JOURNAL OF PROTECTED AREAS RESEARCH

JoPAR e-ISSN:2822-2733 2022 Volume 1-Issue1

JOURNAL OF PROTECTED AREAS RESEARCH
JoPAR, 2022, 1 (1)
e-ISSN: 2822-2733

Journal homepage:
https://mimarlikbilimleri.com/ojs/index.php/journalofprotectedareasresearch
E-mail: **journalofprotectedareas@gmail.com**

JOURNAL OF PROTECTED AREAS RESEARCH
Year: 2022, Volume: 1, Issue: 1
e-ISSN: 2822-2733

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Publisher: Prof. Dr. Atila GÜL
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https://mimarlikbilimleri.com

Cover Design: Gizem DİNÇ

Publish Date
31.01.2022

Isparta- Türkiye

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Indexed in:

JOURNAL OF PROTECTED AREAS RESEARCH

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e-ISSN: 2822-2733

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PREFACE

Starting the First Issue of JoPAR…

The concept of Nature is broadly defined in the macro scale, the concept of "Universe". However, it is accepted as identical with the concept of The Earth (=Blue planet-Ecosphere) we live in. The Earth is an alternative living space in which human beings have been in close relationship and interaction in the context of perception, understanding, and meaning from the moment they existed. Every living and non-living thing on Earth is a part or component of the natural system.

The natural system is the state of balance and harmony that occurs as a result of the relationship and interaction of the producer, consumer, and decomposer components, and is a very complex cyclical system. Each component or asset has a unique value because of the unique roles, services, and contributions of these components.

Nature, in the World we live in, is capable of constantly renewing itself outside of human will and activities, designed as a combination of producer-consumer and decomposer components, and internal and external factors, formed as a result of the relationship and interaction of all living and non-living beings in unity with each other. After all, it is a magnificent design with its laws.

Since the day he moved to settled life, human beings have tried to dominate nature instead of living in harmony and balance with nature, exploited, used, changed, and shaped irresponsibly and excessively. In the last 50 years, human beings have negatively affected nature and natural processes as a result of their multi-faceted activities and caused an average of 0,5°C warming as a result of the increase in greenhouse gas emissions. In the last 100 years, the global climate means that even if no emissions are released from today, the global temperature will continue to increase by 0,5° to 1°C in the coming decades, and according to the climate models made, if measures are not taken to significantly reduce these emissions, the world will be in the next century. predicts that it will be warmer by 1.4° to 5.8°C in.

The basic approach to climate change, which is of vital importance for natural life and humanity on a global scale, includes determining the possible effects and level of climate change, how to combat it, adaptation policies, and what measures to take. For this purpose, PROTECTED AREAS are accepted as a powerful tool and important life insurance in terms of their richness in biodiversity, their ability to capture and store carbon in the atmosphere, and to ensure the sustainability of natural systems.

Protected areas not only provide biodiversity conservation (protection of species and ecosystems) but also provide essential ecological, social, and economic services such as clean water, carbon storage, genetic reservoirs, disaster reduction, soil stabilization. They also offer important opportunities for the protection and sustainability of tangible and intangible cultural heritage.

Today, protected areas with natural and cultural characteristics are increasing numerically and spatially. In the World protected areas database 2021 Report, jointly managed by UNEP-WCMC and IUCN; On the world; The number of terrestrial protected areas is 248,709 and covers about 15.7% of the world's

terrestrial areas and inland waters. The number of marine protected areas is 17,852, covering only 7.91% of the ocean (Protected Planet, 2021).

However, there are multifaceted problems in terms of discourse and action in legal, ecological, social, cultural, economic, planning-design, management, and political dimensions related to protected areas on a national and international scale. For this reason, it requires researching, relating, discussing, and sharing on an International scale by considering all their dimensions of protected areas.

Journal of Protected Areas Research (JoPAR) is a blind, peer-reviewed, and international e-journal that accepts original research articles and review articles dealing with all aspects of protected NATURAL and CULTURAL values and areas in Turkey and the World. **JoPAR** is the first scientific journal published online on natural and culturally protected areas in Turkey. It is published twice a year.

In this context, **JoPAR** is aimed at all components related to the conceptual and theoretical framework, legal situation, planning, design, implementation, management, scientific, artistic, ecological, social, cultural, economic, philosophical, tourism, and technology of protected natural and cultural values or areas.

JoPAR's mission is to publish an international, scientific, quality, and original journal, to provide access to current research to stakeholders, and to raise awareness of nature/environmental protection.

The journal mainly addresses the following topics; Conservation and Protection, Preservation, Natural Protected Areas, Cultural Protected Areas, Ecology, Biodiversity, Cultural Heritage, Tourism, Recreation, Visitor Management, Sustainability, Wildlife, Wild animals & Wild plants, Global warming and Climate change, Ecosystems, Landscape repair (Restoration, Rehabilitation, Reclamation), Urban Conservation & Revitalization, Rural Conservation & Revitalization, Human health& Well-being, and others.....

We would like to thank all authors, Editorial Board, Science, and Advisory Board, The Referees for their contributions to academic production in our field, and all our The Readers for their support. As **JoPAR**, we welcome all your comments, contributions, and suggestions about us.

We hope that **JoPAR** Journal will be beneficial to protected natural and cultural areas, people, and all stakeholders...

"In the true sense, nature conservation and sustainability can be achieved through the collective effort of an organized society and living in harmony with nature".

Prof. Dr. Atila GÜL

EDITOR
31.01.2022

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Journal of Protected Areas Research
JoPAR, 2022, 1 (1), 01-23
e-ISSN: 2822-2733
Research Article

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A Suggested Protection Plan for Important Plants, Areas and Habitats of Köprülü Canyon National Park (Antalya)

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Abstract

In this study, the pressures on the endemic, rare, target species and communities, important habitats, vegetations, and vegetation of the Köprülü Canyon National Park were determined. As a result, with this study, the number of main stands: 15, A1 (number of species in dangerous areas at global scale): 5, A2 (number of endangered species in European scale): 39. Total number of taxa of dangerous species: 48, number of endemic vascular taxa in danger: 44, the total number of endemic taxa: 230, number of endemic taxa for the region: 12. The number of total vascular taxa: 950, genus: 390; family: 94, was determined. The site-specific taxa are; ***Gaudiniopsis macra*** *subsp.* ***micropyroides, Hellenocordum psidicum, Nigella arvensis*** *var.* ***oblanceolata, Rosa dumalis*** *subsp.* ***boissieri*** *var.* ***antalyensis, Scrophularia libanotica*** *subsp.* ***libanotica*** *var.* ***antalyensis, Silene deliculata*** *subsp.* ***pisidica, Stachys antalyensis, Stachys chasmosericea, Tanacetum argenteum*** *subsp.* ***canum*** *var.* ***pumilum.*** *Rare plants are:* ***Echinops onopordum, Amphoricarpos paredictus, Bupleurum davisii, Campanula antalyensis, Cerastium pisidicum, Hypericum ternatum, Omphalodes riplyana, Rhamnus nitidus, Crocus asumaniae****? and* ***Iris pamphylica****. In this context, a conservation management plan has been prepared for the national park management according to the social status of the local people and all the findings to protect the biodiversity in the area. The area is estimated to be one of the pilot areas affected by global warming.*

Keywords: *Köprülü Canyon, Kızıldağ, Management plan, Important habitats, Target species*

Köprülü Kanyon Milli Parkı'nın (Antalya) Önemli Bitkileri, Alanları ve Habitatları için Koruma Planı Önerisi

Öz

Bu çalışmada Köprülü Kanyon Milli Parkının endemik, nadir, hedef tür ve toplulukları, önemli habitatları, vejetasyonları ile birlikte bitki örtüsü üzerindeki baskılar tespit edilmiştir. Sonuçta bu çalışma ile ana meşcere sayısı: 15, A1 (küresel ölçekte tehlikeli alandaki tür sayısı): 5, A2 (Avrupa ölçeğindeki tehlikede tür sayısı): 39. Tehlikeli tür toplam takson sayısı: 48, tehlikede endemik damarlı takson sayısı: 44, toplam endemik takson sayısı: 230, bölge için endemik takson sayısı: 12. Toplam damarlı takson sayısı: 950, cins: 390; familya: 94 olarak belirlenmiştir. Alana özgü taksonlar ise; ***Gaudiniopsis macra*** subsp. ***mikropiroidler, Hellenocordum psidicum, Nigella arvensis*** var. ***oblanceolata, Rosa dumalis*** subsp. ***boissieri*** var. ***antalyensis, Scrophularia libanotica*** subsp. ***libanotica*** var. ***antalyensis, Silene deliculata*** subsp. ***pisidica, Stachys antalyensis, Stachys chasmosericea, Tanacetum argenteum subsp. canum*** var. ***pumilum.*** *Nadir bitkiler şunlardır:* ***Echinops onopordum, Amphoricarpos paredictus, Bupleurum davisii, Campanula antalyensis, Cerastium pisidicum, Hypericum ternatum, Omphalodes riplyana, Rhamnus nitidus, Crocus asumaniae?*** ve ***Iris pamphylica****. Bu bağlamda Alanda biyoçeşitliliği korumak için yöre halkının sosyal statüsüne ve tüm bulgulara göre milli park yönetimi için bir koruma yönetim planı hazırlanmıştır. Alan, küresel ısınmadan etkilenen pilot bölgelerden birisi olacağı tahmin edilmektedir.*

Anahtar kelimeler: *Köprülü Kanyon, Kızıldağ, Yönetim planı, Habitatlar, Hedef türler*

Citation: Özçelik, H. (2022). A Suggested protection plan for ımportant plants, areas and habitats of Köprülü Kanyon National Park (Antalya)**.** *Journal of Protected Areas Research*, 1 (1), 01-23.
DOI: https://doi.org/10.5281/zenodo.6027843

Received: 18/08/2021 –Accepted: 06/01/2022

1. Introduction

Türkiye has a distinctly unique and rich flora in the neighboring countries because of situated on the crossroads of three phytogeographical regions; also its vegetation history, different climatical conditions, topographical, altitudes, soil, and rock structures, etc. In this sense, it is like an open-air museum. It is estimated, the number of vascular plant taxa in the Lakes Region is about 4000. According to the statements of the Agriculture and Forestry Ministry; protected areas in Türkiye correspond to 9.5% of the country's surface area. According to the 2023 targets, it is expressed that will be increasing protected areas to 17%. Although it is pleasing to increase the protected areas, alternative livelihoods should be shown to the local people who make a living from these areas and generally earn their living from animal husbandry. Otherwise, anthropogenic pressures on protected areas will increase. On the other hand, due to the concentration of marble quarries in the region in recent years, protected areas are also heavily affected by this pressure (Batanouny, 1995; Özçelik, 1995; 2000; Özçelik et al., 2001).

As a result, while increasing protected areas is a good initiative, its repercussions on local people should be taken into account and pressures should be minimized. Unfortunately, over the last 70 years, the natural richness of the country have been threatened by over-grazing, moving, fires, cutting, construction, urbanization, industrialization, and anthropogenic factors like herbicide use in agriculture in the country. As a result of the above-mentioned reasons while some endemic and rare plants are undergoing a substantial decline in numbers, others are being destroyed (Küçüker, 1995). There is also severe anthropogenic pressure in and around the park. For this reason, the shallow (***Liquidambar orientalis***) forest in the area has suffered great damage (Kırmacı & Özçelik, 2006).

Türkiye is one of the world's leading countries in protecting biodiversity. Biodiversity of a large part of the country has been determined, except for Eastern Anatolia. The biological diversity of each province has been determined by the Ministry of Agriculture and Forestry, and the habitats and species that need to be protected are listed. All biodiversity inventory has been uploaded to the 'Nuhun Gemisi' database of the Ministry. Numerous official and academic studies have been conducted on the importance and protection of biological diversity (Tekeli et al., 2006; Işık, 1999; Işık, 2014). Studies have been carried out on the application of biodiversity to forestry, planning, and rapid assessment in protected areas (Anonymous, 2006-a, b).

The study area was declared a national park on 12.12.1973. Features; archaeological formations, natural plant communities, and geological formations. Distribution maps of target plant species that need to be protected in Türkiye are also given in the book. The national park which is located in the Western Anatolia region has different ecological conditions and high mountainous fields in general. In point of phytogeographical view, the area is located in the Mediterranean phytogeographical region. It has more primary vegetation than other areas of Türkiye. We guess so, there are at least important 50 monumental trees belonging to ***Cupressus sempervirens, Castanea sativa, Cedrus libani, Pinus brutia, P. nigra*** and ***Ficus carica;*** as scarcely ***Myrtus communis, Laurus nobilis, Quercus coccifera, Arbutus andrachne*** and ***Celtis australis*** in the parking area (Özçelik, 2018). Within the scope of the Important Plant Areas of Turkey (IPA) Project (Özhatay et al., 1997; Özhatay et al., 2003). Bozburun Mountain, which includes our area, is an Important Plant Area that needs urgent protection.

The following taxa are domain-specific: ***Gaudiniopsis macra*** subsp. ***micropyroides, Hellenocordum psidicum, Nigella arvensis*** var. ***oblanceolata, Rosa dumalis*** subsp***. boissieri*** var. ***antalyensis, Scrophularia libanotica*** subsp. ***libanotica*** var. ***antalyensis, Silene deliculata*** subsp. ***pisidica, Stachys antalyensis, Stachys chasmosericea, Tanacetum argenteum*** subsp. ***canum*** var. ***pumilum*** (Ayaşlıgil, 1987; Ayaşlıgil, 1990; Duman, 2005; Özhatay et al., 2003).

Rare plants are: ***Echinops onopordum, Amphoricarpos paredictus, Bupleurum davisii, Campanula antalyensis, Cerastium pisidicum, Hypericum ternatum, Omphalodes riplyana, Rhamnus nitidus, Iris pamphylica*** and ***Crocus asumaniae***?

31 species for ***Allium***, 5 for ***Origanum,*** and 14 for ***Sideritis*** genus were recorded previously from the area (Özhatay et al., 2003; Duman, 2005).

This area has been damaged by a recent fire. Forest fires are a major problem in the region. The most important anthropogenic stratum for the national park. The fire in the 2007 year was not extinguished for a week, causing damage to the plant cover and the local people. Pine forests are the most sensitive to Türkiye's forest fires. 950 ha of forest area burned in the forest fire in Bucakşeyhler district on 24.08.2007. In Taşağıl town and Karabük village on 31 July 2008, a big forest fire appeared. The Mediterranean region is generally covered with fire-sensitive, mostly red pine forests. Forest fires peak in June, especially in July and August. If the relative humidity falls below 20%, the wind speed reaches 50 km/h and the temperature reaches 35 °C, the danger dimension is very high. The forest fires that broke out in 17 provinces and 58 areas in the region between 28-29.7.2021 could not be extinguished for days. In the following days, the number of fires exceeded 100. Not only the forest but also the settlements, barns, animal shelters, animals, and people were burned. There are many injured people. Ministry organizations struggled by carrying water with sprinklers, helicopters, and planes. Despite the support from abroad, local people, and soldiers, the fires could not be prevented. Experiences show that this classical struggle method is expensive and inadequate.

In recent years, new determinations have been made and the borders have been changed in the outer borders of the Park and the areas used by the public on the inner side. Some areas and fields close to settlements have been removed from the park boundary. Dedegül Mountain is a very important mountain in terms of biodiversity. It had no protection status. However, in 2018, Dedegül Mountain was taken under protection and added to the Kızıldağ National Park. Köprülü Canyon National Park was also affected by this practice, and Yaka Canyon and its surroundings were included in the Kızıldağ national park. Therefore, the borders of Köprülü Canyon N. Park were narrowed and its area was reduced. The area is a candidate to be one of the pilot areas affected by global warming.

In 2003-2004 and 2018 years, flora, vegetation, important habitats, and endemics of the park were carried out by us. According to the results, a management plan was proposed to protect biological diversity. This article is a part of a big project. The paper is expected that it will be beneficial to practitioner institutions and those interested in the subject. This article is a part of our related works. We hope that the study will help the conservation efforts of the Agriculture and Forestry Ministry.

2. Material and Method

Köprülü Canyon National Park was chosen as the study area, and vascular plants of this park were chosen as the material. The voucher herbarium samples belonging to vascular plants which formed the basis of our research materials were dried, labeled, identified, and written corresponding to the rules. In identifying the samples, it has been used from “Flora of Turkey” (Davis, 1965-1985; Davis, Mill &Tan, 1988).

In the first step, vegetation types and their floras in the park were determined and noted our important observations were in the field. According to the results of observations in the area, vegetation formations, and their vascular plant taxa, important plants and plant centers are determined. Important characteristic taxa were compared with other vegetations and compared with habitat requirements.

Geographical coordinates and altitudes of all the areas were determined by help the GPS instrument by us (Table 1). Pressure factors on important habitats of the park were determined at the area by us. Important plant areas of the park are divided into three groups sensitive, tampon and development zones. The criteria to choose the plants are evaluated in the relevant chapters. Methods to identify the potential of the target species and bioactivities from year to year have been determined.

The general introduction of Köprülü Canyon National Park, which was chosen as the study area, is summarized in Table 1.

Table 1. A summary of geographical and floristical characteristics of the National Park. (Ayaşlıgil, 1987; 1990; Duman, 2005; Ekim et al., 2000; Özçelik 2012; Özhatay et al., 2003).

Geographical Characteristics	Floristic and Vegetational Characteristics
Provinces: Antalya-Isparta **Geographical division**: West Mediterranean **Forest Region Management:** Antalya **Responsible organization:** Antalya District Managements of Nature Protection and National Parks **Grid square system:** For vascular plants: C3 square For Moss: C12 **The total area:** 36.614 ha. **Altitudes:** (110-)130-2505 m. **Certified date:**12.12.1973 **Geographic state:** 37º 17' N, 31º 06' E **Characteristics:** Archeological remnants, natural plant Formations, geological formations	**Total taxa in dangerous:** 48 **Endemic vascular taxa in dangerous:** 44 **Total endemic vascular plant taxa:** 230 **Endemic taxa number for the area:** 12 **Total vascular taxa:** 950, **Genera:** 390, **Families:** 94 **Important stand types in protection for the area:** *Cupressus sempervirens, Abies cilicica* subsp. *isaurica, Castanea sativa.* **Number of main stand types:** 15 **A1**(Species number in danger of the area on the global scale): 5 **A2**(Species number in dangerous of the area on a European scale): 39 **C2** (Habitat number in dangerous by Bern Convention): 5 **Protection prevents** Critical, fire-sensitive.

The stand types and important habitats of the area were marked on the topographical map of 25.000 scales. Some important photos taken from the area had been added to this knowledge. Furthermore, between 2003-2004 and 2018 important observations were made on vegetation and important areas in an area study carried out within the framework of the GEF II project. In the introduction of vegetation a general classification, dominance, and characteristics of the taxa, their horizontal and vertical distributions, and the distribution of higher categories (class, etc.) in Türkiye were included.

Methods for interpretation and application to the practice of the findings:

In the first step, flora and vegetation of the park were determined and noted important plant areas and critical taxa of the field were. Endemic plants of the area and their IUCN risk categories from the floristic list were determined by help of the literatures (Ayaşlıgil, 1987; Ayaşlıgil, 1990; Duman, 2005; Özçelik, 2012; Özçelik, 2018). Important areas of the park are divided into three groups sensitive, tampon and development zones. As a representative of important habitats and areas, target species were determined by the team. The first zone (sensitive) must be protected at all times and conditions. As a representative of important habitats and areas, target species were determined by the research team. The criteria to choose the plants are evaluated in the relevant chapters. Methods for identifying the potential of the target species and bioactivities from year to year have been determined. Target plant taxa were selected and suggested an observing program to protect important habitats and species of Köprülü Kanyon National Park and its surroundings in light of all works of literature and our observations.

Monitoring Principles for Target Species in National Park:

Türkiye is the gene center of many plants and has rich in biodiversity, but the protection of this biodiversity is too difficult since there are not sufficient enough number of experts who are experienced in this field of science, and most importantly there is not sufficient money specifically allocated for this kind of activities. Therefore, we have to choose candidate species for the plant taxa and habitats. With the present experts and budget, the conduction of such protection studies seems to be impossible. Thus, we have just selected only 5 species as target species, the number can be increased if wanted. A summary of the target species has been given in table 2.

Table 2. Target plant taxa which must be monitored for the National Park and their general characters.

Characters	T a x a
Endemic	***Abies cilicica*** subsp. ***isaurica, Origanum minutiflorum***
Only grown in the study area within Türkiye	***Abies cilicica*** subsp. ***isaurica, Cupressus sempervirens, Origanum minutiflorum, Fritillaria latakiensis***
Forest trees	***Abies cilicica*** subsp .***isaurica, Cupressus sempervirens***
Formings stands	***Abies cilicica*** subsp. ***isaurica, Cupressus sempervirens, Castanea sativa***

The vascular endemic plants of the National Park (consist of 230 taxa) and were published IUCN danger categories (Özçelik, 2012) and its vascular plants (Özçelik, 2018). Also, a list of marshmallows (and a new marshmallow) record was previously published (Kırmacı & Özçelik, 2010). The economic plants of the park were determined and published (Özçelik & Bulut, 2021; Ekim et al., 1991; Duman, 2005). What to protect is outlined in this article. Frequently used terms, names, and measures have been abbreviated.

Abbreviations:

**: The taxon is known from gathering type specimen and only one locality.*
***: The taxon can not be observed in the area by us, because its locality is not determined, only recorded by literature (Duman, 2005; Fakir, 2006; Özhatay et al., 2003) in Table 5.*
N: North, E: East, A: Altitude/Altitudes, m: meter(-s), a.s.l.: almost sea level. Repetitive taxa names are abbreviated to be easily understood, other methods are explained where they are mentioned in the findings.

3. Findings and Discussion

Supported by the Global Environment Fund (GEF), the 'National Capacity Evaluation of Türkiye (NCSA) Project within the Scope of Rio Conventions', of which the United Nations Environment Program (UKEP) is the implementing agency), the National Capacity Action Plan started on 23.2.2009, It was finished in 31.1.2011 (Anonymous, 2011-a). The area of habitats and the areas where the species live should be compatible with the area and capacity of the areas where the public will meet their needs. In other words, if the area allocated to the public cannot meet the need, the pressure on the areas to be protected will increase. The most important of these pressures is animal grazing. Areas suitable for grazing may also be inside, outside, or near the park. The grazing capacity of these pasture areas should be increased and a rotational grazing system should be implemented. Thus, the income of the people increases, and the anthropogenic pressure on protected areas and species decreases. Within the Isparta, By the Provincial Directorate of Agriculture (Isparta) Pasture improvement projects were carried out in some highlands in Şarkikaraağaç district (2004-2007). "Göksöğüt-Çiçekpınar Towns (Ş. Karaağaç-Isparta) Pasture Improvement and Management" (TR. Ministry of Agriculture, Forestry and Rural Affairs, Agricultural Production and Development General Directorate, Isparta Provincial Directorate of Agriculture). grass yield increased, animal carrying capacity increased. These projects can be developed and implemented. Türkiye is one of the first countries to identify and complete the Important Crop Areas (IPA). 122 important plant areas were identified (Özhatay, 2003; 2005). After this determination, 22 more important plant areas were identified on the Baku-Ceyhan Oil Pipeline between 2006 and 2007. Thus, the number of IPAs in Türkiye was 144. One of these areas is Köprülü Canyon National Park (Gökyiğit, 2007; Özhatay, 2006). Türkiye has become a party to many international conventions on biodiversity and environmental protection (Algan & Dündar Kaya, 2003; Akarsu et al., 2005; Özçelik, 1995; 2000). For this reason, it is far ahead of other countries in terms of legal regulations and international cooperation.

The vegetation bands changing and named depending on the altitudes have shown good progress of growth and the layers of these vegetations have taken a different characteristic structure. Succession in most of the areas is in the climax. In some locations, it is depressed due to anthropogenic stress factors. The forest trees forming the climax were ***Pinus brutia*** in low altitudes and inner parts which be affected from the sea up to 1000 (-1500 m). ***P. brutia*** is growing in moisture present in the sea areas of the Mediterranean. Moisture coming from the sea is very influenced by altitude. General distribution in the region of ***P. brutia*** is up to 800 m. However, the distribution of an area in the National Park is up to 1500 m. This spread is perhaps exceptional in the world for the cornice. The

proximity to the sea and the effect of the mountains' parallel extension to the sea are numerous. Even though it stands at 1500 m altitude as expected, this stand is weaker than the other stalagmite stalagmites. The best stands of ***Cupressus sempervirens*** occur in 600-1000 m. ***C. sempervirens*** forest in middle altitudes (600-800 m) in the park. This forest is unique in Türkiye. The second forest is in the USA according to mentioned by the Turkish foresters Therefore, protection of this stand is a priority. This forest has been very effective in the construction of the national park. ***Pinus nigra*** subsp. ***pallasiana*** and ***Abies cilicica*** subsp. ***isaurica*** in high altitudes. The plants of the first zone of vegetation are thermophile plants. Maquis vegetation is composed of evergreen xerophytic plants.

Four different ecosystem types can be seen within the area of the national park: Field, Watery, Forest, Maquis, and Alpine ecosystems. The first four ecosystems are greatly under damage as well. This area is also affected by tourism activities, and also forests by local people. The vegetation by physical appearance consists of mainly 3 zones: tree zone, shrub zone, and herbaceous zone. The main stand types in the area are explained in table 3.

Table 3. Important communities and their floristic compositions of the National Park.

Localities and Communities	**Altitudes** (m)	**Important Taxa** (in an important row)	**Other Characteristics**
Gebiz (Serik) town ***Olea europaea*** var. ***sylvestris*** Maquis	180-460	Tree and Shrub Layers ***Olea europaea*** var. ***sylvestris, Ceratonia siliqua, Arbutus andrachne, Rhamnus oleoides, Myrtus communis*** subsp. ***communis, Quercus coccifera, Pistacia terebinthus*** subsp. ***palaestina.*** Herb Layer ***Myosotis refracta*** subsp. ***refracta, Cerastium brachypetalum*** subsp. ***roeseri, Psilurus incurvus, Catapodium rigidum, Alopecurus arundina, Satureja tymbra, Trifolium arvense.***	The association is well growing on calcareous rocks. It forms pure communities in Gebiz town part of the National park.
Quercus coccifera-Juniperus excelsa Maquis	550-960	Tree and Shrub Layers ***Quercus coocifera, Juniperus excelsa, Pistacia terebinthus*** subsp. ***palaestina, Daphne sericea.*** Herb Layer ***Legousia falcata, Bromus madritensis, Trifolium scabrum, Lens orientalis, Galium setaceum, Ranunculus cuneatus, Dactylis glomerata*** subsp. ***hispanica, Conringia perfoliata, Phlomis lunariifolia, Origanum onites, Valantia hispida.***	The association is well growing on calcareous rocks.
Altınkaya, Beşkonak villages and Güller district (Manavgat) ***Quercus coccifera*** Maquis	150-860	Tree and Shrub Layers ***Quercus coccifera, Phyllyrea latifolia, Arbutus andrachne, Cotinus coggyria, Pistacia terebinthus*** subsp. ***palaestina, Myrtus commnunis*** subsp. ***communis, Laurus nobilis, Smilax aspera, Juniperus excelsa.*** Herb Layer ***Filago eriocephala, Euphorbia falcata, Micromeria myrtifolia, Datura stramonium, Phlomis lunariifolia, Saponaria pamphylica, Astragalus densifoliua, Hyperrhenia hirta, Ceratocaphalus testiculatus, Teucrium chamaedrys*** subsp. ***chamaedrys, Origanum onites, Trifolium scabrum, Legousia falcata.***	It well grow on conglomerate rocks
Pure Communities			
Between Beşkonak and Altınkaya villages, Sace stream. ***Pinus brutia*** Stand	160-1100	Tree and Shrub Layers ***Pinus brutia***, ***Phillyrea latifolia, Arbutus andrachne, Cotinus coggyria, Quercus coccifera, Myrtus commnunis*** subsp. ***communis, Pistacia terebinthus*** subsp. ***palaestina, Cistus creticus, Laurus nobilis, Smilax aspera, Juniperus excelsa.*** Herb Layer ***Crucianella latifolia, Phlomis lunariifolia, Silene otites, Silene vulgaris*** var. ***vulgaris, Erysimum kotschyanum, Ptilostemon chamaepeuce, Onosma oreodoxum, Fumana arabica*** var. ***arabica, Polygala anatolica, Ornithogalum nivale, Teucrium polium, Glycyrrhiza asymetrica, Diplotaxis tenuifolia, Micromeria myrtifolia, Satureja tymbra.***	It well grow on deep soils between 600-800 m.

