

# **RAMSAR SITES OF TURKEY**

Ankara, March 2011

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CONVENTION ON WETLANDS

(Ramsar, Iran, 1971)

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## PREFACE

Turkey adheres to certain international contracts concerning the conservation of the vulnerable ecosystems and species that inhabit them. One of the most important international treaties on nature conservation is The Convention on Wetlands of International Importance, especially as Waterfowl Habitat, or in short, Ramsar Convention, developed in the city of Ramsar in Iran in 1971 and came in to force in 1975. The convention covers lakes and rivers, swamps and marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fish ponds, rice paddies, reservoirs, and salt pans over the world and essentially aims at the conservation and wise use of wetlands. This concept is defined as the application of an ecosystem-based approach with a vision of sustainable development and the conservation of ecological characteristics of wetlands. Another significant aspect of the convention is that it is the only international natural conservation convention devoted to a specific ecosystem. As of March 2011, 160 countries over the world had ratified the convention. Across the parting countries, 1919 wetlands of a total size of 187.054.624 hectares have been declared Ramsar Sites. Turkey acceded to the convention in 1994, 15 years after it came into force, and in the 15 years since (1994 to 2009) declared 13 wetlands covering a total of 179.898 hectares as wetlands of international significance and had them covered by the convention. Contracting parties of the Ramsar Convention make three major commitments: 1- To determine their wetlands of international importance for inclusion in the Ramsar List and provide their efficient management 2- Work towards the wise use of their wetlands through spatial plans of national scale, appropriate policy and regulation making, spatial management and public consciousness raising 3- To cooperate internationally concerning cross border and shared wetlands and shared species. With these commitments, parting countries actually accept to sustain the ecological functions of, develop and hand to next generations their wetlands for their accepted criteria- taking into account the scientific, cultural, economic and recreational value they hold. These are significant commitments for sure and remind that protected areas should be evaluated not only at a national level but also at a regional or even international level. For instance, the Gediz Delta and Kızılırmak Delta where the globally endangered dalmatian pelicans (*Pelecanus crispus*) breed, are Ramsar sites. These two sites have global significance for the conservation of this species superseding their national importance.

When we have a closer look at the 13 Ramsar Sites of Turkey, threats to the habitats are more common than direct threats to the species. Industrial and residential waste driven pollution in lakes and rivers, dropping water levels and expansion of artificial areas due to irregular urbanization and intense human activities around protection zones stand out among the most important issues we face. Obviously more than 13 sites in our country qualify as Ramsar sites. We nature conservationists, expect and demand the Ministry of Environment and Forestry, which is the institution responsible for enforcement of the aforementioned convention, to level up the Ramsar Sites in quality and quantity.

With this publication, Doğa Derneği intends to produce a reference document which will be beneficial to a wide range of works by related governmental institutions and NGO's, nature conservationists, students and scholars, and provide up-to-date and compact information on Turkey's Ramsar Sites for decision makers. We aspire it to be favorable for nature protection studies in our country.

**Cem Orkun Kırac**  
Doğa Derneği  
Managing Board Member  
March 2011, Ankara

## EVALUATION

While the global scale of the loss of wetlands is not known accurately, in several studies published it is argued that more than 50% of wetlands around the world have been lost. However in Europe the loss ratio is estimated to be more than 90%. Wetlands are ecosystems of settling value and use to humans since early ages for their benefits and services. Population rise, urbanization, food demand led to drainage of wide areas especially in the USA and Europe after the 19<sup>th</sup> century, while the threats to wetlands in different areas have increasingly grown. In light of these developments, the significance of wetlands have been recognised and studies concerning wetland conservation have increased and are increasing. In other words, today the fact that 160 countries participate in the Ramsar Convention shows that the conservation of wetlands is of special significance. Numerous organizations are working for the conservation of wetlands around the world.

Turkey acceded to the Ramsar Convention in 1994 and by declaring 13 Ramsar Sites, undertook conservation activities in 179.898 hectares, and showed its commitment to protect not only Ramsar Sites but all wetlands on its land. The increasing amount of importance given to wetland conservation at the global era had also found its place in Turkey and lots of work has been implemented in Turkish wetlands.

Doğa Derneği's Evaluation of Management Planning Processes in Ramsar Sites completed in 2010, highlights the effects of agriculture on wetlands, along with interventions to water regime, residential and industrial pollution, introduction of alien fish species into wetland systems and overhunting as threats. The situation today reveals that, in addition to the former threats, droughts may become a critical problem. The fact that threats concerning wetlands have remained the same from the past to today indicates that efforts towards the wise use of wetlands and participatory planning persist as grave issues.

