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Conservation of Natural Plants and Their Use in Landscape Architecture

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1. Introduction

Biological diversity means the diversification of living organisms in all sources including the terrestrial, marine and other aquatic ecosystems and the ecological structures that are part of these ecosystems. It refers to the differences exhibited by the living environments (habitats or, more broadly, ecosystems) of species in terms of various biotic and abiotic factors. It also refers to the differences between living things in ecosystems and between living and non-living things, which vary according to place and time and to all of genes, species, ecosystems and functions [1].

Biological diversity can be divided into three hierarchical categories: genetic diversity, species diversity and ecosystem diversity.

Genetic Diversity means the diversity within a given species. It is measured by the genetic difference within a certain species, population, variety, sub-species or race.

Species Diversity means the diversity of the species in a particular region or in the entire world. "Species richness", i.e. the number of species in a region is the most commonly used measure in this regard.

Ecosystem Diversity is about the whole created by the community of organisms that interact with each other as an ecological unit and by their physical environment. The ecosystem consists of factors, such as fire, climate and the food cycle, which are separate from the community level and which are non-living themselves but still they affect the formation, structure and interaction of the community of living things. The conservation of biological diversity at the ecosystem level includes the conservation of the food chain and of the energy flow. At this level, it is necessary to protect not only species or groups of species but also characteristics and processes [1].

As human activity continues to spread throughout the earth, natural areas are changed, resulting in increasing extinctions of plants, animals, and other types of species. Currently, many experts believe such extinctions are occurring at the fastest rate in history and perhaps the fastest rate since the extinction of dinosaurs 65 million years ago. This loss of biological diversity is accelerating as desertification, deforestation (especially in the tropics), degradation of oceans and water resources, atmospheric change, and other environmental changes continue rapidly [2].

Biological diversity is important to human welfare for many reasons. Agricultural crops derive from wild species, and the high-yielding hybrids of modern agriculture depend on continuing revitalization from wild genetic stock. Furthermore, future crop species that could be used directly or modified by biotechnology are lost when entire ecosystems are wiped out. Plants are the basis of prescription drugs; a number of plants discovered in tropical rainforests or other wild areas have made significant contributions to treatment of serious diseases. Also, loss of species often means the breakdown of ecosystems that may have important roles in regulating rainfall, controlling floods, producing oxygen and storing carbon, affecting both regional and global climate [2].

At the World Summit on Sustainable Development held in 1992 in Rio de Janeiro, it was agreed that the decrease of biological diversity is a major problem and can only be prevented through international efforts. The Summit ended with the signing of important global conventions including the Convention on Biological Diversity, to which Turkey is a party by signing and ratifying it through the No. Law 4177 of 29 August 1996. The Convention entered into force in our country on 14 May 1997 [1].

The three main goals of the Convention on Biological Diversity (CBD) are:

- Conservation of biological diversity;
- Sustainable use of biological resources; and
- Fair and equitable sharing of the benefits arising from the utilization of genetic resources [1].

The Convention dictates that each country must identify its biological resources for which special protection measures are needed and which have a greater potential for sustainable use and also identify and monitor the categories and processes of actions that may have a negative effect on conservation and sustainable use [1].

2. Biological diversity in Turkey

Turkey displays the character of a small continent in terms of biological diversity. Among the reasons for this are the following facts:

- the country has three different types of bio climate and three Biogeographical Zones, namely Euro-Siberian, Mediterranean and Irano-Turanian,
- its topographic, geological, geomorphologic and soil diversity,
- the existence of different types of aquatic bodies such as the sea, lakes, rivers, and fresh water, salt water and mineral water lakes,

- the altitude differences that range between 0 and 5,000 meters,
- the country has deep canyons and very different types of ecosystems,
- it was less affected by the glacial period in comparison with European countries,
- the existence of the Anatolian Diagonal which links Northern Anatolia to Southern Anatolia resulting in ecological and floristic differences,
- the country is at the point where three continents intersect [1].

The Euro-Siberian Biogeographical Zone extends throughout Northern Anatolia and through those parts of the Thracian Region which face the Black Sea. This climatic region has the highest rainfall and is largely covered with forests. The Mediterranean Biogeographical Zone, on the other hand, covers all areas on the Mediterranean coast and the western parts of Thrace and includes very different types of ecosystems. The Irano-Turanian zone is the largest of the Biogeographical Zones, starting in Central Anatolia and extending as far as Mongolia. The continental climate and steppe flora are predominant in this zone [1].

