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## Examination of Hafik Lake (Sivas-Türkiye) as a Sensitive Area to be Definitely Protected

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### Research Article

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#### ABSTRACT

In today's world, where global environmental problems are experienced, it is a necessity to transfer our natural resources to future generations without deterioration. In this study, Hafik Lake, which was declared and registered in May 2020 as a sensitive area to be definitely protected in Sivas province of Türkiye, was examined. A total area of 114.07 hectares in and around Lake Hafik has been determined and declared as a sensitive area to be definitely protected. Hafik Lake is a small, natural, karstic and open lake located in the north of Hafik district of Sivas province in the Central Anatolia Region. Although it is a small lake, it is important because it is one of the gypsum karst lakes that are rarely seen in Türkiye. The water of Hafik Lake, which is almost completely covered with reeds and mud at the bottom, is freshwater. Hafik Lake, which is intertwined with history, also carries the distinction of being the only example in Türkiye of the type of lake houses called Palafit. Hafik Lake is a sensitive area to be definitely protected and it is one of the privileged areas in Sivas province of Türkiye, where recreational activities can be carried out besides its rich flora, fauna, natural and cultural values. In conclusion, preservation of Hafik Lake's fascinating topographical structure, rich flora, fauna, richness in cultural motifs, historical values and extraordinary natural structure can only be possible by establishing the balance of protection and use of these values. Continuity and transfer to future generations will be possible by ensuring the balance of protection and use in Hafik Lake.

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**Keywords:** Hafik Lake, nature conservation, protected area, protection status.

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### Introduction

Many countries around the world have reserved certain areas for more than a century to protect their natural beauty and biological richness. Protected areas have long been recognized as a tool used to counter the decline of biodiversity in the world. The concept of protected areas, which was once reduced to "national parks and natural reserves", has changed over the last 40 years and is turning into a broader model that includes sustainable use areas. Today, protected areas are accepted as areas that contribute to human welfare, poverty reduction and sustainable development in addition to their nature protection function. These areas are beneficial in many ways such as protecting species and genetic diversity, maintaining ecosystem services, creating new sources of income for local people, and providing tourism and recreation opportunities. There has been a significant increase in the amount of protected areas over the past decade. The number of protected areas in the world has exceeded one hundred thousand, and its total area has reached 12% of terrestrial areas (Demir, 2010). Protected areas now constitute one of the most important forms of land use in the world.

A sensitive area to be definitely protected is defined as areas where extraordinary ecosystems, species, habitat, geological and geomorphological features are preserved at a regional, national or world scale, have occurred generally without human influence, and are at high risk of degradation or destruction (Official Gazette, 2012). Protected areas are of national and international importance. Protected areas are places that meet both ecological balance and recreational needs. The purpose of these areas is to protect nature and resource values by reducing ecological, political, social and economic pressures, to provide sustainability, to prepare the ground for educational, aesthetic and recreational benefits, to serve as a gene pool, to serve as an effective protection tool for reasons such as climate control and prevention of landslides. In order to ensure the sustainability of the national protected area system, it is necessary to determine the status of each protected area and to analyze the resource values, related economic and social structure, and possible monitoring indicators, starting from the pre-declaration. It is imperative to manage each protected area as required by the declared status, to monitor and evaluate the compliance of management practices with the principle of sustainable

development. In this context, the criteria and indicators that can be used should be determined. The established monitoring and evaluation system should be capable of producing reports in accordance with international protected area statutes and required by international agreements and processes. In order to establish protected areas, some evaluations are made and determination criteria are taken as basis. These criteria are which features of the area should be protected, the size of the area, its resources and whether it has a conservation-use value (Karahasanoğlu, 2019).

