SE axis shaped by the Young Alpine tectonic movements. Due to this

topographic structure affects the slopes of the river network, long rivers in the west of the Bosphorus flood into Marmara Sea and in the east they stream to Black Sea. The geomorphologic structure of the city's terrain creates a natural edge between north and south named as "water section line". This line extends on the central east-west axis of the peninsula by cutting across the city as being closer to Marmara Sea in the east and Black Sea in the west (Fig. 3).

The Bosphorus and the southern parts of Istanbul in general are under the influence of the Mediterranean climate. On the other hand, the northern and inner sections are under the effects of continental climate, which is colder and rainy than Mediterranean, with the influences of Black Sea, Balkans and Anatolian geographies (Erinç 1974). This climatic complexity of the city has been defined as "transition character in climate" from Mediterranean to continental effects (Erinç 1980,1979,1974;Yaltırık 1963; Yaltırık et al. 1997; Avcı 1994; Şen 2000; Gönensin 2001) . Istanbul's microclimatic features that cause the differentiation on natural vegetation character is the result of its geomorphologic structure as explained above. Due to the effects of geomorphologic structure of the land, there is a climatic transition which is gradually being temperate from north to south. The different conditions on each side of water section line affects the climate of the area therefore the vegetation structure, in other words, it reveals the ecological thresholds of the region (Yaltırık et al. 1997).

Because the precipitation and temperature gradually change from north to south, different levels of humiditiy affect the soil conditions on each side of the water section line. The South part of the water section line shows semi-arid and Mediterranean characteristics, the vegetation cover of this area named as arid forest lands. The North part of the water section line reflects more humid, rainy and cold climatic conditions. The vegetation cover of this region named as humid forest lands (Dönmez 1968, 1977; Avcı 1994, 2009; Yaltırık et al. 1997). Due to the water section line is closer to the North in European side and to the South in Asian side of the city, natural urban forests cover more area in Kocaeli Plateau while agricultural and build-up areas cover more lands in Çatalca Plateau.

According to the phyto-geographic approach, Turkey is divided into 3 main divisions, namely, Euro-Siberian Flora Zone, Mediterranean Flora Zone and Irano-Turanian Flora Zone. Owing to the transitional landscape characteristics of the city the transition from Euro-Siberian flora to Mediterranean flora in the north-south section of Istanbul can be observed clearly (Başer 2010b: 96-107, Fig.3). On the other hand, since Istanbul is located at the intersection of the first two divisions (Euro-Siberian & Mediterranean), the city has a range of species richness in natural vegetation cover. The dominant native plant species of Istanbul consists with the effects of Euro-Siberian phyto-geographic division on the north and Mediterranean phyto-geographic division on the south and around Bosphorus (Şen 2000).

The dominant vegetation formation of Istanbul is forests (Yaltırık 1963; Avcı 1994; Yaltırık et al. 1997). It is possible to see examples of pristine forests on both sides of the Bosphorus hills today. The Alemdağ Forests on the Anatolian side and the Belgrad Forests on the Europe are humid, mixed-leaf forests. Their dominant tree species[1] are the Oaks - *Quercus robur* (English Oak), *Quercus petraea* (Sessile Oak) and *Quercus frainetto* (Hungarian Oak)- that spread over a broad area. *Fagus orientalis* (Oriental Beech) is observed in areas near the Black Sea coasts. Other species entering into the mix in these humid forests include C*arpinus orientalis* (Hornbeam), *Castanea sativa* (Anatolian Chestnut), *Populus tremula* (Quaking Aspen), *Alnus glutinosa* (Common Alder), *Corylus avellana* (Common Hazel), *Acer campestre* (Hedge Maple), *Acer trautvetteri* (Beech-Maple), *Ulmus minor* (Field Elm), *Tilia tomentosa* (Linden Tree), *Salix caprea* (Goat Willow) and *Salix cinerea* (Grey Willow) (Yaltırık et al. 1997; Avcı 1994, 2009). Apart from forest formation, many species of shrubs, maquis, garrigues, herbaceous plants, bulbous plants, geophytes and climbers of continental and Mediterranean climates finds room to grow in Istanbul (Erinç 1979; Avcı 1994; Yaltırık et al. 1997).

Because of the structure of the deep valleys carved into the sloping land, also changing in land elevations, different microclimatic areas are watched around the slopes of Bosphorus too. Since transitional climate feature of the region effects the plant

geography and create microclimatic conditions, different vegetation types can flourish around Bosphorus. An increase in Mediterranean flora is observed in the warmer areas to the south directions of the hills along the Bosphorus and also near the Marmara Sea coasts and on the Prince's Islands (Fig. 4). *Cercis siliquastrum* (Judas Tree), *Pinus pinea* (Pistachio Pine), *Cupressus sempervirens* (Cypress Trees), which are typical Mediterranean trees that grow well here and reflect the landscape characteristic of the Bosphorus Hills. The cultural trees of Bosphorus hills, which has been accepted as naturalized species, are *Cedrus libani* (Lebanon Cedar), *Platanus* x *acerifolia* (London Plane) and *Platanus orientalis* (Oriental Plane).