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Turkey has taken big steps towards the preparation and implementation of management plans for wetlands. However, as is with other planning practices, participatory wetland management planning is a long term process. It takes time and a lot of effort for a management plan to be conceived in the same manner and adopted by all parties, those related to the area as much as institutions. The wetland management plans implemented in Turkey so far shed light as a foundation to the making of more efficient and successful plans in the future.

Our interviews have shown that the generally perceived benefits of management plans contributed to awareness regarding the function and value of wetlands and supported the conservation of this value. It was told that they facilitate the implementation of regulations, serve as a guide to the site, define precautions against pollution and support further practices.

Wetland management plans support adherence with local, national and international plans and display factors that affect the site or may affect in the future. While stipulating long and short term goals related to the site with different parties, wetland management plans also define the path that needs to be followed and facilitate the resolving/managing of conflicts over the site with this information. However, the benefits of wetland management plans are not limited to this; reaching defined goals for the area clearly displays the issues that need management and defines the finance or labour required, making it easier to organize these with the contribution of different parties. As our interviewees asserted, wetland management plans render a wider public aware of the importance of wetlands, explain why precautions are taken, strengthen communication with the parties and reinforce trust with their transparent nature.

The experience of preparing and implementing wetland management plans in our country stand as a learning process. The wetland management plan preparation processes conducted until now, especially the experience of site managers, generated lessons that can be useful in many other sites

to prepare better plans. One of these lessons lies in the planning process itself which contributes to the recognition and better understanding of the site. In some Ramsar sites the significance of pretraining on wetland management planning for the success of the planning process is emphasized. Increased involvement of the parties has proven important to deepen their knowledge on the ongoing process and gain their support. Other outstanding issues were guidance, experience and support from NGOs and the benefits of identifying income generating activities in the planning process for the success of implementation. A scientific committee where proposed interventions to the site would be evaluated beforehand, to define precautions or to cancel the intervention, is accented as useful in the improved understanding of wetland ecosystem and taking perceptible steps towards their conservation. However we are still at the beginning and we have difficulties in increasing participation in the preparation process and the implementation of the plan as adopted by all parties. Steps such as strengthening coordination among institutions and increasing the capacities of the parties that will prepare and update the plan, lay ahead of us. We need actions towards securing the financial aspect of wetland management plans with regulations, increased technical monitoring and developing awareness on the importance of wetlands at a national scale.

In the current picture, local interest groups such as the İzmir Bird Area Conservation and Development Organization in the Gediz Delta and Samsun Local Wetland Commission Technical Committee in the Kızılırmak Delta are uniting to participate more actively in the management of Ramsar sites and increase the pace of Ramsar Site Management Planning work. This brings hope both for the experience to be gained during the process and for the wise use and participatory management of wetlands. Evaluating and utilisation of the results of past and present studies on wetland management for the upcoming term will increase success rate in the conservation and management of wetlands. A comprehensive approach to wetlands covering all sectors and their importance becoming comprehended by everyone is still one of the most important steps ahead of Turkey for the conservation of wetlands.

**Can Yenyurt**, Doğa Derneği  
**Melike Hemmami**, Doğa Derneği  
**Esther Koopmanschap**, CDI Wageningen UR

(Based on the evaluation study of Turkey's Ramsar Site Management Plans)