Lakes are stagnant waters with deep water masses, which are formed as a result of the filling of the hollow places on the land with water or the natural or artificial closure of the valleys by a barrier, which does not dry out by evaporation. The lakes, which are spread almost all over the continents and their number exceeds tens of thousands, show different characteristics in terms of their size, as well as the physicochemical structure of their waters, their less or more depths (Cirik and Cirik, 2008). While various organisms living in the lake maintain their relations with each other in a balanced way, they form an ecosystem together with the environmental factors surrounding them. There are around in total 200 lakes in Türkiye (Tanyolaç, 2009). Lakes, which are of great importance for wildlife and offer landscapes that will give people a breath of fresh air, unfortunately face dangers such as wrong water policies, pollution and drought. This study was carried out in order to emphasize the importance of Hafik Lake, which is a sensitive area to be definitely protected in Sivas province of Türkiye, and to reveal the current situation.

## Material and Method

Hafik Lake, which is a sensitive area to be definitely protected within the borders of Hafik district of Sivas province, was chosen as the study area. Hafik is located in the upper Kızılırmak River Basin of the Central Anatolia Region. It is surrounded by Almus district of Tokat province and Doğanşar district of Sivas province in the north, Ulaş district in the south, Zara district in the east and Sivas province center in the west. There are two types of climate in Hafik district. These are the harsh and dry continental climate and the partially rainy Black Sea climate. The southern parts of the district and the district center are dominated by a continental climate with cold and snowy winters and hot and dry summers. The northern parts of the district are under the influence of the Black Sea climate, which is partly warm and rainy. The weak vegetation of the southern parts consists of grass, bush and tree groups unique to the region. In the northern parts, there is a strong green cover consisting of Pine, Beech, Oak, Walnut and other plants suitable for the region. The Kızılırmak River passes through the south of Hafik district. Depending on the topographical structure of the district, there are many small lakes within the boundaries of the district. Fish and waterfowl can live in almost all of the lakes and there are reed plants to meet the needs of the citizens living in the region. These

lakes are Hafik Lake, Yarhisar Lake, Çimenyenice Lake, Kuru Lake, Kemis Lake, Hanzar Lake, Büyük and Küçük Lota Lakes (URL-1, 2023). According to the address-based population registration system, the total population of Hafik district in 2022 is 9569. The population of the district center is 3594, of which 1483 are men and 2111 are women. The main livelihood of Hafik district is agriculture and animal husbandry.

According to the Official Gazette (2012), sensitive areas to be definitely protected are; the areas where all effects on the area are limited and the use of land for the protection of resource values. The sensitive areas to be definitely protected should contain one or more of the following criteria. (1) They contain extraordinary ecosystems or species on a regional, national and world scale. (2) Its geological and geomorphological features have been preserved. (3) It has generally occurred without human influence. (4) There is a high risk of deterioration or destruction as a result of human activities. (5) The area does not include human activities that would conflict with its specific protection purposes. (6) It contains most of the local species that are expected to have an ecologically significant density. (7) It has characteristics that are important and do not require continuous intervention in order to achieve conservation goals. (8) Where necessary and possible, it is surrounded by land uses that will help the area achieve its designated conservation objectives. (9) It has manageability features with simple interventions. (10) It includes the breeding areas of the target species or species to be protected. In these sensitive areas to be definitely protected, although there is a definite construction ban, according to the evaluation to be made by the Regional Commissions regarding the nature, content and necessity of the activities; (1) Waste water, drinking water, natural gas and electricity lines can be constructed on condition that the existing road route is used in cases of necessity due to the public interest. (2) Facilities that are necessary for national security can be built. (3) Studies can be carried out to open forest fire roads, to maintain and repair forests, to combat biotic pests and abiotic (fire, flood, storm) factors. (4) In order to ensure the continuity of the natural balance in the lagoon ecosystems, fishing activities can be carried out in line with the opinions of the relevant public institutions, provided that no structures are built, using traditional fishing methods arising from the characteristics of the area.

While determining the method in this study, the situation of Lake Hafik, which was registered and declared as a sensitive area to be definitely protected by the Presidency of the Republic of Türkiye, was taken into consideration. In this study, firstly, previous studies on the subject were investigated. Later, the announcement date of Hafik Lake, which is a sensitive area to be definitely protected, the surface area it covers, other information about this area were collected and examined by making use of the observations and examinations made in the field.

