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Research on Determination of Environmental Factors Affecting Urban Flora of Aksaray Province

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ABSTRACT:

This article is an expanded and updated version of the text entitled "Analysis of the Environmental Factors Affecting the Urban Flora of the Aksaray Province" presented at the 2nd Aksaray International Symposium.

At the present, more than half of the world population live in urban areas. The acts that aim to improve urban life in these areas have been considerably leading to the transition of environmental problem to the cities. Hence, this situation has had negative effect on flora and fauna of the city. Irregular urbanization, air pollution, excavated soil, construction and demolition waste, garbage collection in disorganized storage areas, overgrazing, uncontrolled collection of plants, excessive plant shearing with lawn mowers on roadsides, pesticides, stubble fire are mainly among the identified environmental problems in this work. Aksaray floras are under threat due to different reasons in the direction of these identified problems. It is aimed to draw attention to the subject and raise awareness because of the preliminary study of this research. In this regard, the previous researches on the flora of Aksaray province will be examined; therefore, the environmental conditions that affect and threat the local flora will be detected. In this study have been observed that many environmental factors affect urban flora. Consequently, this study will end with some suggestions on observed environmental problems, and intend to be source for following researches in the future.

Keywords: Aksaray Province, Flora, Environmental Problems

Aksaray İlinde Kentsel Florayı Etkileyen Çevre Faktörlerinin Belirlenmesi Üzerine Bir Araştırma

ÖZ

Günümüzde dünya nüfusunun yarısından fazlası kentlerde yaşamaktadır. Kentsel alanlarda kentsel yaşamı iyileştirmeye yönelik atılan adımlar çevre sorunlarının büyük bir kısmının kentlere taşınmasına neden olmakta, bu durum da flora ve fauna üzerinde baskı oluşturmaktadır. Hızlı kentleşme, hava kirliliği, hafriyat toprağı, inşaat ve yıkıntı atıkları, çöplerin düzensiz toplama alanlarında toplanması, aşırı otlatma, bitkilerin kontrolsüz toplanması, yol kenarlarındaki bitkilerin çim biçme makineleriyle aşırı biçilmesi, tarım ilaçları, anız yangınları bu çalışmada belirlenen başlıca çevresel sorunlar arasındadır. Bu tespit edilen sorunlar doğrultunda Aksaray florası farklı nedenlere bağlı olarak tehdit altındadır. Yapılan bu araşırmanın ön çalışma olması nedeniyle konuya dikkat çekmek ve farkındalık oluşturmak amaçlanmıştır. Bu bağlamda çalışmada Aksaray ilinin florasına ilişkin yapılan araştırmalar incelenmiş, ilin kentsel florasını etkileyen ve tehdit eden çevresel koşullar belirlenmiştir. Yapılan bu çalışmada kentsel floraya birçok çevresel faktörün etki ettiği görülmüştür. Sonuç olarak gözlenen çevresel problemlerin,

çözümüne yönelik olarak öneriler sunulmuş ve gelecekte yapılacak yeni çalışmalara kaynak sağlanması amaçlanmıştır.

Anahtar Kelimeler: Aksaray İli, Flora, Çevresel Problemler

A Research on Determination of Environmental Factors Affecting Urban Flora of Aksaray Province

INTRODUCTION

Sometimes in a deserted island, sometimes away from a civilization, environmental scientists who sometimes work in a rainforest spend years trying to understand the relationship of the living things to their surroundings. Today, the increase of the world population in the cities has turned the direction of the studies about the environmental problems to the urban areas. Ecological plans are needed to protect and sustain natural habitats in urban areas (Altay, Özyiğit, ve Yarcı, 2010, p. 183). The aim of these planning studies is to reduce environmental impacts on the basis of ecological approaches. Ecological planning, conservation of natural structure, improvement of ecological conditions, exploration of usage patterns of the area, prevention and reduction of the effects that disturb the environmental quality, development of plan decisions and prevention of the destruction of natural resources are among the major ecological approaches that can be implemented in urban areas (Mansuroğlu, Kınıklı, ve Saatcı, 2012, p. 255).

Urban ecosystems differ in many ways from non-urban ecosystems. Although most of the factors affecting urban ecosystems are not seen in non-urban areas, the combination of these factors ensures unique ecosystems to form in urban areas (Breuste, Feldmann & Uhlmann, 2013, p.4).