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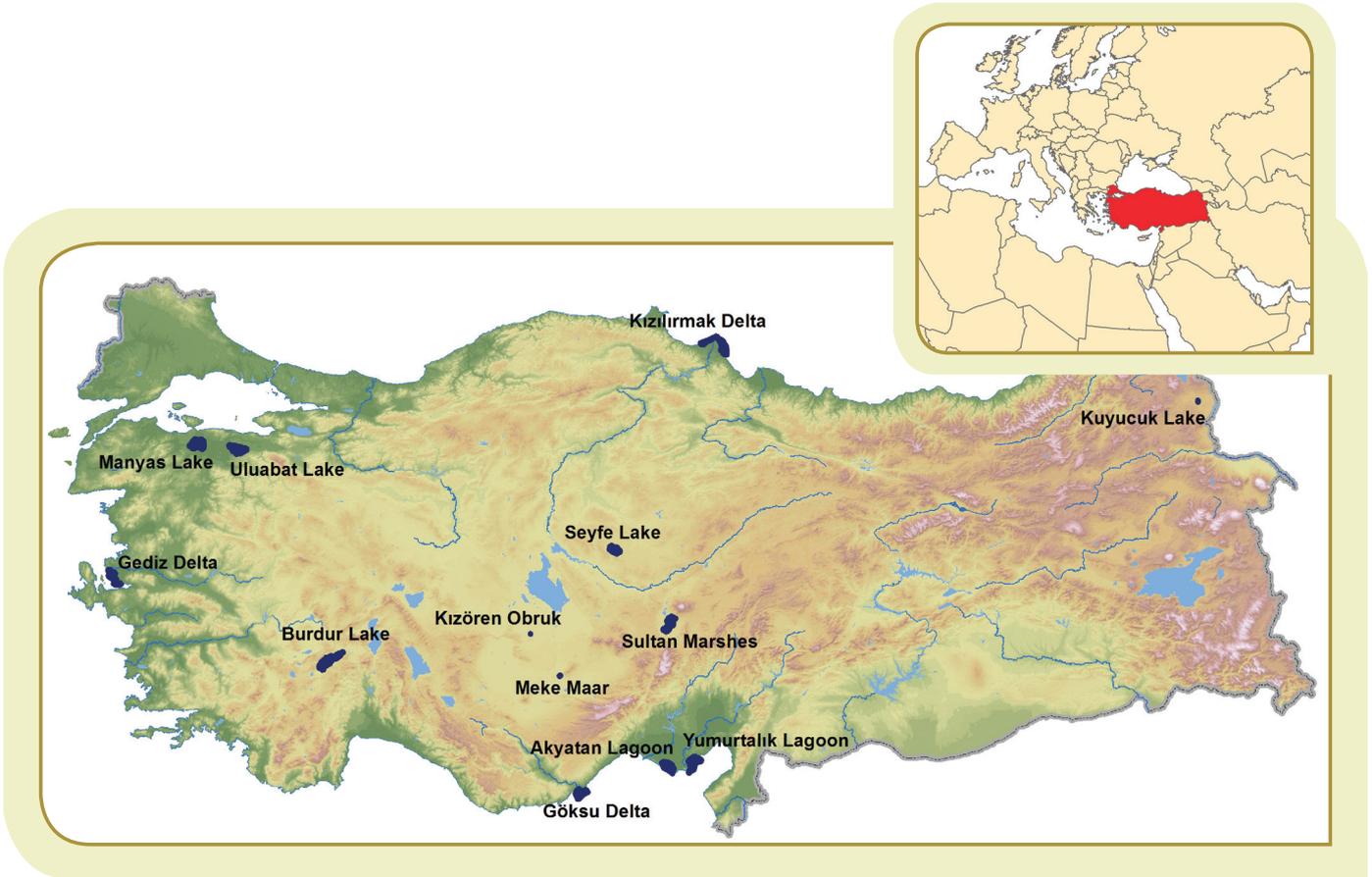
## RAMSAR CONVENTION AND TURKEY

Signed at Ramsar/Iran in 1971 and aiming at the conservation and wise use of wetlands, Ramsar Convention in short (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is acceded by Turkey in 1994. The convention came into force with the Ministry verdict 94/5434 and the decision was declared on 05.17.1994 with the official journal number 21937.

Wetland: natural or artificial, permanent or temporary, continuous or seasonal, ditch or running, fresh, brackish or salt water, at a maximum of 6m during low tide, important as habitats to especially waterbirds and other life, all waters, swamps, marshes and peat moor and all areas ecologically swept by water from their coastline inwards.

Under the Ramsar Convention, 13 sites in Turkey have been listed as Ramsar Sites: Sultan Marshes in Kayseri, Kuş Lake in Balıkesir, Seyfe Lake in Kırşehir, Göksu Delta in Mersin, Burdur Lake in Burdur and Isparta in 1994; Kızılırmak Delta in Samsun, Uluabat Lake in Bursa, Gediz Delta in İzmir, Akyatan Lagoon in Adana in 1998; Yumurtalık Lagoons in Adana, Meke Maar in Konya in 2005; Kızören Obruk in Konya in 2006; Kuyucuk Lake in Kars in 2009; adding up to a total of 179.898 hectares. (Table 1)

Ramsar Sites being foremost, for Turkey's wetlands conservation areas are determined and management plans are made in stages to fulfill liabilities related to both the convention and national law. So far, management plans for 11 of 13 Ramsar Sites (Sultan Marshes, Burdur Lake, Göksu Delta, Gediz Delta, Kızılırmak Delta, Yumurtalık Lagoons, Uluabat Lake, Kuş Lake, Akyatan Lagoon, Seyfe Lake, Kuyucuk Lake) have been prepared and put to implementation, while plans for the other 2 (Kızören Obruk, Meke Maar) are in process.