Natural plant species of the Bosphorus are similar in native species of Istanbul. Parts of southern and south-facing slopes of the Bosphorus area is home to tree species in dry forests, scrub vegetations, maquis and garrigues. In more humid climate zones, especially for deeper cuts in the northern parts of the area and north-facing slopes broad-leaved trees in humid forests and pseudomaquis generates the main types of habitat.

As one can see that, different soil, climatic and geomorphologic structures make it possible for the species of the Mediterranean and Euro-Siberian flora to flourish together in Istanbul. When we compare the species richness of Istanbul with other European countries, it seems that the city has great capacity in terms of biodiversity even though the lands cover a very small space. With around 2500 different natural plant species, Istanbul alone puts European countries such as Holland (1600 species on 41.528 km^2), England (1850 species on 244.820 km^2) and Poland (2450 species on 312.685 km^2) in the shade in this respect (Özhatay and Keskin 2007; Avcı 2009). On the other hand, around 230 exotic trees and shrub species has been planted and growing in Istanbul's streets, parks and urban open spaces (Başer 2010).

Since the geomorphologic structure of the city shapes the climate and hydrologic relations, land use and urbanization directly have been affected by these natural dynamics. Eventually, at the beginning of urbanization phase, the settlements of the city had developed on the south part of the city with a linear expansion. Because of the urbanization on the south, the dry forestlands of the city have become extinct in time. Only some small patches representing the remnants of the past landscape still exist on the western limits of the city. Today, the diffusion process of the urban land-uses to the northest parts is the greatest threat for the north forests and plant biodiversity of Istanbul (Erinç 1974).

Effects of Urbanization on Urban Vegetation

Because Istanbul has continuously changed since the earlier times, designing and planting of the urban landscape cannot be considered as seperated from historical development of the urban macroform. In every period of the city's history there has been reconstruction and renovation efforts of the governments which are still going on today. The periodic change of planting trends in urban open spaces of Istanbul also affects the image of the city.

In this part of the study, the effects of urban change and renovation processes on vegetation cover in Istanbul will be evaluated according to the urban development periods which defined in the studies of Kuban (1996), Çelik (1998) and Ayataç (2007). With reference to these studies, the planting activities in the city has been investigated in three periods:
(1) Ottoman Empire Period(1453-1923), (2) Early Republic Period (1923-1980), (3) Development Period After '80s.

I. Ottoman Empire Period(1453-1923):

The social structure of Istanbul in the Ottoman period had two different faces. The most obvious distinction between these two situations could be clarified as the "dominant" class living in the palace and "ordinary" people living in the neighborhoods (Eldem 1995). The smallest administrative unit was mahalle (neighborhood) until administrative reforming period named as Tanzimat (1839-1876). Residents of the neighborhood were gathering in mosques or the local coffee houses to construct public opinion. Basic municipal services and city management has been undertaken and controlled by the residents themselves (Eldem 1995). Designing or planting the public landscapes by the state was an unusual situation during this period. Therefore, it would be appropriate to address the issue in two

parts as "Classical Period" and "Tanzimat Period" (Administrative Reforms) for examining the use of plants in Istanbul during the Ottoman Period.

In "Classical Period", from 1453 until the late 1700s, the importance of the Bosphorus has increased gradually (Yaltırık et al. 1997). After the great earthquake of Istanbul in 1506, the Turks built residences around Bosphorus and each of them had a large private garden (Yaltırık et al. 1997) (Fig. 5.).

Cypress Tree (*Cupressus sempervirens*) and a small fountain were two most important elements of the Ottoman garden. Because Turks believe that Cypress tree symbolise the first capital of the name of God, they have planted Cypress Tree in the four corners of their garden (Atasoy 2002). According to Evliya Çelebi's descriptions; Kanuni Sultan Süleyman has erected a summer palace in Anatolian Castle Garden and planted cypress trees in this garden. Also he describes the planting activities with Cypress and Plane Trees around palace by the order of Fatih Sultan Mehmet (Atasoy 2002). It is obvious from these examples that why Cypress Tree is so dominant and important for the identity of Ottoman Istanbul.

In Classical period, exotic species had come to Ottoman Palaces with diplomatic relations and limited numbers. According to Yaltırık et al. (1997), until the Tulip Period of the Ottoman Empire (1718-1730) the plants obtained from abroad were *Salix babylonica* (Willow Bunch), *Thuja orientalis* (Eastern Slate), *Morus alba* (White Mulberry) from East and *Aesculus hippocastanum* (Horse Chestnut) from Europe, also *Syringa vulgaris* (Lilac) from Balkans.

During the Classical Ottoman Period, plants had been obtained by removing from the natural forest areas, and special planting compositions were especially used in and around palace gardens or residences. The most remarkable example of this situation is the rescript of Sultan Ahmet III, dated 1722, which is about the trees planted in Kağıthane Sadabad Garden (Fig. 6.). According to this document, Sultan orders a hundred pieces of Linden (*Tilia spp.)*, Ash (*Fraxinus spp.*) and Elm (*Ulmus spp.*) seedlings, which are tall and well grown, removed from the both sides of Bosphorus's wooded and forested areas (Evyapan 1972 ; Yaltırık et al. 1997). After The Tanzimat Period (Administrative Reforms) (1839-1876), along with the modernization and impressions from European practices, institutional renovations have been implemented for rehabilitation of the urban environment. First public open space design implementations started in this period. Special trees imported from European nurseries were used for planting the streets and public gardens (Yaltırık et al. 1997) (Fig. 7.). In this period, even though there had been tree planting with exotic species in urban spaces, native and symbolic tree species were dominant elements of green structure of the Ottoman Istanbul's landscape.