Many natural and cultural elements coexist in the urban areas. These elements forming the human ecosystem interact with each other. In this area, natural environmental conditions such as air, soil, water and plants are in interaction. In addition, socio economic activities such as transportation, trade, industry, and tourism, which have to be constantly developed for economic development, have been intertwined. The healthy functioning of this structure, which is called the urban ecosystem, depends on the balance between the elements that make up this ecosystem (Karadağ, 2009, p. 31).

For planners and decision makers, the ecological information that interests the city is important. However, realizing the proper planning process for urbanization makes the decision making process of scientists difficult (Breuste, 2011, p. 3).

Ecological surveys have mostly been carried out in untouched environments such as natural areas, biotopes, wetlands and forests. The residential areas are outside of these surveys. The city's flora and fauna is dependent on human cultural life conditions. Therefore, it is believed that the cities are not under control and there is no ecological system of their own (Altan, 1997). But in the following years the urban areas began to be intensively researched from the ecological point of view. The main reason for this is the fact that the urban population of the world reaches 60% on average and that a significant part of the environmental problems is transported to the metropoles.

The changes that humans have made in the earth in recent years are increasing day by day and it is becoming important. In the world, especially after the industrial revolution, there have been changes and transformations in the urban areas that have resulted in major environmental problems. Increase in carbon dioxide in the atmosphere, disappearance of species and inability to reach clean potable water are among the major environmental problems in cities (Marzluff, at al., 2008, p. 3).

This research is a preliminary study. Therefore, it is aimed to first draw attention to the subject and to raise awareness. In addition, in this study; it was aimed to analyze the researches related to the flora of Aksaray until this time, to analyze the environmental conditions that affect and threaten the urban florage of the province, to present suggestions for solutions of observed environmental problems, to provide a resource to new studies to be made in the future.

MATERIALS AND METHODS

The basic material of the study is the various primary and secondary sources obtained from literature studies. During the process of constructing the data for the study, university libraries, various electronic library resources, some national and international search engines, domestic and foreign articles, and thesis studies on this subject were used.

In the study, firstly the researches related to the Aksaray flora were examined. Later, environmental conditions affecting and threatening the urban flora of the province have been identified. Finally, suggestions have improved for the solution of environmental problems in Aksaray that is among the priority province in Turkey. In addition, verbal meetings were held with the authorities working in related institutions and organizations and data were collected.

1. The Flora Condition of Aksaray

The vegetation of Aksaray province (Figure 1.) located in the Iran-Turan phytogeographic region is divided into three main formations as grass, tree steppe and forest community. The forests of Aksaray were drawn to the moist and northward-facing local areas and highlands because of destruction for centuries. The forest vegetation, which was destroyed by the effects of drought and biotic factors, has left to the steppe plant cover (Aksaray Belediyesi Bitki Örtüsü, 2014).