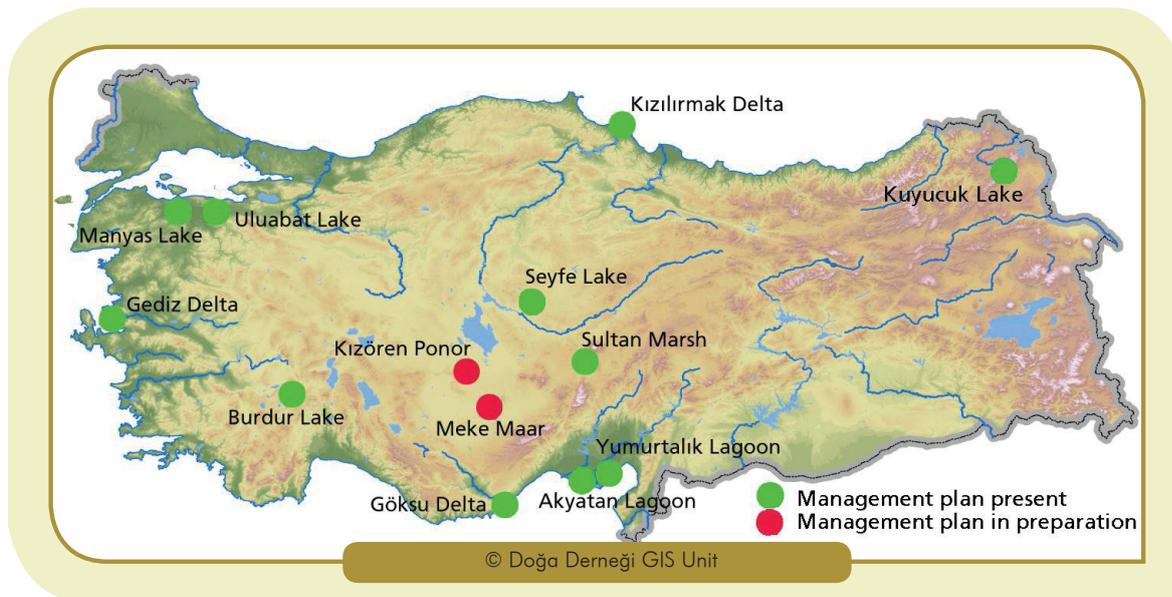
Ramsar Sites of Turkey

**TABLE 1: INFORMATION ON TURKEY'S RAMSAR SITES**

<b>NO</b>	<b>NAME</b>	<b>PROVINCE</b>	<b>RAMSAR SITE DECLARATION DATE</b>
<b>1</b>	Sultan Marshes	Kayseri	13.07.1994
<b>2</b>	Lake Kuş (Manyas)	Balıkesir	13.07.1994 1998 (change of borders)
<b>3</b>	Lake Seyfe	Kırşehir	13.07.1994
<b>4</b>	Göksu Delta	Mersin	13.07.1994
<b>5</b>	Lake Burdur	Burdur	13.07.1994 1998 (change of borders)
<b>6</b>	Kızılırmak Delta	Samsun	15.04.1998
<b>7</b>	Lake Uluabat	Bursa	15.04.1998
<b>8</b>	Gediz Delta	İzmir	15.04.1998
<b>9</b>	Akyatan Lagoon	Adana	15.04.1998
<b>10</b>	Yumurtalık Lagoons	Adana	21.07.2005
<b>11</b>	Meke Maar	Konya	21.07.2005
<b>12</b>	Kızören Obruk (Sinkhole)	Konya	02.05.2006
<b>13</b>	Lake Kuyucuk	Kars	20.06.2009

AREA (ha)	SOURCE VALUES	MANAGEMENT PLAN
17.200	Fresh and salt water ecosystems, vast marshes and swamps, meadows, steppe, waterfowl, plants and fish	Yes
20.400	Shallow fresh water lake, marshes, flood plains, scrubs, flooded willow groups, important bird area	Yes
10.700	Shallow salt water lake, marshy meadows, halophilic steppe, steppe flora, birds	Yes
15.000	Lakes and marshes, halophilic wetlands, sandbanks, sand dunes, waterbirds, mediterranean monk seal, sea turtle, green sea turtle, butterflies, dragonflies	Yes
24.800	Lake, steppe, oak groups, marshes, salt swamps, birds, freshwater fish, butterflies	Yes
21.700	Fresh and mild salt water lakes, river ecosystem, dry and longoz meadows, marshes, mud fields, sand dunes, birds, reptiles, inland water fish	Yes
19.900	Fresh water lake, delta ecosystems, scrubs and willows, aquatic plants, waterfowl, otter, inland water fish	Yes
14.900	Fresh water, salt water and brackish water ecosystems, sand dunes, lagoons, halophilic coastal meadows, marshes, temporary flood meadows, gallery forests, birds, mammals, fresh water fish	Yes
14.700	Lagoon, mud fields, sand dunes, marshes and fresh/salt water swamps, waterfowl, mammals, reptiles, fish	Yes
19.853	Lagoons, salt swamps, fresh water swamps, wet meadows, sand dunes, aleppo pine, waterfowl, sand flora, mammals, fish	Yes
202	Geomorphologic	In process
127	Geomorphologic	In process
416	Bird diversity and geographic features	Yes