During the construction of the Istanbul-Edirne-Rumeli railway line between 1869-1888, many historical buildings and coastal mansions of Topkapi Palace were damaged. However, according to the agreement made with the construction company, the company was responsible for the planting trees around railway station and along the rail line. Due to the requirement of this provision, some exotic species such us *Eucalyptus camaldulensis* (River Red Gum), *Gleditsia triacanthos* (Honey Locust), *Robinia pseudoacacia* (Black Locust), *Acer negundo* (Box elder), *Ailanthus altissima* (Tree-of-Heaven) were planted by foreign firms (Yaltırık et. al 1997). This was the first mass planting action with exotic tree species in the history of Istanbul (Fig. 8.).

II. Early Republic Period (1923-1980)

From the beginning of the Turkish Republic until the 1980s, restructuring the city modelled as a Modern European city had gained importance. In order to accomplish this purpose, building public squares, roads, parks and green areas were always on the agenda of the city administration (Istanbul Vilayeti Neşriyat ve Turizm Müdürlüğü 1949, fig. 9).

After city of Ankara was being announced as new capital of the country, reconstruction movements in Istanbul slowed down between 1923-1945 because of the economic reasons. Renovation of the Beyazıt Square was the most important urban design implementation in this period (Fig. 10.).

The new urban reconstruction period had began with the invitation of three city planners from

Europe in 1933. The palace gardens were opened to the public access during this period by order of the city governor, Lütfi Kırdar. In this period, during the renovation works of streets, parks and squares the plantation of the empty open spaces and streets was held by the city administration (Başer 2010).

Ornamental plants and tree species were started to be produced in the state-run nurseries established in the early years of the Republic. The rootstocks of some tree and shrub species were brought from Europe nurseries and reproduced in Istanbul's nurseries. The fiftythousands plant seedlings which were produced in every year had been sent to different provinces of Istanbul also to the other cities between the years 1935-1945 (Yaltırık et al. 1997).

III.Development Period After '80

After the '80s, for reasons such as globalization and privatization of commercial relations, rather than producing trees with long-lasting period of time, importing urban trees and shrubs from abroad has become a widespread approach in the nurseries of Istanbul. During the 1990s along with the change in municipalities and management of urban open spaces, the amounts of imported plants in the city have increased. Seedlings importation, manufacture and sale have been undertaken by semi-private companies working with the control of municipality (now they are completely customized). During this period, with the aim of urban forestration millions of seedlings have been planted in the city under the control of municipality. At the beginning of the 1990s urban landscape has been planted with thousands of non-native and exotic species as a result of unplanned but well-intentioned efforts of the municipality (Yaltırık et al. 1997). The mass plantings with the imported exotic plant species have been implemented in the majority of new parks, streets and waterfronts of Istanbul metropolitan area. This unplanned action has brought a new identity to Istanbul's green image. Especially at the core of the city amount of exotic tree species are more dominant than native species.

All of these processes explained above are summarized in Fig. 11 with the future projections in case of the continuation of the current state versus the sustainable ecological approach to urban planting in Istanbul.

Typology of Green Landscape Characteristics in Urban Landscape

As a result of alteration of the urban landscape in different cultural periods of Istanbul's history, the vegetation cover of the city also has been gradually changed. With regard to the evaluations mentioned above, four different urban vegetation zones have been determined in Istanbul, each having a different green landscape structure. In these urban regions named as the North Region, South Region, Transition Zone and Bosphorus Region, plant species diversity and amount of green spaces display different patterns because of the ecological and cultural influences.

In Fig. 12, these differences have been delineated with characteristic sections, pictographic plans and site images. In the north regions, natural urban forests and green landscape elements are the dominant features of the urban image. Because the climate is closer to the continental effects, humid forest lands and sand dunes of Black Sea cover more area than the built-up land uses. Around Bosphorus, even though the natural habitats cover more area particularly on the front hills of seaside, the effects of urbanization can be perceived in the urban image of the coastal line and backsides of the slopes. Because the symbolic and native species, which are the remnants of the Ottoman Istanbul, still exist and protected in the palace gardens and historic parks around Bosphorus Region, the vegetation cover reflects the green image of the city as closer to the cultural reality of the city (Fig. 13).

Contrary to that, in the south regions and transition zones, since geomorphologic and climatic conditions are more suitable for anthropogenic land uses in here, these areas are densely built-up. Disconnected and fragmented green landscape elements consist of more exotic species especially in designated urban-scapes (Fig. 14).