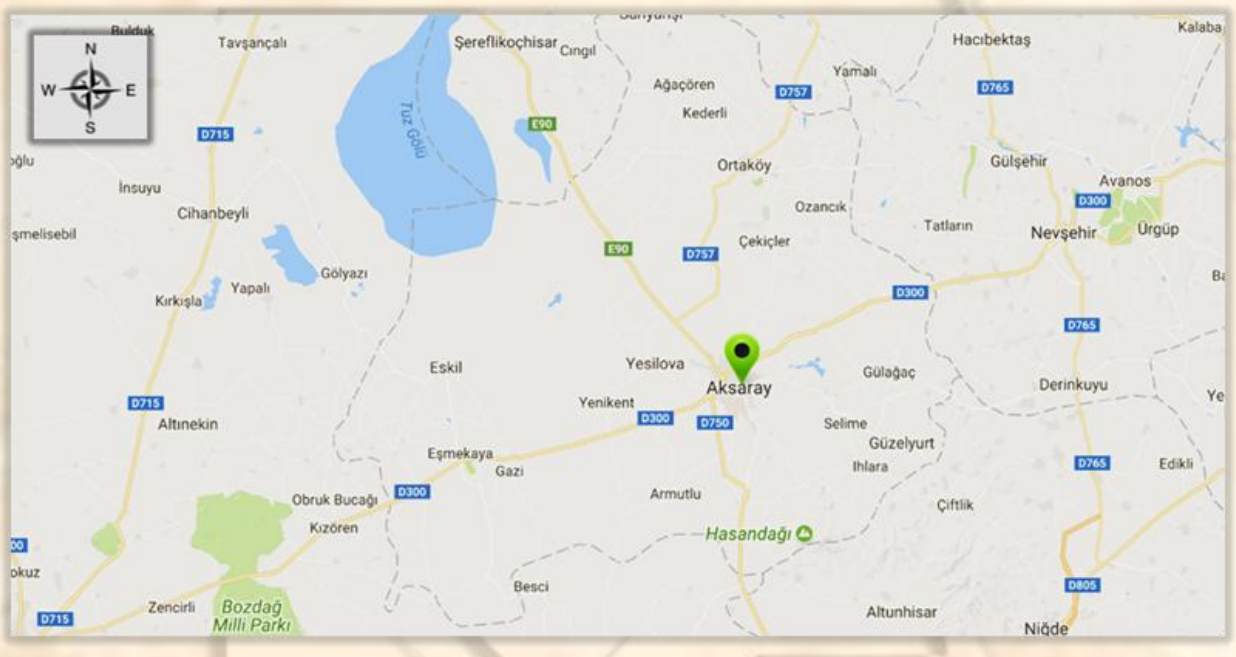

Figure 1. Satellite map of showing work area (Aksaray haritası, 2017)

Aksaray province, which is not rich in forests and natural flora, is in the mid-climatic zone. It also has a cold and terrestrial climate type. The summers are warm and dry. The winters are cold and rainy. Rainfalls are often seen in spring and winter (T.C. Orman ve Su İşleri Bakanlığı Meteoroloji Genel Müdürlüğü, 2017). Also, it is in Turkey's lowest precipitation Salt Lake basin provincial boundaries. Drought, excessive lime, salinity, high pH and anthropogenic effects are among the threats on natural flora.
Some of the studies about the flora completed in Aksaray are as follows. (According to the year of the study):
1. Hasan Dağı'nın Bitki Ekolojisi ve Bitki Sosyolojisi Yönünden Araştırılması (Düzenli, 1976)
2. Ihlara Vadisi (Aksaray)Florası (Çelik ve Dönmez, 1999),
3. Ekicek Dağı (Aksaray) ve Çevresinin (Ünal ve Dinç, 2000),
4. Nizip (Aksaray) Bölgesinin Florası (Öztürk ve Dinç, 2008),
5. Hasan Dağı (Aksaray Kesimi) Florası(Başköse ve Dural, 2011),
6. Mamasın Barajı ve Çevresinin (Aksaray) Florası (Kiraz ve Tekşen, 2014),

7. Nenezi Dağı'nın Florası (Bekarlar-Gülağaç-Aksaray) (Örün ve Tekşen, 2014)
8. Karaören-Yuva-Karkın köyleri(Aksaray-Türkiye) arasında kalan bölgenin florası (Uygur ve Karaman Erkul, 2015)
9. Elmacık, Koçpınar, İncesu Köyleri ve çevresinin florası (Aksaray-Türkiye) (Başer ve Tekşen, 2015)

There are 11466 species of plants in Turkey. In this case, Turkey has more endemic species than endemic plants in the whole of Europe. 3649 of these plant species are endemic. Accordingly endemism rate in Turkey is 31.82% (Başer ve Tekşen, 2015, p. 26). Endemic percentages in studies in different areas of Aksaray is much lower than endemic rates in Turkey (Table 1.). Among the reasons for this are take place such as climate factor, anthropogenic influences, and a narrow fields of study. There is no flora survey covering the entire province. It is thought that the rate of endemism and the number of taxa will increase in the flora studies to be carried out regarding Aksaray in the following years.

Table 1. The number of taxa and endemism rates in studies conducted in different regions of the research area

Studies	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**
Number of Total Taxon	364	494	445	725	458	441	359	366
Endemism Ratio	12.63	13.9	15.7	13.5	11.4	14.73	12.53	12.29

2. Environmental Factors Threatening Aksaray Urban Flora

In this work that reveals the current problems, there are some factors that threaten Aksaray urban floras. Irregular urbanization, air pollution, excavated soil, construction and demolition waste, garbage collection in disorganized storage areas, overgrazing, uncontrolled collection of plants, excessive plant shearing with lawn mowers on roadsides, pesticides, stubble fire are among the environmental problems in Aksaray province. This is a preliminary study. For more detailed information are required further studies.