Bozburun mountain. ***Pinus nigra*** subsp. ***pallasiana*** Stand	1250-1360	Tree and Shrub Layers ***Pinus nigra*** subsp. ***pallasiana, Juniperus excelsa, Phyllyrea latifolia, Quercus coccifera, Pistacia terebinthus*** subsp. ***palaestina.*** Herb Layer ***Filago eriocephala, Euphorbia falcata, Datura stramonium, Saponaria pamphylica, Astragalus densifoliua, Hyperrhenia hirta, Ceratocaphalus testiculatus, Teucrium chamaedrys*** subsp. ***chamaedrys, Origanum onites, Trifolium scabrum, Legousia falcata. Myosotis refracta*** subsp. ***refracta, Cerastium brachypetalum*** subsp. ***roeseri, Psilurus incurvus, Catapodium rigidum, Alopecurus arundina, Trifolium arvense.***	It well grow on conglomerate and limestone rocks.
Bozburun mountain. ***Cedrus libani*** Stand	1540-1750	Tree and Shrub Layers ***Cedrus libani, Phyllyrea latifolia, Pistacia terebinthus*** subsp. ***palaestina, Daphne oleoides*** subsp. ***oleoides.*** Herb Layer ***Euphorbia kotschyana, Genista tinctoria, Viola heldreichiana, Lamium garganicum*** subsp. ***reniforme, Lathyrus laxiflorus*** subsp. ***laxiflorus, Salvia tomentosa, Fumaria microcarpa, Potentilla reptans, Teucrium chamaedrys*** subsp. ***chamaedrys, Polygala anatolia.***	It well grow on conglomerate and limestone rocks.
Ballıbucak-Olukköprü villages, Kestanelik locality. ***Juniperus excelsa*** Stand	740-1460	Tree and Shrub Layers ***Juniperus excelsa, Quercus coccifera, Daphne oleoides*** subsp. ***oleoides, Juniperus foetidissima, Fraxinus ornus*** subsp. ***cilicica.*** Herb Layer ***Crepis sancta, Bromus tectorum, Sedum hispanicum*** var. ***hispanicum, Potentilla humifisa, Eragrostis minor, Salvia tomentosa, Viola heldreichiana.***	It well grow on conglomerate and limestone rocks.
Mixed Stands:			
Pinus brutia–Quercus coccifera Stand	180-1240	Tree and Shrub Layers ***Pinus brutia, Quercus coccifera, Arbutus andrachne, Phyllyrea latifolia, Pistacia terebinthus*** subsp. ***palaestina, Cistus creticus, Quercus cerris, Myrtus communis*** subsp. ***communis, Cistus salviifolius.*** Herb Layer ***Lens ervoides, Bolanthus minuartioides, Senecio vernalis, Clinopodium vulgare*** subsp. ***arundanum, Trifolium physodes, Sideritis lanata, Calepina irregularis, Verbascum olympicum, Crepis reuterana*** subsp. ***reuterana, Bromus tectorum, Cephalaria aristata, Teucrium chamaedrys*** subsp***. chamaedrys, Smilax aspera, Legousia falcata.***	It show widely distribution in the area and attract attention.
Bozburun mountain ***Pinus nigra*** subsp. ***pallasiana–Cedrus libani*** Stand	1300-1520	Tree and Shrub Layers ***Pinus nigra*** subsp. ***pallasiana, Cedrus libani, Abies cilicica*** subsp. ***isaurica, Quercus cerris, Pistacia terebinthus*** subsp. ***palaestina, Arbutus andrachne, Phyllyrea latifolia, Cistus creticus, C. salviifolius, Quercus cerris.*** Herb Layer ***Salvia tomentosa, Solanum dulcamara, Valerianella vesicaria, Silene aegyptiaca*** subsp. ***aegyptiaca, Consolida glandulasa, Geranium lucidum.***	It well grow on conglomerate and limestone rocks.
Pinus nigra subsp. ***pallasiana-Abies cilicica*** subsp. ***isaurica*** Stand	1310-1450	Tree and Shrub Layers ***Pinus nigra*** subsp. ***pallasiana, Abies cilicica*** subsp. ***isaurica, Quercus cerris, Pistacia terebinthus*** subsp. ***palaestina. Arbutus andrachne, Phyllyrea latifolia, Cistus creticus, Crataegus*** spp***., Quercus cerris.*** Herb Layer ***Silene fabaria, Crepis sancta, Echinophora tournefortii, Salvia tomentosa, Euphorbia kotschyana.***	It well grow on conglomerate and limestone rocks of Bozburun mountain.
Pinus nigra		Tree and Shrub Layers ***Pinus nigra*** subsp. ***pallasiana, Cedrus libani, Abies cilicica*** subsp***. isaurica, Juniperus foetidissima, Pistacia terebinthus***	It well grow on conglomerate and

subsp. ***pallasiana -Cedrus libani- Abies cilicica*** subsp. ***isaurica*** Stand	1000-1600	subsp. ***palaestina, Arbutus andrachne, Phyllrea latifolia, Cistus creticus, Crataegus*** spp***., Quercus cerris.*** Herb Layer ***Euphorbia rigida, Epilobium lanceolatum Salvia tomentosa, Xeranthemum annuum.***	limestone rocks of Bozburun mountain.
Pinus nigra subsp. ***pallasiana- Cedrus libani- Abies cilicica*** subsp. ***isaurica- Pinus brutia*** Stand	1350-1450	Tree and Shrub Layers ***Pinus nigra*** subsp. ***pallasiana, Cedrus libani, Abies cilicica*** subsp. ***isaurica, Juniperus foetissima, Pistacia terebinthus*** subsp. ***palaestina. Arbutus andrachne, Phyllrea latifolia, Cistus creticus, Crataegus*** spp***., Quercus cerris.*** Herb Layer ***Salvia tomentosa, Clinopodium vulgare*** subsp. ***arundanum, Leontodon oxylepis*** var. ***oxylepis, Euphorbia kotschyana.***	It well grow on conglomerate and limestone rocks of Bozburun mountain. It forms pure groups in Bozburun mountain (Gebiz) and Sümbültepe stream bads and its upper parts.
Pinus nigra subsp. ***pallasiana–Pinus brutia*** Stand	1000-1350	Tree and Shrub Layers ***Pinus nigra*** subsp. ***pallasiana, Pinus brutia, Rosa canina, Pistacia terebinthus*** subsp. ***palaestina, Arbutus andrachne, Phyllrea latifolia.*** Herb Layer ***Euphorbia rigida, Epilobium lanceolatum, Salvia tomentosa, Xeranthemum annuum.***	It well grow on conglomerate and limestone rocks of Sanlı plateu, upper parts of Sümbültepe locality and its fired area
Pinus nigra subsp. ***pallasiana- Juniperus excelsa*** Stand	1100-1310	Tree and Shrub Layers ***Pinus nigra*** subsp. ***pallasiana, Juniperus excelsa, Rosa canina, Pistacia terebinthus*** subsp. ***palaestina, Arbutus andrachne, Phyllrea latifolia, Cistus creticus, Crataegus*** spp. Herb Layer ***Echinophora tournefortii, Ranunculus argyreus, Galium peplidifolium, Origanum minutiflorum, Asperula setosa.***	It well grow on conglomerate and limestone rocks of Sanlı plateu.
Cedrus libani- Pinus nigra subsp. ***pallasiana*** Stand	1400-1700	Tree and Shrub Layers ***Cedrus libani, Pinus nigra*** subsp. ***pallasiana, Pistacia terebinthus*** subsp. ***palaestina, Arbutus andrachne, Phyllyrea latifolia, Cistus creticus, Crataegus*** spp***., Rosa canina.*** Herb Layer ***Viola heldreichiana, Euphorbia kotshyana, Fumaria microcarpa, Verbascum orgyale, Potentilla reptans, Salvia tomentosa.***	It well grow on conglomerate and limestone rocks of Sanlı plateu, Bozburun mountain.
Cedrus libani- Pinus nigra subsp. ***pallasiana -Abies cilicica*** subsp. ***isaurica*** Stand	1480-1750	Tree and Shrub Layer***s*** ***Cedrus libani-Pinus nigra*** subsp. ***pallasiana, Abies cilicica*** subsp. ***isaurica, Pistacia terebinthus*** subsp. ***palaestina, Arbutus andrachne, Phyllrea latifolia. Cistus creticus, Crataegus*** spp***. Rosa canina.*** Herb Layer ***Euphorbia kotshyana, Verbascum orgyale, Sideritis libanotica*** subsp. ***linearis, Lotus corniculatus*** var. ***tenuifolius, Salvia tomentosa, Origanum minutiflorum.***	It well grow on conglomerate and limestone rocks in upper parts of Hasdümen village
Juniperus excelsa -Cedrus libani Stand	1210-1490	Tree and Shrub Layers ***Juniperus excelsa, Cedrus libani, Pistacia terebinthus*** subsp. ***palaestina, Arbutus andrachne, Phyllrea latifolia, Cistus creticus, Crataegus*** spp***., Rosa dumalis, R. canina, Phlomis grandiflora*** var. ***grandiflora.*** Herb Layer ***Festuca valesiaca, Salvia tomentosa, Teucrium polium, Sedum hispanicum*** *var.* ***hispanicum, Bromus madritensis.***	It well grow on conglomerate and limestone rocks in upper parts of Hasdümen village

Within forest areas, the cypress forest is of a special importance. This area is largest cypress forest in the world. Conglomerate, calcareous and limestone rocks covered by typical maquis, rocky shadows and lower parts have pure and mixed types of ***Cupressus sempervirens.*** The forest area has a very rich biodiversity because of various ecosystems. In the conglomerate rocks around Bozburun Mountain, Ovacık Mountain and Burmahan village ***Abies cilicica*** subsp. ***isaurica*** (relict endemic) are rarely present

due to the less humidity. The firs in this area are old and cannot form cones. Therefore, the stand must be protected. Because it cannot create a new stand in its place.

Table 4. Important forest habitats in dangerous which must protect for the National Park by Bern Convention (Ayaşlıgil, 1987; Özhatay et al., 2003; 2005).

Code	Important Stand Types and Habitats in Dangerous
42.A17	Anadolu cypress ***(Cupressus sempervirens)*** forests
421951	Fir ***(Abies cilicica*** subsp. ***isaurica)*** forests
42B12	Cedar forests in Middle Taurus Mountains ***(Cedrus libani)***
45.11	Wild olive ***(Olea europea)*** forest communities
42.6643	Black Pine (***Pinus nigra*** subsp. ***pallasiana)*** forests
42.B12; 4285B1:	Red Pine ***(Pinus brutia)*** forests
Newly suggested	Chestnut (***Castanea sativa)*** forest.

Table 5. Other habitats in dangerous which must protect for the National Park by Bern convention (Ayaşlıgil, 1987; 1990; Özhatay et al., 2003; 2005).

Code	Important Habitats and Communities in Dangerous
44.72	*Liquidambar orientalis* communities
44811	*Nerium oleander* gallery forests
44812	*Vitex agnus-castus* groups
4512	*Ceratonia siliqua* forest groups
44.714	*Platanus orientalis* forest groups
Protection status of the area	Vulnerable

Table 6. Endemic taxa which must be protect previously (Familias and species are in alphabetic rows).

Taxa	Familias	Localities	Habitats	Altitudes (meters)
****Bupleurum davisii***	Apiaceae	Bozburun mountain, between Tazlıyayla-Tozludere	Limestone rocks and forest clearings	1600 m
*****Amphoricarpos paredictus***	Asteraceae	Bozburun Mountain	Limestone rocks	1600 m
Echinops onopordum	Asteraceae	Beşkonak village surroundings	Limestone rocks and forest clearings	150-450 m
Echinops pannosus	Asteraceae	The Canyon environs	Limestone rocks and redpine forest clearings	150-775m
Tanacetum argenteum subsp. ***canum*** var. ***pumilum***	Asteraceae	Bozburun mountain, Tozluçukur plateu	Alpinic steppe	1900 m
Omphalodes riplyana	Boraginaceae	Bozburun mountain, Kurucaova, Taşlı yayla	In shadows of limestone and conglomerate rocks	1700-1900m
*****Campanula antalyensis***	Campanulaceae	Bozburun mountain	Conglomerate rocks	1200 m
*****Cerastium pisidicum***	Caryophyllaceae	Bozburun mountain	Alpinic steppe	1700 m
****Silene delicatula*** subsp. ***pisidica***	Caryophyllaceae	North parts of Bozburun mountain	Alpinic steppe	2000 m

****Silene guerbuezii***	Caryophyllaceae	Aksu, Pınargözü and Yaka stream environs	Pine forest clearings and sides	1300-1750m
Hypericum ternatum	Hypericaceae	The Kanyon environs, Altınkaya /Zerk village, and its environs	Conglomerate rocks	200-600 m
****Crocus asumaniae***	Iridaceae		Oak forest clearings and sides, Macquis	900-1200 m
****Iris pamphylica***	Iridaceae	Sütçüler, Müezzinler village environs	Oak and pine forests clearings and sides	700-850(1500) m
****Stachys antalyensis***	Lamiaceae	Altınkaya/Zerk village, Kestanelik locality	Conglomerate rocks	150-950 m
****Stachys chasmosericea***	Lamiaceae	Upper parts of Oluk ward, Altınkaya / Zerk village, Sümbültepe and Kestanelik localities	Conglomerate rocks	800-1100 m
****Gaudiniopsis macra*** subsp. ***micropyroides***	Poaceae	Beşkonak village, Özüztaşı	Macquis	1500 m
****Nigella arvensis*** var. ***oblanceolata***	Ranunculaceae			
Rhamnus nitidus	Rhamnaceae	Bozburun mountain, Kozludere locality	Pine forest clearings and limestone rocks	700-1300 m
Rosa dumalis subsp. ***boissieri*** var. ***antalyensis***	Rosaceae	Bozburun mountain, plateu, Pınargözü	Alpinic steppe and Black Pine forest	1500-1700 m
****Scrophularia libanotica*** subsp. ***Libanotica*** var. ***antalyensis***	Scrophulariaceae			

The economic plant potential of Köprülü Kanyon National Park (based on our observations, in order of importance for the area):

Forest Trees and Bushes:

Group Gymnospermae: ***Abies cilicica*** subsp. ***isaurica, Cupressus sempervirens, Cedrus libani, Pinus brutia, Juniperus drupacea, Pinus nigra*** subsp. ***pallasiana, Juniperus excelsa, J. foetidissima, J. oxycedrus*** subsp. ***oxycedrus.***

Group Angiospermae: ***Castenea sativa, Liquidambar orientalis, Fraxinus ormus*** subsp. ***ornus, Acer hyrcanum*** subsp. ***sphaerocaryum, A. monspessulanum*** subsp. ***monspessulanum, Alnus orientalis, Buxus sempervirens, Populus tremula, Tilia platyphyllos, Ulmus glabra, Quercus cerris, Q. coccifera, Juglans regia, Laurus nobilis, Pyrus eleagnifolia, Crataegus*** spp., ***Sorbus umbellata, Rhamnus*** spp., ***Cotinus coggryria, Fontanesia philliraoides*** subsp. ***philliraoides, Phillyrea latifolia.***

Medicinal and Aromatic Plants:

Anthemis spp., ***Helichrysum*** spp., ***Achillea*** spp., ***Artemisia*** spp., ***Taraxacum*** spp., ***Paliurus spina-christi***, ***Alcea*** spp., ***Juniperus drupacea*** and other ***Juniperus*** spp., ***Nigella*** spp., taxa of **Orchidaceae,** ***Origanum*** spp., ***Nasturtium officinale***, ***Papaver*** spp., ***Tilia platyphyllos***, ***Hypericum*** spp., ***Salvia*** spp., ***Sideritis*** spp., ***Thymus*** spp., ***Gypsophila*** spp., ***Digitalis*** spp., ***Vincetoxicum*** spp., ***Glycyrrhiza*** spp., ***Gentiana*** spp., ***Sambucus ebulus***, ***Valeriana*** spp., ***Valerianella*** spp., ***Datisca cannabina***, ***Solanum*** spp., ***Datura stramonium***, ***Hyoscyamus*** spp., ***Verbascum*** spp.

Fruits: Natural and Local Varieties:

Castenea sativa, ***Olea europea***, ***Malus sylvestris, Eriolobus trilobatus, Punica granatum, Cydonia oblonga***, ***Vitis vinifera***, ***Ficus carica*** subsp. ***carica, Cornus mas***, ***Myrtus communis*** subsp. ***communis, Crataegus*** spp., ***Cotoneaster nummularia, Rubus*** spp., ***Amygdalus*** spp., ***Prunus*** spp., ***Pyrus*** spp., ***Pistacia*** spp., ***Ribes orientale***.

Farm Plants:

Cicer anatolicum, ***Pisum sativum, Vicia sativa*** subsp. ***sativa, V. sativa*** subsp. ***nigra***, ***V. sativa*** subsp. ***incisa***, ***V. sativa*** subsp. ***amphicarpa***, ***V. narbonensis*** var. ***narbonensis***, ***Lathyrus sativus*** and other ***Lathyrus*** spp.

Vegetable Plants:

Daucus spp., ***Portulaca oleracea***, ***Rumex*** spp., ***Polygonum*** spp., ***Tragopogon*** spp., ***Scorzonera*** spp.

Industrial Plants:

Pimpinella spp., ***Papever*** spp., ***Linum*** spp., ***Gypsophila*** spp., ***Rumex*** spp., ***Reseda lutea***, ***Rhus coriaria***, ***Alkanna*** spp., ***Pimpinella*** spp., ***Papever*** spp., ***Linum*** spp., ***Gypsophila*** spp., ***Rumex*** spp., ***Reseda lutea***, ***Rhus coriaria***.

Hazy Ornamental Plants:

Saponaria spp., ***Thalictrum orientale***, ***Paeonia mascula***, ***Hesperis*** spp., ***Malcolmia*** spp., ***Viola*** spp., ***Ricotia*** spp., ***Fibigia*** spp., ***Aethionema*** spp., ***Aubrieta*** spp., ***Rosa*** spp., ***Glaucium*** spp., ***Papaver*** spp., ***Eranthis hyemalis***, ***Colchicum*** spp., ***Crocus*** spp., ***Fritillaria*** spp., ***Iris*** spp., ***Muscari*** spp., ***Tulipa*** spp., ***Dianthus*** spp., ***Allium*** spp., ***Gladiolus*** spp., ***Ornithogalum*** spp., ***Veronica*** spp., ***Geranium*** spp., ***Silene*** spp., ***Scorzonera*** spp., ***Tragopogon*** spp., ***Helichrysum*** spp., ***Jurinea*** spp., ***Centaurea*** spp., ***Sympphytum orientale***, ***Corydalis rutifolia*** subsp. ***erdelii***, ***Dianthus*** spp., ***Alcea*** spp., ***Lonicera*** spp., ***Rosularia*** spp., ***Sedum*** spp., ***Sempervivum*** spp., ***Parnassia palustris***, ***Anemone*** spp., ***Consolida*** spp., ***Delphinium*** spp., ***Ranunculus*** spp., ***Cyclamen*** spp., ***Galanthus*** spp., ***Sternbergia*** spp.

Table 7a. Important Plant Centers of the National Park.
***:** Numbers of endemic or important nonendemic(rare) plant taxa growing in the park

No:	Localities	Important Plant Groups Growing in the Localities as due to Ecological Conditions	Total Taxa Numbers*
1.	***Yaka (Kapiz) Stream, Sanlıbeli and its environs***	*Maquis, shrubs, rock vegetations, Pinus nigra stands, and hydrophytes on particular limestone rocks:* (N: 045-77-167; E: 025-19-997; A: 1000-1800 m).	275
2.1.	***Yeşil Vadi*** (Green Valley in English)	*Coniferous woodlands and partly oak forest on limestone and conglomerate rocks:* (N: 37-10765; E: 031-08-185; A: 1140-1780 m).	72
2.2.		*Xeromorphic dwarf shrubs and cushion forms on steppe vegetation and some geophytes like Asphodeline on conglomerate slopes:* (N: 37-10765; E: 031-08-185; A: 1630-1950 m).	
2.3.		*Rock vegetation on conglomerate rocks and their ridges:* (N: 37-10765; E: 031-08-185, A: 800-1380 m).	
2.4.		*Meadows on colluvial soils of subalpine belts:* (N: 37-10765; E: 031-08-185; A: 1300-1900 m).	
3.1.	***Villages of Delisarnıç, Sümbültepe, Altınkaya, Oluk and Çaltepe; Yokuşbaşı and Kestanelik villages' environs***	*on Conglomerate and limestone rock:* (N: 37-12-596; E: 031-08-509; A: 280-1900 m).	70
		Maquis vegetation on conglomerate rocks: (N: 37-12-596; E: 031-08-509; A: 280-760 m).	
3.2.		*Pinus brutia* stands mixed with oak and cedar and fire clearings on conglomerate rocks: (N: 37-12-596; E: 031-08-509; A: 800-1150 m).	
3.3.		*Coniferous woodland, cedar, juniper, fir on conglomerate rocks:* (N: 37-12-596; E: 031-08-509; A: 1140-1450 m).	

3.4.		*Rock vegetation on conglomerate rocks:* (N: 37-12-596; E: 031-08-509; A: 700-1900 m).	
3.5.		*Chesnut trees in cultural areas:* (N: 37-12-596; E: 031-08-509; A: 1000-1200 m).	
4.	***Köprü River and its environs***	*Maquis, rock vegetations and hydrophytes:* (N: 37-11-241; E:031-10; A: 150-1400 m).	55
5.		*Dwarf shrub communities, maquis vegetation, dry grasslands, and Pinus brutia stands on limestone and conglomerate rocks:* (N: 37-08; E: 031-11; A: 150-500 m).	37
6.1.	***Bozburun Mountain***	*Xeromorphic dwarf shrubs and steppe vegetations belonging to genera mainly Astragalus, Bromus on conglomerate and limestone rocks and their ridges:* (N: 37-20; E: 031-01; A: 1600-2380 m a.s.l.).	30
6.2.		*High mountain steppes:* (N: 37-20; E: 031-01; A: 2000 m).	
7.	**Bozburun Mountain**	*Xeromorphic dwarf shrubs, mainly in the form of spiny cushions, and high mountain meadows on conglomerate rocks:* (A: 1700-2380 m).	**15**
8.1.	***Güller village; Koç and Kısık streams and their environs***	*Maquis vegetation on conglomerate rocks* (200-760 m).	**12**
8.2.		Cupressus sempervirens stands and its monumental trees on conglomerate rocks (460-700 m).	
8.3.		*Rock vegetation on conglomerate rocks* (130-700 m).	

Table 7b. Target taxa which must be monitored in the Park and its environs suggested by a floristic researching team.

Plant taxa	Reasons to be selected target plants	
	Importance for the national park	**Ecologic and floristic reasons**
Abies cilicica subsp. ***isaurica*** **Family:** Pinaceae **Vernacular names:** İledin Köknar, Göknar	-A coniferous forest tree. -Represent the family Pinaceae in the area -Its stands cover higher localities of the park -Forming mixed stands together with ***Cedrus libani*** and sometimes ***Pinus nigra*** subsp. ***pallasiana*** between 1000-2000 m.s.l.; so it can represent also ***Cedrus libani***. -Branches are used as animal feed and so it may be under pressure more than ***Pinus nigra*** subsp. ***pallasiana.*** It forms a transition zone to alpine vegetation in Bozburun Mountain. Thus, biotic pressure factors may affect this tree at first. For this reason, there is no reason to determine other plants for the alpine vegetation zone of the mountain	-Relict endemic -East Mediterranean element -Distributed in only Western, Taurus in Türkiye. -Ecological tolerance is less than other taxa in the family, thus can give an opinion for sudden environmental changes. It forms mixed stands with ***Cedrus libani, Pinus nigra,*** and ***Juniperus excelsa*** in the environs of Burmahan village (Gebiz) and slopes of Ovacık Mountain between 1140-1780 m. asl on conglomerate rocks. In addition, it is grown on conglomerate and limestone between 1200-1800 m on the mountain.

Cupressus sempervirens **Familia:** Cupressaceae **Vernacular names:** Karaservi, Selvi, Mezarlık servisi	- A coniferous forest tree. - Only representative of its genus and family in Türkiye, - Cultured especially in cemeteries, parks, and gardens, and also it is a hedge plant in Western and Southern Turkey, - Populations show genetic variation in the area, - Forms strong stands, - Only stand in Türkiye, - The biggest stand of ***C. sempervirens*** in the world, - Many monumental trees of the species in the area, - Dominant forest tree for stream beds and low altitudes in the parking area, - May become a symbol for the national park.	- Chorotype is East Mediterranean, only in the Lake district (Antalya – Isparta). - Vertical distribution on conglomerates and limestones among 300-1200 m.
Castanea sativa **Familia:** Fagaceae **Vernacular Name:** Kestane, Anadolu Kestanesi	-Angiosperm forest and fruit tree, -Representative of Fagaceae, -Cultured by Romans in the past around the locality of Kestanelik between Ballıbucak-Olukköprü villages for economic purposes and also protected as a small grove by local people, -Many monumental trees of the species in the area, -Represent the forest formations of middle altitudes like 850 m.in the national park.	- Euro-Siberian element, - Common in Turkey, - Not a natural species in the region, - Seeds are edible and therefore protected by the villagers, - No new generations in the area. **Flowering period:** 6-7 **Fruiting period:** 9-10
Origanum minutiflorum **Familia:** Labiatae (Lamiaceae) **Vernacular names:** Sütçüler kekiği, Tota kekiği**,** Yayla kekiği, Aşkekiği, Çorba kekiği)	- Medicinal and aromatic species, - Export products by villagers in Lakes District and the park area, - A herbaceous dicot plant is present in the open land and understorey. Labiatae is the most important family of medicinal and aromatic plants. Its gene center is in the Mediterranean region The species may represent its own family.	- Rare and endemic (it is grown in national parks and environs), - East Mediterranean element, - Vertical distribution on crevices and limestone between 1200 to 1800 m with other Labiatae taxa, - Well growing in the area. **Flowering period:** 7-8.
Fritillaria lakakiensis **Familia:** Liliaceae **Vernacular names:** Gupkup otu, Ağlayan gelin	- A herbaceous geophyte plant present in the open land and understorey of ornamental value, - Monitoring is not difficult throughout the year because its habitats are very near to the village (Altınkaya), - It is well known by local people.	- Rare and East Mediterranean element, - Grown only in Antalya (doubtfully also in Hatay), - On limestone rocks under the deciduous trees and clearings (specially in ***Quercus*** stands) at middle altitudes (like800-1200 m). **Flowering period:** 3-4
Cicer incisum	- Wild chickpea (foodstuff), - Its fruits are bigger than other ***Cicer*** species.	- It is seen in alpine vegetation and rocky places
Lens ervoides	- Wild lentil(foodstuff)	- On rocky places of ***P. brutia*** forest, - Mediterranean element.
Lens orientalis	- Wild lentil(foodstuff), - It is allied to ***L. culinaris*** Medik. which is cultured.	- Under oak and pine forests, on destroyed places, vineyards, and field sides
Pisum sativum subsp. ***elatius*** var. ***elatius***	- Wild pea (foodstuff), - Wild form of the pea which is cultured.	- On rocky places and field sides up to 1700 m.
Pisum sativum subsp. ***elatius*** var. ***pumilio***	- Wild pea (foodstuff), - Wild form of the pea which is cultured.	- On rocky places of maquis and field sides between 700-1800 m.
Vavilovia formosa	- Wild, but an important fodder plant, - Important in gardening and flowering.	- It is grown on stone piles of high mountain vegetation (after 2000 m).
Vicia sativa subsp. ***sativa***	- Fodder plant	- It is a cosmopolitan plant up to 1600 m. in different habitats
Vicia sativa subsp. ***nigra***	- Fodder plant	- It is a cosmopolitan plant up to 2000 m. in different habitats

Liquidambar orientalis	- *Medicinal and aromatical* - Forest tree	- Relict endemic - In and around stream beds
Triticum baeoticum subsp. ***baeoticum***	- Wild wheat(foodstuff)	- Present in intense grazing places, field margins, and roadsides, under forest, at 100-1600 m. - Scattered throughout Türkiye
Cicer isauricum	- Wild chickpea(foodstuff)	**- Endemic,** East Mediterranean element; - It grows under ***P. nigra*** forest (on volcanic rocks only in Antalya district and its environs)
Vicia narbonensis	- Fodder plant - It is cultivated	- It can be grown in field sides, limestone, and volcanic areas up to 1500 m**.**

Table 7c. Potentially important other target plants which must be monitored year to year.