## WETLANDS: HABITATS OF GREAT IMPORTANCE



Map of Wetland Management Plans in Turkey's Ramsar Sites

Wetlands, considered the world's natural wealth museums due to the biological diversity they host, are the most important ecosystems in the world with their natural services and economic value. Wetlands:

- By fostering or evacuating subterranean waters, balance groundwater. By storing flood waters, leveling floods, inhibiting seawater from getting in shore, regulate the region's water regime.
- Maintain the level of humidity around them and have a positive effect in the local climate elements, especially precipitation and temperature.
- Clean water by blocking residue and toxic material or by utilizing sustenance (such as nitrogen, phosphorus).
- Along with tropical forests, are the most biologically productive ecosystems of the world.
- Provide a habitat for rich flora and fauna with ecological and high commercial value, especially fish and waterbirds.
- Possess high economic value. Fishery, agriculture and livestock farming, reed production, tourism and transportation opportunities add to regional and national economy.

According to the Ramsar Convention, 135 internationally important wetlands have been determined in Turkey. Many of these have international importance due to the waterbirds and fish species they inhabit. The necessary criteria to become a Ramsar Site and existing Ramsar sites are listed below.

### Ramsar Criteria

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant

and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

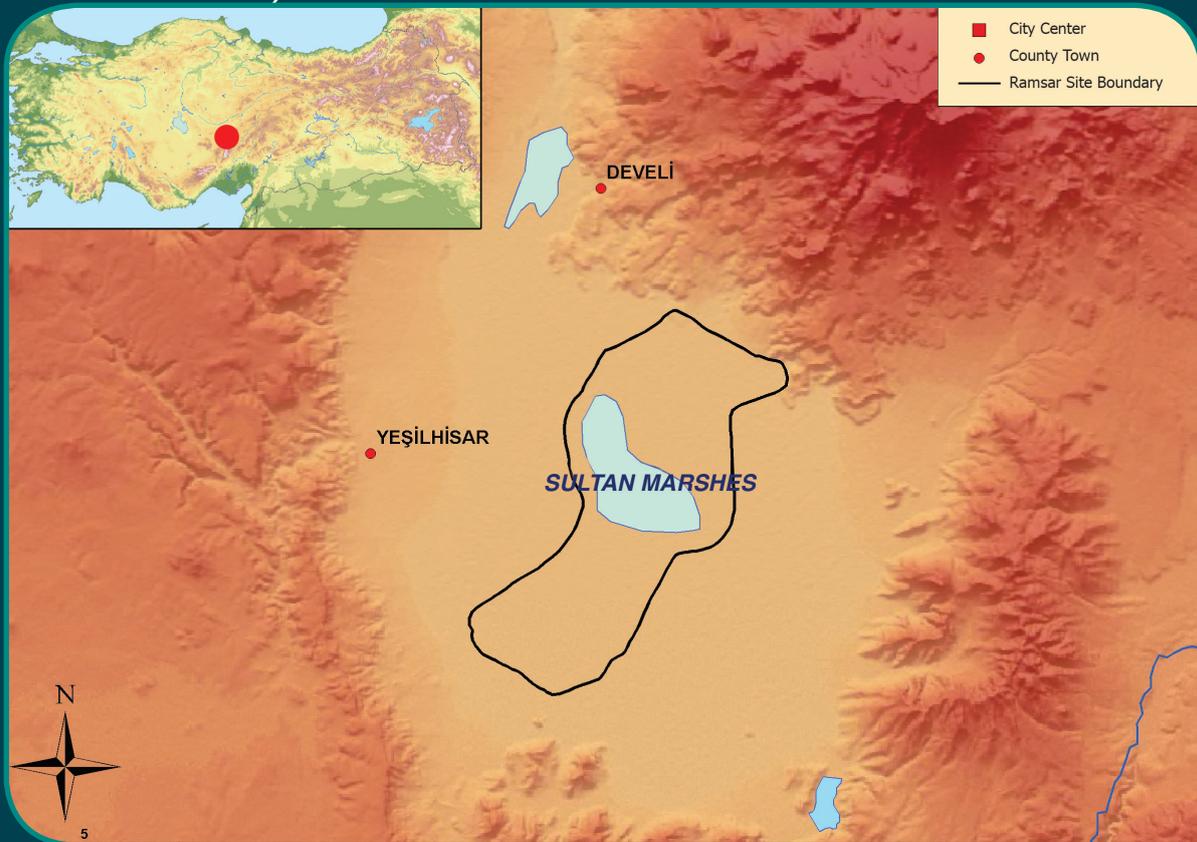
Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.