a. Rapid Urbanization

Aksaray city became a province in 1989 and then it has taken place among the priority provinces in development in 1997. As a result, immigration from the surrounding provinces and districts has received and the construction sector has shown a large increase. With the effect of urban transformation in Aksaray, natural areas quickly disappeared. This situation has caused habitat and vegetation losses.

b. Air pollution

Today, as a result of industrialization and urbanization, the need for energy is excessive. Much of this energy needs come from the burning of fossil fuels and their derivatives. However, the pollutants that form as a result of this burning disrupt the natural structure and composition of the atmosphere. Also all living things are affected by this situation (Elkoca, 2003, p. 368). In Aksaray province, the poor quality and carbon emission fuels used for the heating of the buildings especially in winter affect the natural flora by creating air pollution.

c. Excavation soil and construction demolition wastes

Due to the development in the province of Aksaray, industrialization and urbanization have gained great velocity. As a result, construction activities have increased. Construction of houses, buildings, bridges, roads and similar structures, restoration of existing upper and lower structures, renovation and demolition are among the construction activities. During all these activities, very large amounts of excavated soil and construction wreckage (Figure 2.) are occurred. Aksaray, which is also in the process of urban transformation form high quantity waste. Leaving these wastes in irregular landfills leads to environmental pollution. In addition, Aksaray city lands, which contains endemic and rare plants in terms of natural flora are under the pressure by the wastes.

Figure 2. Construction wreckages damaging flora

d. Collecting Of Garbages In Irregular Collection Areas.

Over the years, immigration from rural and other cities to Aksaray province has increased. As a result of this situation, the province of Aksaray has faced the problems of urban garbage and domestic waste. Piles of garbage have formed in rubble areas and near the people's habitats. These garbages, by spreading odour and dust, negatively threaten human health and the lives of others living thing.

e. Overgrazing

In the province of Aksaray, which has a lot of plant diversity, natural plant cover is damaged especially in the summer months. The reason is that the grazing times are and the number of grazing animals is high. Destruction of the vegetation cover increases soil erosion and inefficiency of the soil. Also, because of unplanned and irregular grazing (Figure 3.), natural ecosystems deteriorate and rare and endemic plant species disappear.

Figure 3. Overgrazing

2. 6. Uncontrolled collection of plants

Especially in spring, plants that grow on the edges of the roads and on the edges of the arable fields, are gathered unconsciously by the public for both economic concerns and alternative treatment methods. The locally named plants such as kapari, adaçayı madımak otu, alıç, ayrık otu, badem, çiğdem, ebe gümeci, kuzukulağı, sığırdili ve mayasıl otu are collected by the public.

2. 7. Excessive cutting of roadside plants with lawn mowers

With the coming of summer, grass mowing machines (Figure 4.) are used especially in parks, gardens and roadsides. As a result, the roots of single-year, two-year and multi-annual plants are damaged. In addition, the reproductive processes that lead to the product formation of the plants the next year are also affected. Moreover, grass mowing machines cause deep scars in the shells of the trees, causing them to peel off.

Figure 4. Cutting of roadside plants with lawn mowers

f. Agricultural Pesticides

Agrochemicals are used by farmers against many factors that may be detrimental to the developmental stages of plants. In addition, these chemicals are applied to plants to prevent degradation of crops and produce products in higher quality conditions. However, the agricultural chemicals used to increase human quality of life have threatened very seriously the environment in which the individual lives as a result of their uncontrolled, unconscious and unnecessary use. These chemicals applied to agricultural areas, forests and gardens pollute the soil. The chemical substances in the contaminated soil pass to the plants over time. Later, these chemicals pass to other creatures that use plants as food. As a result, living creatures in the food chain are damaged.

g. Stubble Fire

Grain plants such as wheat, barley and rye are harvested in the province of Aksaray that is an agricultural city. After harvest, plant stalks left in the field are burned by farmers for reasons such as not being a value, destroying insects and other harmful, and facilitating soil handling. Afterwards, this fire can not be controlled and the natural flora on the sides of the fields and roads is damaged. In addition, with the stubble fires, the valuable organic part burns, the durability against water holding power and erosion is reduced. Besides, stubble fires pollute the air.

h. Tourism Trips

There is a close relationship between tourism and the environment. Throughout the world, the development of tourism has increased facilities that are incompatible with environmentally insensitive nature. In addition, destructive impact of mass tourism increases day by day.In Aksaray province, the number of visitorshas increased every year. As a result, natural elements and historical buildings are damaged in places such as Hasandağı, Ihlara Valley and Güzelyurt in Aksaray province.