CONCLUSION

Our study area, Istanbul is the largest metropolis of Turkey. At the same time, Istanbul is the main economic capital, also the core of industrial and financial development center of the whole country. The city shows a high potential for biological diversity

and native habitats, due to its location on the transition point of different climatic regimes between Middle Europe and the Mediterranean regions.

Although it has a great potential of natural and cultural plant biodiversity, especially after the 1970s the city has lost its huge amount of natural forests and native vegetation land cover as a result of the rapid urbanization process. This processes have changed the vegetation cover and landscape character of the city.

In this study, the changing structure of vegetation cover and its effects of the whole urban landscape had been tried to demonstrate. In order to regain the lost green areas, planting the urban open spaces has always been on the current agenda of local authorities of Istanbul. Although this goal has been put into practice with good intentions, in order to ecologically sustainable and culturally viable city a planned approach must be taken into account in the selection of plant species. In the management of urban green structure, the historical evolution process of green spaces and culturally significant plant species should be considered as well as ecological conditions of the urban environment. This study tried to open a perspective with the case of Istanbul for creating culturally respective urban green.

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NOTES

[1] *The scientific latin names of plant species which used in this study has been taken from the Davis (1965-1988) and Donner and Çolak (2007). Davis's "Flora of Turkey and the East Aegean Islands" is a scientific study which consists of 11 volumes containing scientific latin names of Turkey's plant species. Because each volume of this study completed in different years, the date of the study is given as between 1965-1988 in the references list.*

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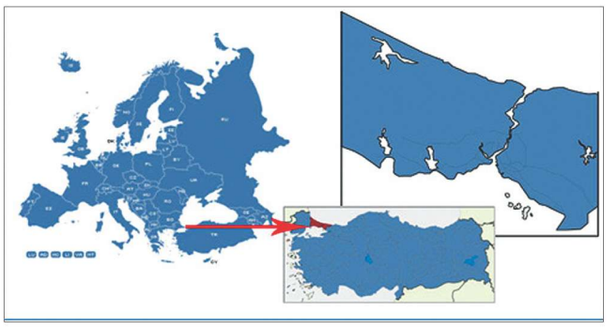


Fig. 1. Location of Istanbul

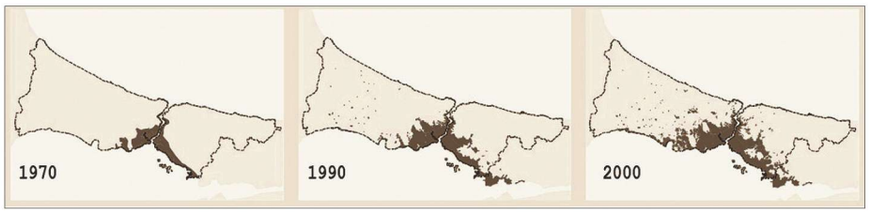
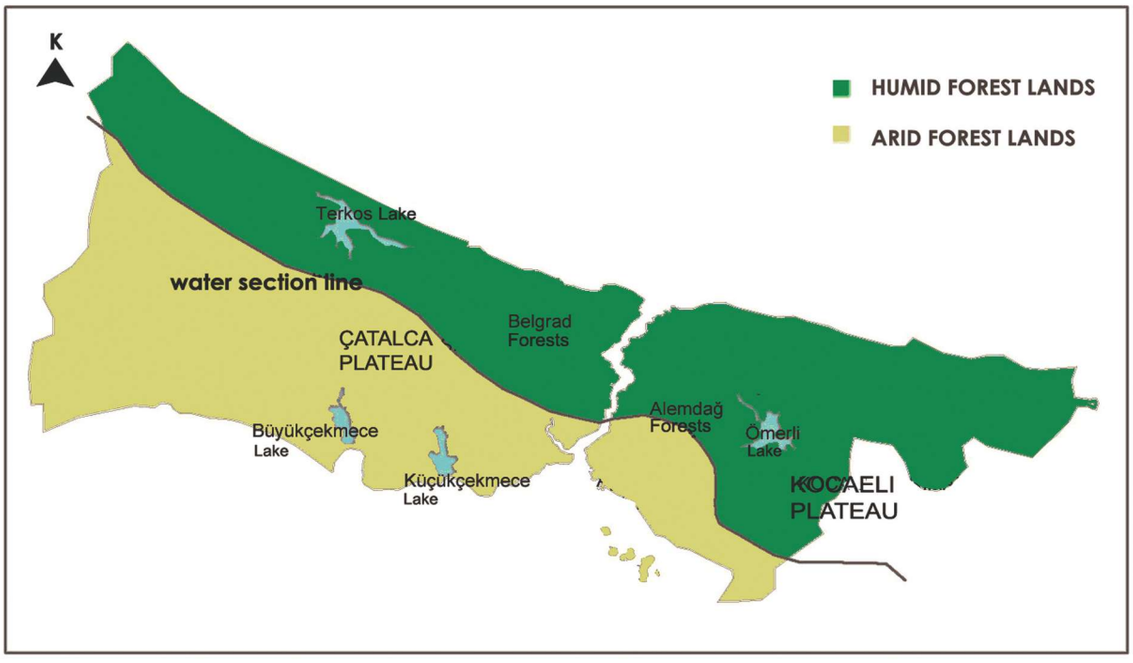