## Results and Discussion

As a result of the evaluation of the protection status of the Hafik Lake Potential Natural Site within the borders of Hafik district of Sivas province, it was decided to register and declare it as a sensitive area to be definitely protected on 13 May 2020 in accordance with Article 109 of the Presidential Decree No. Hafik

Lake, which is a sensitive area to be definitely protected, is 114.07 hectares (Table 1). Hafik Lake has been determined as a sensitive area to be definitely protected with slice number ED50 6 Degree 37 (Official Gazette, 2020). Hafik Lake is a sensitive area to be definitely protected in the Central Anatolian Region of Türkiye (Figure 1).

Table 1. Basic features of Hafik Lake, which is a sensitive area to be definitely protected.

Conservation Area Name	Province	District	Protected Area Slice Number	Declaration Date	Protected Area Size
Hafik Lake	Sivas	Hafik	ED50 6 Derece 37	13.05.2020	114.07 hectare



Figure 1. Sensitive area to be definitely protected:  
Hafik Lake

The area shown in blue in Figure 1 is a qualified natural conservation area, while the area shown in green is a sustainable conservation and controlled use area. Hafik Lake is within the borders of Hafik district of Sivas province and is about 3 kilometers away from the district center. Hafik Lake, which is 40 kilometers away from Sivas city center, is 1290 meters above sea level. Hafik Lake is fed by both surface and groundwaters. In addition, rain and snow waters from the surrounding slopes and hills contribute to the feeding of the lake. The surroundings of Hafik Lake are composed of Miocene and Quaternary aged units. The Miocene aged unit forms sandstone, conglomerate, limestone, gypsum, marl and mudstone layers, and middle-upper Miocene gypsum-marls are also encountered. The gypsum is in a dirty-white nodular structure, and the marls are red-green in color and form layers with gypsum. Quaternary aged alluvium and terraces overlie the Miocene units. Alluvium and terraces consist of pebbles and sandstones

derived from all types of units in the region. The local geology consists of gravels, conglomerates, limestones, gypsums, marl, and mudstones (Kılıç, 1998).

The collected waters accumulated in the pits formed as a result of the melting of lime and gypsum stones in calcareous regions form karst lakes (Cirik and Cirik, 2008). Hafik Lake covers an area of approximately 1 square kilometer at the base of the east-west trending, wide and flat shaped karst bowl developed on the gypsum plateau in the north of Hafik district. The water of Hafik Lake, which is almost completely covered with reeds and mud at the bottom, is freshwater. This small lake is a bird sanctuary. The waters of Hafik Lake, which swell in the rainy season, flow into Koç Creek in the east. This creek is an important tributary of the Kızılırnak River, 3 kilometers to the south. This stream, which settled on the gypsum plateau with its wide-bottomed boat-shaped valley, covered the karst bowl where Hafik Lake is located, as a result of the widening of the valley. Hafik Lake is connected to the underground table of the stream with underground karst cavities (Atiker, 1993). The meeting of the waters of Hafik Lake, which swells in the rainy season, with Kızılırmak via Koç Stream also increases bird diversity.

Pilir Höyük, a historical settlement, is located on the small island to the west of Hafik Lake. During the archaeological excavation works carried out as soundings in Pilir Höyük, the existence of lake houses on wooden poles driven into the lake floor was determined and it was determined that the settlement dates back to the Neolithic, Chalcolithic and Early Bronze Ages. Pilir Höyük is the only example in Türkiye of the lake house style called Palafit, many examples of which were discovered in Zurich Lake and Alpine lakes in Switzerland, and is located in Hafik Lake (URL-2, 2023). These houses, defined as Palafit houses, rise on wooden planks nailed to the floor of Hafik Lake. Surrounded by reeds on the shores of Hafik Lake, Pilir Höyük is very different from other mounds with its many features. Pilir Höyük, which is located in Hafik Lake with its natural beauty, attracts attention.

Kılıç (1998) identified Bacillariophyta, Chlorophyta and Cyanophyta as the most abundant algae groups in the phytoplankton community in Hafik Lake. Cyclotella meneghiniana and Cyclotella ocellata were found more

frequently than other diatom species. Chlorophyta was the most abundant group after diatoms. Also, Chlamydomonas, Oocystis, and Scenedesmus are the major genera representing Chlorophyta.