Plant taxa	Economic Importance	Geographical and Ecological Characteristics
Lathyrus sativus	Field plant (accepted also as weed)	- It is grown around the cultivated land up to 1600 m.
Cedrus libani	- It is a very important forest tree in the Mediterranean region - Medicinal plant, - It is naturally represented own genus in Türkiye	- It is a dominant forest tree formed as mixed and pure stands up to1000-2000 m.
Juniperus drupacea	- A typical forest tree in the Taurus Mountains and the Mediterranean region, - It is used for purposing Medicinal, Food and - Fodder	- It is grown seldom in forests and shrubs on general limestone between 700-1600 m.
Juniperus oxycedrus subsp. ***oxycedrus***	- A forest tree is sometimes in shrub form in Türkiye. - Medicinal plant	-It is grown abundantly in maqui shrubs, oak, and conifer forests at middle altitudes
Juniperus excelsa	- A forest tree in sometimes shrub form of Türkiye in general - Medicinal plant	-Its populations are often or seldomly appear in forests and maquis on general limestone up to 1300-2400 m. It is among forest trees showing tolerance to cold and drought
Pinus nigra subsp. ***pallasiana***	- It is a very important forest tree of Mediterranean region, - Medicinal plant.	-It is a dominant forest tree formed as mixed and pure stands up to 300-1000 m. -After red pine zone, it is the dominant pine species in Western Anatolia
Pinus brutia	- It is an important forest tree in the Mediterranean - Medical plant.	- It is dominantly grown as a forest tree up to 1200 m.
Prunus x domestica	- It is a fruit tree - It is wild species specific to Turkey	- Grown in Kozludere nearby the North part of Bozburun mountain (1200 m).
Cerasus prostrata var. ***prostrata***	- It is a fruit tree - It is wild species-specific to Turkey	- Grown in Bozburun mountain, Taşlı Yayla, and rocky places up to 1800-2000 m.
Amygdalus orientalis	- It is a fruit tree - It is wild species-specific to Turkey	- Grown in Kozludere nearby the northern part of Bozburun Mountain on limestone rocks (1200 m).
Pyrus amygdaliformis	- It is a fruit tree - It is wild species-specific to Turkey	- Grown on maques areas and open fields within the forests up to 1500 m.
Pyrus elaeagnifolia subsp. ***elaeagnifolia***	- It is a fruit tree - It is wild species-specific to Turkey	- Grown in Kozludere nearby the North part of Bozburun mountain (1200 m).
Lactuca intricata	- It is a vegetable plant	- Grown on the sloppy areas and rocky area starting from the middle altitudes up to the high plateau vegetation

4. Conclusion and Suggestions

Many pressure factors influence the National Park:

- The area is in the Mediterranean region, mostly covered with red pine and cypress forests. Therefore, it is very sensitive to fire. Every year, fire breaks out in the region.

- The proposal of building a dam on Köprü ırmağı was stated as a dangerous factor by Özhatay et all., 2003). But nowadays the dam construction is not included in the program, so this danger is not seen.

- Manavgat and Serik cities demand drinking water from the river. The request was denied.

- Constructions for touristic purposes have increased, especially in Mediterranean and Aegean sea coasts.

- Medicinal and ornamental plants, also valuable as gene sources, have generally been over-collected for some economical purposes from the area. Many plants due to their known medicinal properties are grown within the National Park area. These plants are directly collected from nature and a great amount of them are exported, especially from the Isparta part where many non-native residents have been visiting here for tourism, but they are actually involved in the collection and taking away the bulbous plants. ***Orchis*** (wild orchid), ***Cyclamen, Galanthus, Eranthis, Leucojum,*** and ***Anemon***e. ***Fritillaria*** and ***Tulipa*** spp. are very common examples of these plants.

- Intensive animal grazing and harvesting of grass have caused a remarkable reduction in the number of plant species and have caused serious damages to their local populations in some areas of the national park. Some habitats are under several stress factors. Therefore, immediate protection actions are needed. The recommendations on such floristic, economic, and protection actions were given in Table 7.

There are two water sources named Gökçesu in Beşkonak village. One of them has high capacity **(**located in N= 37º10' 481; E= 031º 11' 162; A: 152 m). Drinking water for Karabük village is obtained from this spring. The second one (N= 37º10'803; E= 031º10'970; A: 47 m) has relatively low capacity.

If the waters are taken away for the cities, local people will turn to be against the state. Also, natural hygrophytic vegetation and concerning the situation ecosystem structures will be destroyed. In 1992-1995 years, drinking water for Gebiz town was provided from Kısık Stream (Hatipler part of Hasdümen village belonging to Gebiz town). In Günlüklüyatak and Kızıltaş localities ***Liquidambar orientalis*** stand was suffered from the practices. The ecosystem needs immediate protection efforts. Not only the local people but also the state should cooperate in the protection of natural structures of the national park (Kırmacı & Özçelik, 2006).

Preserving the gene origins of plants became a serious global problem today. Successful protection depends on the determination of the number of gene resources and the determination of risk factors in Türkiye have gone a step further by determining IUCN Risk Categories. In addition, Türkiye signed the agreements on plants and the protection of their habitats (Rio and Bern conventions). However, monitoring studies on a species under risk cannot be done either on a national or international scale. Because of the impossibility of putting live creatures in front of politics all the plant genetic resources cannot be protected at the national level. Basic protection rules are determined as ecosystems at the international level. Setting up national parks and continuing them in a country, in which the environment has been generally damaged in Türkiye, there is a need for international cooperation. Otherwise, no useful outcomes can be expected from such a conservation system. In Türkiye, the people of rural regions can usually regard the government policy on National Parks as troublemakers for their life and see no advantages of such policies with which their life would change. However, our study area attracts the attention of tourists coming to Türkiye for the natural landscape. If the natural life of a country is destroyed it will also be lost its importance for tourism and agriculture. Thus, the gene resources of plants must be protected from the destruction of tourism. To reduce up to minimum degree negative effects of humans (local people and visitors, tourist facilities, etc.) on the area and its

environs using a good management strategy of the national park. To supply new financial sources for local people and to strengthen their socio-economical situations.

- The easiest way of protection is natural protection (in situ) since there is integrity between the living creatures in the natural environment. The following measures must be taken into consideration when attempting the protection of natural habitats:

- Some plant species may exert pressure on rare and site-specific plant species. The pressure of such species should be reduced.

- Determination and protection of the important areas to be protected.

- Determination and monitoring of the target (indicator) species.

- A strategic governmental management plan dealing also with public concerns should be prepared and carried out.

- Fishing by dynamite, electrical current, or poisonous plants like spurge or mullein in some running or steady waters in the park area is common. These dangers should be avoided.

Pressure factors in the field should be identified and monitored:

-The effects of various environmental stress factors on target species,

-The effects of harmful organisms on target species and the methods to fight them off and

-The effects of global changes on target species.

The pressing factors mentioned above on the area must be eliminated:

- Gökçesu springs must be preserved in their present state (A technical report was prepared on this subject and given to the Nature Conservation and National Parks General Management).

- Overgrazing must be prevented. Grazing plans must fit with the area's ecosystem so that the plants there can flourish. In the early spring and late autumn (seeding season), grazing must not be allowed.

- In the protection area mixing of foreign genes to natural populations or exchange of them must certainly be prevented.

In this plan, nearly all of the programs for the preservation of the genetic diversity of plants contain forest habitats. There is not a program that aims at only cultivated plants, or their natural relatives. In my opinion, it is not true that only to protect wild fruits, vegetables, feed, etc. plants in the area. These are the parts of a forest ecosystem. They continue to exist in the dominance of forest trees that compose the climax. For example, wheat (***Triticum baeoticum***) is a sub-forest plant. Most of the bulbous ornamental plants are among such plants. In this system, dominant forest habitats are just like the head of a state. When the head ceases to exist, the system will collapse, stop functioning properly. It is much easier to protect and watch an individual than the population. There is an economic dimension of this as well; therefore, areas have been selected to protect several species rather than just one species.

To understand that the habitats are protected and to take adequate measures promptly, the indicator plants were selected and called target or flag species. Examining the populations of these species will provide information about the course of important habitats as well as protect the relevant target species. All these efforts are to preserve the genetic diversity in the national park. As these habitats are protected, the animals' homes (home range) will be guaranteed and wildlife will flourish.

- For protecting genetic varieties by distinguishing target species, population size, and distributions throughout the country; plant species and density inventories should be done.

- Negative factors must be determined in such areas and to get rid of these negative factors, precautions must be taken. Methods that are not natural (methods that do not fit the ecosystem) must be avoided. Shaving regions and artificial rejuvenation are the biggest threats in this respect.

- The ***Liquidambar orientalis*** and ***Quercus vulcanica*** forests nearby can be added to the national park or a connection between these forests and the national park should be made.

- Long-term development plans should be accelerated.

- The Mediterranean region is generally covered with fire-sensitive, mostly red pine forests. Forest fires peak in June, especially in July and August months. If the relative humidity falls below 20%, wind speed reaches 50 km/h, and temperature 35 °C, the danger dimension is very high. *Recommendations are:* Sensitive forests and their borders should be determined while planting trees in burned areas. Vegetation of fire-resistant trees should be created with a 1-2 km long cordon at the edge of the settlements. These buffer zones should be irrigated during the fire and sensitive periods, and fire-fighting litter should be cleared. Buffer zones should be created to stop the fire on certain mountain ridges, taking into account the direction of the wind, its speed, and possible localities where sabotage actions can be made. Roads and water wells should be opened to facilitate the movement of land vehicles from these areas.

When a fire breaks out, a forest engineer at the command center should be able to calculate where and how long this fire can be stopped using scientific methods. If the fire passes the first rescue zone, it must be stopped at the second barrier. Engineering projects and calculations should be made for this purpose. Practitioners and academics should do postgraduate studies and research together within the scope of global warming projects. Considering that almost all of the fires were started by carelessness and willful intent, early warning and camera systems that are sensitive to fog, smoke and heat should be installed in the appropriate places, recording sufficiently close-ups. Accommodation in the forest during sensitive periods, picnic and fire, etc. should be banned. The usefulness of fire watchtowers should also be discussed.

Areas of the national park should be divided into three parts:

Main zone (Sensitive Zone):

These zones are very important in floristic terms. The floristic structure of the national park and important vegetation types can be seen in these areas. Therefore, in these zones, the natural structure must not be violated or modified. No biotic or anthropologic pressure factors must be allowed. Such zones, with their present conditions, are very near to their natural state. They must certainly be protected.

These places are:

- Yaka Deresi (Kapiz stream): This is the smallest locality, but very rich in the endemic taxon. As a horizontal, at least 100 m (in some places up to 300 m) along the stream should be kept under protection.

- The old ***Pinus nigra*** forest above the Pınargözü, bordering the national park.

- The canyon, which is 14 km in length, has rich plant diversity and water sources in some parts. At least 100 m (in some places up to 300 m.) along the stream should be kept under protection.

-Cypress ***(Cupressus sempervirens)*** Forest in locality Yeşilvadi (its borders must be determined and preserved).

-Relict endemic ***Abies cilicica*** subsp. ***isaurica*** (Köknar, İledin) forest, boundaries of which must be found by Bozburun Mountain and Burmahan-Gebiz districts.

-High mountain vegetation in Bozburun mountain and other high places.

Second zone (Tampon Zone):

This zone is to be provided with protection of the first zone. It is neither right nor possible to stop people from benefiting from the national park. A tampon zone needs to be established to keep the 1st zone away from pressures. This zone contains some localities to which the local people can benefit without any damage to the natural structure. In these parts, the local people and others (who wish to do so) should be allowed to walk around freely.

Picnic sports, recreational areas, highland activities (animal grazing by nomads) cultivated parts, graveyards, parts belonging to the ministry of forestry (appropriated for logging) should be within the boundaries of this zone. This zone will meet the needs of the local people. This zone contains destroyed forests, bushes, and semi-natural parts.

Semi-natural areas:

-A grove of chestnut.

On the way to Altınkaya (Zerk/Selge), along the canyon, the wood area, which is made up of olive trees and ***Ceratonia siliqua*** trees. The olive and crop trees (***Ceratonia siliqua***) in this part may be grafted under the control of forestry officials and the fruits may be given away to the local people. The ***Pinus brutia*** forest on the south side of the canyon may also be used for cutting or as picnic spots.

-The highlands above Ballıbucak: Highland activities can be allowed in this zone in a restricted way.

In this part, ***Thymus, Origanum*** spp. can be cultivated and apiculture can be done. Plants such as ***Galanthus, Corydalis, Fritillaria*** spp. which grow in the national Park's flora can be cultivated and sold under the guidance of experts.

-Graveyards.

-Satan Rocks in the south of Altınkaya (Zerk / Selge) village

Third zone (Development Zone):

This zone will be accessible to human needs but within the limits of the rules. In this zone, local people can engage commercial activities for the needs of the tourists visiting the area, with the least damage to the zone. Parking shopping markets and information boxes, temples, toilet facilities, paths for mountain sports will be within the boundary of this zone. These areas are:

- The ancient theatre and its neighborhood near the village of Altınkaya,
- Residential places,
- The spots occupied by the tourist facilities on each side of the canyon,
- Paths and
- Tour paths.

Although phytosociological studies have been done in many areas, there is very little recent information about the spread of distinguished associations. Although present floristic and phytosociological studies indicate the genetic diversity; however, they should also deal with the biology, population genetic, and auto ecology of the target species chosen to be protected. These studies should not be restricted to the zone where the concerned species is preserved. At least, the places out of the protected zone should be included.

The production of scientific data should be sustainable, the data should be archived and interpreted. Therefore, within PAMAs a Data Management Unit should be set up and information should be gathered and interpreted. The success of the project depends on the effective evaluation and interpretation of the gathered data. The zone may be kept under surveillance using technology.

Suggestions on the area protect can be summarized as below:

- Annual re-evaluation of management strategies will be helpful.

The areas concerned are natural or semi-natural areas providing sustainability of genetic diversity; defined as plant associations in natural habitats possessing diverse flora with species threatened by extinction and different age classes together, also suitable for selection of target species for protection, economically important zones. The areas are most ideal for the protection of animals and maybe resized according to changing situations.

- Early warning systems must be established and improved.

The sustainability of ecosystems to protect genetic diversity is inevitable. Interspecific competition is an important step for genetic diversity. So the growth areas where the target species (except *Castanea* forest) are dominant must be added to core protection zones, and tampon belts enveloping belts must be formed.

- Realization and successful operation of management are very difficult and complex.

There are many problems with land ownership and use in the area. These problems bring forest organizations and local people face to face. The first principle is to get public support as studies like this cover many localities and have social and economical sides. Although all of the areas are governmental, traditional land use and lifestyles may hinder such programs. Individuals and studies opposing the local people must not be. Total acceptance can not be expected in people, but public support should be formed to rule.

- Education**:** Education is a key to environmental consciousness and protective cautions. We witness damage to biodiversity in the area both by the official way and local people. The reason for this is ignorance. Academic circles and implementing institutions should cooperate. Foresters often do not recognize or care about herbaceous plants. However, most of the biodiversity comes from herbaceous plants. The plant imported plants (*Ailanthus altissima, Robinia pseudoacacia,* etc.) in some places. These species are invasive, disrupting the natural flora.

- Increasing the life standards of local people without some important investments is never possible. The education of people is related to their living standards and without education, the area cannot be protected. Education is a continuous process; education efforts will be ruined if voluntary trainers sent by national park management are confronted by local people due to prejudice. Thus, such education can only be provided by the youth sent to education.

- Underdeveloped countries must be supported as financial and technical by developed countries.

Plant genetic resources are divided into various countries, in other words, protection of these is a global issue and international cooperation is needed. Accordingly, Türkiye, being rich in biological diversity, should improve cooperation with other countries.

Results on the study area in respect to the important habitats and plant localities will be explained under 3 sections; important plant areas, economic plants, and endemics. There are important running waters in the park, like Kapiz (Yaka) stream and the Köprü river. Besides, there are seasonal brooks. All water bodies in the park area have freshwater character and this enabled the formation of freshwater ecosystems around the park. Especially in Yaka (Kapiz) stream endemics, rock, and hydrophytic plants are dominant. *Pinus nigra* stands cover most of the area. Higher parts of stands include older black pine trees (on average 700 years). An important portion of these can be accepted as monumental trees. The area has the richest in floristic means in Lakes Region.

Suggestions of our team on the protection of the national park can be listed as:

We should continue to be in communication with university academicians and they should be asked for consultation whenever it is necessary to do so.

- Biodiversity conservation efforts in the park can be developed and improved by taking some programs of the Botanical Gardens as an example. Educational programs can be organized especially for children (Anonim, 2011-b).

-Finding the actual reasons for anthropogenic stress factors in the area is almost impossible

-Understanding the reasons for forest fires and the best caution methods is necessary.

-Increasing the life standard of local people is very difficult. State promotion for the cultivation of *Origanum minutiflorum* (Oregano) will be promising to local people.

-To find the mistakes results must be controlled. This requires care at each step and national park management must avoid such mistakes. All help possible to be given to poor local people must be served.

-To clarify the situation is very difficult as finding out the real reasons is impossible. To us, real reasons must be unemployment and illiteracy. It cannot be dealt with by local people without a good management plan. This plan should be long-term and should be compatible with the realities of the region.

Suggestions for monitoring target species populations in the National Park

-Protection areas should be as large as to include enough number of the target species to protect biodiversity as target species and other species can conduct an intra- and infraspecific dynamic relation in between.

-Representative populations of target taxa should be chosen from the localities most affected by important environmental factors.

-Observing all populations of the target species may not be possible. Therefore, the populations showing typical characters with enough candidate populations should be protected (on typical main rocks, in ice hollows, etc.).

-If it is possible populations of the target species in extreme sides of the national park should be protected and observed. Central areas of the studied region cannot fully representative of the stress factors and candidate populations

-A complex geographic diversity study should be done for understanding the degree of diversity between the target species present in stands.

-Origin and bio-systematic studies are urgently needed for the stands of target species.

-The best way to protect stands is to protect them together with their ecosystems. But in the circumstances where there are no suitable economic and social conditions, the candidate populations on sampled habitats should be protected.

The first stage of the plan is to watch the target species according to the above-mentioned plan. In the protection of biological diversity, the target is to preserve the ecosystem, species, individuals and to preserve genetic diversity among the species. The protection of plant gene resources and habitats are the same things Because, unless habitats are protected, species and subspecies cannot be protected. It is essential that protect national parks and even the whole country. However, the economic conditions do not render this. At first, the taxa which are important on a global or national scale have been chosen as target species in the perspective of endemic and economic terms. Turkish plan for the protection of plant genetic bio-diversity on its habitat (In Situ) (Kaya et al., 1998) has been chosen as the main criteria.

The main purpose of monitoring and preserving the target species, is to preserve the biological diversity, natural environment, and the wild allies of cultivated and cultured plants. For example, with the protection of ***Abies cilicica*** subsp. ***isaurica*** forest, alpine mountain forest zone mixed stands and their populations, alpine vegetation, and many endemic and economic plants will be under protection as well. Because this forest also consists of Cedrus libani and Pinus nigra trees and other deciduous trees, not only the concerned species but also many other tree species will be under protection. In the upper zone, mostly ***Pinus nigra, Juniperus foetidissima, J. excelsa, J. oxycedrus, Quercus*** spp., ***Ostrya carpinifolia, Acer*** spp., and other plants flourish together. This area is where the pressing factors which pose threats exist. Therefore, the possible stress factors in the upper zone will at first affect this forest. Once this forest gets damaged, the alpine region will be under threat and it will be easier to compare with upper zones.

Cypress (***Cupressus sempervirens***) forest, on the other hand, is another value of biological diversity itself. The species and their ecotypes with rich genetic diversity can more easily adapt to environmental conditions which can be changed by time and location. Species with rich genetic diversity are more effective and beneficial in meeting the human needs that change with scientific and technological developments.

Kuyucak plateau, Ballıbucak to Çatak hill, very degraded juniper forest, no protection required.

There are Sandal trees (*Arbutus andrachne*) under the cypress forest, in the upper parts of Büyrümköprü and Olukköprü. The cypress forest cliffs are rich in endemics. Ekiz Plateau is partially rich in endemics. This area is within the borders of the National Park. Bozburun mountain; south and southeast slopes, Deyneklidere, Bağılovası (Cypress forest) are rich in endemics. Cypress forest (almost 400 ha), Zerk (Altınkaya)-the upper side of Büyrümköprü (hard to damage due to high slope). Delisarnıç village and its surroundings are rich in endemics and are already protected.

Bozburun mountain cliffs (southeast), overlooking Zerk/Altınkaya village, Kilten Plateau is rich in endemics but does not belong to the National Park (it lies within the borders of Bozburun Mountain).

The study area and its surroundings are one of the pilot regions most affected by global climate change. The changes here will create important data for the whole world.

Acknowledgments and Information Note

In 2003-2004 years, World Bank and the Ministry of Environment and Forestry of TR. supported the Project(GEF II). I would like to thank the relevant institutions and our research team. The article complies with national and international research and publication ethics.

Author Contribution and Conflict of Interest Disclosure Information

All authors contributed equally to the research article.

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Journal of Protected Areas Research
JoPAR, 2022, 1 (1), 24-33
e-ISSN: 2822-2733
Research Article

Journal homepage:
https://mimarlikbilimleri.com/ojs/index.php/journalofprotectedareasresearch
E-mail: journalofprotectedareas@gmail.com

Population Status of Wild Goat (*Capra aegagrus* Erxl. 1777) in the Yazılıkaya State Reserve in Isparta

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Abstract

Wild goat (Capra aegagrus), which is one of the most important members of biological diversity in the Mediterranean Region of Turkey, is also the major game species in the country. For this reason, it is also important to monitor the population trend of the species. The study was carried out between 2008-1019 in Yazılıkaya State Hunting Ground (SHG) in Sütçüler District of Isparta province. After being declared as an SHG in 2007 its status was revised in 2020. The study area was 55 hectares. The population in the SHG was observed by the vantage point counts technique. Microsoft Excel Program was used to evaluate the census results and the GraphPad Prism 8 analysis program was used to determine the progress of the population over the years. It was determined that the population size was 343 individuals in 2008, 573 individuals in 2019, and the highest population size was 744 individuals in 2016. It was observed that the restrictive factors on the wild goat population in the study area were the hunting pressure caused by illegal and overhunting and the negative effects of marble quarries operated in the area.

Keywords: *Wild goat (**Capra aegagrus**), Population inventory, Population trends, Direct observation, Point count, Hunting pressure, Marble quarries*

Isparta Yazılıkaya Devlet Avlağında Yaban Keçisi (*Capra aegagrus* Erxl. 1777)'nin Popülasyon Durumu

Öz

*Ülkemizin Akdeniz Bölgesinde biyolojik çeşitliliğin çok önemli üyelerinden biri olan, yaban keçisi (**Capra aegagrus** Erxl. 1777) Türkiye'nin en önemli av hayvanı türlerinden biridir. Bu sebeple türün popülasyon trendinin izlenmesi önem arz etmektedir. Çalışma Isparta ili Sütçüler İlçesi Yazılıkaya Devlet Avlağında 2008-2019 yılları arasında yürütülmüştür. Yazılıkaya 2007 yılında Devlet Avlağı (DA) olarak ilan edilmiş ve 2020'de statüsü yenilenmiştir. Toplam alanı 55.411 hektardır. Sahadaki popülasyon noktada sayım tekniğiyle gözlenmiş, sayım sonuçlarının değerlendirilmesinde Microsoft Excel programından yararlanılmıştır. Yaban keçisi popülasyonunun yıllar içesindeki seyrini tespit etmek amacıyla GraphPad Prism 8 analiz programı kullanılmıştır. 2008 yılında popülasyon büyüklüğünün 343 birey, 2019 yılında 573 birey olduğu, en yüksek popülasyon büyüklüğünün ise 2016 yılında 744 birey olarak sayılmıştır. Araştırma alanında yaban keçisi popülasyonu üzerindeki kısıtlayıcı faktörlerin kaçak ve aşırı avlanmadan kaynaklanan avlanma baskısı ile sahada işletilen mermer ocakları olduğu tespit edilmiştir.*

Anahtar Kelimeler: *Yaban keçisi (**Capra aegagrus**), Popülasyon envanteri, Doğrudan gözlem, Noktada sayım, Avlanma baskısı, Mermer ocakları*

Citation: Ünal, Y. & Oğurlu, İ. (2022). Population status of wild goat (*Capra aegagrus* Erxl. 1777) in the Yazılıkaya state reserve in Isparta. *Journal of Protected Areas Research*, 1 (1), 24-33.

DOI: https://doi.org/10.5281/zenodo.6052834

Received: *10/09/2021 –* ***Accepted:*** *10/01/2022*

1. Giriş

Türkiye; İran-Turan, Avrupa-Sibirya ve Akdeniz Biyo-coğrafyaları ile bu coğrafyaların geçiş zonlarında ve üç kıtanın birleşme noktasında yer almaktadır (Akgündüz ve diğerleri, 2012, Ocak, 2012; Kesici ve diğerleri, 2010).) Türkiye'nin, Asya, Avrupa ve Afrika kıtaları arasında yer alması; ekolojik koşulların çeşitlenmesine, jeolojik yapının çok değişken olmasına, farklı iklim koşullarının oluşmasına ve buna bağlı olarak da çok zengin bir biyolojik çeşitliliğin ortaya çıkmasına neden olmaktadır (Hızal, 2007). Türkiye coğrafi yapısı, konumu taşıdığı habitat özellikleri sahip olduğu bitki ve yaban hayatı çeşitliliğiyle Avrupa'nın en zengin ülkesidir (Paşalı, 2014, Gündoğdu, 2006). Türkiye'nin çarpıcı biyolojik çeşitliliğinin oluşmasında iklim ve topografya çok önemli bir rol oynamaktadır. Türkiye 11000'den fazla bitki, 150 memeli, 491 kuş, 716 balık ve 141 sürüngen türünden oluşan çok zengin bir fauna ve flora çeşitliliğine sahiptir. Türkiye'nin yüz ölçümü Dünya yüz ölçümünün %0,1'ine tekabül etmesine rağmen, Tüm Dünya memelilerinin %2,9'u Türkiye'de yayılış göstermektedir (Kiriş ve diğerleri, 2013).