Fig. 2. Urban expansion in Istanbul between 1970 and 2000 (Urban Age 2009)



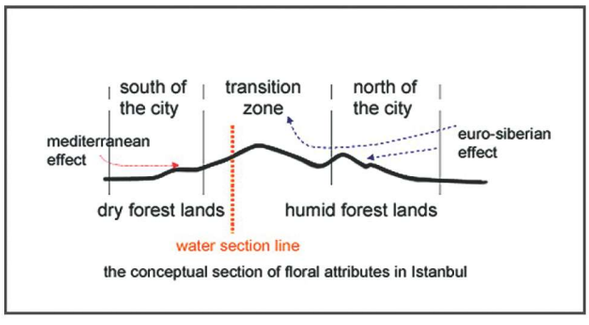


Fig. 3. Water section line and changing characteristics between north and south of the city (Başer 2010)

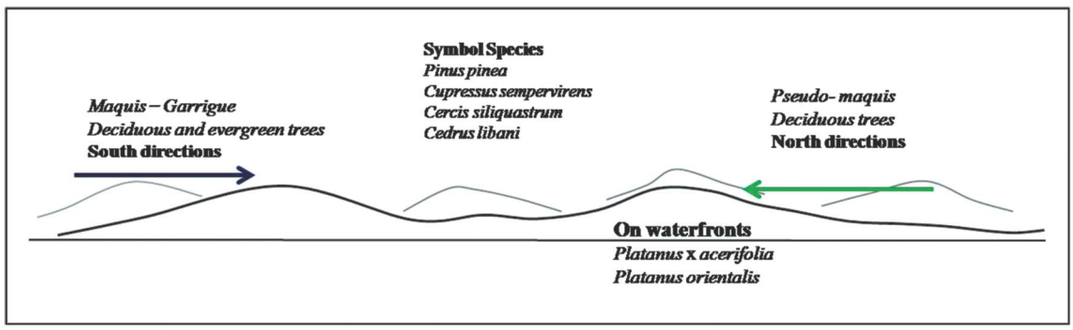


Fig. 4. Schematic section of the native and cultural vegetation structure of Bosphorus landscape (Başer 2010: 117)

Fig. 5. Köçeoğlu Yalısı, Bebek (Kuban 2001)

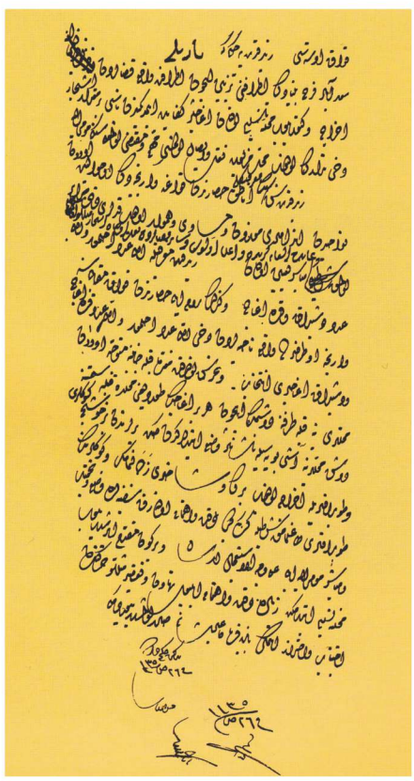


Fig. 6.
The rescript of Sultan Ahmet III (Irmak 2007), Kağıthane from Melling (Atasoy 2002)

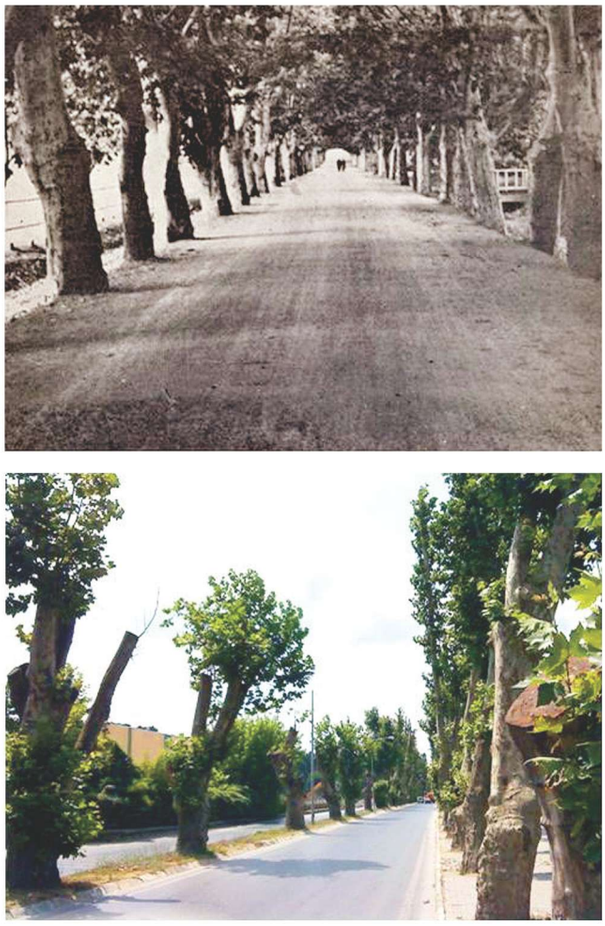


Fig. 7. Yesterday and today view of London Plane trees on two sides of Bahçeköy Street (Above: Istanbul Vilayeti Neşriyat ve Turizm Müdürlüğü,1949; Belove: B. Başer, 2009)