# SULTAN MARSHES RAMSAR SITE

Map of Sultan Marshes Ramsar Site



## SULTAN MARSHES

It is located within the boundaries of Develi, Yahyalı and Yeşilhisar districts of Kayseri province. 35km to Develi, 24km to Yahyalı and 18km to Yeşilhisar, Sultan Marshes is located 90km in the south of Kayseri.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Sultan Marshes
<b>Location and Boundaries</b>	Located within the boundaries of Develi, Yahyalı and Yeşilhisar districts of Kayseri province.
<b>Area</b>	17.200 ha
<b>Coordinates</b>	38° 20'N 035° 17'E
<b>Elevation</b>	1070 m -1260 m
<b>Conservation Status</b>	Ramsar Site Natural Heritage Site Wildlife Improvement Area National Park
<b>Population</b>	23.714
<b>Climate</b>	Continental
<b>National and International Significance</b>	Turkey's wetland of international importance Key Biodiversity Area Important Plant Area Important Bird Area
<b>Site Significance</b>	Important wetland system in Central Anatolia
<b>Site Symbols</b>	Reed harvesting
<b>Management Plan</b>	2007-2011 Management Plan is enacted.
<b>Facilities in the Site</b>	Birdwatching tower

### Land Tenure / Proprietorship

Proprietorship and management of most of the protected area is under state competency. Local people carry out reed harvesting and agricultural activities.

### Conservation Statuses

An area of 45.000ha was designated as Sultan Marshes Wildlife Protection Site in 1971. Sultan Marshes Wildlife Protection Site has become an Area of Special Conservation Interest pursuant to Bern Convention in 1984. An area of 17.200ha was designated as protected area in 1988. An area of 39.000ha was delineated as important bird area in 1990.

The 17.200ha protected area was also designated as Natural Heritage Site of 1<sup>st</sup> Degree based on its boundaries in 1993 and as Ramsar Site in 1994. In 2003, the boundaries of the protected area was modified and increased to 24.523ha. The protection status of the 24.523-hectares protected area was changed to national park and designated as Sultan Marshes National Park.

Sultan Marshes Ramsar Site meets 5 out of 9 criteria for identifying wetlands of international importance. These are;

RAMSAR CRITERIA	DESCRIPTION	SULTAN MARSHES
<b>Criterion 2</b>	The site supports globally threatened species listed in the red list of International Union for Conservation of Nature (IUCN)	The site supports threatened white-headed duck ( <i>Oxyura leucocephala</i> ), as well as vulnerable red-breasted goose ( <i>Branta ruficollis</i> ), ferruginous duck ( <i>Aythya nyroca</i> ), imperial eagle ( <i>Aquila heliaca</i> ), greater spotted eagle ( <i>Aquila clanga</i> ), lesser kestrel ( <i>Falco naumani</i> ), corn crane ( <i>Crex crex</i> ), great bustard ( <i>Otis tarda</i> ).
<b>Criterion 3</b>	The site regularly supports congregations of waterbirds in significant numbers that confirm the value and diversity of the site.	Since the site consists of fresh, salt and brackish water ecosystems, Sultan Marshes is an important habitat for many plant and animal species. Sultan Marshes support many endemic species. It also is an important habitat particularly for waterbird congregations due to being located on two main bird migration routes.
<b>Criterion 4</b>	Significant numbers of birds stage in the site during migration period.	Grey heron ( <i>Ardea cinerea</i> ), pigmy cormorant ( <i>Phalacrocorax pygmeus</i> ), white-headed duck ( <i>Oxyura leucocephala</i> ), ruddy shelducks ( <i>Tadorna ferruginea</i> ), western marsh harrier ( <i>Circus aeruginosus</i> ), common kingfisher ( <i>Alcedo atthis</i> ) occur in the site in summer and winter seasons. Flamingo ( <i>Phoenicopterus roseus</i> ), Eurasian spoonbill ( <i>Platalea leucorodia</i> ), white stork ( <i>Ciconia ciconia</i> ) as well as some duck and goose species use the site as stopover during migration.
<b>Criterion 5</b>	The site regularly supports 20,000 or more waterbirds.	Every year between September and October bird population exceeds 500.000.
<b>Criterion 6</b>	The site regularly supports 1 percent of the individuals in a population of one species or subspecies of waterbird.	Sultan Marshes support many bird species during their breeding and feeding periods. In particular, during the migration period, flamingo ( <i>Phoenicopterus roseus</i> ) population reaches far more than 1 percent threshold. For example in 1998 more than 200.000 flamingos were recorded in the area.

## MANAGEMENT STRUCTURE

Management of Sultan Marshes is under the authority of Ministry of Environment and Forestry Directorate General of Nature Conservation and Natural Parks and Kayseri Provincial Directorate of Environment and Forestry. Nature Conservation and Natural Parks Engineering office is the executive entity for the management of the site.