Dünya üzerinde Kafkasya ve Orta Doğu'nun bazı ülkelerinde yayılış gösteren yaban keçisi (***Capra aegagrus***) Türkiye'de, batıda Datça yarımadasından başlayarak doğuya doğru Akdeniz Bölgesi'ni çevreleyen dağlarda, Toros ve Anti-Toroslar üzerinden Doğu, Kuzeydoğu ve Güneydoğu Anadolu'nun 4000-4500 m yükseklikteki sarp dağlık bölgelerinde yayılış göstermektedir (Weinberg ve diğerleri, 2008; Kence ve diğerleri, 2002; Huş, 1974). Çalışma alanını oluşturan Isparta yöresi ise, Türkiye'nin güneyinde ve Toros dağlarının eteklerinde yer almaktadır (Ünal, 2011). Yaban keçisi, Dünya Doğa Koruma Birliği (IUCN) yayınladığı Dünya Kırmızı Listesinde Vulnarable-Hassas "VU" kategorisinde yer almaktadır (Paşalı, 2014).

Biyolojik çeşitlilik zincirinin çok önemli halkalarından biri olan yaban keçisi, Türkiye'nin en önemli av hayvanı türüdür (Kayaöz, 1999; Gündoğdu, 2006,). Dünya genelinde *Capra* cinsine ait; *Capra hircus*, *C. ibex*, *C. caucasica*, *C. cylindricornis*, *C. pyrenaica, C. falconeri*, *C. nubiana* ve *C. lervia* ile yayılış gösteren 9 türden biridir (Gündoğdu, 2006, Weinberg, 2002). Yaban keçisi türüne ait Dünya'da 5 alttür olduğu bilinmektedir. Bunlardan Türkiye'de yayılış göstereni *C. aegagrus ssp. aegagrus*, diğerleri ise *C. aegagrus ssp. blythi, C. aegagrus ssp. chialtanensis, C. aegagrus ssp. cretica* ve *C. aegagrus ssp. turcmenica*'dır (Paşalı, 2014, Shackleton, 1997). Yaban keçisi evcil keçi (*C. hircus*) 'nin atasıdır (Clutton-Brock, 2012; Ahmed ve diğerleri, 2016).

Yaban keçisinin ergin bir tekesinin uzunluğu 120-130 cm, omuz yüksekliği 90-100 cm, ağırlığı ise yaklaşık 80-90 kg dır. Aynı erginlikteki dişinin ağırlığı ise 30-35 kg, uzunluğu ise 60-70 cm'dir (Başkaya, 2000). Kuyrukları kısa ve yukarıya kalkık, bacakları kısa ve kuvvetli, arka bacaklar ön bacaklara göre biraz daha uzun ve kaslıdır (Gündoğdu ve Oğurlu, 2009). Genel itibariyle, kayalık, çalılık ve iğne yapraklı ormanların bir arada bulunduğu dağlık alanları tercih etmektedir. Herbivor (otçul) beslenir. (Korshunov, 1994), yaban keçisinin başlıca ardıç, çalı yaprakları ve çeşitli otsu bitkileri ile beslendiğini bildirmiştir. Yaban keçisi genel olarak 2-3'lü guruplar halinde dolaşan bir yaban hayvanı türüdür. Grup yapısı popülasyonun büyüklüğüne (pb) göre farklılıklar göstermekle birlikte popülasyonun yoğun olduğu habitatlarda 50'li guruplar halinde görülebilir. Doğum periyodu nisan ayı ortalarında başlamaktadır. Bu dönemde, dişiler doğum yapacakları sığınaklara çekilerek sürüden ayrılmakta, yaşlı erkekler de sürüden ayrılarak kendi başlarına veya kendi aralarında kurdukları küçük gruplarla dolaşmaktadır. Çiftleşme periyodu Kasım ayı başında başlamaktadır. Erkek ve dişiler kış/ilkbahar periyodu gibi bir arada karışık bulunmaktadır. Genç ve güçsüz erkekler sürüden ayrı gezmekte ve kendi aralarında bir grup oluşturmaktadır. Sadece dişilerden oluşan gruplara, erkek-dişi karışık grupları kadar sıkça rastlanmaktadır (Şekil 1) (Gündoğdu, 2006).

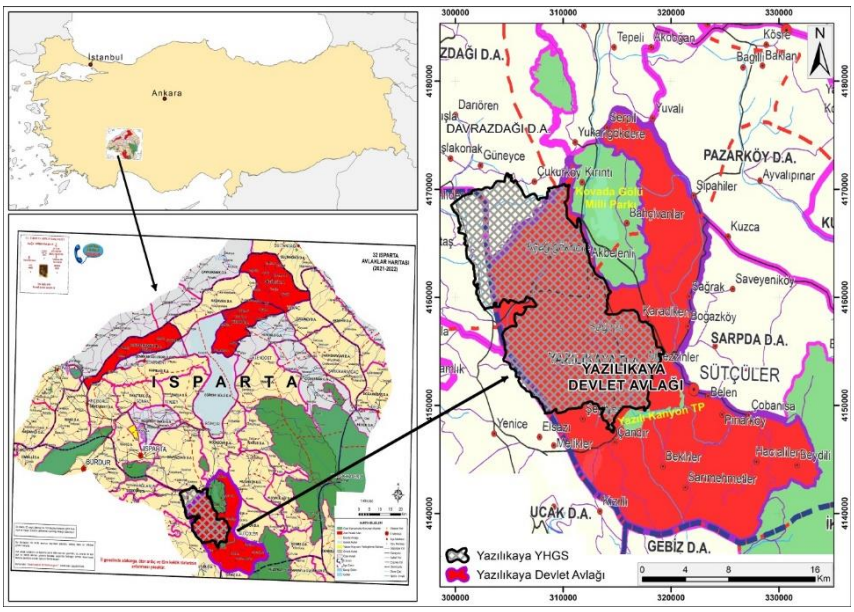
Alem	: Animalia
Şube	: Chordata
Sınıf	: Mammalia
Takım	: Artiodactyla
Alttakım	: Ruminantia
Familya	: Bovidae
Altfamilya	: Caprinae
Cins	: Capra
Tür	: aegagrus
Alttür	: aegagrus
Otör	: Erxleben, 1777

Şekil 1. Yaban keçisi (***C. aegagrus***) dişi birey ve sistematikteki yeri (Foto Yasin ÜNAL)

Türkiye'de bulunan ve sayısı 84'ü bulan Yaban Hayatı Geliştirme Sahaları içinde en fazla envanter çalışması yürütülen av ve yaban hayvanı türü yaban keçisi (***C. aegagrus***)'dir. Türkiye'nin en önemli av yaban hayvanlarından biri olan bu türün envanter çalışmalarına büyük önem verilmekte olup, bu çalışmalar Tarım ve Orman Bakanlığı Doğa Koruma ve Milli Parklar Genel Müdürlüğü (DKMP) tarafından koordine edilmektedir. Isparta ili Yazılıkaya DA'nda yayılış gösteren yaban keçisi populasyonlarına yönelik olarak 2004-2006 yılları arasında Gündoğdu (2006) tarafından sayımlar yürütülmüştür. Bu araştırma, 2008-2019 döneminde Tarım ve Orman Bakanlığı DKMP 6. Bölge Müdürlüğü ve Süleyman Demirel Üniversitesi Orman Fakültesi iş birliğinde, Isparta İli Yazılıkaya DA'nda yürütülmüştür. Araştırmanın 2008-2011 yılları arasındaki verileri, Yasin ÜNAL a ait olan ve Prof. Dr. İdris OĞURLU'nun tez danışmanlığını yaptığı doktora tez çalışmasına aittir (Ünal, 2011).

2. Materyal ve Yöntem

Yazılıkaya Devlet Avlağı (DA) 2007 de ilan edilmiştir. 18.03.2020 de revize edilmiştir. Toplam alanı 55.411 ha. dır. Sayımlar, sahanın revize edilmeden önce kapladığı alan bazında yapılmıştır. Toplam yüzölçümü Isparta ormanlarının yaklaşık %2,84'ünü tekabül eden Yazılıkaya DA'nda, Türkiye'nin en önemli büyük memeli ve av hayvanı türlerinden biri olan yaban keçisi (***C. aegagrus***) yayılış göstermektedir. Bu alanda yerleşim alanları ve uygun olmayan habitatlar dikkate alındığında yaban keçisinin, alanın %60'lık bir alan kaplayan sarp, kayalık habitatlarda yayılış gösterdiği gözlenmiştir. Popülasyon yoğunluklarının (py) hesap edilmesinde sahanın 12.240 hektarlık bölümü esas alınmıştır (Şekil 2).



Şekil 2. Çalışma sahasının konumu

Popülasyon envanteri çalışmalarında Doğrudan sayım teknikleri içerisinde yer alan "Noktada Sayım" metodu uygulanmıştır. Arazi çalışmaları her yılın Kasım – Aralık aylarında 2-3 haftalık aralıklarla gerçekleştirilmiştir. Sayımlarda Doğa Koruma 6. Bölge Müdürlüğü elemanlarının da katıldığı günde ortalama 20-25 kişi görev almıştır.

Gözlem zamanı olarak, yaban keçisinin tüm gün aktif olduğu göz önünde bulundurularak sabah güneşin doğuşundan batışına kadar gözlemler sürdürülmüştür. Her gözlem mevkiinde sabah (seher vakti) ve ikindi (gün batmadan önceki dönem) olmak üzere en az iki gözlem yapılmıştır. Mümkün oldukça gözlem noktaları karşılıklı olarak alınmak suretiyle tek noktadan görülmeyen noktaların da (kör nokta) görülmesi hedeflenmiştir.

Sayımlar 2'şer kişilik sayım timleriyle gerçekleştirmiştir. Envantere başlamadan önce sayım ekibine, çalışma öncesinde türün morfolojisi, biyolojisi ve ekolojisi ile ilgili bilgiler ile kamp malzemelerinin ve gözlem araçlarının nasıl kullanılacağına dair bilgiler verilmiştir. Sayım timlerine gözlem boyunca dikkat etmeleri gereken hususlar, sayımın başlama ve bitiş saatleri ve direkt gözlem kartının nasıl doldurulacağı ayrıntılı olarak açıklandıktan sonra, önceden 1/25000 topografik haritalar üzerinde belirlenmiş gözlem noktalarına bırakılmıştır. Her ekip kendi gözlem noktasında gerçekleştirdiği sayımları doğrudan gözlem kartlarına işaretlemiştir.

Envanter dönüşünde, gözlem kartları bir araya getirilerek değerlendirilmeye alınmıştır. Sayım sonuçları hesaplanırken, gözlem mevkiindeki gruplar kendi içinde değerlendirilmiştir. Envanter sonuçlarının değerlendirilmesinde Microsoft Excel programı ile, yıllar itibariyle yaban keçisi artış-azalış oranlarını tespit etmek amacıyla GraphPad Prism 8 analiz programından yararlanılmıştır.

3. Bulgular ve Tartışma

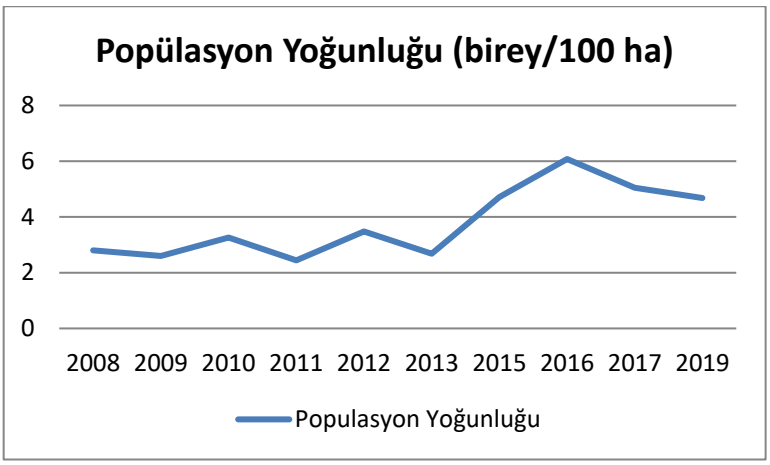
Bu bölümde yaban keçisi (***C. aegagrus***) envanter çalışmaları sonucunda kaydedilen popülasyon büyüklükleri (pb), popülasyon yoğunlukları (py) ve popülasyon dinamiğine ilişkin bulgular ile tartışma verilmiştir. 2008-2011 yıllarına ait yaban keçisi populasyon verileri Ünal, (2011) doktora tez araştırması sırasında elde edilmiştir. 2011 yılından sonrasına ait veriler ise, Süleyman Demirel Üniversitesi ve Doğa Koruma ve Milli Parklar 6. Bölge Müdürlüğü'nün iş birliğiyle yürütülen popülasyon sayım sonuçlarını içermektedir. Sayımların değerlendirilmesi aşamasında yerleşim yerleri, ziraat alanları, mermer ocağı gibi yayılışa uygun olmayan ve yaban keçisinin uzak durduğu alanlar dikkate alınmamıştır.

Araştırma bulgularına göre, popülasyon büyüklüğü 2008 yılında 343, 2019 yılında ise 573'tür. En yüksek popülasyon büyüklüğü 2016 yılında 744 birey tespit edilmiştir (Çizelge 1, Şekil 3). 2008 sayımlarından sonra popülasyon büyüklüğünde artış ve azalışlar ortaya çıkmıştır. Kayda değer ilk artış 2016 sayımlarında 618 olarak gerçekleşmiştir (Şekil 3). Bu aynı zamanda alanın taşıma kapasitesi değeri olan 800-1000 yaban keçisi sayısına en yakın değerdir.

Çizelge 1. 2008-2019 sayım dönemleri popülasyon büyüklüğü (pb), yoğunluğü (py) ve artış/azalış değerleri

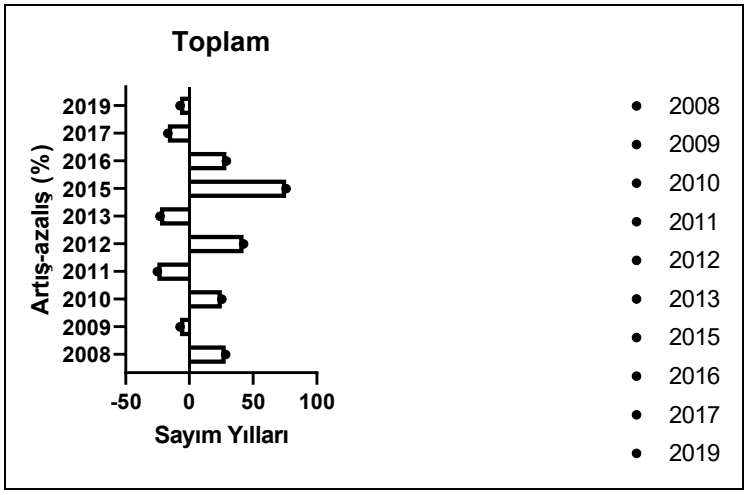
	2008	2009	2010	2011	2012	2013	2015	2016	2017	2019
pb (sayı)	343	318	399	299	426	328	577	744	618	573
py (birey/100 ha)	2,80	2,59	3,25	2,44	3,48	2,67	4,71	6,07	5,04	4,68
Artış /azalış	28,46	-7,29	25,47	25,06	42,47	-23,00	75,91	28,94	-16,93	-7,28

Popülasyon yoğunluk değerleri dikkate alındığında inişli çıkışlı bir grafiğin ortaya çıktığı görülmektedir. 2008 yılında 2,80 olan popülasyon yoğunluğu, 2009 yılında 2,59'a inmiştir. Bu dalgalanma 2015 yılına kadar devam etmiştir. İlk belirgin artış 2015 yılında görülmüştür (py: 4,71) (Çizelge 1). Şekil 3'te görüldüğü üzere, pb değerleri 2008, 2010, 2012, 2015 ve 2016 yıllarında pozitif (+), diğer yıllarda ise negatif yönde (-) yönde ilerlemiştir (Şekil 4). Pb değerlerinde 2012 yılında -25,47'lik azalış 2015 yılında ise +75,91'lik bir artış dikkat çekmektedir.



Şekil 3. 2008-2019 sayımlarında yaban keçisi popülasyon yoğunluk (py) değerleri

Popülasyon yoğunluğu 2008'den 2013 yılına kadar ortalama 100 hektarda 3 bireyken, 2013-2016 yılları arasında hızlı bir artışla 6 birey/100 ha değerine kadar ulaşmıştır.



Şekil 4. 2008-2019 sayımlarında yaban keçisi artış-azalış oranları

Bu araştırmada, yaban keçilerinin 299 (2,44 adet/100 ha) ile 744 (6,07 birey/100 ha) arasında popülasyon büyüklüğüne sahip olduğu görülmüştür. Benzer bir araştırmada Korshunov (1994) Türkmenistan'da Kopet Dağı'nda popülasyon yoğunluğunu 1,33-10,54 birey/100 ha; Gündoğdu (2006), Isparta- Sütçüler yöresinde 1,49 birey/100 ha ve yine Gündoğdu (2011), Mersin bölgesinde 2,5 birey/100 ha tespit etmişlerdir. Araştırmamızda elde edilen sonuçlar, diğer çalışmaların sonuçları ile karşılaştırıldığında yoğunluk değerlerinde önemli farkların olmadığı görülmüştür.

Şekil 4 incelendiğinde, artış-azalış oranlarında artı-eksi yönünde ilerleyen bir grafik görülmektedir. 2008 yılından sonra eksi yönde azalış dikkat çekmektedir. Bu azalmaya yol açan en büyük etkenin çalışma alanında faaliyet gösteren ve yaban keçisi popülasyonları üzerinde gürültü ve toz kaynaklı olumsuz etkiler meydana getiren mermer ocakları olduğu düşünülmektedir. 2009-2011 yılları arasında büyük bir hızla sahayı kaplayan mermer ocaklarının 69 adet olduğu ve 13 tanesinin yaban keçisi, yaşama ortamında faaliyet gösterdiği tespit edilmiştir (DKMP, 2018). Bu tarihten sonra ise mermer ocağı sayısında ivmeli bir artış görülmektedir. Bu dönemde yaban keçisi grupları mermer ocağı yakın çevresindeki habitatlardan uzaklaşıp daha sakin alanlara yönelmiştir.

Akdeniz Bölgesi'nde habitat daralması veya habitat kaybının yaban keçisinin maruz kaldığı olumsuz faktörlerin başında geldiği bilinmektedir. Paşalı, (2014) ve Sağlam ve diğerleri, (2010) bu konuda yaptıkları araştırmada, Akdeniz Bölgesi'nde habitat daralması veya habitat kayıplarının yaban keçisinin maruz kaldığı olumsuz faktörlerin başında geldiğini bildirmişlerdir. Süel ve diğerleri (2019) ise, koruma faaliyetlerinin popülasyon artışı için kilit rol üstlendiği için potansiyel habitatların önceden belirlenmesi,

bu habitatların av amenajman planlarına girmesi, mermer ocağı izinleri verilmeden önce yaban keçisi doğal habitatı içerisinde kalıp kalmadığının kontrol edilmesini tavsiye etmişlerdir.

4. Sonuç ve Öneriler

Yaban keçisinin yaşama alanında bulunan ve doğal yırtıcıları olan kurt (*Canis lupus*), vaşak (*Lynx lynx*) gibi hayvanların yaban keçisi popülasyonunu üzerinde dikkate değer sorun oluşturduğuna şahit olunmamıştır. Buna karşılık yaban keçisinin sahadaki en büyük probleminin insan kaynaklı kısıtlayıcı faktörler olduğu düşünülmektedir. Yaban keçisinin sahada yaşayabileceği alanlar gitgide daralmaktadır. Bunun en büyük sebebi; yöre halkının yaban keçisi yaşama alanları yakınlarına küçük mahalleler halinde yerleşmiş olmaları, bu mahallelerin gitgide genişlemeleri ve dolayısıyla bu türün insan baskısına maruz kalmış olması ve rahat hareket edememesidir. Ayrıca, bazı yaban keçisi yaşama alanlarında faaliyet gösteren mermer ocakları türün habitatlarını bölmek ve daraltmak suretiyle tür üzerinde stres oluşturmaktadır.

Sahada cereyan eden aşırı ve kaçak avcılık faaliyetleri, popülasyon üzerinde önemli zarar ve tahribat oluşturmaktadır. Kaçak avcılığın büyük oranda yöre dışından gelen avcılar tarafından yapıldığı yöre halkı tarafından birçok kez dile getirilmiştir. Bu durum popülasyonların kaçak avcılığa karşı korunamadığı ve caydırıcı önlemlerin ve hukuki yaptırımların ciddiyetle uygulanmadığının bir göstergesi olarak değerlendirilmiştir. O halde bu husus üzerinde ciddiyetle durulmalı, koruma faaliyetleri artırılmalıdır.

Türkiye'de av turizmine konu olan en önemli av ve yaban hayvanı türlerinin başında gelen yaban keçisi envanter çalışmaları her yıl Tarım ve Orman Bakanlığı Doğa Koruma ve Milli Parklar Genel Müdürlüğü tarafından Yaban Hayatı Geliştirme Sahaları ve Devlet avlaklarında düzenli olarak yapılmaktadır. Bu envanterlere, gönüllü üniversite ve STK kuruluşları destek vermektedir. Envanterler sonucunda, ilgili YHGS'deki popülasyon artışı, av turizmi kota ve trofe miktarı ve kalitesi başarıda önemli rol üstlenmektedir. Burada önemli nokta, av kaynaklarından yararlanılması ve av turizminden sürdürülebilir fayda sağlanması için, av kaynağının habitatı ile birlikte korunmasından geçmektedir. Koruma faaliyetleri popülasyon artışı için kilit rol üstlendiği için de potansiyel habitatların önceden belirlenmesi ve bu habitatların av amenajman planlarına girmesi gerekmektedir.

Yaban keçisi, Türkiye'nin önemli av ve yaban hayvanlarından ve ekosistemin önemli bir parçası olması açısından sürekliliğine ihtiyaç vardır. Envanter çalışmalarında uzman ve tecrübeli teknik elemanlarla, yöreden güvenilir avcı, çobanlar iş birliğinde görev almalıdır. Envanter çalışmaları esnasında yaşama ortamında ve civarındaki fauna ve floraya ait her türlü bilgi ve özellikle yırtıcıları kaydedilmelidir. Bu bilgiler doğrultusunda yaban keçisinin bozuk habitatlarının iyileştirilmesine yönelik çalışmalar planlanmalı ve her bir yaşam ortamında taşıma kapasitesi tespit edilerek popülasyon fazlası av turizmi çerçevesinde avlattırılmalıdır. Yaban keçisinin gerçek popülasyonunun tespit edilerek uygun ve doğru sayıdaki bireylerin avlattırılması, popülasyonun azalmasına değil tam aksine artmasını sağlayacaktır. Zira av turizmi kapsamında yöre insanının elde edeceği gelir insanları yaban keçilerini teşvik edecek, bu durum ise büyük oranda kaçak avcılığın da önüne geçecektir.

Yaban keçisinin var olduğu bilinen fakat bugüne kadar envanter çalışması yapılmayan alanlar da çalışma kapsamına alınmalı ve tüm yöredeki yaban keçisi popülasyonunun belirlenmesine çalışılmalıdır. Fakat burada karşımıza çıkan en önemli problem, konusunda uzman personel ve ekip ihtiyacının giderilmesidir.

Yaban keçisinin yayılış gösterdiği habitatlarda madencilik ve ormancılık çalışmaları yürütülürken bütün yaban hayvanı türlerinin yaşam ortamı istekleri dikkate alınarak gerekli tedbirler alınmalıdır ve bu tedbirlerinin yerine getirilip getirilmediği denetlenmelidir.

Oğurlu ve Ünal (2011), kaçak avın ve yırtıcıların kontrolü, halk desteği ve özellikle Köy Tüzel Kişiliği (KTK) Eliyle Koruma Modelinin geliştirilmesi olarak açıklamış, aşırı ve kaçak avcılığın önüne geçmek için, sürekli arazide gezebilecek, yöreyi ve yöre halkını tanıyan saha bekçisi/kılavuzların istihdam edilmesi ve bu kişilerin mutlak surette o yöre insanından seçilmesi gerektiğini bildirmiştir. Önerilen kılavuzların, sürekli sahayı gezebilecek tecrübe ve kapasiteye sahip insanlar olması, yöreyi ve yöre avcılarını

tanıması, dışarıdan gelebilecek avcılara karşı yörede yaşayan dost, arkadaş ve akrabalarından destek alabilmesi gibi önemli avantajları bulunmaktadır.

Teşekkür ve Bilgi Notu

Bu makale Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Orman Mühendisliği Ana Bilim Dalı'nda tamamlanan ve Isparta-Yazılıkaya'da Av-Yaban Hayatı Envanteri adlı Doktora tezinden üretilmiştir. 1766-D-08 No'lu proje ile Doktora tezine Nakdi destek sağlayan Süleyman Demirel Üniversitesi Bilimsel Araştırma Projeleri Koordinasyon Birimi'ne ve arazi çalışmalarında ve verilerin temininde her türlü desteği veren Tarım ve Orman Bakanlığı Doğa Koruma ve Milli Parklar Genel Müdürlüğü 6. Bölge Müdürlüğüne teşekkür ederiz. Makalede ulusal ve uluslararası araştırma ve yayın etiğine uyulmuştur. Çalışmada etik kurul izni gerekmemiştir.

Yazar Katkısı ve Çıkar Çatışması Beyan Bilgisi

Makalede tüm yazarlar aynı oranda katkıda bulunmuştur.

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Population Status of Wild Goat (Capra aegagrus Erxl. 1777) in the Yazılıkaya State Game Reserve in Isparta

Summary

The wild goat is one of the most important species of Turkey's biological diversity chain and the most important game species (Kayaöz, 1999; Gündoğdu, 2006,). There are 9 species belonging to the genus Capra worldwide. These are Capra aegagrus, C. hircus, C. ibex, C. caucasica, C. cylindricornis, C. pyrenaica, C. falconeri, C. nubiana, and C. lervia (Gündoğdu, 2006, Weinberg, 2002). It is known that there are 5 subspecies in the world belonging to the wild goat (C. Aegagrus) species. C. aegagrus ssp. aegagrus is a species distributed in Turkey. The others are C. aegagrus ssp. blythi, C. aegagrus ssp. chialtanensis, C. aegagrus ssp. cretica and C. aegagrus ssp. turcmenica (Paşalı, 2014, Shackleton, 1997). The wild goat is the ancestor of the domestic goat (C. hircus) (Clutton-Brock, 2012; Ahmed et al., 2016).

The adult male wild goat is 120-130 cm long, 90-100 cm high at the shoulder, and 80-90 kg in weight. The weight of the same adult female is 30-35 kg, and the length is 60-70 cm (Başkaya, 2000). Wild goat has a short and upturned tail and short and strong legs. Their hind legs are slightly longer and more muscular than their front legs (Gündoğdu and Oğurlu, 2009). In general, it prefers mountainous areas were rocky, bush, and coniferous forests coexist as habitats. It is herbivorous. Korshunov (1994) reported that wild goats mainly feed on juniper, shrub leaves, and various herbaceous plants. Wild goat is a type of wild animal that generally wanders in groups of 2-3. Although the group structure differs according to the size of the population, it can be seen in groups of 50 in habitats where the population is dense. The birth period begins in mid-April. During this period, females leave the herd by retreating to shelters where they will give birth, while older males leave the herd and wander around on their own or in small groups they form among themselves. The mating period begins in early November. Males and females are mixed like winter/spring period, these herds show a special herd structure with their leaders, raids, hierarchy and communication, young and weak males travel separately from the herd and form a group among themselves, while some females stay together with their newly grown young. There are groups consisting of only females, as well as mixed male-female groups are frequently encountered (Figure 1) (Gündoğdu, 2006).

This research was carried out in Yazilikaya State hunting ground in Isparta Province between 2008 and 2019. The data of the research between 2008-2011 belonged to Yasin ÜNAL doctoral thesis and was supervised by Prof. Dr. İdris OĞURLU (Ünal, 2011). Inventory studies were carried out with the technical contributions of Süleyman Demirel University, Faculty of Forestry, and the 6th Regional Directorate of Nature Conservation.