3. Ecosystem diversity

Turkey has agricultural, forest, mountain, steppe, wetland, coastal and marine ecosystems and different forms and combinations of these ecosystems [1].

Agricultural Ecosystems: In Turkey different agricultural ecosystems are seen in coastal regions, inner regions and transition regions. Cultivated areas, located mostly in steppe zones, constitute about 35 percent of Turkey's total surface area [1].

Steppe Ecosystems: There are about 21 million hectares of steppes and grasslands, defined as areas covered with herbaceous plants in Turkey. The steppe ecosystems are prevalent especially in Central Anatolia, in the high mountain floors of the Aegean and Mediterranean Regions and in a major part of Eastern Anatolia. The most characteristic feature of the steppe ecosystem is the predominance of annual or perennial herbaceous plants. The floristic composition of the steppe vegetation is very rich and includes many endemic plants. The steppe formation can be divided into two as "Plain Steppe" and "Mountain Steppe" in Turkey depending on the topographical structure of the area in which it lies. The plain steppe provides a habitat for species such as halophilic plants, members of the Chenopodiaceae, Juncaceae and Cyperaceae, *Peganum harmala* L., *Veronica cymbalaria* Bodard, *Thymus* L. and *Salvia* L. The mountain steppe on the other hand, hosts the species of *Astragalus* L., *Onobrychis cornuta* (L.) Desv., *Acantholimon* Boiss., *Asphodelus* L. and *Thymus* L. In the Eastern Anatolia mountain steppe, *Ferula* L. becomes more predominant unlike in other regions. Alpine and sub-Alpine meadows cover large areas in the higher parts of the Eastern Black Sea Mountains and in the northern and northeastern parts of Eastern Anatolia [1].

Forest Ecosystems: In Turkey, forest ecosystems cover a total area of 21,188,747 hectares. Forests consisting of broad-leaved trees are more widespread in Turkey. Coniferous trees occur at all altitudes from sea level to the highest limit where forests exist. In the Aegean and Mediterranean regions, there are humid and semi-humid coniferous and dry forests

(*Quercus* L, *Pinus nigra* Arnold and *Pinus brutia* Ten.) as well as shrubs and maquis. These rich forest ecosystems of Turkey provide habitats for a great number of endemic plant species, important bird species and other wildlife species. These ecosystems also include the wild relatives of many cultivated plants which are important for agricultural biological diversity [1].

Mountain Ecosystems: In Turkey, there are mountain systems formed by folding, faulting and volcanism. The types of the mountain ecosystems differ according to biogeographical regions, to patterns of formation and to altitudes [1].

Inland Waters Ecosystems: Turkey has very important inland water resources to maintain biological diversity with its rivers and lakes covering an area of about 10,000 km². In studies conducted so far, 135 wetlands of international significance have been identified and 12 of them designated as Ramsar sites. In Turkey, there are 7 drainage basins including 26 river basins, and the ground waters are estimated at 94 billion m³. The average annual rainfall is about 640 mm, roughly one third of which reaches water reserves and thus contributes to the maintenance of wetlands. In Turkey's wetlands, plants such as *Typha* L., *Phragmites* L, *Schoenoplectus* (REICHB.) PALLA and *Juncus* L. form large communities. In addition, there are also plants that cover the water surface such as *Nymphae* L. and underwater plants that grow in shallow lakes such as *Phodophyllum* L., *Wolffia* Horkel ex Schleid., *Lemna* L. and *Ceratophyllum* L., *Myriophyllum* L. and *Potamogeton* L. [1].

Coastal and Marine Ecosystems: Different characteristics of the seas surrounding Turkey, namely the Black Sea, the Marmara, the Aegean and the Eastern Mediterranean, have resulted in the diversification of the biological resources they contain. The Mediterranean, which has the highest salinity and temperature among the Turkish seas, is the area with the richest biological diversity. Coastal ecosystems are highly special ecosystems as they are important sudden transition zones (ecotones) where marine and terrestrial ecosystems intersect. Coastal ecosystems form 4.1 % of the terrestrial resources that make up the country's surface area. The fact that the patterns in which mountains come down to the sea, and the coastal topography, differ from each other in the coastal areas of our country have resulted in various coastal ecosystems such as dunes, caves, deltas, lagoons, marshes and calcerous terraces. Among all these coasts, particularly the coastal areas in the Eastern Mediterranean region are rich ecosystems with very high flora and fauna diversity [1].