Utilizing sustainable tourism without causing environmental and social deterioration is among the tasks of all the destination managers. Aksaray will be able to benefit economically from this situation in the years to come if it protects and uses its natural historical and cultural values (Tuncer, 2017, p.136).
Aksaray became a province in 1989 with the influence of industry, trade and housing. Later, in Aksaray province where rapid change and transformation took place, environmental problems which threat natural flora have occurred. Other environmental problems that threaten the Aksaray urban flora are given below.
- water pollution (Figure 5.)

- industrial wastes
- excess of agriculture and pasture lands
- use of the picnic area
- tree planting studies
- city parks
- exotic plants
- children's parks
- waste piller
- waste oils
- used tires
- the walk of native and foreign tourists in natural areas, cycling tours, horseback nature walks

Figure 5. Industrial Pollution in Karasu River

CONCLUSION AND EVALUATION

Over the last two centuries the growth of cities has increased the importance of urban life, which is the basis of modern human life. In this growth, economic factors, technological developments and influence of communication are great. However, the growth of urban life has brought about environmental problems on a global scale. Water pollution, air pollution and traffic-related problems are some of the problems that affect cities (McMichael, 2000).

Irregular urbanization, air pollution, excavated soil, construction and demolition waste, garbage collection in disorganized storage areas, overgrazing, uncontrolled collection of plants, excessive plant shearing with lawn mowers on roadsides, pesticides, stubble fire are mainly among the identified environmental problems in this work. These environmental problems affect the urban flora of Aksaray. Studies should be carried out in the following periods to improve the Aksaray urban flora. Determining further factors that threaten the environment will be useful for the future of the city. The solution to the problems identified in this study is the following.

-For the city's environmental health, people's peace and happiness environment, the city must be planned, organized and infrastructural rather than being a distorted city. Thus, the services of the local governments in Aksaray city will be reached to the public with economically and rationally.

- The city of Aksaray has a wide variety of ecological surroundings. To protect these environments, businesses that are considered harmful to the environment should be thoroughly investigated. Environmental impact assessment (EIA) must be carried out before businesses are built up.

-Air pollution, which causes diseases such as asthma and lung cancer in humans, increases in Aksaray province especially in winter. In order to prevent air pollution in future periods in Aksaray province, fuels with low carbon emission such as natural gas should be used in the heating of houses.

-Excavation soil and construction demolition wastes should be minimized in the source. In addition, these wastes should not be confused with each other in order to facilitate recycling.

-The rapid increase in the population in the cities has increased the consumption. This situation also increases the amount of garbage that is generated in the city. In order to protect the cleanliness and health of the cities and their immediate surroundings, solid waste and garbage should be collected regularly in the city. To reduce the amount of waste, the waste should be separated in the source, people should be informed about recycling and recycling facilities should be increased.

-Irregular or overgrazing can lead to soil fertility imbalances and reduced variability in plant species. For this, a systematic grazing should be done in these areas and People in the grazing work should be informed. In the study area, plant richness is decreasing over time due to agricultural conversion and picnic areas. Due to these anthropogenic conditions, a natural plant inventory should be established for contribution to future work.

-Economic reasons and healing are effective in collecting plants from the nature. However, the population of plant during collection should not be compromised.

-Especially in the summer months, lawnmowers are used extensively in the province of Aksaray. For this reason, damage of natural plants should be prevented in mowing works on the roadside.

-Use of pesticide in agricultural production are evaluated within the scope of agricultural struggle. Within the scope of the struggle, the level of consciousness of farmers and sellers of agrochemicals should be raised. Pesticide producers should take responsibility for the application of agricultural chemicals to crops. In addition, farmers should not buy pesticides from businesses as much as they want and responsible persons should give from these pesticides as much as the size of the farmland.

-The biological, chemical and physical structure of the soil and its productivity are important for living things and criminal sanctions should be increased against the burning of stubble. In addition, mower activity should be made from the lowest possible level.

As a result, Aksaray province has a great importance because it is rapidly industrializing and developing in every area. Relevant institutions and authorities must best fulfill their responsibilities for the resolution of environmental problems and the protection of biodiversity. But for a sustainable environment, environmental consciousness is essential for every individual in society. Therefore, every individual in society must fulfill his or her duty to leave a healthy environment for future generations.

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