Yazilikaya State hunting ground was declared in 2007 and revised on 18.03.2020. Its total area is 55,411 ha. Inventory studies were based on the area occupied by the site before it was revised. Wild goat (C. aegagrus), one of Türkiye's most important large mammal and game animal species, is distributed in the Yazilikaya State hunting ground, the total area of which corresponds to approximately 2.84% of the forests of Isparta. Considering the residential areas and unsuitable habitats in this area, it is observed that 60% of the wild goats are distributed in 12240 hectares of steep and rocky habitats. 12.240 hectares of the field were taken as a basis for calculating the population densities (PD) (Figure 2).

In the population inventory studies, the "Point-count " method was applied. Field studies were carried out in 2-3 week intervals in November - December of each year. Considering that the wild goat is active all day, observations were continued from sunrise to sunset. At least two observations were made at each observation site, one in the morning and one in the evening.

Calculating the counting results, the groups at the observation site were evaluated within themselves. In the evaluation of the inventory results, the Microsoft excel program and GraphPad Prism 8 analysis program were used to determine the increase-decrease rates of wild goats over the years.

According to 10-year data, the population inventory obtained between 2008-2019 shows that the population size was 343 in 2008 and 573 in 2019. The highest population size belonged to 2016 and it

was determined that there were 744 individuals (Table 1, Figure 3). After the 2008 census, increasing-decreasing numbers were determined. It is seen that the significant increase was realized as 618 in the 2016 census for the first time (Figure 3). This is also the closest value to the number of 800-1000 wild goats, which is the carrying capacity of the area.

Considering the population density values, it is seen that a fluctuating graph emerges. The population density, which was 2.80 in 2008, decreased to 2.59 in 2009. This fluctuation continued until 2015. The first significant increase was seen in 2015 (PD: 4.71) (Table 1). As seen in Figure 3, population size values are positive (+) in 2008, 2010, 2012, 2015, and 2016, and negative (-) in other years (Figure 4). The population size values are drawn attention that A decrease of-25.47 in 2012 and an increase of +75.91 in 2015.

From 2008 to 2013, the population density was 3 individuals per 100 hectares on average, and between 2013-2016 it reached up to 6 individuals/100 ha with an almost one-to-one increase.

It turns out that the wild goats in the study area have a population size between 299 (1.99 individuals/100 ha) and 744 (6.07 individuals/100 ha). In a similar study, Korshunov (1994) found the population density of Kopet Mountain in Turkmenistan to be 1.33-10.54 individuals/100 ha; In Turkey, as wild goat population density values, Gündoğdu (2006) determined 1.49 individuals/100 ha in Isparta- Sütçüler region and again Gündoğdu (2011) determined 2.5 individuals/100 ha in Mersin region. When the results obtained in our research were compared with the results of other studies, it was seen that the wild goat had relatively close density values in our study area.

It is observed that the biggest factor causing this decrease is the marble quarries operating in our study area and causing negative effects on wild goat populations due to noise and dust. Since the day a marble quarry started operating, it is seen that wild goats move away from the quarry area and move towards calmer areas. It is known that habitat shrinkage or habitat loss is the leading negative factor that wild goats are exposed to in the Mediterranean region (Sağlam et al., 2010; Paşalı, 2014). Since conservation activities play a key role in population growth, the first precaution that comes to mind is to identify potential habitats and to make hunting management plans for these habitats (Süel et al., 2019).

Journal of Protected Areas Research
JoPAR, 2022, 1 (1), 34-47
e-ISSN: 2822-2733
Review Article

Journal homepage:
https://mimarlikbilimleri.com/ojs/index.php/journalofprotectedareasresearch
E-mail: **journalofprotectedareas@gmail.com**

Nature-Based Alternative Tourism in Protected Areas

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Abstract

The demands and needs of people, who have changed with economic, social, and technological developments throughout history, have also been reflected in travel cultures in the 21st century. Changing demands have directed tourism from mass movement to alternative options. The shift of people's orientation towards protected areas, which are rich in natural and cultural resource values and allow alternative tourism types, has revealed the importance of establishing the protection-utilization balance of these areas. In this study, sustainable tourism and alternative tourism issues are discussed and the relationship between protected areas and alternative tourism is explained in line with the literature.

Keywords: *Sustainable development, Alternative tourism, Protected area history, Protected areas*

Korunan Alanlarda Doğa Temelli Alternatif Turizm

Öz

Tarih boyunca ekonomik, sosyal ve teknolojik gelişmeler ile değişim gösteren insanların istek ve ihtiyaçları 21. yüzyıla gelindiğinde seyahat kültürlerine de yansımıştır. Değişen istekler turizmi kitlesel hareketten alternatif seçeneklere doğru yönlendirmiştir. İnsanların yönelimlerinin doğal ve kültürel kaynak değerleri açısından zengin olan ve alternatif turizm türlerinin yapılmasına olanak sunan korunan alanlara doğru kayması bu alanların koruma-kullanma dengesinin kurulmasının gereğinin önemi ortaya koymuştur. Bu çalışmada sürdürülebilir turizm ve alternatif turizm konuları ele alınarak korunan alanlar ve alternatif turizm arasındaki ilişki literatür doğrultusunda açıklanmıştır.

Anahtar Kelimeler: *Sürdürülebilir gelişim, Alternatif turizm, Korunan alan tarihi, Korunan alanlar*

Citation: Kurdoğlu, B.Ç. & Parlak, P.Ö. (2022). Nature-based alternative tourism in protected areas. *Journal of Protected Areas Research*, 1 (1), 34-47.

DOI: https://doi.org/10.5281/zenodo.6052852

Received:*10/11/2021* –***Accepted:*** *20/01/2022*

1. Introduction

Billions of years ago, the gas cloud surrounding our planet, the increase in the gas density, which accumulates in the atmosphere, prevented heat loss and made the temperature 33 C° warmer (WWF, 2018) and the adventure of living life began. The role of the human being, who is a part of this delicate balance, has changed over time in this adventure. Since humans are creatures that can exist in relationship with nature by nature, nature and humans are two parts of an inseparable whole that must be together throughout life (Gül, 2013). The historical process of the relationship between man and nature, of course, shows that there are changes in the way people perceive it. Nature which was an instructive being before becomes a resource to be exploited over time. From the time the first hunters/gatherers were shaping their life according to geographical, climatic, etc. to the present day, it is possible to see that there has been a dramatic change in the way of life of humanity. People first started to live in communities with the agricultural revolution and developed their skills over time, and by the 20th century, they started to change their habits and lifestyles by realizing the industrial revolution. The technological advances experienced with the industrial revolution have led to the development and growth of cities and the concentration of the world population in the cities.

Until the year the 2000s, cities with various economic, social, and educational opportunities faced various problems such as excessive demand and migration, and after these years, people started to feel the longing for nature and natural areas by complaining about their living conditions (Dinç, 2019). This deficiency experienced by people has caused the travel preferences to change, and the preferences to shift from mass tourism to alternative tourism forms and natural areas. Nature-based tourism, which is a sub-type of alternative tourism, and outdoor recreation activities such as hiking and mountain biking have gained increasing popularity in recent years with this changing demand (Balmford et al., 2009; Eagles, 2014; Ballantyne & Pickering, 2015; Lee et al., 2020; Gül & Kurdoğlu, 2021; Gül & Metin, 2021).

The areas that attract the most attention for outdoor recreation activities and nature-based tourism are undoubtedly protected areas. National parks, which are one of the protected area classes, are defined as "natural parts with national and international rare natural and cultural resource values and protection, recreation, and tourism areas in terms of scientific and aesthetics" according to the National Parks Law No. 2873 (TC Resmi Gazete, 1983). The orientation towards protected areas and national parks has increased the creation of recreational trails in these areas (Marion & Leung, 2001; Marion & Leung, 2004; Cole 2004; Ballantyne & Pickering, 2015). These trails are designed to facilitate people's access to points of interest in protected areas and prevent uncontrolled dispersal and minimize human-induced negative impacts on flora, fauna, and water resources (Duffey, 1975; Leung & Marion, 2000; Olive & Marion; 2009; Tomczyk & Ewertowski, 2013).

1.1. Sustainable Development and Alternative Tourism

The basic behavior that activates people is curiosity. This is why they travel from their current location to different locations to see new places and to have new experiences. Tourism is the whole of social, cultural, and economic activities that enable people to travel for personal or commercial purposes (UNWTO, 2020). The places that people prefer to visit the most in the regions they travel to are natural and cultural areas. From this point of view, the explanation of Harrison & Price (1996) that tourism is a service industry whose main source has deep relations with environment and culture is very appropriate (Leslie, 2012).

In the 1970s, the increase in people's incomes and the development of travel vehicles led to the development of existing holiday resorts and the establishment of new holiday destinations. The rapid growths of tourism and unplanned developments have led to serious changes in land use patterns (Budowski, 1976). These changes have caused the development of tourism to be questioned and the negative effects it has created on the environment to be discussed.

The emergence of the concept of sustainability with the Report of Our Common Future published in 1987 and the emergence of ecological awareness as a result of this report draws attention to the

negative environmental effects of mass tourism (Leslie 2012; Mihalic, 2016). Destructions on natural and cultural resources cause tourism regions to lose their attractiveness. This situation also increases the demand for change by people, and a new quest leads to an alternative tourism understanding that is opposed to mass tourism. The searches for alternative tourism and the necessity of including the goal of sustainable development in the tourism industry have revealed the concept of sustainable tourism (Erdoğan, 2003). Sustainable tourism is the management of natural resources, taking into account the needs of local communities while meeting the expectations of tourists (Pratt et al., 2011). According to Weaver (1999), tourism is divided into two as sustainable and unsustainable tourism (Figure 1). But he argues that there is no clear distinction between them. Even if tourism includes sustainable activities, it will have an impact on the area where it is made. The important point here is that sustainable tourism aims to minimize these effects and to aim at management forms that can prevent possible problems.

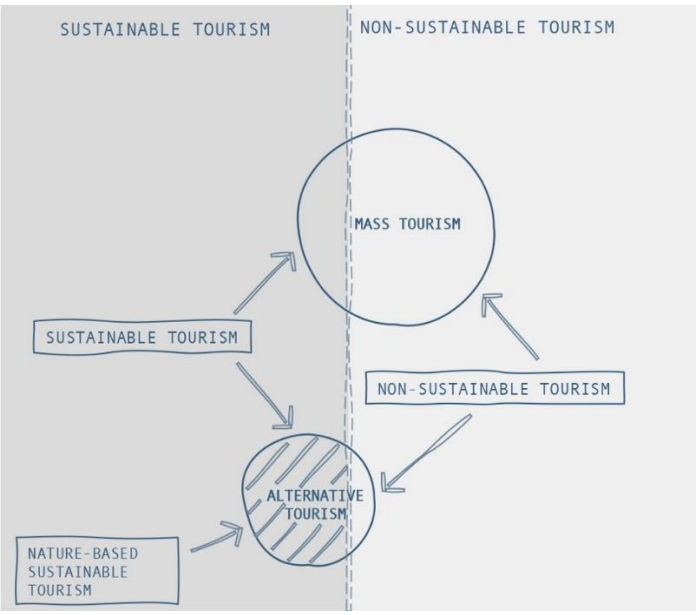


Figure 1. The relationship between sustainability and tourism (Weaver, 1999)

Alternative tourism is a type of tourism that allows experiencing natural areas and cultural activities in the visited region as an alternative to mass tourism, which we call the sea, sand, sun, and city tour (Erdoğan, 2003). Considering Figure 1, it should be emphasized that not every type of alternative tourism can be sustainable, and that only alternative tourism types based on sustainable principles will be sustainable tourism. As indicated in Figure 1, for alternative tourism to be sustainable, it must be associated with sustainable practices. In this case, nature-based alternative tourism types, which are expressed as shaded on the sustainable side of Figure 1, can be considered sustainable tourism. Based on the studies of Newsome, Moore, and Dowling (2012) and Hill and Gale (2009), nature-based alternative tourism types are indicated in Figure 2.

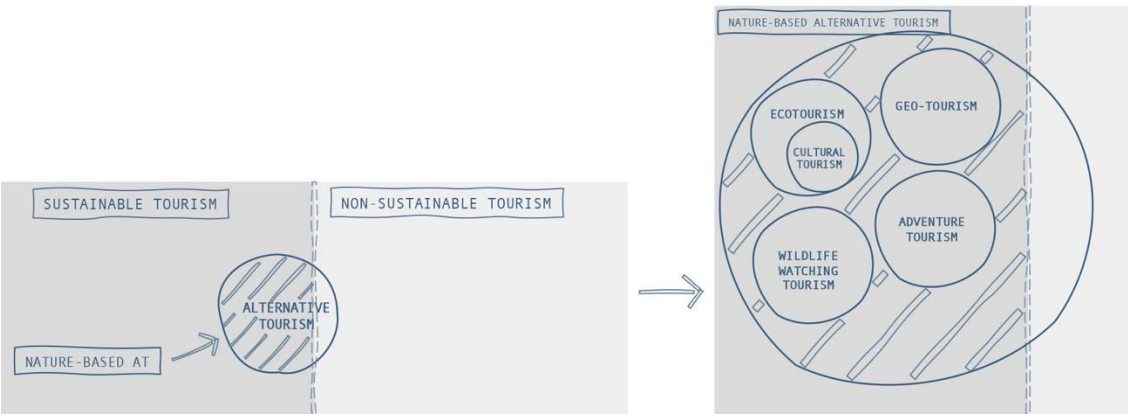


Figure 2. Nature-based alternative tourism types

1.2. Nature-Based Alternative Tourism

Newsome et al. (2002), nature-based tourism is a type of tourism based on natural areas, in which protection and education programs are taken into account while doing adventure, wildlife, natural landscape, and ecotourism activities (Dwyer, 2014).

Nature-based tourism with a general expression is a type of tourism that includes outdoor activities related to nature (Dwyer, 2014). Buckley, (2011) is divided the outdoor recreation activities into three; consumptive, adventure, and non-consumption / nature-based (no consumptive) (Newsome et al., 2012). Consumer (consumptive) outdoor tourism includes recreational hunting and fishing, adventure tourism is excitement-focused and outdoor activities, non-consumptive / non-consumptive nature-based tourism includes animal/plant observation and activities focused on enjoying nature (Buckley, 2008). 2011; Newsome et al., 2012).

According to Dowling (2001), nature-based tourism includes activities related to the abiotic, biotic, and cultural characteristics of the environment (Table 1). E.g; Abiotic components of the environment, such as various geological formations, waterfalls, glacial lakes, encourage geo-tourism activities focused on the natural landscape, biotic components such as wildlife and vegetation, activities that involve observation, local architecture, and traditional activities encourage activities focused on the cultural components of the environment.

Table 1. Environmental components focused on nature-based alternative tourism types

Nature Based Alternative Tourism Types	Environmental Components		
	Abiotic	Biotic	Culture
Ecotourism			
Adventure Tourism			
Wildlife Watching Tourism			
Geotourism			

Huybers & Bennet (2002) emphasize that the quality of the natural landscape and environment will be directly proportional to the quality of visitors' experiences (Blanco, 2011; Dwyer, 2014). The desire of people to experience and appreciate these “unspoiled” areas forms the basis of nature-based tourism. For this reason, it is essential to protect natural areas to maintain their attractiveness. Nature-based tourism takes into account the principles of sustainability and promotes responsible tourism to protect and maintain natural areas. The basic principles of responsible tourism were first defined by Hetzer in 1965. These;

- Keeping environmental impacts to a minimum

- Respect the local culture

- Maximizing the benefits that can be provided to the local people

- To maximize tourist satisfaction (Blamey, 2001).

1.2.1. Ecotourism

Ecotourism is a nature-based tourism type that includes environmental education and sustainable management models (Blamey, 2001). Many definitions of ecotourism have been made so far, and when the definitions are examined, it has been determined that all definitions commonly refer to conservation, education, and local participation in ecotourism (Erdogan & Erdogan, 2005; Erdogan, 2010). According to Weaver (2008), ecotourism has five basic features. These;

- Ecotourism is a form of tourism.

- The sites visited are primarily nature-based but should also include cultural resources when requested.

- It should support education and training.

- It should contribute to environmental and socio-cultural sustainability.

- It must be economically sustainable.

Again, according to Newsome et al. (2012), ecotourism is divided into five categories: nature-based, ecologically sustainable, environmentally educational, beneficial to the local community, and tourist satisfaction. In this case, briefly explaining these five categories will contribute to a better understanding of the concept of ecotourism. Ecotourism focuses on the biotic, abiotic, and cultural characteristics of the environment, that is, nature needs itself. For this reason, the correct planning, development, and management of ecotourism are extremely important for the protection of natural areas and natural resources. This means that the activities to be carried out must respect and not harm the environment and the culture of the region. The most basic feature that distinguishes ecotourism from other nature-based tourism types is that it is educational. The environmental education that visitors receive from nature experiences affects the formation or increase of awareness of the person, thus taking tangible actions for protection. Including local producers and services in the ecotourism program contributes both to the development of local communities and to increasing the quality of experience of visitors. Meeting the expectations of the visitors from their experiences and their satisfaction is the basis of the sustainability of tourism. The issue that should not be forgotten here is that the protection and sustainability of natural resources should come before the satisfaction of tourists.

1.2.2. Adventure Tourism

According to Quinn (1990), human passion to experience hidden or unknown things triggers adventure. The adventure seeker sets out to discover something hidden and unknown. In this case, adventure is directly related to exploration (Weber, 2001). Adventure tourism, as described by Hall & Weiler (1992), is an outdoor tourism activity where the participant of the experience is affected by the environment and management, in a natural environment that contains unknown (risk) elements, far from the place where the person lives (Weber, 2001; Gülcan, 2004).

For humans, mountains, lakes, forests (abiotic components), and wildlife habitats (biotic components) represent places of escape that offer excitement and adventure (Beedie &Hudson, 2003). The main reasons for the increase in the interest in adventure tourism in recent years are that people escape from the monotonous city life and seek self, insight, and knowledge (Gyimothy & Mukletun, 2004). In this whole journey of self-discovery, people fleeing from the urban environment discover their own identity by re-evaluating their limits and social status by forcing their physical and sensory skills in the unknown nature (especially in the mountains) (Beedie & Hudson, 2003). In this context, it would be a shallow definition to define adventure tourism only as of the pursuit of risk and uncertainty. On the contrary, adventure tourism is an action that offers various opportunities to experience nature, which is a part of the personal development process of people (Walle, 1997; Gyimothy & Mukletun, 2004).

1.2.3. Wildlife Watching Tourism

Wildlife viewing tourism is a sub-type of non-consumptive nature-based tourism based on the experience of watching plant and animal communities in their natural environment. It should be especially noted that it is useful to distinguish between wildlife tourism and wildlife watching tourism. Wildlife tourism, which includes recreational activities such as hunting and fishing, is a type of consumer tourism. However, wildlife watching tourism includes only observational experiences (Tapper, 2006). There is no hunting for nutritional or sportive purposes and consumption of plant and animal communities here.

Wildlife monitoring tourism carries out its activities in undisturbed natural areas and protected areas for its purpose. The increasing demand on a global scale in recent years has led to concerns about the pressures that may occur in such areas. The main risk factors threaten natural life; disease, climate change, poaching, and smuggling (UNWTO, 2015). It is possible to keep the pressures that

may occur at the lowest level with properly planned sustainable management models. On the other hand, it should not be forgotten that wildlife watching tourism can create negative effects on biodiversity, as well as contribute to raising awareness of people (Curtin & Kragh, 2014). Observing and witnessing the wildlife on-site enables people to internalize it by establishing emotional bonds. The awareness that not only humanity but also all living things need existing resources reflects on people's behaviors and enables them to support their conservation activities.

1.2.4. Geo-tourism

Our world has undergone geodynamic processes since its existence and is constantly evolving and changing (Çiftçi & Güngör, 2016). We can obtain information about the processes from the formation of the Earth to the present with the help of minerals, rocks, and fossils found in rocks (Güngör, 2012). People who are interested in the formation of the earth and the changes that have taken place over time have wanted to know and understand the earth by making use of branches of science such as archaeology and paleontology (Güngör, 2012; Çiftçi & Güngör, 2016). Geo-tourism is a type of nature-based tourism that focuses on geological components such as rocks, minerals, fossils, and geo-morphological processes on the earth (Newsome et al., 2012). Geo-tourism is based on three basic principles: geologically based, sustainable and educational (Dowling, 2013). Geo-tourism helps people interact with local people and develop the local economy while examining geological features. According to Dowling 2009, creating employment for the local people with the right management forms allows the promotion of geotourism (Newsome et al., 2012). Geotourism contributes to the conservation of geological heritage while promoting the creation of favorable conditions for tourism development (Newsome et al., 2012; Dowling, 2013; Gordon, 2018; Ólafsdóttir, 2019).

1.3. Nature-Based Alternative Tourism and Protected Area Relationship

1.3.1. A brief history of protected areas

According to the IUCN (2002) report, protected areas are cultural artifacts, and the history of nature conservation is based on the idea of protecting special places centuries ago. The first examples of protected areas are special areas reserved for requirements such as sanctuaries and hunting reserves (Kurdoğlu, 2007). When the historical process of nature conservation is examined, the process that started with the protection of the areas or sanctuaries allocated to them by various emperors and feudal lords continued with the opening of these areas to the use of the public. The declaration of Yellowstone as a national park and the increasing number of protected areas created the need for the establishment of a management structure. The establishment of management structures has led to the realization of various activities by establishing various organizations and institutions to protect natural resources and ensure their sustainability. The detailed chronological order of the protected area history, which has developed quite a bit until today, is briefly summarized in Figure 6, since there are many sources on the subject and it is not wanted to be repeated (Demirel, 2005; Yücel & Babuş, 2005; Kurdoğlu, 2007; Düzgüneş, 2015; Yeşil, 2016). Events with orange color in the figure represent developments in Turkey, events with * signify developments both in the world and in Turkey.

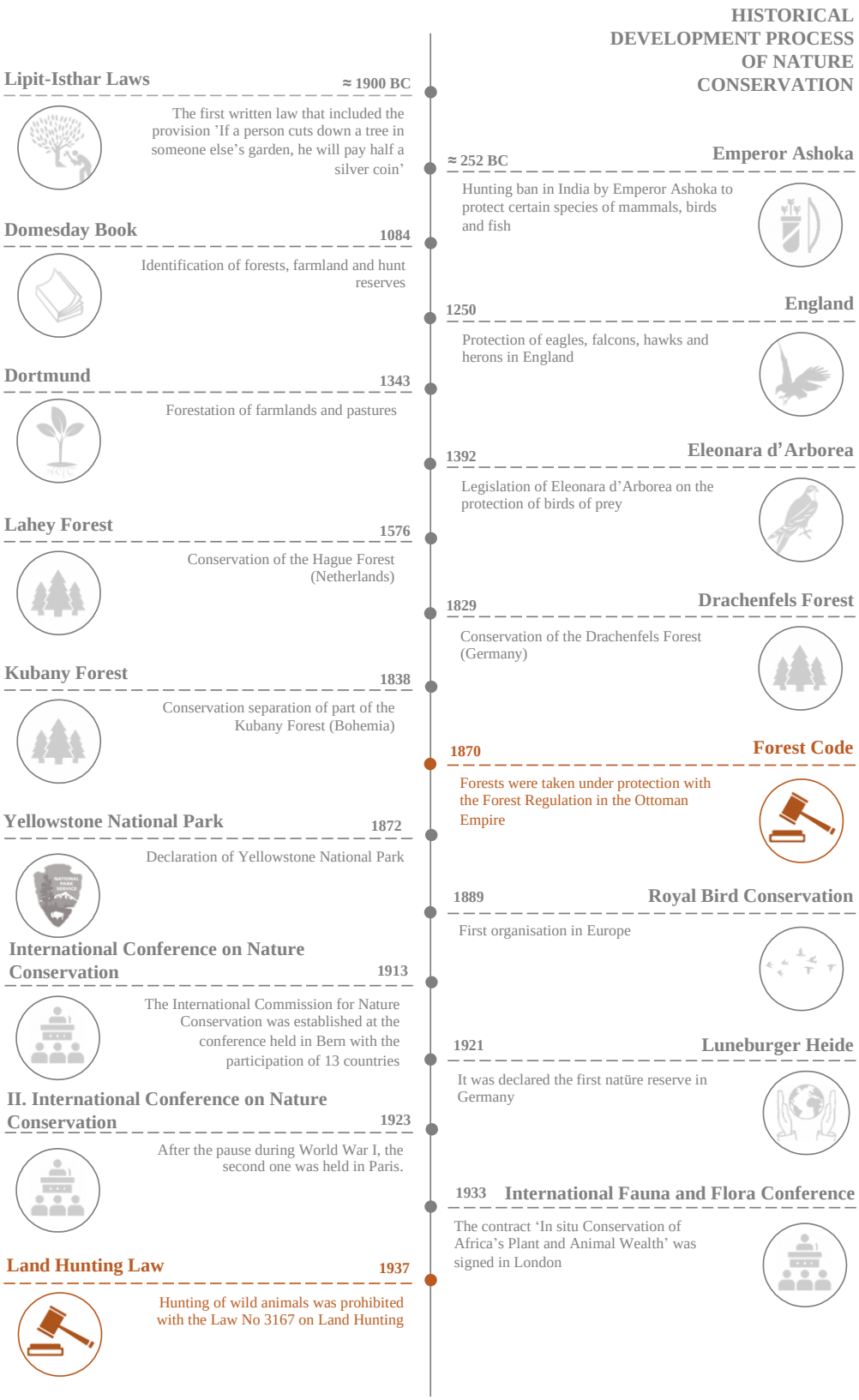
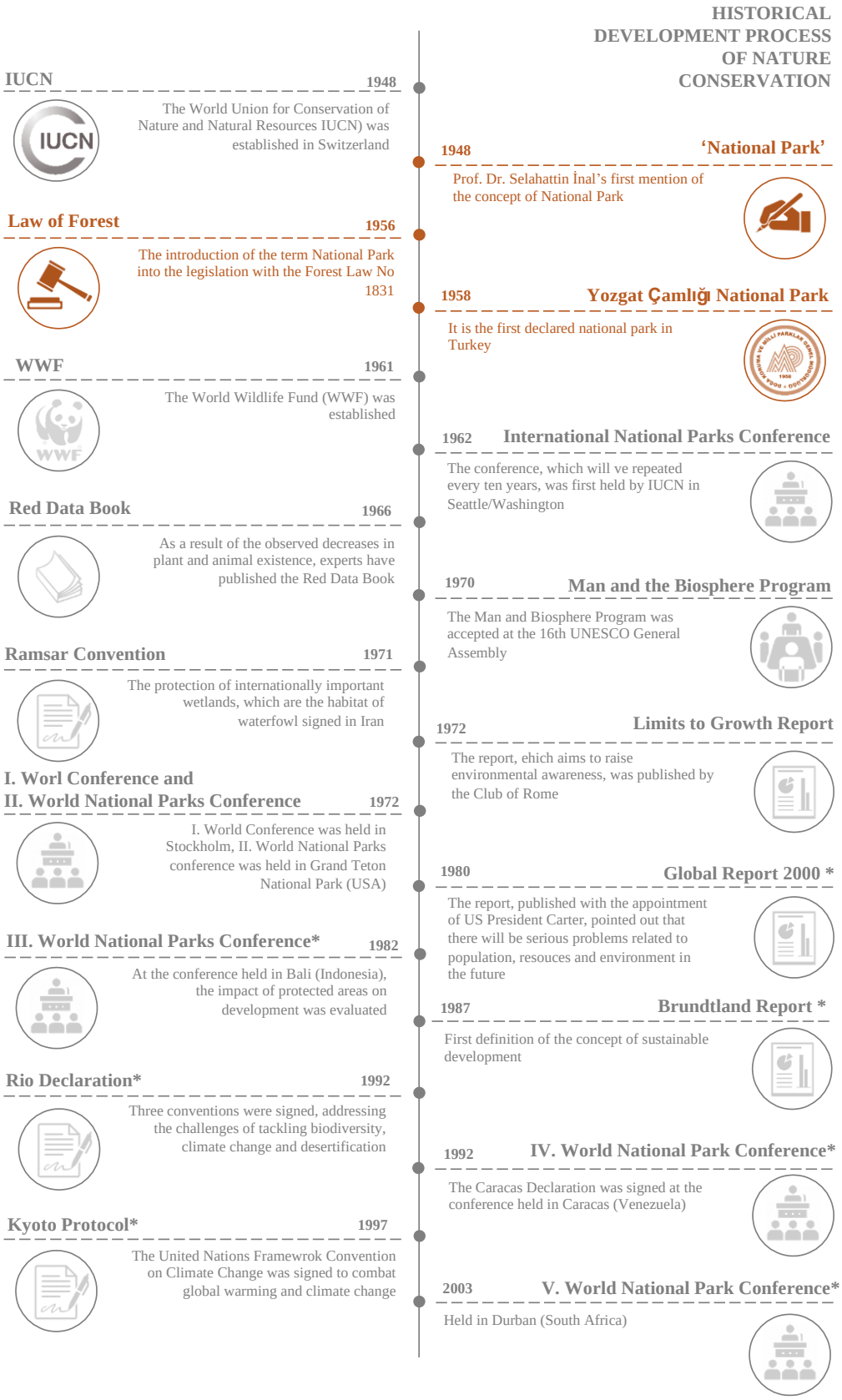


Figure 3. The historical development process of nature conservation

Continuation of Figure 3



1.3.2. Protected Area Categories

Protected areas according to the current definition made by IUCN in 2008; "A clearly defined geographical area that is recognized, allocated and managed, by legal or other effective means, to ensure the long-term conservation of nature with associated ecosystem services and cultural values". For the protected areas to be planned and managed correctly, it is extremely important to determine which protection status these areas will have and what kind of protection form will be applied (Özkaya, 2015). In 1994, the importance of having an internationally determined standard for a clearer understanding of the purposes of protected areas and promoting awareness was emphasized and the international protected area classification system prepared by IUCN was accepted. According to this system, six management classes (Table 2) and their management objectives matrix (Table 3), whose protection purpose and priorities have been determined, are defined. These are Strict Conservation/Wildlife Areas, National Park, Natural Monument, Habitat and Species Management Areas, Landscape (Land/Marine) Protected Areas, and Managed Resource Conservation Areas (IUCN, 1994).