4. Species diversity

Turkey has a relatively rich flora (about 12 000 species) and still a great number of species are being described (Figure 1,2,3,4). In this flora, there are a lot of interesting species such as halophytic species, semi-desert plants, carnivorous plants and nickel hyperaccumulators. In Turkey, the rate of endemism is relatively high when compared with other European countries. It is about 34 percent in Turkey while it is 14.9 percent in Greece, 2.9 percent in France, 18.6 percent in Spain and 0.1 percent in Poland. The number of endemic species in Turkey is greater than 3000 [3].

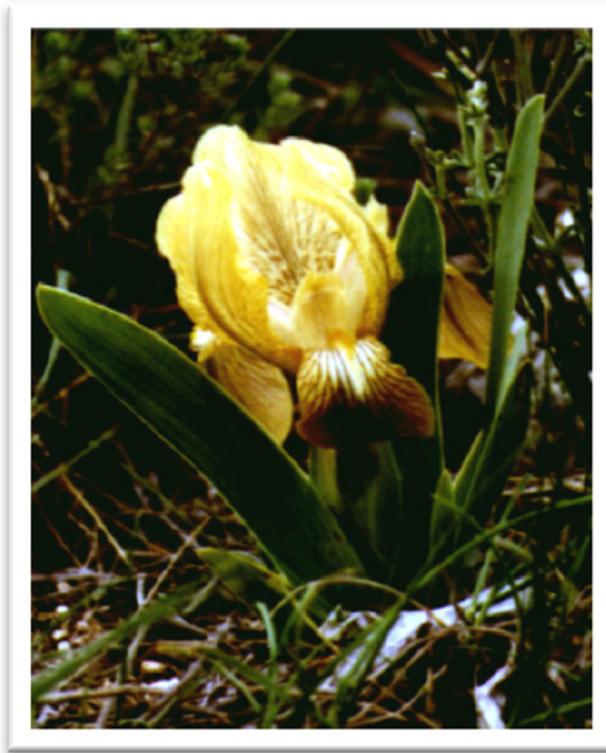


Figure 1. *Iris schachtii* Markgraf (Z. Dilaver)



Figure 2. *Crocus danfordiae* Maw.(Z. Dilaver)



Figure 3. *Astragalus anthylloides* Lam. (Z. Dilaver)



Figure 4. *Scutellaria orientalis* L. (Z. Dilaver)

In terms of endemic plant species, the richest family of Turkey is Compositae, which has approximately 425 endemic species. The richest genus in terms of endemic species, on the other hand, is *Astragalus* L. with 250 species. It is followed by *Verbascum* L. with 185 species [4].

Among the phytogeographical regions, the Irano-Turanian is the region having the highest number of endemic. Mediterranean Region is the second and the Euro-Siberian Region is the third in this regard. Turkey's richest region in terms of endemic plants unique to that region alone is the Mediterranean region with 800 or so species. In Eastern Anatolia 375, in Central Anatolia 275, in Black Sea 210 and in the Aegean Region 150 endemic species grow. Marmara (70) and Southeast Anatolia (35) Regions are the poorest geographical regions of Turkey in terms of endemics. The other endemics are distributed in more than one geographical area [4].

“Red List of Threatened Species” is the most well-known study of the World Conservation Union (IUCN), which was last published in 2004. This red list is accepted to be the most comprehensive source about the latest status of threatened plant and animal species. IUCN cited the danger categories as:

1. Extinct,
2. Extinct in the wild,
3. Critically endangered
4. Endangered
5. Vulnerable
6. Lower risk
7. Data deficient
8. Not evaluated [5].

In our country, after being completed 9 volume of Flora of Turkey as a main source in 1985, a list similar with this was started to be constituted with the help of Turkish Association for Conservation of Nature and Natural Resources. It was published in 1989 with the name of “List of Rare Threatened and Endemic Plants in Turkey”. After this publication, more and more floristic studies -especially the project investigating endemic plants of Turkey in detail- showed that some data in the first list should be changed or at least could be updated. Thereupon “Red Data Book of Turkish Plants” which was prepared and published in 2000 became a national list using new threat categories of IUCN. This source is because it shows Turkey’s biological diversity and the status of species in terms of the danger categories. In order to protect biological diversity it is necessary to know about it and to create its database. In this study 3504 endemic and 1096 rare plants were assessed and listed in accordance with appropriate danger categories. According to this list, 46.6 percent of 3504 endemic plants and 77.4 percent of 1096 rare plants is under threat. On the other hand, 13 plant taxon in total, of which 12 was endemic, and one was rare, already extinct. While 270 endemic and 244 rare plant taxon could not be placed under a danger category because of lack of data and were listed under DD-Data deficient category [6].