Fig. 8. Urban fringes around Topkapı Palace left: Plan of Topkapı Palace in the begginning of the 19th century, from Melling (Necipoğlu 2007), right: today the palace and its surroundings

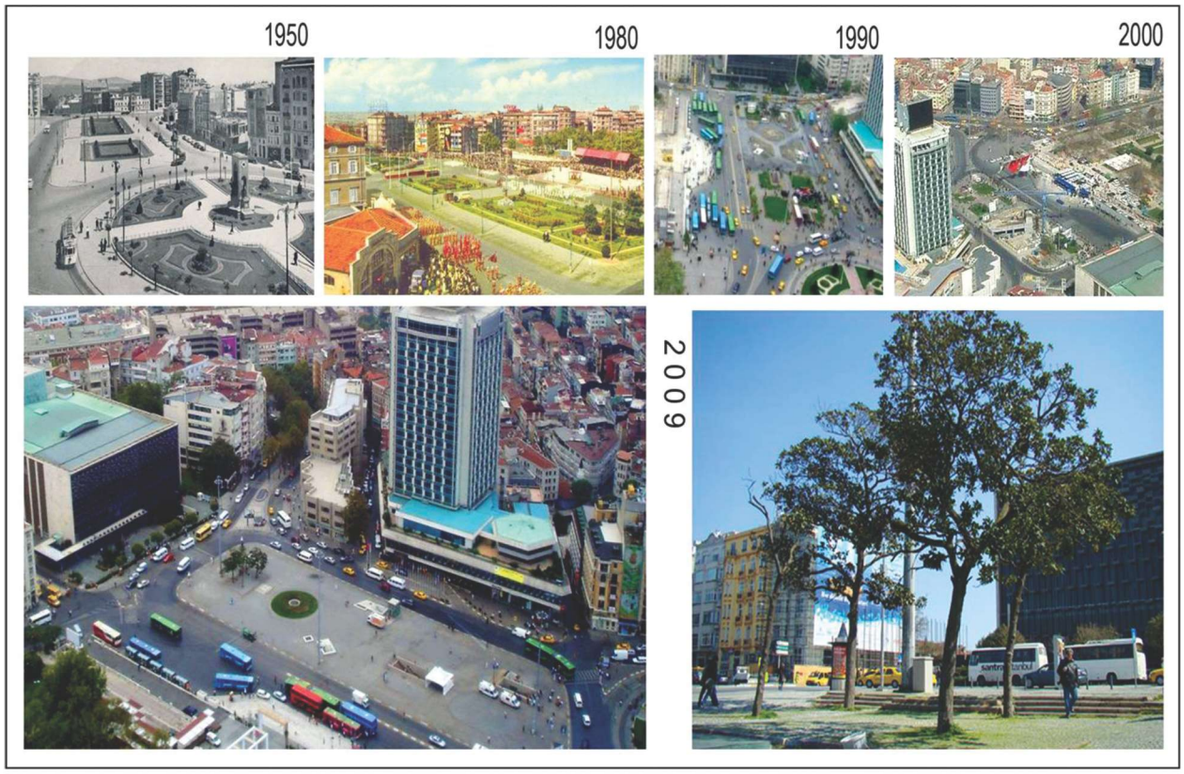


Fig. 9. Change in urban green and tree plantings in Taksim Square between 1950-2009 (Başer 2010: 143)
(*The photographs in this picture dated as 1950 obtained from Gülersoy(1986) and dated as 1990, 2000 from Istanbul Metropolitan Municipality Archives and on-site photographs*)