Table 2. IUCN protected area classification system (IUCN, 2008)

Category		Explanation
I	Ia	**Strict Protected Area:** Protected areas managed for scientific studies.
	Ib	**Wildlife Area:** Protected areas managed to protect wildlife.
II		**National Park:** Protected areas managed for ecosystem conservation and recreation.
III		**Natural Monument:** Areas managed to preserve certain natural features.
IV		**Habitat and Species Management Area:** Areas requiring management intervention for habitat and species conservation.
V		**Landscape (Land/Marine) Conservation Area:** Protected areas managed for landscape protection and recreation
VI		**Managed Resource Conservation Area:** Managed areas for sustainable use of natural ecosystems

Table 3. IUCN protected area management objectives matrix (IUCN, 2008).

Management Goal	Ia	Ib	II	III	IV	V	VI
Scientific research	1	3	2	2	2	2	3
Wildlife conservation	2	1	2	3	3	-	2
Conservation of biodiversity	1	2	1	1	1	2	1
Maintenance of environmental services	2	1	1	-	1	2	1
Preservation of certain natural/cultural features	-	-	2	1	3	1	3
Tourism and recreation	-	2	1	1	3	1	3
Training	-	-	2	2	2	2	3
Sustainable use of natural ecosystem resources	-	3	3	-	2	2	1
Preservation of cultural/traditional qualities	-	-	-	-	-	1	2
1: Primary target, 2: Secondary target, 3: Possible applicable target, -: Not applicable							

Two different categories are not included in the IUCN classification but are in the status of our country. These are Special Environmental Protection Area and Natural Protected Areas. Again, they are not included in the IUCN categories, but there are international protection statuses determined by the international conventions that Turkey has signed. These; World Heritage Sites (Convention on the Protection of the World Cultural and Natural Heritage-UNESCO), Biosphere Reserves (Man and Biosphere Program (MAP)- UNESCO), Emerald Net Areas (Convention on the Protection of Wildlife

and Habitats), Special Environmental Protection Areas (Barcelona Convention) and Ramsar Sites (Ramsar Convention) (Albayrak, 2010; Özkaya, 2015).

1.3.3. Benefits and risks of nature-based tourism in protected areas

Nature-based tourism has benefits such as creating economic resources in protected areas, supporting the protection of the region, and increasing the quality of life of the local community. Although the establishment of nature-based tourism activities in protected areas may seem costly at first, they can create a serious income source in the long run. If it is planned correctly, the incomes obtained from conservation can be much higher than other land use incomes such as agriculture and animal farming. Demonstrating the economic value that the protected areas can bring to the country or region where they are located ensures the creation of public and political support for the protection of natural and cultural heritage. In addition, the demand for authentic experiences by visitors encourages local people to maintain their traditions, festivals, and cultural events. Experiencing protected areas contributes to the volunteering of visitors for conservation and to provide the income needed for the maintenance and repair of the area. On the other hand, it should be emphasized that if tourism activities in protected areas are not managed correctly, they may have negative environmental, financial and socio-cultural effects. The increase in the demand for protected areas and the increase in the number of visitors may increase the costs of services to be provided, which may increase the tax burden on the local people and cause a decrease in the income of the people. The increase in the number of visitors and the income difference between the visitors and the local people may lead to the deterioration of social activities and the loss of cultural values. Since nature-based tourism activities are carried out in areas that are already sensitive, even with the best management method, it will cause environmental effects. It is extremely important to determine to what extent the said effect will be accepted or not, to make an accurate comparison between the effects of the changes to be made in the use of the land, and to take precautions by clearly determining the environmental risks (IUCN, 2008). Table 4 lists the benefits of nature-based tourism to protected areas and the risks it may pose in these areas.

Table 4. Potential benefits and risks of nature-based tourism in protected areas (IUCN;2008)

BENEFITS OF NATURE-BASED TOURISM	ECONOMIC	It contributes to the diversification of local tourism businesses and the revival of the local economy.
		It encourages the domestic production of goods.
		It creates employment for local people.
		Generates financial resources for protected areas and local people.
	PROTECTION	It provides an opportunity to raise awareness of the importance of natural and cultural heritage through education or experience of the area, thus creating responsible consumers.
		It supports biodiversity and the conservation of ecological processes.
		It encourages the development of good management systems and environmental practices to control the functioning of tourism activities.
	SOCIAL	Supports environmental education for visitors and locals
		It encourages local people to value their culture and environment.
		By developing new and different activities, it contributes to the creation of interesting environments not only for visitors but also for the people of the region.
		It helps to increase the welfare level of the people of the region.
		Supports the development of culture, crafts, and arts
RISKS OF NATURE-BASED TOURISM	ECONOMIC	The increase in the number of visitors causes an increase in service costs.
		The increase in costs leads to an increase in the tax burden on the local people.
		Acquisition of local businesses with reduced income by foreign capital.
		Income not contributing to society, with touristic expenditures leaking out of the local area.
	SOCIAL	The increasing number of visitors may cause deterioration in the social structure.
		Failure to establish good management plans can result in not meeting community needs.
		Loss of authenticity of local traditions
		Exploitation by ignoring the wishes of local people.

ENVIRONMENTAL	Destruction of vegetation and wildlife for the construction of tourism facilities.
	The dumping of rubbish on the site by visitors.
	Soil compaction or erosion in frequently used areas.
	Observing changes in the behavior of wildlife.
	Damage to the existing habitat by visitors or organisms coming from outside to the area by different means.

2. Conclusion

Since the discovery of agriculture, people started to use natural resources, and this use turned into exploitation over time. The population, especially concentrated in urban areas, has caused cities to be exposed to serious anthropogenic pressures. Although people migrated to cities for purposes such as increasing the level of welfare, most people did not feel like they belonged to the city. The main reason for this is that man is an entity that finds life in nature, shapes his life with the effect of natural conditions, and can exist in a relationship with nature even if he does not want to (Gül, 2013). Even though the people who migrated from the rural areas to the cities tried to adapt, they felt the lack of their weakening relationship with nature. Even for people who were born and raised in the city, the occupation of the green areas that exist with urbanization and the deterioration of the natural structure of the city caused the human-city relationship to be damaged and the sense of belonging weakened. It is seen that leisure and recreation activities of people who feel this deprivation more in time tend to nature and natural areas. Kurdoğlu (2008) reports that the demand for areas rich in natural and cultural resource values for tourism and various recreational activities is increasing gradually. The continuation of these activities depends on the protection of existing ecosystems, biological diversity, and cultural heritage (Kurdoğlu, 2001).

While these resources are open to human use, it is extremely important to give priority to the protection and continuity of these resources. For this reason, there is a need for management plans to ensure sustainable use in areas rich in resource value. For these plans to be prepared correctly, first of all, resource inventory and analysis of the study area should be made by teams of experts such as geologists, biologists, forest engineers, landscape architects, surveyors, and sociologists. Being able to determine the current values correctly is the cornerstone of the planning and management of the area. Another issue that should not be ignored is participation. While the studies are being carried out, it is necessary to consider the expectations and interests of the local people living in the area and the visitors coming to the area and to be included in all stages of the program from planning and implementation. These types of practices enable the local people to play an active role in increasing the level of welfare and commitment to the area and therefore in protecting the existing values. This satisfaction of the locals directly affects the service to be provided in the area and satisfies the expectations of the visitors whose main purpose is to experience the natural and local life.

Acknowledgments and Information Note

This article was produced from the Master's thesis titled Walking Route Planning Process in the Example of Kaçkar Mountains National Park and Its Neighborhood, which was completed at Karadeniz Technical University, Institute of Science and Technology, Department of Landscape Architecture.

Author Contribution and Conflict of Interest Disclosure Information

All authors contributed equally to the article.

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Journal of Protected Areas Research
JoPAR, 2022, 1 (1), 48-59
e-ISSN: 2822-2733
Review Article

Journal homepage:
https://mimarlikbilimleri.com/ojs/index.php/journalofprotectedareasresearch
E-mail: journalofprotectedareas@gmail.com

A New Approach in Nature Conservation: Geoparks and Their Global Importance

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Abstract

Geological formations are the common heritage of world history that establishes the link between past, present and future. Rocks, minerals, fossils, geomorphology and soil are integral parts of nature. While geological formations deeply affect the cultural diversity of civilizations, they provide important data in understanding the world heritage. It stores information on natural disasters such as soil formation, desertification, earthquake, flood, erosion, volcanic activity, and all kinds of problems that have occurred about plant and animal species. Therefore, they play a key role in presenting today's problems and projections for the future. Geopark areas, which exist in these areas and exhibit unique geological and geomorphological structures, are important protection structures evaluated by visitors on a global scale. Today, geoparks, that considered as geotourism destinations with their natural and cultural resource values, allow touristic activities on the one hand, and on the other hand, have an educational feature that transfers the information from past to present. In this study, the global importance of geoparks and their contribution to nature conservation are examined.

Keywords: *Nature conservation, Geology, Geopark, Geotourism*

Doğa Korumada Yeni Bir Yaklaşım: Jeoparklar ve Küresel Önemi

Öz

Jeolojik oluşumlar, dünya tarihinin geçmiş, günümüz ve gelecek arasındaki bağını kuran ortak mirasıdır. Kayalar, mineraller, fosiller, jeomorfoloji ve toprak doğanın ayrılmaz parçalarıdır. Jeolojik oluşumlar uygarlıkların kültürel çeşitliliklerini derinden etkilerken dünya mirasını anlamada önemli doneler sunmaktadır. Toprak oluşumu, çölleşme, deprem, sel, erozyon, volkanik hareketlilik gibi doğal afetler ile bitki ve hayvan türleri hakkında meydana gelmiş her türlü sorunlara ilişkin bilgiyi içinde saklamaktadır. Bu nedenle günümüz sorunları ve geleceğe ilişkin projeksiyonların ortaya konmasında kilit rol oynamaktadırlar. Söz konusu alanlarda mevcudiyet gösteren, jeolojik ve jeomorfolojik açıdan kendine özgü yapılar sergileyen jeopark alanları küresel ölçekte ziyaretçilerce değerlendirilen önemli koruma yapılarıdır. Günümüzde sahip olduğu doğal ve kültürel kaynak değerleri ile jeoturizm destinasyonları olarak değerlendirilen jeoparklar bir yandan turistik faaliyetlere imkân tanırken diğer yandan da geçmişe ait bilgiyi günümüze aktaran eğitici bir özelliğe sahiptir. Bu çalışmada jeoparkların küresel açıdan önemi ve doğa korumaya olan katkısı irdelenmektedir.

Anahtar Kelimeler: *Doğa koruma, Jeoloji, Jeopark, Jeoturizm*

Citation: Düzgüneş, E. (2021). A new approach in nature conservation: geoparks and their global importance. *Journal of Protected Areas Research*, 1 (1), 48-59.

DOI: https://doi.org/10.5281/zenodo.6052884

Received: *22/12/2021 –**Accepted:*** *25/01/2022*

1. Giriş

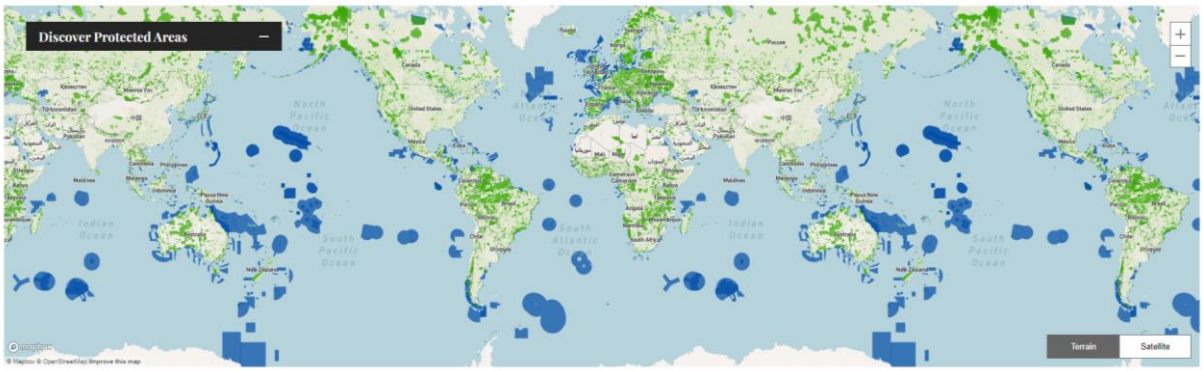
İnsan odaklı tahribatların gün geçtikçe artması sonucu doğal kaynak değerleri de aynı hızla bozulmaya ve tükenmeye başlamıştır. İnsani gelişim ve ekonomik kalkınma çabaları sonucu ekosistem üzerinde meydana gelen olumsuz etkiler toprak kaybı, sel, erozyon, ormansızlaşma, sulak alanların kuruması, deprem, kuraklık gibi çevresel felaketlere yol açmıştır. Bu duruma ek olarak gerçekleştirilen kontrolsüz turistik faaliyetler doğal alanların bozulma sürecini hızlandırmıştır. Bu bağlamda küresel çapta ülkeler hükümet politikalarına da yansıtacak şekilde bir takım koruma sistemleri geliştirmiştir. Bu sistemlerden biri ve en çok benimseneni korunan alan sistemleridir (Düzgüneş, 2015; Kervankıran ve Eryılmaz, 2015; Gül ve Metin, 2021).

Çatı kuruluş olan ve dünya koruma faaliyetlerine yayınladıkları rehber ve modeller ile yön veren Dünya Doğayı Koruma Birliği (IUCN)'ye göre korunan alan "biyolojik çeşitliliği korumak ve devamlılığını sağlamak amacıyla doğal ve kültürel kaynakların etkili yasa ve diğer mekanizmalarla yönetilen kara ve/veya deniz parçalarıdır" (IUCN, 1994). Doğa Koruma ve Milli Parklar Genel Müdürlüğü'ne göre ise "ekosistem hizmetlerinin ve kültürel değerlerin, tabiatla birlikte uzun vadeli korunması ve devamlılığın sağlanması amacıyla mevzuatla tanımlanan ve yönetilen coğrafi bir alan" olarak ifade edilmektedir (Milli Parklar Genel Müdürlüğü, 2021).

Korunan alanlar uluslararası geçerliliği olan ekosistem ve canlı varlıkların korunması ve devamlılığını amaçlamaktadır (Çağlayan, 2019). Bir korunan alanın sistemi tesis edilirken 9 temek amaç göz önünde bulundurulur (IUCN-UNEP-WWF, 1980; Anonim, 2006; Gül ve Kurdoğlu, 2021). Bunlar;

- Yaşam destek sistemlerinin korunması
- Tür ve ekosistemlerin sürdürülebilir kullanımı
- Genetik çeşitliliğin korunması
- Bilimsel araştırma
- Yaban hayatının korunması
- Spesifik karaktere sahip doğal ve kültürel özelliklerin korunması
- Turistik ve rekreasyonel faaliyetler
- Eğitim
- Kültürel ve geleneksel özelliklerin sürdürülmesi

Bu bağlamda günümüzde küresel ölçekte dünya yüzeyinin %16,64'ü karasal, %7,74'ü ise denizel alan olarak koruma altındadır. Dünya genelinde karasal ve denizel alanların dağılımı Şekil 1'de verilmektedir (Protected Planet, 2021).

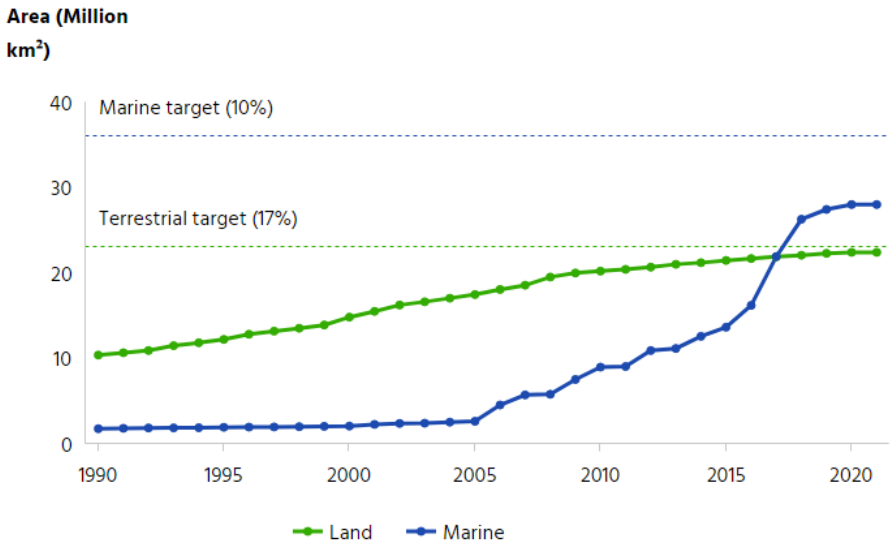


Şekil 1. Karasal ve denizel koruma alanları

*Yeşil renkler karasal, mavi renkler ise denizel koruma alanlarını ifade etmektedir.

1990 yılından günümüze kadar karasal koruma alanlarında sürekli bir artış görülürken denizel koruma alanlarında 2000'li yıllara kadar durağan bir ivme hakimken özellikle 2005 yılından itibaren ciddi bir

artış hızı gözlemlenmektedir (Şekil 2). IUCN'e göre 2030 yılına kadar karasal alanlarda %17, denizel alanlarda ise hedefin %10 olması gerekmektedir.



Şekil 2. 1990-2021 Yılları arası korunan alanların kapladığı alandaki yüzdesel değişimler

Bu kapsamda IUCN farklı koruma yapılarını yönetim amaçlarına göre 6 sınıfa ayırmıştır (Çizelge 1). Bunlar, mutlak doğa rezervi ile yabanıl alanlar, milli parklar, doğal anıtlar, habitat ve tür yönetim alanları, peyzaj koruma alanları ve kaynak koruma alanlarıdır.

Çizelge 1. Yönetim amaçlarına göre korunan alan sınıfları (Mac Kinnon, MacKinnon, Graham, ve Jim, 1986; IUCN, 1994; Eagles, Mc Cool ve Haynes, 2002)

Yönetim Amaçları	Korunan Alan Sınıfları						
	Ia	Ib	II	III	IV	V	VI
Örnek Ekosistemlerin Doğal Durumlarında Korunması	1	1	1	1	1	2	3
Ekolojik Çeşitliliğin ve Çevre Düzeninin Devamı	1	2	1	1	2	2	2
Bilimsel Araştırma	1	3	2	2	2	2	3
Yaban Hayatı Koruma	2	1	2	3	3	-	2
Tür ve Genetik Çeşitliliğin Korunması	1	2	1	1	1	2	1
Çevresel Hizmetlerin Tesisi	2	1	1	-	1	2	1
Su Havzası Şartlarının Korunması	3	-	1	2	2	2	2
Yaban Hayatından Protein ve Hayvansal Ürün Üretimi, Sportif Avcılık ve Balıkçılık İzni	-	-	-	2	-	3	3
Erozyon-Sedimantasyon Kontrolü, Yatırımları (baraj, regülatör, vb.)	-	-	3	3	3	3	3
Özellikli Doğal ve Kültürel Değerlerin Korunması	-	-	2	1	3	1	3
Turizm ve Rekreasyon	-	2	1	1	3	1	3
Eğitim	-	2	2	2	3	-	-
Doğal Ekosistem Kaynaklarının Sürdürülebilir Kullanımı	-	3	3	-	2	2	1
Kültürel ve Geleneksel Özelliklerin Tesisi	-	-	-	-	-	1	2
Sürdürülebilir Ürün Temelli Odun, Yem veya Deniz Ürünlerini Tedarik Etmesi	-	-	3	-	3	2	1
Manzara Güzelliğinin ve Açık Alanların Korunması	3	-	1	2	2	1	-

Esnek Yönetim, Çok Amaçlı Faydalanmanın Sürdürülmesi	-	-	-	-	-	3	2
Menkul Teşvikler, Marjinal Alanların Sürdürülebilir Kullanımı ve Kırsal Kalkınmaya Katkı	-	-	1	2	2	1	3

1: Kaynak Yönetiminde Birincil Amaç 2: Her Zaman Önemli İkincil Amaç 3: Potansiyel Uygulanabilir, En Az Ağırlıklı Yönetim Amacı -: Uygun Olmayan Amaç	**Ia:** Mutlak Doğa Koruma Rezervi **Ib:** Yabanıl Alanlar **II:** Milli Park **III:** Doğal Anıt **IV:** Habitat ve Tür Yönetim Alanı **V:** Peyzaj Koruma Alanı **VI:** Kaynak Koruma Alanı

Günümüzde korunan alan yapıları ülkeden ülkeye değişiklik göstererek farklı adlarla ve farklı yasal mekanizmalarla ilan edilmektedir. Bu bağlamda kimi alanlar ulusal kanunlarla korunurken kimi alanlar ise uluslararası sözleşmeler ile korunmaktadır. Uluslararası kanunlarla korunan alanlardan birisi de jeoparklardır.

Bu çalışmada jeoparkların küresel ölçekteki önemi, Avrupa ve dünya çapında gerçekleştirilen girişim ve oluşumlar ile doğa korumaya olan katkısı üzerinde durulmaktadır.

2. Jeoparklar

Jeopark, aynı veya farklı türden jeositlerin bir arada bulunduğu, yaya gezme mesafesinden küçük olmayan, ender özellik sergileyen, bilimsel ve ekonomik değer oluşturan doğal alanlardır (Akbulut ve Ünsal, 2012; Jeolojik Mirası Koruma Derneği, 2021).

Geçmiş ile günümüz arasında köprü niteliği olarak görülen jeolojik miraslar insanlık ve doğa tarihi açısından son derece önemli alanlardır. 13 Haziran 1991 yılında Fransa'da 30'dan fazla ülke tarafından imzalanan Digne Bildirgesi ile "yerkürenin insanlara sunduğu kaynakların sonsuz olmadığı, o kaynaklar olmadan canlıların yaşayamayacağı, insanoğlu neslini sürdürmek istiyorsa yerküreyi tanımak ve sürdürülebilir kullanmayı sağlamak gerektiği" vurgulanmıştır (Digne Bildirgesi, 1991). Digne Bildirgesi'nin yayınlanmasından sonra giderek daha fazla sayıda ülke, sınırları dahilinde yer alan önemli jeolojik ve jeomorfolojik mirasa sahip çıkmaya ve korumak için stratejiler geliştirmeye başlamıştır (Yeşil, Yeşil ve Yılmaz, 2008).

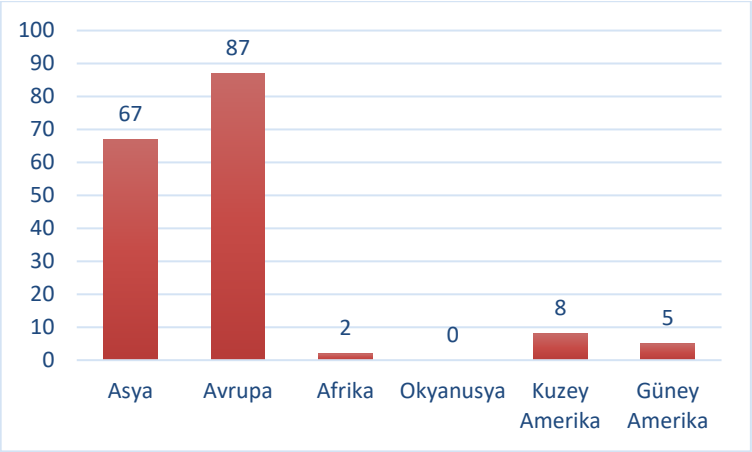
Jeoparklar yalnızca jeoloji anlamına gelmemekle birlikte dünyanın 4,6 milyar yıllık tarihinin her yönünü ve toplumu nasıl şekillendirdiğini de ifade etmektedir (UNESCO Türkiye Milli Komisyonu, 2021a). Jeoparklar yerkabuğu içerisinde geçmişten kalan çok sayıda jeosit barındırdığı için bilimsel değeri yüksek alanlar olup jeoturizm potansiyeline sahiptirler (Kazancı, 2010). Jeopark içerisinde düzenlenen her türlü etkinlik jeoparkın ulusal ve uluslararası düzeyde tanınabilirliğine katkı sağlamaktadır. Dolayısıyla jeoparklar bölgenin sürdürülebilir bir şekilde kalkınmasına yön vermektedir (Erdem, 2015).

Jeoparkların canlı yaşama ve ekosisteme birçok yararı bulunmaktadır. Bulunduğu alan içerisinde bilimsel ve eğitim çalışmalarına imkân tanıması (Gümüş, 2008, Kazancı, 2010), insanların bugün ve gelecekteki yerküreyi anlamasına yardımcı olması (Ekiz, 2015) ve insanoğlunun doğayı öğrenip, doğayla barışık bir şekilde yaşamayı ve doğayı anlamalarına yardımcı olması (Yıldız, 2017) söz konusu yararlardan birkaçıdır. Bu kapsamda bir jeoparkın sahip olması gereken özellikler şunlardır (European Geoparks, 2021a);

- Net sınırlara sahip olmalıdır.
- UNESCO Küresel Jeopark Ağı'na katılımış olmalıdır.
- Alan içerisindeki yerlerin çoğu jeolojik miras niteliğinde olmalıdır.
- Jeolojik mirasın korunması ve geliştirilmesi amacıyla bir yönetim yapısına sahip olmalıdır.
- UNESCO Küresel Jeopark Ağı'na dahil olan diğer alanlar ile etkileşim içinde olmalıdır.