Plant Groups	Defined Species/ subspecies	Endemic Species	Rare and Endangered Species	Extinct species
Algae	2.150	----	unknown	unknown
Lichen (Lichenes)	1000	----	unknown	unknown
Moss (Bryophytes)	910	2	2	unknown
Pteridophytes Ferns	101	3	1	unknown
Gymnospermae (Gymnosperms)	35	5	1	unknown
Monocotyledonous (Monocotyledons)	1.765	420	180	-
Dicotyledonous (Dicotyledons)	9.100	3500	1100	11

Table 1. Taxon numbers of species and subspecies of various plant groups; endemism, rare and endangered species, extinct species

5. Genetic diversity

Plant genetic diversity is of great importance for both Turkish and world agriculture. Turkey has a very special position in terms of plant genetic resources. Turkey is situated at the intersection of two important Vavilovian gene centers: Mediterranean and Near East. These two regions have a key role in the emergence of cereals and horticultural plants. Some of the cultivated plant species of Anatolian origin are the following: *Linum* L., *Allium* L., *Hordeum* L., *Triticum* L., *Avena* L., *Cicer* L., *Lens* Mill., *Pisum* L., *Vitis* L., *Amygdalus* L., *Prunus* L., *Beta* L., etc. Turkey, situated where two different gene and diversity centres overlap, is the gene and origin centre of the following cultivated plants among others: *Triticum* L., *Hordeum* L., *Secale* L., *Avena* L., *Linum* L., *Allium* L., *Cicer* L., *Lens* Mill., *Pisum* L., *Medicago* L. and *Vicia* L. Turkey is the home of many decorative plants including *Tulipa* L. and *Galanthus* L. [1].

Turkey is also quite rich in gene resources, including the valuable gene resources of *Cedrus libani* A. Rich., *Picea orientalis* (L.) LINK and *Fagus orientalis* LIPSKY together with 5 *Pinus* L., 4 *Abies* Mill., 20 *Quercus* L. and 8 *Juniperus* L. species among the local forest trees of national and global importance. The important forest trees are as follows: *Pinus* L. species (*Pinus brutia* Ten., *P. nigra* Arnold, *P. sylvestris* L., *P. halepensis* Mill. and *P. pinea* L.), *Abies* Mill. species (*Abies nordmanniana* (STEV.) SPACH subsp. *nordmanniana* (STEV.) SPACH, *A. nordmanniana* (STEV.) SPACH subsp. *bornmulleriana* (mattf.) COODE ET CULLEN, *A. nordmanniana* (STEV.) SPACH subsp. *equitrojani* (ASCHERS. ET SINT. EX BOISS.) COOD ET C, *A. cilicica* (ANT. ET KOTSCHY) CARR. subsp. *cilicica* (ANT. ET KOTSCHY) CARR., *A. cilicica* (ANT. ET KOTSCHY) subsp. *isaurica* COODE ET CULLEN), *Cedrus libani* A. Rich., *Fagus orientalis* LIPSKY, *Picea orientalis* (L.) LINK, *Tilia* L., *Alnus* Mill. (2 species, a total of 6 taxons), *Juniperus* L. (8 species), and *Quercus* L. (about 20 species) [1].

6. Conservation of biological diversity

There are two different methods that are widely accepted in the world, used in order to conserve biological diversity. First of these is the “In Situ” conservation that aims at protecting the plants within their own natural growth areas. The other system is the “Ex Situ” conservation that envisages the protection of biological diversity features outside their natural living areas [7].

Despite it is possible to protect a large number of plant species by moving them to the areas outside their ecosystems by means of ex-situ conservation methods, the most important way to protect plant species is to protect them in the habitats they live. The reason for this is that all living things depend on each other in an ecosystem. No species in nature has an isolated environment and the species interact with other in many ways. Another advantage of in situ conservation is that protecting an efficient species population in its own habitat is easier when compared with ex situ conservation. As a result, ex situ conservation methods appears to be only as supporting methods alongside the in situ conservation. However, the botanical gardens allowing you to see many species of plants together and learn about are important, especially in terms of education and scientific research. Likewise, seeds and tissue banks is increasingly gaining importance with the fast growing biotechnology methods. However, in species with the physical environment as a whole to protect ecosystems, the future will be guaranteed [8].