Çepken (2008) found the average dissolved oxygen 8.3 mg/L, average conductivity 1032  $\mu\text{mhos}/\text{cm}$ , average secchi depth 1.06 m and average water temperature 13.9  $^{\circ}\text{C}$  in Hafik Lake. It was determined that Chlorophyta, one of the algae groups, was dominant in the summer season and Cyanophyta was dominant in the autumn season in Hafik Lake. However, it was determined that the Chlorophyta group was the group with the richest number of species. It has been reported that other algae groups (Cyanophyta, Bacillariophyta, Cryptophyta, Chrysophyta, Charophyta and Pyrrophyta) determined in Lake Hafik are represented in low numbers. In addition, a total of 12 taxa belonging to 2 different phylums (Rotifera and Arthropoda) were identified in Zooplankton. It was determined that the Copepoda group was dominant in the summer months, while the Rotifera group was dominant in the autumn months. In addition, it has been reported that the Cladocera group is represented in low numbers.

Kekilli (2010) encountered *Squalius cephalus* together with *Cyprinus carpio*, *Alburnus chalcoides*, *Capoeta capoeta*, *Capoeta tinca* and *Chondrostoma nasus* species and a large amount of freshwater crayfish (*Astacus leptodactylus*) during his fish samplings in Hafik Lake. Also by Kekilli (2010) *Netta rufina*, *Anas platyrhynchos*, *Podiceps cristatus*, *Ardea cinerea*, *Ardea alba*, *Ardeola ralloides*, *Plegadis falcinellus*, *Ciconia ciconia*, *Ciconia nigra*, *Tadorna ferruginea*, *Aythya ferina*, *Circus aeruginosus*, *Grus grus*, *Fulica atra*, *Alcedo atthis* bird species such as Hafik Lake and its surroundings have been observed. It has been reported that these bird species use Hafik Lake and its surroundings for feeding, breeding and accommodation.

The otter (*Lutra lutra*), which is at the top of the food chain, continues to exist in the Hafik Lake ecosystem. Otters generally prefer the stagnant waters of Hafik Lake where coastal vegetation is common. Among the endangered species of Europe, the most threatened mammal species are the otters. Otters have been hunted by humans for years because of their precious fur. Another reason for the decline of the otter population is the increase in water pollution. The otter is an indicator species that indicates that the aquatic ecosystems they live in are healthy and clean (Barlas and Dirican, 2000). Accordingly, the existence of otters in Hafik Lake indicates that this aquatic ecosystem is healthy and clean.

Hafik Lake has first class water quality and the annual average nitrate value is 1.6 mg/L (SPEP, 2021). According to TWPCR (2008), the water of Hafik Lake, which has first class water quality, can be disinfected and used not only for drinking purposes, but also for recreational purposes, rainbow trout farming, animal production and other purposes. For this reason, Hafik Lake and the region it is located support a very rich ecosystem structure.

Hafik Lake ecosystem, which is 1290 meters above sea level, has a very high recreational potential for mountaineering and hiking activities with its geomorphological structure, vegetation, wildlife features and landscape beauties. About half an hour from Sivas city center, Hafik Lake attracts nature lovers with its natural beauty and biological diversity. It is aimed to bring Hafik Lake, which has been determined as a sensitive area to be definitely protected, to tourism with sensitive work to be done in a way that its natural structure will be preserved. While hiking trails and social facilities are planned to serve at a certain point in order to protect Hafik Lake, transfer it to future generations and visit it consciously, only some parts of the lake will be visited. Hafik Lake, which has been determined as a sensitive area to be definitely protected by the decision published in the Official Gazette by the Presidency of Türkiye, is also a feeding, breeding and accommodation area for waterfowl. While approximately 150 to 200 bird species live in Hafik Lake, 7-8 thousand birds spend their feeding and hatching periods from here (URL-3, 2023). In addition, Hafik Lake is one of the important wetlands of Sivas province due to the fact that it hosts many plant and animal species and fish. "Natural Site-Qualified Natural Protection Area" and "Natural Site-Sustainable Conservation and Controlled Use Area" parts of Hafik Lake have been registered with the approval of the Ministry of Environment and Urbanization dated 12.03.2020 and numbered 66790. Hafik Lake is expected to be a candidate for Ramsar, the internationally important wetlands convention. Because the plant species around and Hafik Lake are expected to gain international status due to the underwater life and the feeding, breeding and habitat for important birds. There are recreation areas and restaurants around Hafik Lake, which attracts the attention of visitors every season. However, Hafik Lake is mostly preferred during the spring and summer months. Hafik Lake, which is highly appreciated for its nature, is expected to increase its visitors even more with its Ramsar status. It has been observed that amateur angling, water recreation activities, bird watching, picnic and trekking-like activities are carried out in and around Hafik Lake.

