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Sustaining Urban Forestry Activities: The Case Study of Çivril District, Denizli-Turkey

Cengiz YÜCEDAĞ[1], Latif Gürkan KAYA[1]*, Hüseyin Samet AŞIKKUTLU[1], Eşe SAĞIR[2]

[1]Burdur Mehmet Akif Ersoy University, Faculty of Engineering-Architecture, Burdur
[2]Burdur Mehmet Akif Ersoy University, Institute of Science and Technology, Burdur

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Sorumlu Yazar (Corresponding author): lgkaya@gmail.com*
+90 248 2132700 *+90 248 2132704*

ABSTRACT

Çivril is the third largest district of Denizli-Turkey with about 61000 of population. It has many important recreational and touristic areas including Gümüşsu (Homa) waterfall, Eumania antique city, Dedeköy and Serbanşah mosques, Beycesultan, Lake Işıklı, Gökgöl, Ak and Çıtak bridges, Akdağ Nature Park, old mansion, Koca plateau and Canyon Tokalı. In this study, the observation, examination, interview and assessment are done in the parks, gardens, road-sides and refuges of Çivril district, Lake Işıklı, Gümüşsu waterfall and Akdağ Nature Park. Accordingly, there is no problem with the selection of woody plant species, planting and maintenance (irrigation, weeding, struggle with dis-ease etc.) in big parks of district but although the selection of those in small parks is good and adequate, planting and maintenance have not been taken care of. Color, aesthetics, appearance, harmony and functional values in the selection of woody plant species used in the planting activities of the pavement and the refuge are taken into consid-eration but not their eco-biological characteristics. Gümüşsu waterfall and Akdağ Nature Park provide recreational activities but Lake Işıklı which has natural visualization does not provide. Accessibility is a negative factor for the recreational usage of these areas. Finally, urban forestry activities of Çivril should be primarily started with the plan-ning, designing and management of the open and green lands of the city center in an integrated way considering the ecological and technical criteria.

Keywords: Çivril, Maintenance, Plantation, Urban Forestry Activities, Sustainable

Kent Ormancılığı Faaliyetlerinin Sürdürülmesi: Çivril, Denizli Örneği

ÖZ

Yaklaşık 61000 nüfusa sahip olan Çivril, Denizli ilinin üçüncü en büyük ilçesidir. İlçe, Gümüşsu Şelalesi, Eumania Antik Kenti, Dedeköy ve Serbenşah camileri, Beycesultan, Işıklı Gölü, Gökgöl, Ak ve Çıtak Köprüleri, Akdağ Tabiat Parkı, Eski Konak, Koca Yayla ve Tokalı Kanyonu gibi önemli rekreasyonel ve turistik alanlara sahiptir. Bu çalışma-da, Çivril ilçesinin parklarında, bahçelerinde, yol kenarlarında, refüjlerinde ve Işıklı Gölü, Gümüşsu Şelalesi ile Akdağ Tabiat Parkı'nda gözlem, inceleme, mülakat ve değerlendirmeler yürütülmüştür. Buna göre, kentin büyük parklarında odunsu bitki türü seçiminde, seçilen türlerin plantasyon ve bakımı (sulama, ot alma, hastalıklarla mücadele vb.) konularında bir sorun bulunmamıştır. Ama küçük parklarda tür seçimi iyi ve yeterli olmasına rağmen, dikim ve bakım konularına dikkat edilmemiş olduğu tespit edilmiştir. Kaldırım ve refüjlerin plantasyon çalışmalarında kullanılan odunsu bitki türü seçiminde renk, estetik, görünüş, harmoni ve işlevsel değerlere dikkat edilmesine rağmen, türlerin eko-biyolojik özelliklerinin dikkate alınmadığı ortaya çıkmıştır. Gümüşsu şelalesi ve Akdağ Tabiat

parkı rekreasyonel aktiviteler sağlamasına karşın, doğal güzelliğe sahip Işıklı Gölü herhangi bir rekreasyonel aktivite sağlamamaktadır. Bu alanların rekreasyonel kullanımı için ulaşılabilirlik negatif bir etmendir. Sonuç olarak, Çivril'in kent ormancılığı faaliyetlerine öncelikli olarak kent merkezindeki açık/yeşil alanların ekolojik ve teknik ölçütleri dikkate alan bütünleşik bir yolla planlanması, tasarımı ve yönetimi ile başlanmalıdır.