7. In Situ Conservation

In the “In Situ” system, the restricted areas where the genetic material is found are protected by minimizing the human and animal effects [9].

The rapid consumption of natural resources, the increasing amount of pollution and environmental problems that have reached a global dimension have brought the obligation for countries to act in cooperation. Today, protected areas are vital component of all global and National nature conservation efforts. Many areas that have rich biodiversity and natural - cultural values have been designated as a national park and other protection statues to support conservation [10].

Protected areas are the cornerstone of biodiversity conservation; they maintain key habitats, provide refugia, allow for species migration and movement, and ensure the maintenance of natural processes across the landscape. Not only do protected areas secure biodiversity conservation, they also secure the well-being of humanity itself. Protected areas provide livelihoods for nearly 1.1 billion people are the primary source of drinking water for over a third of the world’s largest cities and are a major factor in ensuring global food security. Well managed protected areas harboring participatory and equitable governance mechanisms yield significant benefits far beyond their boundaries, which can be translated into cumulative advantages across a National economy and contribute to poverty reduction and sustainable development including achievement of the Millennium Development Goals [10].

Definition of Protected Area According to the IUCN (1994): An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means [11].

Definition of Protected Area According to the IUCN (2008): A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values [12].

IUCN divided the protected areas into the following categories [12]:

- Category I a: Strict nature reserve

Category I a - strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.

- Category I b: Wilderness area

Category I b - protected areas are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.

- Category II: National park

Category II - protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.

- Category III: Natural monument or feature

Category III - protected areas are set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.

- Category IV: Habitat/species management area

Category IV - protected areas aim to protect particular species or habitats and management reflects this priority. Many category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.

- Category V: Protected landscape/Seascape

Category V - protected areas where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and

scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

- Category VI: Protected area with sustainable use of natural resources

Category VI - protected areas conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

Besides these categories, it is observed that countries develop others based on their regulations and institutional structure. Also, there are other protected areas like UNESCO Biosphere Reserves, World Heritage Areas, and RAMSAR Areas. While there are protected areas managed by national legislations and specific laws that belongs to the areas, at the same time, those are affected by the international conventions and agreements which are relevant with the conservation of biodiversity and natural resources, management and sustainable use of the values and sustainable development [13].

Protected Areas in Turkey

Protection initiatives in Turkey are mostly in the form of in situ protection. There are various protected areas in Turkey which are under different institutions' authority and supervision and defined under certain laws. Turkey has signed many international conventions and protocols on Nature Protection. These conventions are;

- Convention on Biodiversity Conservation (Rio Convention) (1997)
- Cartagena Protocol (2004)
- CITES (1996)
- Barcelona Convention (1988)
- Bucharest Convention (1994)
- Protection of Cultural and National Heritage (1983)
- Convention on Combating Erosion (1998)
- European Landscape Convention (2000)
- Bern Convention(1984)
- Ramsar Convention (1994)
- Kyoto Protocol (2009) [14].

In accordance with these conventions, by 2011, nearly 1800 sites had been identified by the Ministry of Forest and Water as warranted protection under the 1983 law (Table 2) [14].

Turkey has 41 National Parks and approximately 37 percent of their total area is forest ecosystems (Figure 5,6,7). Besides, Turkey has 41 Nature Parks and approximately 25 percent of them are forest ecosystems (Figure 8) [15].

Conservation Status	Number	Related Law
National park	41	Law on National Parks
Nature conservation area	31	Law on National Parks
Natural monument	106	Law on National Parks
Nature park	41	Law on National Parks
Wild life reserve areas	79	Law on Terrestrial Hunting
Conservation forest	57	Law on Forest
Genetic conservation areas	214	Law on Forest
Seed stands	339	Law on Forest
Specially protected areas (SPAs)	14	Law on Environment
Natural sites	947	Law on Conservation of Cultural And Natural Heritage
Ramsar sites	13	Ramsar Convention By-law on Conservation of Wetlands
Biosphere Reserve	1	Law on National Parks -Law on Forest

Table 2. Protected areas which identified by the Ministry of Forest and Water [14].



Figure 5. National Parks in Turkey [16].



Figure 6. Munzur Valley National Park, Turkey [17].



Figure 7. Soğuksu National Park, Turkey [17].