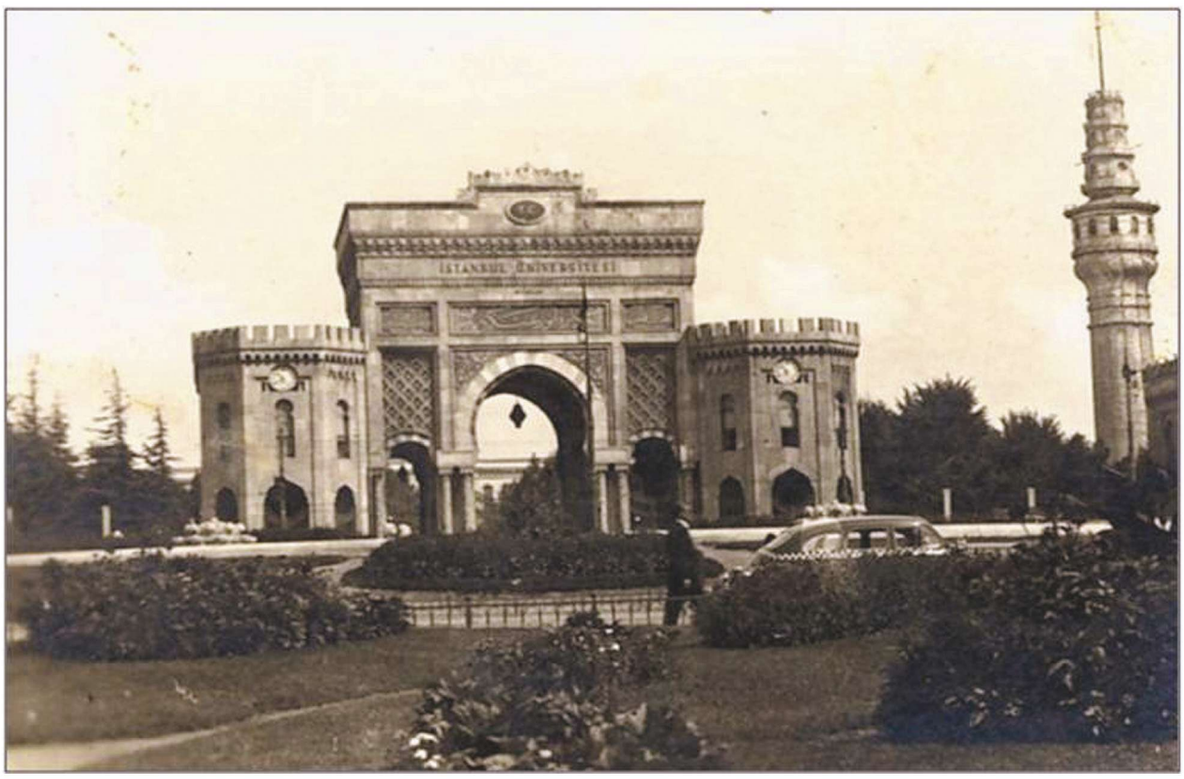


Fig. 10. Beyazıt Square after the renovation in Early Republic Period of Turkey. (Istanbul Vilayeti Neşriyat ve Turizm Müdürlüğü 1949)