Anahtar Kelimeler: Çivril, Bakım, Plantasyon, Kent Ormancılığı Faaliyetleri, Sürdürülebilir

INTRODUCTION

People's expectations from green lands and forests in and near cities have increased and changed due to rapid urbanization (Atmiş et al., 2012). Thus, many large parks were created in the capitals of European and North American countries. The significant part of these parks consisted of forest-like vegetation. However, today, many people dislike the artificial nature of the city parks and other recreational facilities. They want a more natural, more spontaneous and less human-shaped landscapes. This shift of demands to a more or less natural environment requires new efforts from city planners in cooperation with foresters and urban planners. Urban forestry has been recognized as a discipline within environmental related professions since the early 1970s. From that moment on much attention has been paid to this field of forestry, especially in the USA, Canada and European countries. Today this list is enlarged by developing countries (Patarkalashvili, 2017).

Sustain forest activities planning has many benefits in terms of the environment. Forest activities planning means making decisions about the future situation of forest land. In this case, it is necessary to predict how the forest land has changed over time and the effects of natural factors and human activities on the forest land. In this way, successful and sustainable forest planning studies can be achieved (Cetin, 2015a,b; Cetin et al., 2018a,b; Yücedağ et al., 2018)

Determination of forest activities with land cover and green area change related to forest area and its immediate surroundings: forest activities change is due to human activities and natural factors. Land cover is one of the most important data used to demonstrate the effects of forest are use changes, especially human activities. Production of forest activities use maps can be done by using different methods on satellite images. Some studies have produced land cover maps of the controlled classification technique over Landsat satellite imagery. By using land cover maps, the changes in urban development and green areas over time have been evaluated. At the same time, the relationship between changes in the forest activities over time and changes in the forest population has been examined (Cetin et al., 2010; Cetin, 2016a; Cetin and Sevik, 2016a).

The recent study is to develop a forest plan according to the goals of sustaining the natural and cultural landscape values of an area by considering landscape variables such as the number of potential visitors, vegetation cover, cultural values, forest activities and the topographic structure. ArcGIS was used as the geographical information system to evaluate the forest variables, and the study data were obtained through a land survey, questionnaires and mapping. The area has a highly variable topographic structure, that is, it has a rich structure in terms of surface forms and therefore has visual forest value. This surface variety also makes the area rich in vegetation cover and climate values; this richness can be called location advantage. It has enabled the formation of rich flora and therefore fauna variety for forest activities (Cetin et al., 2010; Cetin et al., 2018a)

Urban forest life quality; it is a concept that can be expressed in terms of objective and subjective evaluation that takes place in the interaction between quality of life and quality of the environment on the axis of forest, society, economy and environment based on the perception of the quality of urban forest life, peace, health, security, serenity and so on. While the values constitute the subjective components; Concrete values such as built environment, natural environment, economic and social functional areas constitute objective components. Although open and green lands are associated with natural life, at the same time social and economic values. Service within certain service distances to the settlement areas in their surroundings is targeted (Cetin et al., 2010; Cetin, 2015a; Cetin, 2016a,b; Cetin and Sevik, 2016a,b). To develop a green infrastructural system that will prepare a city that is resistant to climate change. This Green infrastructure for sustainable urban development and green economy, and approach to providing urban biodiversity (Cetin et al., 2018a)

The concept of green came to the forefront and all the newly built public and private in the buildings; energy saving and resource efficiency. Emitting carbon dioxide and based on the sustainability of green spaces an understanding of a green building has begun to prevail (Kaya, 2009; Cetin and Sevik, 2016c).