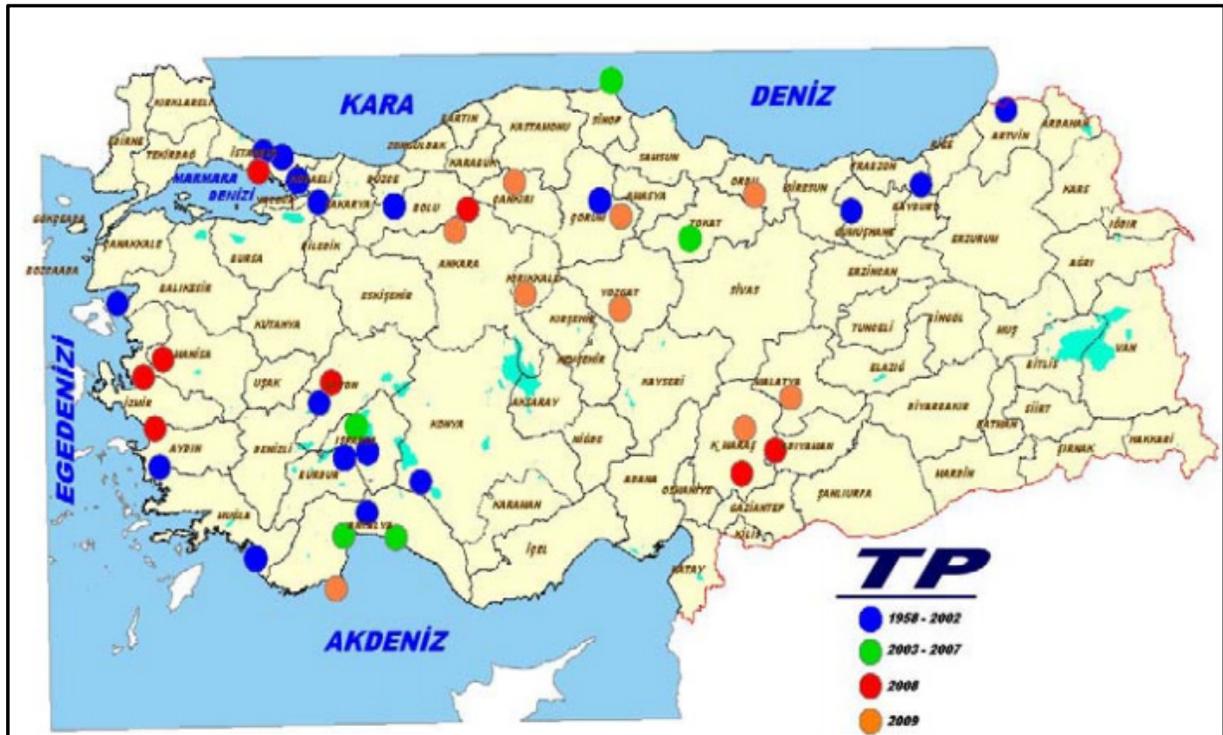


Figure 8. Nature Parks in Turkey [16].

8. Ex Situ conservation

This method is composed of;

- observation,
- gathering,
- storage, production and replacement,
- assessment,
- documentation,
- distribution and material exchange,
- preservation,
- education
- cooperation and organization steps [7].

Ex Situ conservation actions are an important complementary measure to In Situ habitat management. Ex situ conservation of wild plants is a central and unique role of botanic gardens. They have the appropriate facilities and staff expertise in botany and horticulture to be an 'insurance policy' against plant extinction. The Botanic Gardens ex situ program primarily employs three strategies: seed banking, tissue culture and genetic analysis of endangered plants. Seed banking is one of the most effective and useful ways of conserving genetic diversity ex situ, as the majority of wild plant species from dry land environments produce desiccation tolerant seeds that can be successfully stored for over 200 years. In most outbreeding species, the majority of the genetic diversity of the species may be captured by a single large seed sample. Conservation of population seed samples from these species

provides insurance against loss of the wild population, whilst allowing biologists to develop germination protocols, propagation techniques etc. to support use of the species [22]. Tissue culture is the propagation, under controlled laboratory conditions, of rare and endangered plants that are difficult to propagate from seed or whose seed does not store well. Genetic analysis of rare species through various techniques, including, Microsatellites, Sequencing, AFLP (Amplified Fragment Length Polymorphism and ISSR (inter-simple sequence repeats), is helping guide preservation and restoration activities [18].