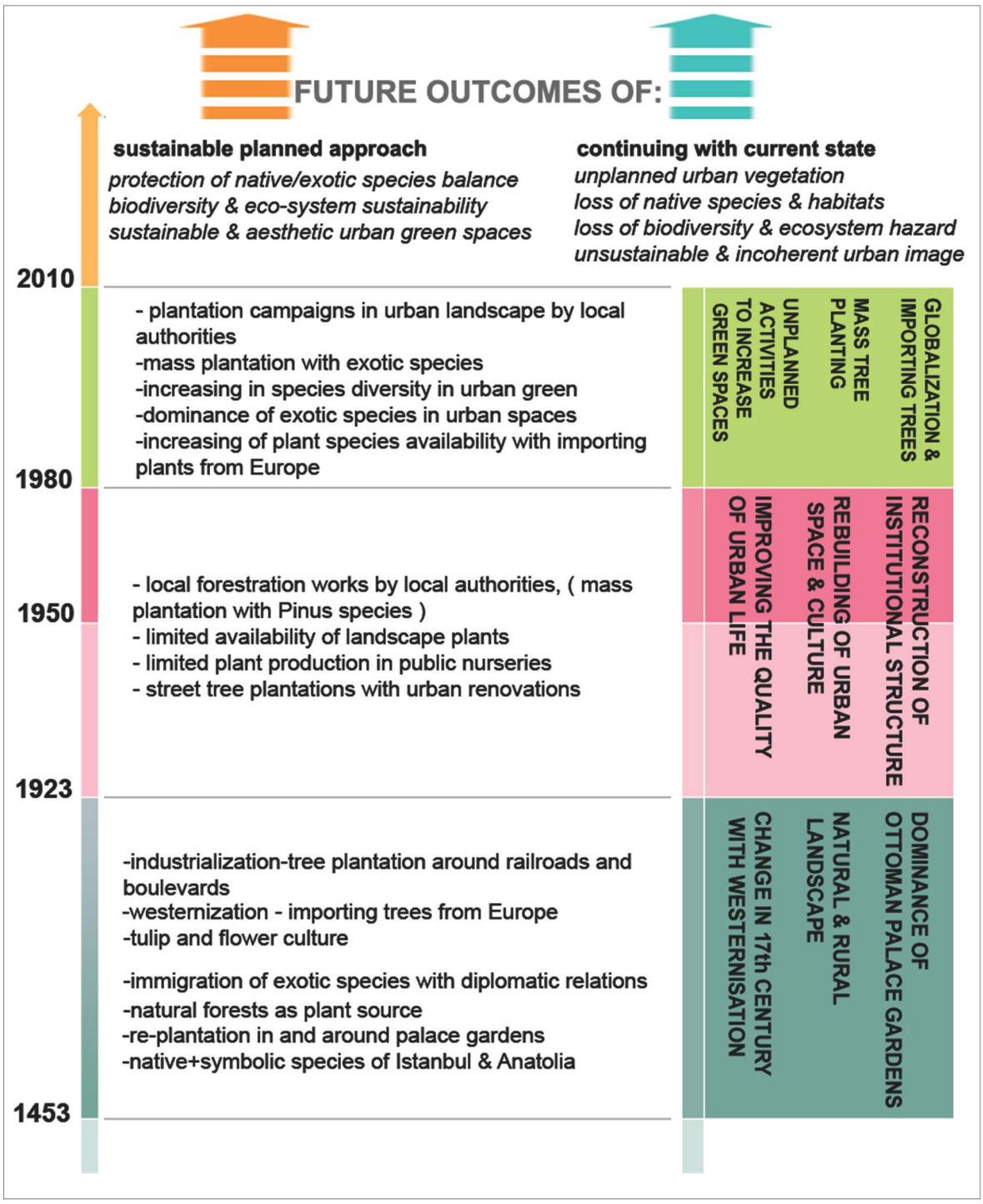


Fig. 11. The change process in urban plant species with the cultural influences

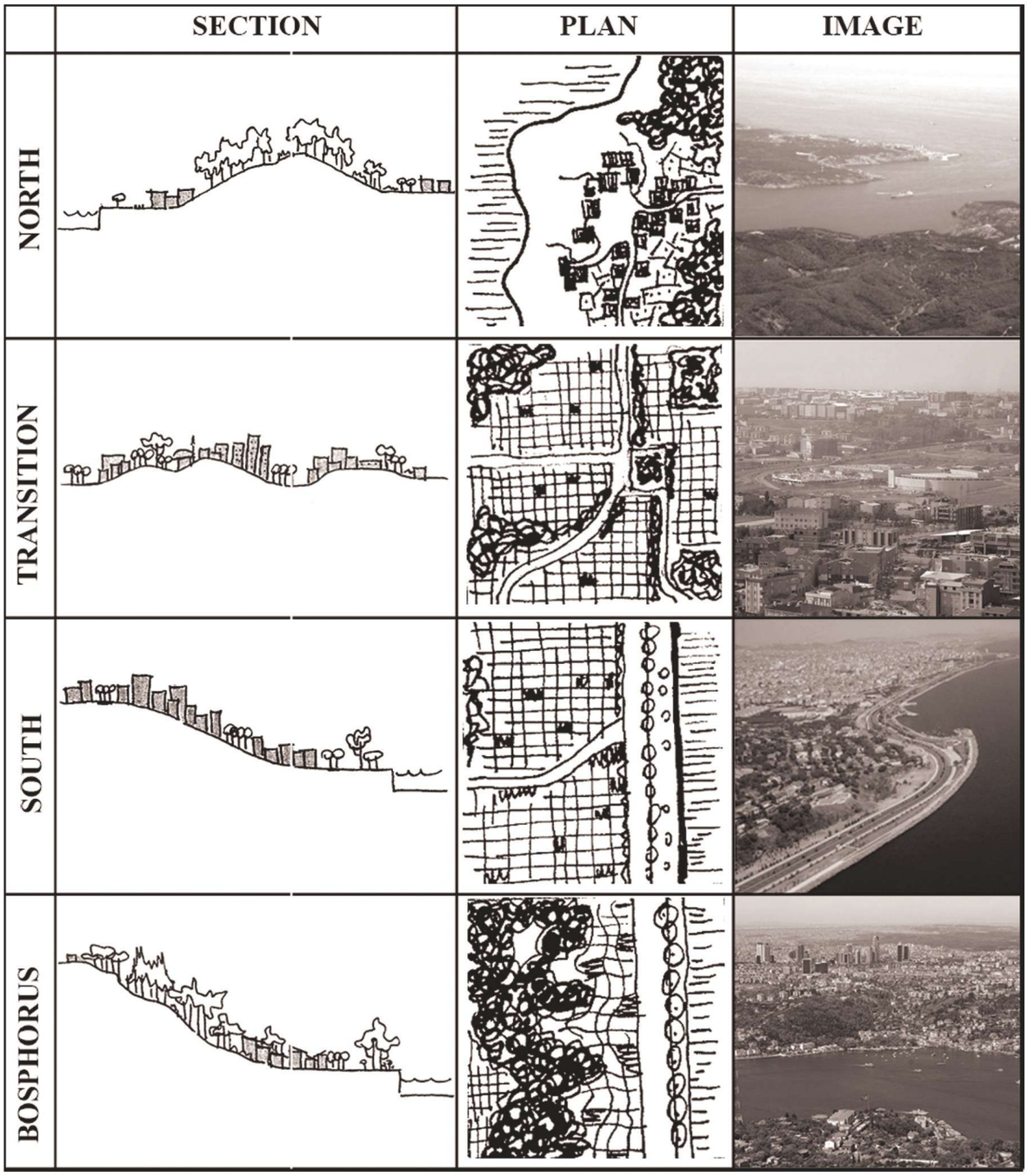


Fig. 12. Typology of four different green landscape of Istanbul

Fig.13. Left: Beykoz Province of North Zone and Right: Bebek Park from Bosphorus Zone (Başer 2010)

Fig. 14. Left: Göztepe Province in Transition Zone and Right: Kartal Province in South Zone (Başer 2010)