Urban forestry is the management of vegetation, particularly trees, in urban and suburban areas such as cities, towns, villages, etc. (Nowak et al., 2005; Gezer

and Gül, 2009; Nowak and Dwyer, 2009). In a broader sense, urban forestry, minimizing environmental problems such as the current and possible air and noise pollution, meeting the biological and physical needs of people such as recreation and providing functional values (oxygen production, shade and aesthetic appearance, etc.), is all kind of planted green infrastructure establishment and management. In brief, it includes planning of urban green lands, planting and maintenance of urban trees (Gezer, 1998). Through proper planning, design, and management, urban trees can mitigate many of the environmental impacts of urban development by moderating climate, reducing building energy use and atmospheric carbon dioxide (CO_2), improving air quality, lowering rainfall runoff and flooding, and reducing noise levels (Gezer, 1998; Kaya, 2009).

Based on these views, the selection of woody taxa in the parks, gardens, roadsides and refuges of Çivril District, Lake Işıklı, Gümüşsu waterfall and Akdağ Nature Park, and the principles of their planting and maintenance, and the recreational qualifications of these areas were evaluated in the current study.

MATERIALS AND METHODS

In the study, the center and vicinity of Çivril, the third largest district of Denizli-Turkey with about 61000 of population, are examined as material (Figure 1). The observation, examination, interview and assessment are done in the parks, gardens, roadsides and refuges of the district, Lake Işıklı, Gümüşsu waterfall and Akdağ Nature Park. The official documents related to the district are used.

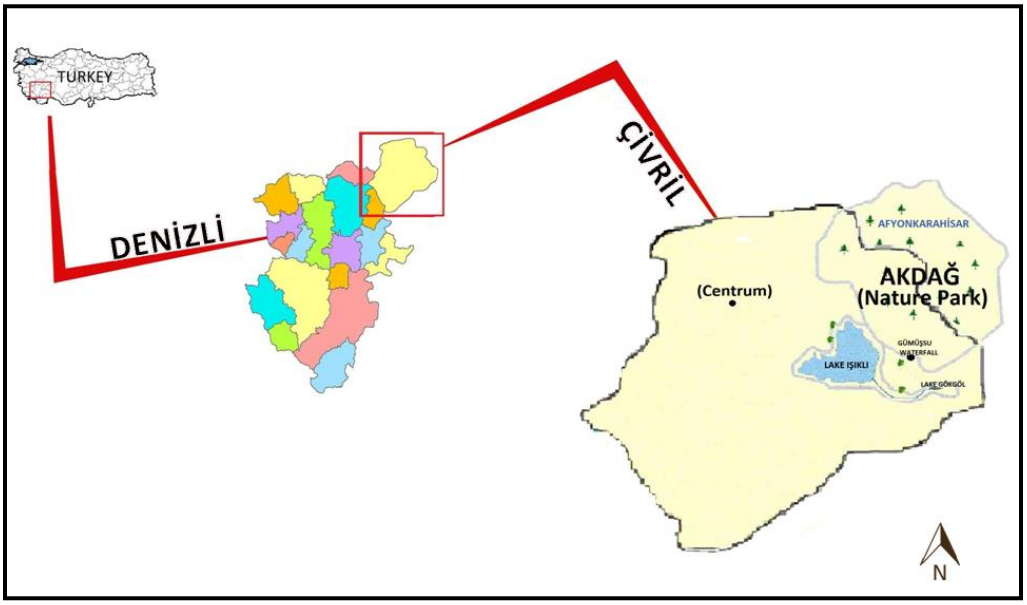

Figure 1. Location of Study Area

Çivril is one of the largest counties in the province of Denizli with an area 1499 sq km. It is surrounded by Sandıklı and Dinar (Afyonkarahisar) in the east, Karahallı (Uşak), Bekilli, Çal and Baklan (Denizli) in the west, Sivaslı (Uşak) and Sandıklı (Afyonkarahisar) in the north and Dazkırı, Evciler (Afyonkarahisar) and Baklan (Denizli) in the south. Its average altitude is 941 m. It has a combination of the Mediterranean climate in the Aegean Region and the continental climate in the Central Anatolia Region. The average temperature and the annual average precipitation in Çivril are 13.2°C and 444.1 mm, respectively (Özdemir and Dönmez, 2014). The vegetation in Çivril varies depending on the elevation. According to this, first, there are scrubs and steppe trees on mountain slopes, followed by mixed wood and evergreen forests further up (Eroğlu et al., 2014).