Ex Situ Conservation in Turkey

Botanic gardens, which are the most significant applications of Ex situ protection methods, have been newly developing in Turkey. The first botanic garden to be established in Turkey is Istanbul University, Alfred Heilbronn Botanic Garden. It was established in 1935 under Istanbul University, Faculty of Applied Sciences, Department of Botany and it was given its current name in 2003. In this garden, there are 5 thousand genus and 6 thousand species belonging to 127 families, which are endemic and foreign homed. There are also seed banks and herbarium units in the garden. "Istanbul Botanic Garden Seeds Catalog" was published for the first time in 1935. The garden has been exchanging seeds with 373 botanic gardens from 63 countries. Istanbul University, Center for Research and Application of Natural Resources, established in relation with the Botanic Garden, aims at preventing the loss of rare and epidemic species of Turkish plant possessions by making them live in appropriate areas and conservatories [18].

Another important botanical garden in Turkey is Nezahat Gokyigit Botanical Garden (NGBB), located in Istanbul (Figure 9). NGBB is established on 32 hectares of parkland and it was opened to public in 2002. NGBB forms a space for breath-taking offering Istanbul 12 percent of its green space, and it is also a research, education and training center [19].



Figure 9. Nezahat Göküyigit Botanical Garden, Garden of Medicinal and Aromatic Plants [19].

Besides, “National Botanical Garden” is planned to be established in Ankara. The project covering an area of 2000 decares has started in 2008 and the construction work has begun in 2011.

Gene banks are also ex situ conservation units apart from the botanical gardens. Aegean Agricultural Research Institute Gene Bank and Plant Genetic Resources Unit of Field Crops Central Research Institute have been working for the conservation of genetic resources. In addition, the world's 3rd largest gene bank (Seed Gene Bank) after the U.S. and China was established in Ankara in 2010 with a storage capacity of 250 thousand samples.

9. Use of natural plants in landscape architecture in the scope of preserving biological diversity

Years before, when the natural areas had not been this much damaged with the pressure from the settlement, industrial and even agricultural areas, people would find it absurd to use the natural vegetation species in plant design work. Furthermore, until recently, many natural samples were seen as weed. But today, it has been realized that especially in developed countries, cities and areas of cultural activities puts nature away from people. For this reason, people want to see natural plant samples around them in order to feel close to nature.

Alpha

The fact that the natural areas are confronted with an increasing pressure increases concerns over plants of natural vegetation. Today, some species are threatened and are in danger of extinction. For some, on the other hand, it is observed that their expansion areas are getting narrower and that they do not grow in areas where they have been previously observed. In this regard, the use of natural vegetation samples which are in danger of extinction or damaged, in landscape architecture is important. Transfer of natural samples to gardens, are important for providing these plants with protection areas, as well as for increasing the awareness of protection and their recognition by the people.

Native plants naturally occur in the region in which they evolved, while non-native plants might provide some of the above benefits, native plants have many additional advantages. Because native plants are adapted to local soils and climate conditions, they generally require less watering and fertilizing than non-natives. Natives are often more resistant to insects and disease as well, and so are less likely to need pesticides. Wildlife evolved with plants; therefore, they use native plant communities for food, cover and rearing young. Using native plants helps preserve the balance and beauty of natural ecosystems [20].

Non-native plants can be invasive. They have few or no naturally occurring measures to control them, such as insects or competitors. Invasive plants can spread rapidly and smother or out-compete native vegetation. Invasive, non-native plants are not effective in providing quality habitat [20].

Use of natural vegetation species in landscape architecture, creates a landscape harmonious with nature, and it is an application compatible with economic conditions. In this way,

selection of plant materials that meet environmental conditions with minimal care should be preferred as an economic approach to planning.

In Turkey, due to lack of work for cultivation of natural plants, obtaining plants from nurseries is not yet possible. In this case, it is not possible to provide the supply of plants for applications, as well as natural vegetation cannot become a sector generating income. Over the years, the greatest economic gain has been derived from the plants with bulb, tuber and corm, which have been pulled out from their natural areas. However, with their extensive use in landscape architecture natural plants will be an important branch of ornamental plant industry.

10. The utilization process of natural plants

Anatolia, throughout the history, has been the location where many natural species were cultivated for the first time. For example, it is known that the origin of 30 percent of the field crops is Anatolia. Besides the field crops, in many parts of Turkey, many natural plant species are collected directly from nature and used for nourishment. Plants are also used for different purposes other than nourishment [3].