2.1. UNESCO Küresel Jeopark Ağı

Jeopark çalışmaları UNESCO'nun 2001 yılından günümüze desteklediği programlardan birisidir. 2004 yılında Paris'te bir araya gelen ağ 2015 yılında gerçekleştirilen UNESCO 38. Genel Konferansı'nda jeoparkların statüsü değiştirilmiş ve tescilinin UNESCO tarafından yapılmasına karar verilmiştir. 2021 yılı itibariyle 46 ülkeden 169 jeopark programa dahildir (Global Geoparks Network, 2021). Küresel ölçekte kıtalar arası jeopark dağılımı Şekil 3'te gösterilmektedir.



Şekil 3. Jeoparkların Kıtalar Ölçeğinde Dağılımı

Küresel Jeopark Ağı sayesinde konusunda uzman kişiler arasında iş birliği gelişmektedir. Böylece uzmanlar arasında değişimler gerçekleştirilebilmektedir. Söz konusu alanların ilanı ile birlikte, bulunduğu bölge ve ülke uluslararası ölçekte tanınır hale gelmekte ve ağın sağladığı fonlama ile sürdürülebilir ekonomik kalkınmaya hizmet eden bir stratejiye dönüşerek jeolojik değerlerin korunması sağlanmaktadır. Bununla beraber yerel halkın istihdamı ile ekonomik katkı oluşturmaktadır.

Küresel Jeopark Ağı'na göre ağın bir parçası olan jeopkarlar şu misyonlara sahiptir (UNESCO Türkiye Milli Komisyonu, 2021b);

- Günümüz ve gelecek kuşaklar için jeolojik mirası korumak
- Jeoloji eksenli bilim dalları ile çevresel olayla hakkında kitleleri eğitim vermek
- Sürdürülebilir sosyo-ekonomik ve kültürel kalkınmayı desteklemek
- Katılımcı çok kültürlü ortaklıklar geliştirmek
- Araştırmaları teşvik etmek
- Ortak iş birliği yolu ile ağın sürdürülebilirliğini sağlamak
- Küresel jeopark ağına ait bülten, kitap ve yayınlara katkı sağlamak

Bununla beraber UNESCO Dünya Jeopark ağında 10 tematik konu üzerinde önemle durulmaktadır (UNESCO Global Geoparks, 2021).

1. **Doğal kaynaklar:** İnsanları doğal kaynakların sürdürülebilir kullanımı hakkında bilgilendirerek, doğal kaynaklara, çevreye ve peyzaj bütünlüğüne saygılı davranmayı teşvik etmektedir.
2. **Jeolojik tehlikeler:** Volkan patlaması, deprem ve tsunami gibi doğal afetler hakkında farkındalık oluşturarak, yerel topluluklarla birlikte jeolojik afetleri en aza indirmek için stratejiler geliştirmektedir.
3. **İklim değişikliği:** Geçmişe yönelik iklim değişim kayıtlarından hareketle günümüz iklim değişiklikleri üzerinde eğitimler vererek, yenilenebilir enerji kaynaklarına adaptasyonu sağlamakta ve "yeşil turizm" in standartlarını belirlemektedir.
4. **Eğitim:** Jeoparkın esas amaçlarından biri bütün yaş gruplarındaki insanlar için eğitim faaliyetleri geliştirmek ve jeolojik miras ile ilgili farkındalığı arttırarak; doğal, tarihi, somut olan ve olmayan kültürel miras arasındaki ilişkiyi kurmaktır.

5. **Bilim:** Jeoparklar akademik enstitüleri, yer bilimlerinde aktif bilimsel çalışmalar yapmaya teşvik ederek yerküre ile onun süreçleri hakkında bilgi üretmek için diğer disiplinler arası ilişkileri kurmaktadır.
6. **Kültür:** Jeoparkların temelini insanlar ve toplumlar arası ilişkilerin keşfedilmesidir.
7. **Kadın:** Jeoparkın kadınların gelişimi ya da eğitimleri üzerine odaklandığı önemli faaliyetleri bulunmaktadır.
8. **Sürdürülebilir gelişme:** Jeopark çok zengin kaynak değerlerine sahip olsa bile, ancak içinde yaşayan/ziyarete gelen insanlarla birlikte evrensel değerlere ulaşabilmektedir. Her jeopark, sürdürülebilir bir gelişme planına sahiptir. Bu plan çerçevesinde sahip olduğu değerler insan kullanımı ile birlikte sürdürülebilir bir gelişmeye açıktır.
9. **Yerel ve yerli bilgi:** Jeopark aktif olarak yerel ve yerli bilgiyi içermektedir. İnsanların kültürünü korumaktadır.
10. **Jeolojik koruma:** Jeoparkların esas amaçlarından birisi; yer kürenin mirasını sürdürülebilir bir şekilde korumak ve onun koruma ihtiyacını anlamaktır.

2.1.1. UNESCO Küresel Jeopark Ağına Başvuru ve Değerlendirme Kriterleri

Üyelik başvurusunda bulunan ülkelerin ilk olarak Küresel Jeopark Ağı (GGN) sekreterliği ile bağlantı kurması gerekmektedir. Burada dikkat edilmesi gereken husus Avrupa Jeopark Ağı'na üye olan UNESCO Küresel Jeopark Ağı'na zaten üyedir. Ancak başvuru yapılırken Avrupa ülkelerinden olan başvuruları Avrupa Jeopark Ağı (EGN) karara bağlamaktadır. Başvuru dosyası hazırlanarak üyelik süreci başlatıldıktan sonra aday jeopark Avrupa Jeopark Ağı ve Küresel Jeopark Ağı'na bağlı bağımsız bir uzman heyet tarafından incelenmektedir.

Bir alanın jeopark olması için uzun bir sürece ihtiyaç vardır. Bu süreçte Küresel Jeopark Ağı ve Avrupa Jeopark Ağı'na göre bazı değerlendirme kriterleri bulunmaktadır. Bu kriterler esasında koruma, eğitim ve turizme dayanmaktadır (Erdem, 2015). Bir jeopark için değerlendirme kriterleri aşağıdaki gibidir (UNESCO Global Geoparks, 2021);

1. **Boyut ve Yerleşim (Düzen):** Ağa katılmak isteyen bir jeopark alanının sınırları açıkça tanımlanmalıdır. Bu bağlamda gerek yerel ekonomik gerekse kültürel gelişmelere hizmet edebilecek yeterli alan genişliğine sahip olmalıdır.

2. **Yönetim ve Yerel Katılım:** Jeopark alanının küresel ağa dahil olabilmesi için etkin bir yönetim yapısına sahip olması gereklidir. Ancak bu yeterli olmayıp yerel ölçekte paydaşların da yönetim yapısına dahil olması beklenmektedir. Ancak bu sayede yönetim yapısının nitelikli bir koruma sağlayacağı vurgulanmaktadır. Yönetim yapısı yukarıdan aşağıya değil aşağıdan yukarıya doğru işleyen bir modele sahip olmalıdır.

3. **Ekonomik Kalkınma:** Bir jeopark alanının temel amacı sürdürülebilir kalkınma çerçevesinde ekonomik faaliyetleri teşvik etmektir. Bu durum kırsal ve kentsel alandaki çevre ile insan yaşam koşullarının iyileştirilmesine önemli katkılar sunmaktadır. Yenilikçi yerel işletmeler, yazlık endüstriler, jeoturizm, jeoürün satışı ekonomik söz konusu faaliyetlerden birkaçıdır.

4. **Eğitim:** Bir jeopark alanı gerek yerel halka gerekse ziyaretçilere yerküre hakkında bilgi vermektedir. Bu kapsamda alan ile ilgili çevresel ve kültürel kavramları aktaracak araç, etkinlik ve programların organizasyonu yapılmaktadır. Bu organizasyonlara müzeler, eğitim merkezleri, rehberli turlar, haritalar, seminerler, kurslar ve iletişim araçları örnek olarak verilebilir.

5. **Koruma:** Jeoparkın yer aldığı merkezi otorite bu alanda yer alan jeositlerin, temsili kayaç ve oluşumların, minarel ve kaynakları ile fosillerin yerel gelenek ve yasal mevzuatlara göre korunmasını sağlamakla yükümlüdür.

6. **Küresel Ağ:** Ağ dünya genelindeki tüm bölgeleri kapsamaktadır. Bu sayede ortak değer ve çıkarları gözeterek paydaşları bir araya getirmektedir. Bu yaklaşım konusunda uzman olan uygulayıcılar arasında değişim ve iş birliği gerçekleştirilmesini sağlamaktadır. Bir ağa üye olmak diğer ağdaki üye alanların bilgi ve deneyimlerinden faydalanmanın önünü açmaktadır.

Kriterleri yerine getiren jeopark adayları başvuru yaparak süreçte de başarılı olduktan sonra UNESCO listesine girmektedir. (UNESCO Türkiye Milli Komisyonu, 2021b). Süreçte başarılı olan her jeopark alanı, yönetimi ve performansı açısından 4 yılda bir denetlenmektedir. Denetleme sonucunda çıkan raporda jeopark alanı gerekli şartları sağlıyor ise jeopark alanı Küresel Jeopark Ağı (GGN) 'nin bir üyesi olmaya devam etmektedir. Ancak jeopark için tavsiyelerde bulunulursa ve iki yılda bir gerçekleşen denetimleri de geçemezse üye listesinden çıkartılmaktadır. Dolayısıyla tüm ayrıcalıklardan faydalanmasına son verilmektedir (UNESCO Türkiye Milli Komisyonu, 2021b).

2.2. Avrupa Jeopark Ağı

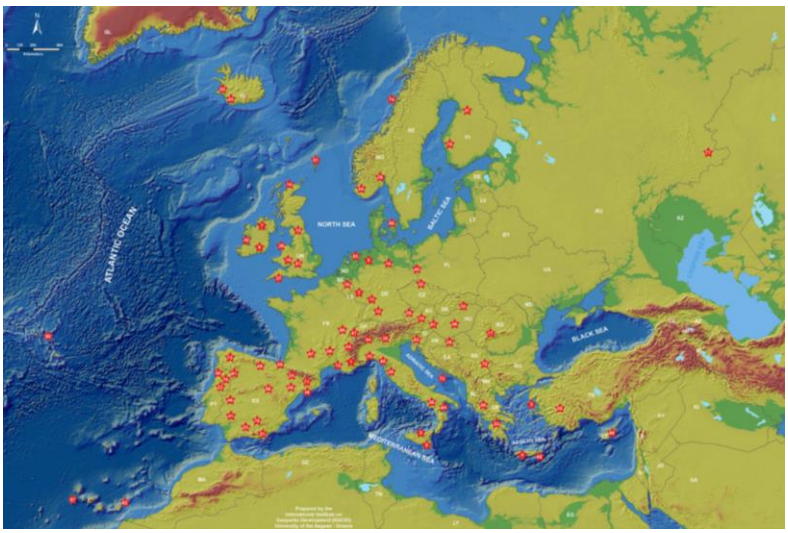
1997 yılında Çin'in Bejing kentinde Uluslarası Jeoloji Kongresi düzenlenmiştir. Bu kongrede iki bilim insanı olan Guy Martini (Fransa) ve Nickolas Zouros (Yunanistan) jeoparklar arasında bir ağ oluşturma fikrini gündeme geltirmiştir (Gümüş, 2008; Frey, 2001). Böylece 2000 yılında Reserve Geologique de Haute Provence/Fransa, Vulkaneifel European Geopark/Almanya, Petrified Forest of Lesvos/Yunanistan ve Maestrazgo Cultural Park/İspanya olmak üzere dört Avrupa Jeoparkının önderliğinde Avrupa Jeoparklar Ağı kurulmuştur (Zouros ve Ramsey, 2007; Ekiz, 2015). Bu ağ European LEADER IIC kapsamında oluşturulmuştur (Zouros 2005; Gümüş, 2008). Yönetim merkezi Fransa'da bulunmaktadır (Ekiz, 2015).

Avrupa Jeopark Ağı (EGN) kurulmasının amaçları şu şekildedir (European Geoparks, 2021a);

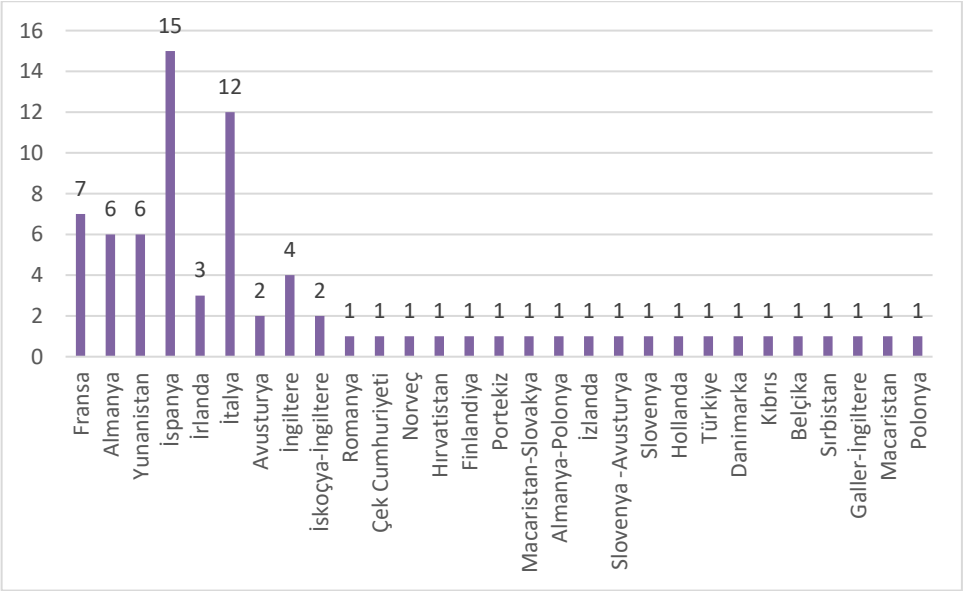
- Kendi bölgelerindeki jeolojik mirası korumak ve sürdürülebilir kalkınmayı sağlamak
- Sürdürülebilir kalkınmaya dahil olan ülkelerle güçlü bir Avrupa grubu oluşturmak
- Müzakerede bulunarak yeni ortak Avrupa Programları oluşturmak

Avrupa Jeopark Ağı yerel bir ağdır ve ortak aktiviteleri hem geliştirmek hem de desteklemek amacıyla yılda iki kez toplanmaktadır (UNESCO Türkiye Milli Komisyonu, 2021a).

Günümüzde Avrupa jeopark ağına 26 Avrupa ülkesinden 88 jeopark dahildir (Şekil 4). Jeoparkların ülkesel dağılımlarına ilişkin bilgiler Şekil 5'de gösterilmektedir.



Şekil 4. Avrupa ülkelerindeki jeoparkların konumsal dağılımları (European Geoparks, 2021b)



Şekil 5. Avrupa jeoparklarının ülkelere göre dağılımları

3. Jeopark – Turizm - Doğa Koruma İlişkisi

Jeoparklar alternatif turizm türlerinden biri olan jeoturizme imkân tanımaktadır. Bu turizm türü ile dünya genelinde jeolojik ve jeomorfolojik çeşitlilik, jeomiras, jeosit gibi (volkanik alanlar, mağaralar, şelaleler, yüksek rakımlı dağlar, vb.) önemli peyzaj değerlerine sahip alanlarda turistik faaliyetler gerçekleştirilmektedir. Jeoturizm, doğayı ve jeolojik mirasları incelemek, korumak ve yorumlamak amacıyla jeomorfolojik yapıları ve çeşitli peyzajları içinde barındıran alanlarda gerçekleştirilen ziyaretleri ifade etmektedir. Bu yönüyle sürdürülebilir yerel kalkınma için önemli bir kaynak olarak değerlendirilen bu turizm türü ulusal ve uluslararası açıdan bilimsel, eğitsel, tarihi, kültürel ve sosyal yapı ile zengin bir biyoçeşitliliği içinde barındırmaktadır.

Jeoturizm, bünyesindeki jeopark ve jeositlerle sosyo-kültürel yapı ve biyoçeşitliliği içinde barındırarak kültürel doku ve türlerin korunmasına yardımcı olmaktadır. Dolayısıyla, jeolojik mirasların gelecek nesillere aktarılmasını ve aynı zamanda toplumun doğaya yönelik bilinç kazanmasını sağlamaktadır. Eğitim açısından açık laboratuvar olarak kullanılarak, doğa uzmanları ve eğitimcilere araştırma ve inceleme konusunda fırsat tanımaktadır. Uluslararası anlamda önem kazanan bu alanlar ziyaretçi çekerek ziyaretçilere yeryüzünün geçmişini anlama ve öğrenme olanağı tanımaktadır. Ayrıca jeoturizm, ekonomik getirisinin yanı sıra doğal kaynakların sürdürülebilirliği ve turizm imkânı sağlaması açısından büyük önem taşımaktadır. Jeoturizm, doğa eğitimlerinin yanı sıra doğa korumacılığının da yapılabildiği ve bunun yanında ekonomik gelirin de sağlanabildiği, bundan dolayı da son yıllarda hızlı bir şekilde gelişen bir sosyal faaliyet alanı olarak karşımıza çıkmaktadır. Günümüzde dünyanın pek çok ülkesinde jeomirasın korunması, araştırılması, eğitim, doğa koruma ve yerel kalkınmayı sağlamak amacıyla, jeoturizm faaliyeti gerçekleştirilmektedir.

4. Tartışma ve Sonuç

Küresel açıdan Jeoçeşitlilik ve jeomiras açısından ülkeler zengin bir potansiyele sahiptir. Jeoturizmin öğeleri arasında yer alan jeositler, jeolojik miras alanları ve jeoparklar dünyanın bugünden başlayarak tüm evrelerini anlamamıza yardımcı olacak donelere sahiptir. Jeolojik geçmişe ait bir belge özelliğinde olan söz konusu zenginlik insanoğlunun üzerinde yaşadığı dünyayı tanıması için uygun bir araç olduğu ve dolayısıyla ekonomik açıdan da katma değer sağlayacağı aşikardır. Bu bağlamda jeopark alanlarında korumanın ön planda olması ve sürdürülebilirliğinin sağlanması gerekmektedir. Dolayısıyla stratejik kararların alınmasında katılımcı yaklaşımı içeren bir süreç takip edilmelidir. Aynı zamanda bölgede yaşamını sürdüren yerel halka yönelik bilinçlendirme faaliyetleri gerçekleştirilerek jeoparkların, jeolojik öge ve oluşumların neden önemli olduğuna ilişkin bilgi verilmelidir.

Salt jeolojik kaynak değerleri dışında jeopark alanın doğal, kültürel ve tarihi kaynak değerlerinin de göz önüne alınması son derece önemlidir. Bu sayede ilgili kaynak çeşitliliği ile bütünleştirilmiş bu alanlar

gerek ziyaretçiler için birer çekim noktası gerekse yerel kalkınma ve kaynak değerlerinin sürdürülebilirliği için birer fırsat oluşturacaktır.

Teşekkür ve Bilgi Notu

Makalede ulusal ve uluslararası araştırma ve yayın etiğine uyulmuştur. Çalışmada etik kurul izni gerekmemiştir.

Yazar Katkısı ve Çıkar Çatışması Beyan Bilgisi

Makalede yazar %100 katkıda bulunmuştur. Herhangi bir çıkar çatışması bulunmamaktadır.

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A New Approach in Nature Conservation: Geoparks and Their Global Importance

Summary

Geological formations are the common heritage of world history that establishes the link between past, present and future. Rocks, minerals, fossils, geomorphology and soil are integral parts of nature. While these formations deeply affect the cultural diversity of civilizations, they provide important data in understanding the world heritage. It stores information on natural disasters such as soil formation, desertification, earthquake, flood, erosion, volcanic activity and all kinds of problems related to plant and animal species. Therefore, they play a key role in presenting today's problems and projections for the future. Geopark areas, which exist in these areas and exhibit unique geological and geomorphological structures, are important protection structures evaluated by visitors on a global scale. In this study, the importance of geoparks on a global scale, European and world-wide initiatives and formations and their contribution to nature conservation are emphasized.

With the Digne Declaration signed by more than 30 countries in France on June 13, 1991, it was emphasized that "the resources offered by the earth to humans are not infinite, living things cannot survive without those resources, and it is necessary to recognize the earth and ensure its sustainable use if human beings want to continue their generation" (Digne Declaration, 1991). After the publication of the Digne Declaration, more countries started to develop strategies to protect and protect the important geological and geomorphological heritage within their borders (Yeşil, Yeşil and Yılmaz, 2008).

Geoparks do not only mean geology, but also express how they have shaped every aspect of the world's 4.6 billion year history and society (UNESCO Turkish National Commission, 2021a). Since geoparks contain many geosites from the past in the earth's crust, they are areas of high scientific value and have geotourism potential (Kazancı, 2010). All kinds of events organized within the geopark contribute to the national and international recognition of the geopark. Therefore, geoparks direct the sustainable development of the region (Erdem, 2015).

Geoparks have many benefits to living life and ecosystem. It enables scientific and educational studies in its field (Gümüş, 2008, Kazancı, 2010), helps people understand the world today and in the future (Ekiz, 2015), and helps human beings learn and live in harmony with nature and understand nature (Yıldız, 2017) are some of the benefits in question. In this context, the features that a geopark should have are as follows (European Geoparks, 2021a);

• It should have clear boundaries.

• Must have participated in the UNESCO Global Geoparks Network.

• Most of the sites within the area should be of geological heritage.

• It should have a management structure in order to protect and develop the geological heritage.

• It should interact with other areas included in the UNESCO Global Geopark Network.

Geopark studies is one of the programs supported by UNESCO since 2001. The network, which came together in Paris in 2004, changed the status of geoparks at the 38th General Conference of UNESCO held in 2015 and decided to register them by UNESCO. As of 2021, 169 geoparks from 46 countries are included in the program (Global Geoparks Network, 2021). Thanks to the Global Geopark Network, cooperation is developing among experts in their fields. Thus, exchanges between experts can be realized. With the announcement of the said areas, the region and country in which it is located become internationally recognized, and the protection of geological values is ensured by transforming into a strategy that serves sustainable economic development with the funding provided by the network. In addition, it creates an economic contribution with the employment of local people.

It takes a long time for an area to become a geopark. In this process, there are some evaluation criteria according to the Global Geopark Network and the European Geopark Network. These criteria are based

on conservation, education and tourism (Erdem, 2015). Geopark candidates who fulfill the criteria apply and are included in the UNESCO list after being successful in the process. (UNESCO Turkish National Commission, 2021b). Every successful geopark area in the process is inspected every 4 years in terms of its management and performance. If the geopark area meets the necessary conditions in the report resulting from the audit, the geopark area continues to be a member of the Global Geopark Network (GGN). However, if recommendations are made for the geopark and it fails to pass the biennial inspections, it is removed from the member list. Therefore, all privileges are terminated (UNESCO Turkish National Commission, 2021b).

Today, geoparks, which are considered as geotourism destinations with their natural and cultural resource values, not only allow touristic activities, but also have an educational feature that transfers the information from the past to the present. In this respect, geoparks allow geotourism, which is one of the alternative tourism types. With this type of tourism, touristic activities are carried out in areas with important landscape values such as geological and geomorphological diversity, geoheritage, geosite (volcanic areas, caves, waterfalls, high-altitude mountains, etc.) throughout the world. Geotourism refers to visits made in areas that contain geomorphological structures and various landscapes in order to examine, preserve and interpret nature and geological heritages. In this respect, this type of tourism, which is considered as an important resource for sustainable local development, contains national and international scientific, educational, historical, cultural and social structure and a rich biodiversity.

Geotourism helps preserve cultural texture and species by incorporating socio-cultural structure and biodiversity with its geoparks and geosites. Therefore, it ensures the transfer of geological heritages to future generations and at the same time, the society gains awareness about nature. It is used as an open laboratory for education, giving naturalists and educators the opportunity to research and study. These areas, which have gained international importance, attract visitors and give them the opportunity to understand and learn about the history of the earth. In addition to its economic return, geotourism is of great importance in terms of sustainability of natural resources and providing tourism opportunities. Geotourism emerges as a rapidly developing field of social activity in recent years, where nature conservation can be done as well as nature education and economic income can be provided as well. Today, geotourism activities are carried out in many countries of the world in order to protect geo-heritage, research, education, nature protection and local development.

Countries have a rich potential in terms of geodiversity and geoheritage from a global perspective. Geosites, geological heritage sites and geoparks, which are among the elements of geotourism, have data that will help us understand all phases of the world starting from today. It is obvious that this richness, which is a document belonging to the geological past, is a suitable tool for human beings to get to know the world they live on, and therefore it will provide added value in terms of economy. In this context, protection in geopark areas should be at the forefront and its sustainability should be ensured. Therefore, a process that includes a participatory approach should be followed in making strategic decisions. At the same time, awareness raising activities should be carried out for the local people living in the region and information should be given about why geoparks, geological elements and formations are important. It is extremely important to consider the natural, cultural and historical resource values of the geopark area, apart from the purely geological resource values. In this way, these areas, which are integrated with the diversity of resources, will be both attraction points for visitors and an opportunity for local development and sustainability of resource values.

Journal of Protected Areas Research
JoPAR, 2022, 1 (1), 60-74
e-ISSN: 2822-2733
Review Article

Journal homepage:
https://mimarlikbilimleri.com/ojs/index.php/journalofprotectedareasresearch
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Investigation of Protected Natural Areas in Afyonkarahisar Region

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Abstract

Studies on protected areas date back to ancient times. However, serious and official conservation efforts started in 1872 when Yellowstone was declared the first National Park in the USA. Studies, which accelerated after the beginning of the last century, spread around the world. The first protected area in Turkey Yozgat Çamlığı declared in 1958. Later on, different studies on protected areas in Turkey as well as in the world. In Turkey, forest and protected areas are protected by the Ministry of Environment and Urbanization Ministry of Water Affairs. In the study, the analysis of the protected areas in Afyonkarahisar province was investigated. As a result of the study, protection areas with different statuses such as nature protection areas, natural monuments, nature purses, wetlands of national importance, wildlife development, seed stands, gene protection forests in Afyonkarahisar province were reached.

Keywords: *Protected areas, Natural parks, Afyonkarahisar*

Afyonkarahisar Yöresindeki Korunan Doğal Alanların İrdelenmesi

Öz

Korunan alanlar ile ilgili yapılan çalışmalar eski zamanlara kadar dayanmaktadır. Fakat ciddi anlamda ve resmi statüdeki koruma çalışmaları 1872 Yılında ABD'de Yellowstone'nun ilk Milli Park ilan edilmesi üzerine başlamıştır. Geçen yüzyılın başlarından sonra hızlanan çalışmalar dünya geneline yayılmıştır. Türkiye'de ise ilk koruma alanı 1958 yılında ilan edilen Yozgat Çamlığı'dır. Daha sonra dünyadaki gibi Türkiye'de de korunan alanları üzerine farklı çalışmalar yapılmıştır. Türkiye'de korunan alanlar Orman ve Su İşleri Bakanlığı ile Çevre ve Şehircilik Bakanlıkları tarafından korunmaktadır. Çalışma da Afyonkarahisar ilindeki korunan alanların analizleri araştırılmıştır. Çalışmanın sonucunda Afyonkarahisar ilinde tabiat koruma alanı, tabiat anıtı, tabiat pakları, ulusal öneme haiz sulak alanları, yaban hayatı geliştirme, tohum meşçereleri, gen koruma ormanları gibi farklı statülerde olan koruma alanlarına ulaşılmıştır.

Anahtar Kelimeler: *Korunan alanlar, Tabiat parkları, Afyonkarahisar*

Citation: Yambol, G. (2022). Investigation of protected natural areas in Afyonkarahisar Region. *Journal of Protected Areas Research*, 1 (1), 60-74.