Lake Işıklı is located in the southeast of Çivril district and southwest of Akdağ (Özdemir and Dönmez, 2014). Its average altitude and depth is 850 m and 2.5-5 m, respectively. It covers a total of 4000 ha (Bulut et al., 2012). It has a great potential for ecotourism with its biodiversity (Çelik and Gülersoy, 2013).

Gümüşsu waterfall with a fall height of about 30 m is located 30 km east of Çivril. Its water is very cold and sweet (URL-1, 2017). The most important advantages of the Gümüşsu waterfall are that it has many natural and cultural attractions and it is located close to Çivril district. Natural vegetation of the waterfall and its surroundings includes oak communities. The bushy vegetation in the recreation area prevents the waterfall from

being seen clearly from a distance in the spring and summer seasons (Polat et al., 2012).

Akdağ Nature Park, which was declared as a nature park on 29 June 2000, occupies a total area of 14 781 ha. 8535.5 ha out of this area is within the boundaries of Sandıklı district of Afyonkarahisar and the rest (6245.5 ha) is located in the Çivril district of Denizli. It has an important ecological value due to its vegetation and animal species. The park contains 550 plant species. The park's rich vegetation makes the area attractive and valuable for photographers and researchers with botanical tourism and nature curiosity (Baytok and Yavuz, 2011).

RESULTS AND DISCUSSION

Woody Taxa Used in the Çivril District

The most commonly used woody species are as follows;

Brutian pine (*Pinus brutia* Ten.), Anatolian black pine [*Pinus nigra* Arnold subsp. *pallasiana* (Lamb.)], Taurus cedar (*Cedrus libani* A. Rich), Junipers (*Juniperus* sp.), Oaks (*Quercus* sp.), Wych elm (*Ulmus glabra* Huds.), Willows (*Salix* sp.), Poplars (*Populus sp*.), Anatolian chestnut (*Castanea sativa* Mill.), Persian walnut (*Juglans regia* L.), Oriental plane (*Platanus orientalis* L.), Black locust (*Robinia pseudoacacia* L.), Umbrella black locust (*Robinia pseudoacacia* 'Umbraculifera'), Weeping mulberry (*Morus nigra* 'Pendula'), Common yew (*Taxus baccata* L.), Narrowed-leaved ash (*Fraxinus angustifolia* Wahl.), Dogwood (*Cornus mas* L.), Cistus (*Cistus* sp.), Common hazel (*Corylus avellana* L.), Mountain maple (*Acer hyrcanum* F. et Mey.), Laurel (*Laurus nobilis* L.), Buckthorn (*Rhamnus* sp.), Barberry (*Berberis* sp.), Elderberry (*Sambucus nigra* L.), Honeysuckle (*Lonicera caucasica* Willd.), Tamarix (Tamarix *parviflora* D.C.), Jujube (*Zizypus jujube* Mill.), Sumac (*Rhus sp*.), Medlar (*Mespilus germenica* L.), Pistachio (*Pistacia terebinthus* L.), Christ's thorn (*Paliurus spina-christi* Mill.), Hackberry (*Celtis* sp.), White rowan (*Sorbus umbellata* (Desf.) Fritsch), Hawthorn species (*Crataegus ssp*.), Almonds (*Amygdalus sp*.), Common pear (*Pyrus communis* L.), Woolly blackberry (*Rubus canascens* D.C.), Rock cotoneaster (*Coteneaster horizantalis* Decne.), Spanish broom (*Spartium junceum* L.), Spindle tree (*Euonymus europaeaus* L.), Scarlet firethorn (*Pyracantha coccinea* Roem.), Oregon grape (*Mahonia aquifolium* (Pursh) Nutt.).

Parks, Gardens, Roadsides and Refuges of Çivril District

In this context, urban green lands serving Çivril district are Cumhuriyet and Ahmetçik parks, Bayraktepe recreation area, neighborhood parks, institutional gardens, cemeteries, sport complexes, avenue, refuge and roads. There is no problem with the selection of plant species in Cumhuriyet and Ahmetçik parks, and Bayraktepe recreation area (Figure 2 and 3). At the same time, their equipment and designs are in good condition. They are places where the people of the district can go for leisure and recreation.