About 1000 species of Geophytes are grown in Turkey which constitute an important part in the biological richness of the country and majority of which have economic potential as ornamental plants and medicinal plants [21]. Collection of certain types of bulbs of these plants was initially in the form of a personal curiosity but afterwards it gained commercial importance with the collection of flower bulbs in bulk. This trade, which was conducted in Netherlands, Denmark, Switzerland, Germany, Italy and in various other European countries, reached fairly large quantities since the 1960s. While up to 15000 *Galanthus* L. bulbs were exported in the early 1970s after 10 years, the amount has exceeded two times of this amount. Although in some species, small-scale domestic production activities are carried out, *Galanthus* L., *Eranthis hyemalis* (L.) Salisb., *Anemone blanda* Schott et Kotschy, *Leucojum aestivum* L., *Cyclamen* L., *Fritillaria* L., et *Sternbergia* Waldst kit, *Lilium candidum* L. , *Tulipa humilis* Herbert L., *Arum*, *Dracunculus* Miller, *Geranium tuberosum* L., *Colchicum speciosum* Stev., *Muscari* Miller, *Ornithogalum nutans* L., *Scilla bifolia* L., *Gladiolus* L., *Oxalis* L., *Urginea maritima* (L.) Baker, *Pancratium maritimum* L. and *Narcissus* L. are largely collected from nature and became the species traded most [23]. However, in recent periods, controls over the onion pull-outs are from nature are conducted and cultivation of bulbous plants is carried out. Due to the measures taken after 1990s, the populations of geophytes sold abroad were brought back to their former levels and important progress was made in the production and exportation of *Lilium candidum* L., *Sternbergia lutea* (L.) KER-GAWL. EX SPRENGEL, *Fritillaria imperialis* L., *F. persica* L., *Leucojum aestivum* L. and *Cyclamen hederifolium* AITON abroad. [4].

Besides bulbous plants, some plant species are collected from the nature and consumed in the country or sold abroad, because of their medical and aromatic qualities. Plant species with scientifically identified medical feature and which are used by the people are numerous in the flora of Turkey. Aromatic plants such as *Origanum* L. and the plants used

as tea like *Salvia* L. and *Sideritis* L. are used in small residential gardens. In addition, with the spread of theme parks, gardens of medicinal and aromatic plants are organized in parks and botanical gardens. However, due to the difficulties in finding local plant samples foreign plants are more commonly found.

The most important condition for the promotion of the use of natural plants is conducting studies for their production; cultivation, variety creation and adaptation, as well as enabling users obtain them through nurseries. In recent years, studies on this issue have been increasing.

Some research has been being carried out at Atatürk Garden Culture Central Research Institute regarding the cultivation of various ornamental plants. In 2002, within the framework of the project on "Detection, Rehabilitation and Growing Techniques of Existing *Paeonia* L. Species in the Flora of Turkey" which was realized by the cooperation of private sector, university and public sector, species belonging to 11 taxon out of 55 populations were collected and preserved in peony gene resources garden [21].

Another important work was the "Cultivation of Some Natural Plants and the Inclusion of New Species and Varieties in Ornamental Plants Industry" project, carried out in 2006-2009. In the framework of the project which was conducted with the participation of 7 research institutes, 8 universities and 18 private sector organizations; 1166 population have been identified covering 241 species (177 geophytes species, 20 dune, and 44 outdoor plant species). Plant samples were subjected to pre-selection, moved to cultivation areas and preserved at responsible institution. Candidates of new varieties of existing species were determined at end of the study. The work under the project is continuing with variety creation activities [21].

In addition, a project has been initiated in 2010 called "Cultivation of Turkey's Geophytes, Providing New Species and Cultivars to the New Sectors. With this work it is aimed to collect the geophytes to be exhibited in "Turkey Geophyte Garden, to develop of varieties from the collected plants and to determine the biological activities of the plants collected. [21].

11. Conclusion

Increasing human activity results in negative effects for the natural areas, threatening the existence of plants, animals, and other types of species. It is generally admitted that the extinctions of plant species are occurring at an unprecedented pace in recent years. Thus, conservation of biological diversity is an issue gaining greater importance in today's world.

Turkey is an important country in terms of biological diversity as it displays the character of a small continent having a rich flora. However, Turkey has been facing the same threats against its biological diversity and its conservation becomes more and more important. As described above, there are different ways and methods used for preserving plant diversity in Turkey. One method is to protect the endemic species and prevent their extinction by making use of these plants in gardens and other living environments of people. By doing so,

there would be an important step taken for increasing people's consciousness. As people spend more time with natural plants, their protection motives and knowledge would certainly increase.

However, in order for providing these environments to people and increase their access to natural plants, more works and projects for improving cultivation and production of natural plants are needed.

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