DOI: https://doi.org/10.5281/zenodo.6052999

Received: 18/08/2021 –Accepted: 06/01/2022

1. Introduction

Nature conservation is an area studied within environmental protection. Nature conservation is “the rational use of Earth's resources” according to Mac Kinnon (1986). Nature conservation is important for scientific and ethical, economic, health, educational and didactic aesthetics, recreational and touristic reasons (Demirel, 2005). According to IUCN; Nature conservation has three main purposes. These are the protection of biological diversity, the protection of natural resources according to the principle of continuity, and the harmony between other elements of the biosphere and human societies (Çolak, 2001).

Nature conservation is the work carried out to protect all living and non-living beings from all kinds of negative effects, pressures, and destructions of people and to secure them for the future, and to maintain ecosystem services such as ecological, environmental, socio-economic, and cultural of natural systems. Today, nature conservation efforts focus on the protection of the natural environment in which people live and interact and the cultural spaces they produce from their existence, that is, from the "human factor" (Gül and Kurdoğlu, 2021; Gül and Metin, 2021).

Although human beings have been using nature for their benefits since their existence, their conservation work goes back to ancient times. Some of the edicts of Emperor Osaka in India, King William in England and published in Rome are known. The main serious studies took place at the beginning of the last century (MacKinnon, 1986; Yücel, 1994). It is the industrial revolution and with it, great destructions and irreversible damages in nature. After these activities started to return to human beings as dangerous problems, nature conservation awareness began to mature. The world, especially the USA has come to the forefront in terms of firsts in conservation studies with official status. The US Congress declared Yellowstone the first national park in 1872 and the Antiquities Act in 1906 as the first natural monument. Many countries in Europe followed the USA. With the protection of more than 15% of its lands in Europe, Germany and Venezuela came to the fore in South America (Yücel, 1994). Due to the importance of protected areas, new areas have been identified and gained protection status in many countries (Emerton, Bishop & Thomas, 2006).

The spatial and numerical amounts of protected areas are increasing day by day by declaring many nature protection areas with different names or statuses in the world and our country. In the World Database of Protected Areas 2021 Report, jointly managed by UNEP-WCMC and IUCN; The number of protected areas in the world's terrestrial areas and inland waters is 248,797, which constitutes approximately 15,67% of the world's terrestrial surface area. Marine protected area, on the other hand, is 17,861 in total, making up 7.72% of it. (Protected Planet, 2021).

The most important organization related to nature conservation is IUCN (International Conservation of Nature and Natural Resources). Although its first establishment years were in 1948, it took its real name in 1958. The association, of which more than 1000 organizations are members in the world, held its first meeting in the USA in 1962. IUCN has divided the protected areas into different statuses and conducts pioneering studies on this subject in the world (Yücel, 1994).

Protected areas provide important ecological, social and economic services such as clean water, carbon storage, genetic reservoirs, disaster mitigation and soil stabilization, and important opportunities to protect our cultural heritage, beyond just preserving biodiversity. It is an operational tool that can provide an advantage in adapting to climate change with protected area networks that will be well managed and created in terms of quality and quantity of protected areas. It can function as an insurance for the future, especially by protecting the area as a whole (soil, water, air, species, etc.), allowing the movement of plants and animals, resisting all kinds of natural disasters and connections, increasing the capacity to capture and store carbon (Gül, Dinç & Gül, 2021).

2. Material and Method

In this study, a literature review on the protected areas of Afyonkarahisar province was made and evaluated with a general situation analysis. The city where the Battle of the Commander-in-Chief took place, the National Park of the Commander-in-Chief, which hosts dozens of striking monuments, including the Mustafa Kemal Atatürk Monument, has special importance. Located at the crossing

point of the Phrygian Valley, which stretches for 500 kilometers, Afyonkarahisar is also visited by tourists with its fascinating fairy chimneys and rock formations, similar to the examples in Cappadocia. The city, which is almost a paradise for those who love nature trips and sports, has many untouched nature protection areas such as Akdağ Nature Park, Eber Lake, and 26 August Nature Park. Many activities such as nature walks, camping, rock climbing, caving, and mountaineering can be done in these areas. Protected areas in the province are mainly located in forest areas.

3. Findings and Discussion

3.1. Afyonkarahisar Castle / Center

Afyonkarahisar Castle, located on a volcanic rock mass at an altitude of 226 meters, was built by the Hittite Emperor II in 1350 BC. It was used as a fortified place in the Arzava Campaign during the reign of Murshil and was named Hapanuva. The castle was also the scene of important battles during the Byzantine and Seljuk periods. At the summit of the castle, cultural traces belonging to the Phrygian Period, who lived in Anatolia between 1200-700 BC, were found. There are many places of worship and 4 large cisterns (water pits) dedicated to the Mother Goddess Kybele. Its walls were repaired in 1235 by Architect Bedrettin Gevhertaş, who was the foreman of the castle during the reign of Seljuk Sultan Alaaddin Keykubat. In addition, a small mosque and a palace were built next to the castle. In 1573, the Ottoman Sultan II. By the order of Selim, the bastions, cisterns and tower were repaired again by Mahmut Bey (Türkiye Kültür Portalı 2021)

Figure 1. Afyonkarahisar castle / center (Türkiye Kültür Portalı, 2021)

3.2. Commander-in-Chief Historical National Park / Center

It is within the borders of Afyon, Kütahya, and Uşak provinces in Inner West Anatolia. It was declared a national park in 1981. Its surface area is 348,340 decares, 17,120 decares are in Uşak, 151,720 decares are in Kütahya, 179,500 decares are within the borders of Afyon province(**Figure 2**). Commander-in-Chief Historical National Park is among the important milestones in the history of the Republic of Turkey. The areas within the Historical National Park are the most important part of our National Liberation War, which ended with the expulsion of the imperialist occupation forces from Anatolia; These are the regions where the Great Offensive began on August 26 and the Battle of the Commander-in-Chief took place on August 30. Mustafa Kemal Pasha, who played the first-degree role in the success of the Great Offensive with his military genius, gained strength in the country and the world after this War. Atatürk, with the power and authority he received from his nation, started modernization moves and implemented radical innovations to make the existence and independence of the Turkish society permanent. The Historical National Park area is not only a holy place where the turning point of our National War of Independence against imperialist countries was experienced, our struggle for independence and freedom became monumental and epic, but also a symbol of the determination, courage, and faith of the Turkish Nation in the defense of the homeland despite all adverse conditions. This is why; Commander-in-Chief Historical National Park cannot be seen as a national park or as an ordinary conservation area in terms of use in the conservation-use balance

approach. The areas around Afyon Kocatepe and Dumlupınar were declared as Historical National Parks, and the National Park, which was determined in two separate sections as Afyon Kocatepe and Dumlupınar by the course of the war, was connected by a hundred-meter lane in both directions of the Afyon-Uşak highway (Türkiye Kültür Portalı 2021).

Figure 2. Commander-in-Chief Historical National Park/center (Türkiye Kültür Portalı 2021).

3.3. 26 August Nature Park / Center

It is located within the borders of Sinanpaşa district of Afyonkarahisar province; The total area of the field is 64.83 ha. It was declared as a nature park with the consent of the Ministry of Environment and Forestry, dated 03.04.2008 and numbered B.18.0DMP.0.02.452-89. A Long Term Development Plan was prepared within the scope of Article 4 of the National Parks Law No. 2873 and it was approved by the Ministry of Environment and Forestry and entered into force on 03.04.2008 (Figure 3)**.** Within the framework of the Long Term Development Plan, on 26 August Nature Park; 1 observation tower, 3 entrance and control buildings, 5 WCs, 4 parking lots, 1 children's playground, 1 country restaurant, 6 tennis courts, 2 carpet pitches, 3 tribunes, 1 sportsman's locker cabin. , 1 pony shelter (six units), 1 mosque, 1 waterfall, service buildings, 1 buffet, picnic units, and walking paths around the lake were built (Afyonkarahisar İl Kültür ve Turizm Müdürlüğü, 2020).

Figure 3. 26 August Nature Park / Center Afyonkarahisar İl Kültür ve Turizm Müdürlüğü, 2020)

3.4. Akdag Nature Park / Sandıklı

Akdağ Nature Park, which was announced on 29.06.2000 due to its recreational potential, wildlife richness, and interesting landscape expansions, is 14,692 ha. 5.463 hectares are in the Sandıklı district of Afyon province and 9.229 hectares are in the Çivril District of Denizli (Figure 4). In addition

to its geological, geomorphological, and hydrogeological character, the nature park is rich in species and ecosystem diversity as it is located on the transition zone of 3 phytogeographical regions in Turkey. In the southwest, south, and southeast parts of the nature park, which is defined as a sensitive protection area; Some of the Red Deer and Yılkı horse habitats are old larch forests, Alpine areas, natural landscape areas, Badger stand and areas where endemic species are found. Except for the controlled use zone at the entrance of Kocayayla, Menteş, and Çivril, the entire area to the north of the sensitive protection zone is reserved as a sustainable use zone. The most important resource value of the area is its fauna. Especially the red deer; There are endangered bearded vultures and griffon vultures, wild horses, and many wild animal species. Another resource value of the area is Tokalı Canyon. Akdag and its surroundings are a part of nature that has vegetation and wildlife features and is suitable for the rest and entertainment of the people in the integrity of the landscape (Tarım ve Orman Bakanlığı, 2021).

Figure 4. Akdağ Nature Park / Sandıklı (Tarım ve Orman Bakanlığı, 2021).

3.5. Erkmen Nature Park / Center

The area, which operates as a daily use area within the borders of the Commander-in-Chief Historical National Park, remained outside the borders of the historical national park after the border change of the historical national park in December 2016 (Figure 5). Considering the resource values and recreational potentials of the area, 51.7 ha area was declared as a nature park with the approval of the Ministry on 28.05.2018. It is 7.5 km from the center of Afyon Province, and transportation is provided by public buses from the city center (Tarım ve Orman Bakanlığı, 2021).

Figure 5. Erkmen Nature Park / Center (Tarım ve Orman Bakanlığı, 2021).

3.6. Dandindere Nature Reserve / Emirdag

It is within the borders of Afyonkarahisar province- Emirdağ district and 30 km. distance and is 260 Ha size. The Taurus Cedar (Cedrus libani), which generally spreads in the south and south-west of our country, was able to enter the northernmost border of the steppe transition zone in Inner West Anatolia and was isolated in this region (Figure 6). Dandin Stream, which is located in the northernmost part of the cedar stand, has been taken into the status of Nature Conservation Area to protect the cedar forest, put it into the service of science and education studies, ensure that its natural features are preserved and that present and future generations benefit from this area. On the field; There are Taurus Cedar, Boylu juniper, Skunk juniper, Tar juniper and Hairy oak species. As animal species, fox, wolf, badger, pig, rabbit, partridge, and quail are encountered (Akcil, 2021).

Figure 6. Dandindere Nature Reserve / Emirdag (Akcil, 2021).

3.7. Yedikapi Nature Park / Bolvadin

Yedikapı Nature Park is in the Bolvadin district of Afyonkarahisar province. The area is 9 km from Kemerkaya village, 27 km from Bolvadin town center, and 12 km from Emirdağ district (Figure 7). Transportation is provided by continuing to towns and towns via Afyonkarahisar- Bolvadin, and Eskişehir - Konya highways. Transportation is provided from the stabilized road 4 km inside the Eskişehir Konya highway. The property of the site is the state forest belonging to the treasury under the rule and disposal of the state. There is Yedikapı Pond, which was completed in 2015 and was completed in 2015. The area is 215.9 ha. Afyonkarahisar's 12th has been declared as the 139th Nature Park of our country. There are no Yaylaçayı Stream, Yedikapı Pond and Üçpınar Stream flowing near the site.

Figure 7. Yedikapı Nature Park / Bolvadin

3.8. Kocayayla / Sandıklı

Kocayayla, on the skirts of Akdağ, which is located within the borders of Sandıklı district of our province and some of which overflows to Hocalar and Kızılören districts, is at an average of 1,600 m and the summit of Akdağ is at an altitude of 2,500 m (Figure 8). Kocayayla and Akdag vicinity are 35 km from our Sandıklı district. It is one of the rare places that are easy to reach with an asphalt road up to Sorkun town via Hocalar district on the right of Ankara-Antalya road. Starting from Sorkun, 1,600 m. from the winding roads that start with oak forests through the stabilized forest and where

the pine trees intensify as they rise. The high valley is reached. In addition to the bare mountains and deserted areas of Anatolia, lush forests, water resources, and meadows that will not match our Black Sea region; In short, the wildlife equivalent to its rich flora (horse horses, deer, pigs, foxes, wolves, etc.) instantly brings peace and vitality to our monotonous and concrete life. Without disturbing the natural landscape, footpaths, equestrian trails, bicycle tracks, wildlife watching points, small dams for trout production, ponds, social facilities for excursionists and campers, and pools will make these beauties even more attractive and unique. Around Kocayayla, many caves are waiting to be discovered. Estimated 20 km. long canyon and Akçay, which flows into Çivril Lake from the canyon. Along the canyon, there are caves where human beings have not stepped foot and routes that will attract the attention of trekkers. This unique place has been declared a "Nature Park" by the Ministry of Forestry, General Directorate of National Parks and Hunting-Wildlife, with the Approval dated 29.06.2000 and numbered 270 (Akcil, 2021).

Figure 8. Kocayayla / Sandıklı (Akcil, 2021).

3.9. Akşehir Lake / Sultandagi

A part of it is in Afyonkarahisar and a part of it is within the borders of Konya province. 211 km² of the lake, which has a surface area of 304 km², is within the borders of Afyonkarahisar province. The lake, which is 956 m above sea level, is surrounded by reeds and reeds. It is fed from Sultan Mountains and Eber Lake. Most of the lake, which is in the closed basin, is salty. Carp and pike live in the lake. It is also one of the places frequented by migratory birds.

Figure 9. Akşehir Lake / Sultandağı

3.10. Eber Lake / Bolvadin

It is one of the most interesting and largest lakes in Turkey. The endemic plant species Eber Yellow grows only in Eber Lake in the world. It is one of the most important wetlands around Bolvadin. It is a tectonic lake located in the closed basin of Akarçay-Eber, between the northwest slopes of the Sultan Mountains and the southern extensions of the Emir Mountains. Our province has an area of 150 km² within the borders of Çay and Bolvadin districts (Figure 10). Located on the migration route of migratory birds in Turkey, Lake Eber hosts many bird species as a breeding and living area with its

reeds. Reed production with the highest economic value is made in the lake and there are carp, pike, and mirror carp. Because the lake allows hunting tourism, it is seen that many people from outside the province build hunting houses on the lakeshore. Another striking feature of Lake Eber is the floating islets formed by reed roots on the water, which the locals call "Kopak". It has even been seen that fishermen and hunters set up shelters on these islets. The lake, which is a wonder of nature, consisting of reeds and reeds, takes its place at the top of the photoshoots of the couples to get married (Afyondayiz, 2021).

Figure 10. Eber Lake/ Bolvadin (Afyondayiz, 2021).

3.11. Emre Lake / İhsaniye

It is the smallest lake in the naturally formed area within the borders of Afyonkarahisar. It is between Döğer Town and Bayramaliler Village of İhsaniye District (Figure 11). Depending on the precipitation periods, its area narrows and expands. Its depth increases to over 3 millimeters in some places. Its waters are sweet. Emre Lake provides the opportunity to see many beauties of the Phrygian Valley. Many artifacts found in the Phrygian Valley can be seen during the excursion with canoes on the lake. The surface area of the pond is approximately 5 km² and its depth is over 3 millimeters in some regions. (Afyonkarahisar il Kültür ve Turizm Müdürlüğü, 2021).

Figure 11. Lake Emre / İhsaniye (Afyonkarahisar il Kültür ve Turizm Müdürlüğü,2021).

3.12. Acı Lake / Basmakci

A part of it is within the borders of Afyonkarahisar and a part of it is within the borders of Denizli province. Its area is 41.5 square kilometers and 20 square kilometers is within the borders of Başmakçı and Dazkırı districts of Afyonkarahisar (Figure 12). It is 842 meters above sea level. Sodium sulfate and its derivatives are produced from the lake, which has soda water. The boiling waters from the skirts of Söğüt Mountain, located in the south-east of the lake, not only feed the lake but also create living environments. It is one of the special regions where flamingo herds can live in summer and winter. Toads and turtles and fish measuring 3-4 centimeters live in reeds and near water sources. Migratory birds such as flamingo, seagull, cormorant, wild duck, crane, wild goose, pelican,

and stork visit the Aşağı Akpınar village and its surroundings, where the food chain is rich. In the mountains to the southeast, eagles, hawks, and hawks, which are birds of prey, live. Acıgöl is one of the most important protected areas in Anatolia in terms of the bird population. It has important potential in terms of tourism. For those interested in nature sports, the mountains and plateaus in the southeast of the lake are very important. It is possible to reach the lake by going 4-5 kilometers from Başmakçı district towards Aşağı Akpınar Village (Afyonkarahisar il Kültür ve Turizm Müdürlüğü, 2021).

Figure 12. Acıgöl / Başmakçı (Afyonkarahisar il Kültür ve Turizm Müdürlüğü, 2021)

3.13. Karakuyu Lake / Dinar

Afyonkarahisar Province has many lakes and ponds that can attract the attention of tourism due to its location in the Lakes Region (Figure 13). In addition to natural lakes such as Akşehir, Eber, Karamık, Acıgöl, there are many ponds for irrigation purposes such as Karakuyu, Pınarbaşı, Bayat, Selevir, Örenler, Kırka, Emre, Taşoluk. Among them, Karakuyu is the most striking natural and touristic one. The lake area, which is fed by Kocapınar spring waters and is 13,741 hectares, is rich in organic matter (peat), but it was separated as a Wildlife Protection Area in 1994 and is also a first-degree natural protected area. Karakuyu Lake is a living environment and a safe shelter for various water birds (Dikkuyruk, Duck, Crane, etc.) that are under protection due to its location in the lakes region and on the migration routes of birds. During the migration season, birds such as storks, herons, willow warblers, and flamingos stay in this region. 173 bird species have been identified by bird experts. It also has rich water resources. Today, the entire lake is covered with reeds, straw grass, and water lilies. This feature of the site significantly contributes to the nesting and hiding of birds. Another feature of Karakuyu Lake and Kocapınar springs is that it does not "freeze" due to the formation of spring waters, thus creating a natural environment for birds in winter. The first to discover Karakuyu Lake were the vertical tails in the winter of 1991. That winter, large numbers of goose tails, ducks, and cranes came to Lake Karakuyu. Towards the summer months, birds such as storks and herons, and later kingfishers, cuckoos, stilts, reeds, scurvy, willow, nightingale, and flamingo began to settle in this region. Golden eagles were also seen in the mountains in the south (Afyonkarahisar İl Kültür ve Turizm Müdürlüğü, 2021).

Figure 13. Lake Karakuyu / Dinar Afyonkarahisar İl Kültür ve Turizm Müdürlüğü, 2021).

3.14. Phrygian Valley / İhsaniye

B.C. Phrygians have a distinctive and unique place among the civilizations that have prevailed from the Old Bronze Age covering 3000-2000 years to the present day. Hittites BC. After their rule starting from 1700 and lasting 500 years, BC. At the time of their disintegration around 1200 BC, a tribe migrated to Anatolia from the west and was later called Phrygian. During these migrations, Anatolia, after a dark period of 400 years, BC. 8th century II. Half of the Phrygians became enlightened with the political dominance of the Phrygians in 750 BC, and the Phrygians became a powerful state during the reign of their legendary King Midas. Phrygians, who became Anatolian like the Hittites and formed a unique culture in the region where Afyonkarahisar-Eskişehir-Kütahya provinces merged, are the most famous in the world with their temple facades belonging to the cult of the Mother Goddess Kübele, carved on large rock blocks in the form of cult tombs and tomb monuments, and lion reliefs belonging to the cult of the Mother Goddess Kybele. They have enabled the creation of interesting and most valuable works of art. Phrygian Rock Monuments, which are unique in the world, such as Aslantaş, Yılantaş, Maltaş, Kapıkaya I and Kapıkaya II in the Göynüş Valley and Döğer Region, which are located in the north of Afyonkarahisar, are the main ones. Phrygians BC Although they lost their political superiority since the end of the 6th century, Phrygian culture, religion, and mythology continued for hundreds of years in Afyonkarahisar and its environs, and the Phrygian language was spoken in the region for a thousand years (Figure 14) (Afyonkarahisar İl Kültür ve Turizm Müdürlüğü, 2021).

Figure 14. Phrygian Valley / İhsaniye (Afyonkarahisar İl Kültür ve Turizm Müdürlüğü, 2021).

3.15. Aslantaş-Yılantaş / İhsaniye

Aslantaş: The burial chamber, which was carved by opening a doorway on the front face of a large piece of rock, has a triangular ceiling and there is a cedar on the left side to lay the dead. On both sides of the doorway, reliefs of two majestic lions roaring and a baby lion under their feet was carved. B.C. It is estimated that Aslantaş, which is thought to have been built in the 7th century, is the tomb of an important Phrygian King (Visitafyon, 2021). Yılantaş: It is located about 100 meters west of Aslantaş, where the same rocks are located. Since the monument was disintegrated in the past centuries, its beams can be seen, and only the head and a foot relief of a lion relief have survived to the present day. The snake relief is on the lower side of the front of the monument. There are reliefs of two snakes wrapped around each other on the door and two warriors attacking the snake with their spears on both sides of the door. It is not visible today because it is under the upturned rock. The way the palm-leaved column capital was built, the Phrygians descended to Çukurova, dating back to the 7th century BC. century (Visitafyon, 2021).

Figure 15. Aslantaş / İhsaniye (Visitafyon, 2021).

3.16. Karamık Reeds / Çay

It has been registered as "Karamık Reeds Natural Protected Area and Sustainable Conservation and Controlled Use Area" located within the borders of the Çay District of Afyonkarahisar Province. Eskişehir Natural Heritage Conservation Regional Commission's Decision dated 28/09/2017 and numbered 291 was approved by the Ministry of Environment and Urbanization by the Ministry's Approval dated 03/11/2017 and numbered 13108, and Article 13/A-2 of the Decree-Law No. 644 (Figure 16) (Çevre ve Şehircilik Bakanlığı, 2021).

Figure 16. Karamık Reeds / Çay (Çevre ve Şehircilik Bakanlığı, 2021).

3.17. Koruluk Kermes Oak / Dazkırı

Koruluk Kermes Oak 1 is a Natural Monument located within the borders of Dazkırı district of Afyon province and Kızılören Village. It was registered on 06.09.2002. It is 1000 m^2 in total. The Kermes Oak (*Quercus coccifera* L.) monument tree has a diameter of 77 cm, a height of 11 m, and a circumference of 243 cm (GeziRehberim, 2021).

Figure 17. Kermes Oak 1 Natural Monument / Dazkırı (GeziRehberim, 2021).

Koruluk Kermes Oak 2 is a Natural Monument located within the borders of Dazkırı district of Afyon province and Kızılören Village. It was registered on 06.09.2002. It is 1000 m^2 in total. The Kermes Oak (Quercus coccifera L.) species has a height of 16,8 m, a diameter of 97-101-75, and a perimeter of 306-318-236 cm (GeziRehberim, 2021).

Koruluk Kermes Oak 3 is a Natural Monument located within the borders of Dazkırı district of Afyon province and Kızılören Village. It was registered on 06.09.2002. It is 1000 m^2 in total. Kermes Oak (*Quercus coccifera* L.) species has a height of 13 m, a diameter of 1,17m, and a circumference of 3.70m (GeziRehberim, 2021).

Figure 18. Koruluk Kermes Oak 3 Natural Monuments / Dazkırı (GeziRehberim, 2021).

4. Conclusion and Recommendations

Afyonkarahisar province has different natural riches due to the dynamism in its topographic structure. In this respect, it includes areas that are protected and need to be protected in many different statuses throughout the province. Some protected areas with different statuses;

- Nature Reserve; dandindere,
- Natural Monument; Grove Kermes Oak
- Nature Park; 26 August TP, Akdağ TP, Phrygian Valley TP, Erkmen TP, Yedikapı TP
- Wetlands of National Importance; Karakuyu Reeds, Karamık Reeds
- Wildlife Development; Karakuyu Lake
- Seed Stands; Örendere, Sincanlı (Pinus nigra), Sultandağı (Cedrus libani)
- Gene Conservation Forests;
    - ✓ Turkish pine (*Pinus brutia*) Afyonkarahisar-Örendere
    - ✓ Turkish Hazelnut (*Coryllus colurna*) Afyonkarahisar-Sultandagi
    - ✓ Chestnut (*Castanea sativa*) Afyonkarahisar-Sandıklı
    - ✓ Pulley Oak (*Quercus vulcanica*) Afyonkarahisar-Sultandagi

- ✓ Badger (*Taxus baccata*) was determined as Afyonkarahisar-Sultandagi.

To understand the value of biological richness and to protect these riches, it is tried to maintain the balance of protection and development. Increasing the number of protected areas and managing them effectively should be considered as one of the most effective methods in raising awareness of nature conservation and solving environmental problems.

- Tourism activities pose a threat in natural areas (natural red pine forests, maquis, etc.). Activities during daily visits to these areas should be limited by considering the carrying capacity.
- Mining activities should never be allowed in protected areas. These activities damage the natural structure of the habitat. Comprehensive biodiversity studies should also be carried out in the currently operated mining areas and the decisions to be taken for all flora and fauna species determined as a result of the study should be followed.
- Potential areas with natural and ecological importance should be determined by scientific studies, natural and cultural resource values and protected status should be given.
- Chemical pesticides for agricultural purposes should not be allowed around lakes and wetlands.
- The ecological character should be preserved in all kinds of land and water use planning, not to pollute wetlands, to protect their natural structures. Wetlands should never be dried and their functionality should be maintained.
- The works carried out to widen the road can greatly reduce the population of biological and endemic species in protected areas. All kinds of precautions should be taken against the possibility of fire in protected areas close to forest areas. In particular, stubble burning should not be allowed.
- Conversion of natural areas (frigana and maquis habitats) that can have high returns due to economic activities to agricultural areas should also be encouraged to carry out greenhouse activities on flatlands, and the destruction of natural habitats should not be allowed.

In the protection of the environment and ecology, the determination of common goals by all countries in the world and the implementation of various practices in this direction contribute to the development of environmental awareness. One of the most important steps taken in this area, the continuation of the protected areas and increasing their numbers will be one of the most basic ways to transfer the world we live in and live into future generations.

Increasing the understanding of the value of nature in terms of discourse and action in the climate change adaptation process, establishing a production and consumption relationship compatible with natural systems, and disseminating organized and conscious collective awareness in nature/environmental protection will play an important role. The future of humanity and nature will be possible if people value nature in terms of discourse and action, with an ecological perspective. (Gül, Türker, Anaç & Gül, 2021).

In order not to pollute, it should be aimed not to produce but not to pollute while producing, and the understanding of turning to controlled and clean production should be adopted.

It is necessary to realize that all living things have the right to continue their natural life healthily and to adopt a lifestyle in harmony with nature for the sustainability of their natural systems.

The management of the ecological environment should be ensured by establishing a conservation and conservation-oriented use relationship.

Water intake, sand intake, rubble, garbage, excavation spillage, collection of plant and animal species, wastewater discharge, cutting of reeds, poaching, etc. activities should not be allowed and all kinds of legal sanctions should be applied in activities related to this.

Provincial Directorate of Environment and Urbanization and Provincial Directorates of Agriculture and Forestry working on conservation should show more interest in this issue.

Protected areas should be purposefully planned and managed with the participation of all stakeholders.

Acknowledgments and Information Note

The article complies with national and international research and publication ethics. Ethics committee approval was not required for the study.

Author Contribution and Conflict of Interest Disclosure Information

The article was contributed as the sole author.

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JOURNAL OF PROTECTED AREAS RESEARCH

JoPAR, 2022, 1 (1)

e-ISSN: 2822-2733

Journal homepage:

https://mimarlikbilimleri.com/ojs/index.php/journalofprotectedareasresearch

E-mail:

journalofprotectedareas@gmail.com

Publisher: Prof. Dr. Atila GÜL

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