## HYDROLOGICAL ASPECTS

Sultan Marshes is situated in the centre of a closed catchment basin of 319.000-hectares. Precipitation, streams flowing downwards the slopes to the plain, as well as waters dribbling underground in the heights and surfacing in the slopes around the plain by forming springs are the factors determining the hydrological structure of the site. Erciyes Mountain receives an important portion of the precipitation. Yahyalı, Ağcaşar, Develi, Yeşilhisar and Dünderlı are the remarkable streams in the site. Soysallı and Çayırozü are the two important springs of the site. Karaboğa and Yeniköy Springs provide additional inflow outside of the agricultural irrigation season.

Wetland ecosystem in Sultan Marshes has preserved its natural structure since there had been no human intervention until 1960s. Yahyalı and Dünderlı Streams feed the Güney Marshes that receives

abundant inflows in some winters and the freshwater lakes. When Güney Marshes reach maximum level, water flows into Lake Yay. Whereas in the north surface and ground water flows from Soysalli and Çayırözü Springs primarily fills the Kepir (Kuzey) Marshes, then extending from the Marshes it reaches Lake Yay.

Lake Yay is located at the lowest altitude of Develi Plain. Being a shallow lake with a maximum depth of 1.5m, Lake Yay dries out in some years. To maintain its lowest level of 1070.2m the minimum annual water inflow amount is 20 million m<sup>3</sup> for Lake Yay and 10 million m<sup>3</sup> for Güney Marshes; a total of 30 million m<sup>3</sup>.

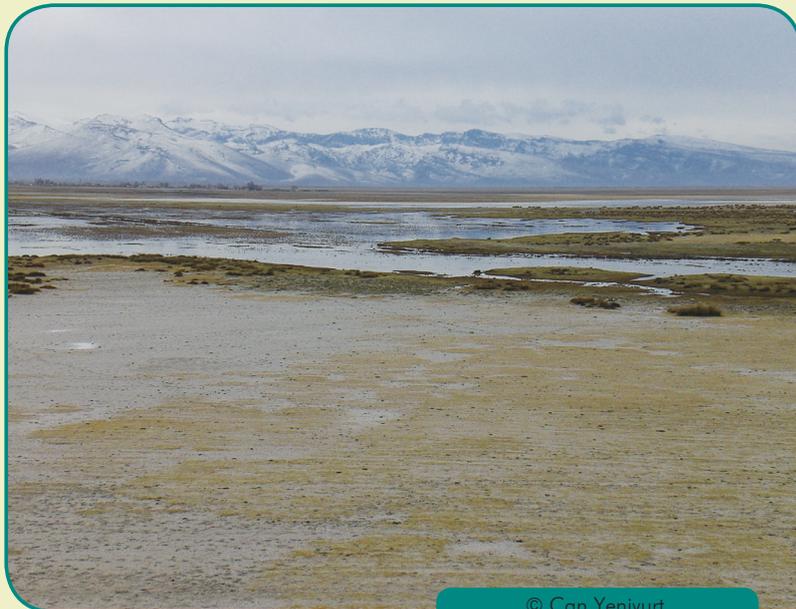


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In 1960s, when the importance of swamp and wetland ecosystems was not well known, Develi Merhale Project by the State Waterworks Directorate (DSİ) aimed at draining the whole basin in order to convert it to agriculture lands. At the beginning of 1970s, DSİ initiated a project for the expansion of irrigated agriculture throughout the basin. Three dams were constructed and most of the surface water inside the basin started to be utilized for irrigation. Afterwards, additional drainage canals were constructed through the wetland. As a result, the ground water level of the basin has remarkably decreased and the interrupted water cycle resulted in a great sum of degradation of the wetland ecosystem in Sultan Marshes.

## GEOLOGICAL ASPECTS

Alluvial soils cover a great portion of Develi Plain. Other large soil groups existing in Sultan Marshes are organic, hydromorphic alluvial, brown and brown acidic soils. While heavy clay soil prevails in Lake Yay and its environment, volcanic tuffs surround Sindelhöyük.



© Can Yeniurt

There are formations of Paleozoic, Mesozoic and Senozoic in Dereli Plain and immediates. In the past 5000 years as the ground depression of Develi-Kayseri Plains sank, the oldest volcanic ground of Erciyes Mountain that had been formed in the middle of two plains had also started to sink. The central cone of the mountain erected on this sank ground. This formation of the mountain determined the formation of Incesu Valley in northeast and particularly of Aliboran and Çalbama coastlines. These then determined the surface elevation of upper Pleistocene pluvial period lakes in Develi Plain located behind the coastlines.

The basin is surrounded by Erciyes Mountain (3.916 m) in the north, Develi Mountain (2.074 m) in the east, Aladağ Mountains (3.373 m) in the south and Karadağ and Hodul Mountains in the west.