Figure 2. Views from Cumhuriyet Park (above) and Ahmetçik Park (below)

Figure 3. Views from Bayraktepe Recreation Area

Positive observations in the large parks of the district are not determined in the neighborhood parks and garden of school (Figure 4 and 5) and Government House of Çivril. Neighborhood parks are not established in the direction of planning and design principles. These parks which are not complied with planting design criteria and which have an unplanned settlement of equipment have lost their landscape design efficiency. Equipment such as seating units, lighting elements and especially playgrounds are exceedingly inadequate and neglected as well. Although the number and selection of plant in these parks is good, much attention has not been paid to the planting and maintenance of plants.

Figure 4. Views from park in front of Soil Products Office of Çivril

Figure 5. Views from gardens of School

Though there is not any regular and systematic record of green lands in Çivril district, according to the information received from Municipality of Çivril parks, gardens, refuges and pavements in the district have a total of 408 green lands covering 965 574 square meter. Baswood, Stone pine, magnolia, sweetgum, cedar and plane trees are also planted in these areas. There is not enough technical staff concerning urban green lands in the Municipality of Çivril. Gül et al. (2013) have indicated that there were significant challenges because of the insufficient staff in urban forestry practices. Kenney et al. (2011) have also stated that the optimal number of urban forestry staff would vary among communities and a better criterion would address the training, skill, and experience of the staff. Atmiş et al. (2017) stressed that one of the leading factors affecting the management of urban forest was management intensity (staff numbers and the presence of a management plan).

The selection of woody species used in the road, avenue, pavement, and refuge has been generally paid attention to color, aesthetics, appearance, harmony, and functional values. However, plants having suitable eco-biological characteristics are not selected for some pavements. There is a problem with maintenance activities such as pruning and irrigation. People are found to use some parks improperly (Figure 6). On the other hand, improper landscape designs, tree selection, and tree maintenance can increase environmental costs such as pollen production, emissions of volatile organic compounds from trees and maintenance activities, as well as increased building energy use, additional needs for waste disposal, increases in infrastructure repair costs, and water consumption (Nowak and Dwyer, 2009).

Figure 6. Views from refuges, pavements and improper-used parks

Lake Işıklı

According to observations, woody species including poplar, juniper, Brutian pine, Anatolian black pine, cypress, oak, and willow are widely distributed in Lake Işıklı. Despite its natural visualization, the environs of Lake Işıklı has not been met the recreational activities of the people (Figure 7). For this reason, the environs of Lake Işıklı must be rearranged based on the landscape design principles.

Gümüşsu Waterfall

The waterfall with a rich plant variety has adequate recreational facilities. The natural vegetation of the waterfall and its environs dominates oak communities. Brutian pine, Crimean juniper (*Juniperus excelsa* Bieb.), Stinking juniper (*Juniperus foetidissima* Willd.), Oriental plane, White willow (*Salix alba* L.), White poplar (*Populus alba* L.), Hawthorn (*Crataegus monogyna* Jacq.), Bird rowan (*Sorbus torminalis* (L.) Crantz), Dogwood, Pistachio, Christ's thorn are common woody taxa in the waterfall and its environs. Similar results are reported by Polat et al. (2012). These authors have also stated that one of the most important advantages of the Gümüşsu waterfall is easy accessible.

Akdağ Nature Park

Akdağ Nature Park is a place with unique and natural beauty due to having facilities such as transhumance, mountain climbing, cave and canyon tour, nature trekking, flora and fauna observing because it has bushy forests, rich water resources, canyon, caves, plateau, rich flora and fauna, monumental trees and natural landscape. Despite all these positive qualities, it is not used too much because it does not have adequate facilities for recreational use.

Figure 7. Views from Lake Işıklı

CONCLUSIONS

Accessibility is a negative factor for the recreational usage of these areas. Finally, sustaining urban forestry activities of Çivril should be primarily started with the planning, designing and management of the open/green lands of the city center in an integrated way considering the ecological and technical criteria. Especially management activities should be attributed the detailed resource inventories and monitoring. These should not only provide basic information about the district, but also about its special characteristics in a broader urban forestry context. On the other hand, planning, designing and management deficiencies in urban forestry activities of Çivril need to be assessed by various scientific researches. Furthermore, a participatory approach will make urban forestry activities of Çivril more sustainable.

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