Sustainability principles should not be adhered to in the management of nature and ecosystem areas around the world. Ecologically sensitive areas are areas that can create positive social, economic, physical and ecological effects on society as well as protecting natural resources and ecosystem. Ecologically sensitive areas have attracted people's attention with their natural and cultural values, which has led to the development of tourism activities in these areas. In these areas where conservation is a priority, sustainable tourism activities have come to the fore. Tourism activities with controlled development will also help to achieve the balance of protection and use in ecologically sensitive areas (Çalışkan 2019). Today, tourism is gaining more and more importance in terms of both developing and developed countries with its social, cultural and economic

dimensions. Tourism is not only a rapidly increasing economic activity by creating positive economic effects, but also an application area that can create social and cultural problems that can cause destruction on the artificial and natural environment. Sustainability in tourism is possible by preserving and developing the regional or natural values that constitute the source of tourism and ensuring the continuity of attractiveness. In this context, sustainable tourism can be defined as a management style in which the cultural, economic and biological diversity is maintained by preserving the environment in which people interact, and at the same time, it aims to meet the economic, social and economic. Sustainable development is a holistic approach that programs both today's and tomorrow's lives by establishing a delicate balance between human and nature, without exceeding the capacity of supplying natural resources, in a way that will allow the needs of today and future generations to be met and developed (Akinci and Kasalak, 2020). The tourism sector has an inevitable interaction with the environment due to its characteristics. For this reason, in the context of sustainable tourism, it is tried to minimize the damage to the environment with environmentally friendly practices in tourism activities (Özmen, 2020). The deterioration of the ecological balance is an important problem for the tourism sector. The future of tourism businesses largely depends on the environment. The most important capital of these enterprises is the environment and the continuity of the tourism enterprises depends on the protection of the environment. For this reason, accommodation businesses operating in the tourism sector, especially those that interact more with the environment, should be more sensitive to the environment (Atay, 2022). A good and applicable management model should be established in Hafik Lake, which has been registered and declared as a sensitive area to be protected, with the participation of local people and relevant stakeholders, aiming to minimize the possible negative effects and to take measures against. With holistic planning approaches, Hafik Lake, which is a sensitive area to be definitely protected, should be handled with all its values and the potentials of this area should be revealed.

## Conclusion

Hafik Lake is a significant area, notable for its location, bio-ecological structure, wildlife, and other natural features. Today, while environmental problems reach dangerous levels, it is necessary to develop environmental protection awareness. It is now accepted that the contribution of tourism to the development of the awareness that a local wealth is a universal value. The basic principle in the use of all kinds of natural resources is to ensure the balance of protection and use in nature. It is now known by everyone that the environmental problems and destruction created as a

result of the excessive and unbalanced use of natural resources in recent years have reached levels that threaten the life of all living things in the world, including humans. For the continuity of Hafik Lake, which has been declared and registered as a definitely protected area, it is essential to protect its nature and culture by considering the balance of protection and use. For the continuity of Hafik Lake, which has been declared and registered as a definitely protected area, it is essential to protect its nature, flora, fauna and culture by considering the balance of protection and use.

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