## BIOLOGICAL ASPECTS

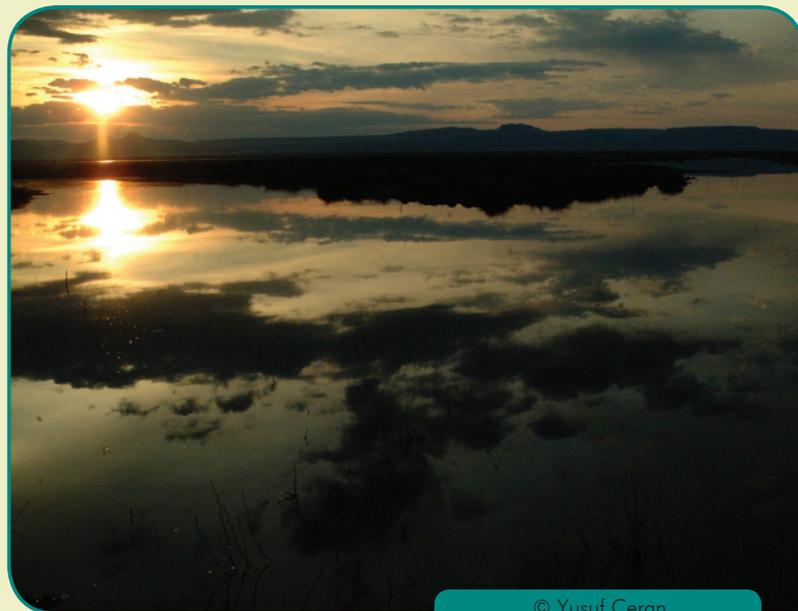
### Habitats

Sultan Marshes are located within the large Central Anatolian steppe ecosystem. Sultan Marshes consists of five different habitats: reed beds, fresh and saltwater lakes, meadows and salt swamps.

### Kuzey and Güney Marshes

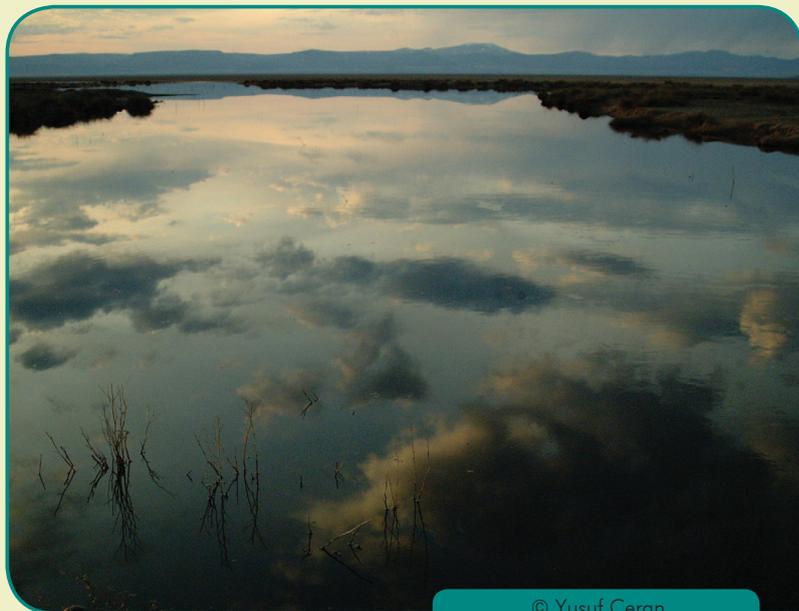
Güney Marshes and Kepir Marshes in the north cover an area of 6.953 ha. Though remarkably shrunk due to inadequate inflow, Güney Marshes still cover a 4.919-hectare area. Since a great portion of Kepir Marshes were handed over to local

people as agricultural lands as part of the Land Reform in the 1950s, the original character of the habitat has been significantly degraded and today only a 2.034-hectare portion of it exists.



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Freshwater Lakes (Eğri Lake, Bağınaltı Lake, Sarp Lake, Kanlı Lake and Soysallı Pınar Lake) cover an area of 16.9 ha. Eğri, Bağınaltı and Sarp Lakes cover an 8.5-hectare area and are fed by surface and ground waters coming from the marshes. Kanlı Lake (2.5 ha) is formed where Çayırözü Spring discharges and Soysallı Pınar Lake (5.9 ha) is formed where Soysallı Spring discharges.

### Saltwater Lakes (Yay Lake and Çöl Lake)

Located in a low altitude in the middle of Sultan Marshes, Lake Yay is the largest salt lake. Its surface area is 4.076ha and is the largest of

salt lakes. Ground water carrying salt minerals from the soil and flowing from north and south feed the lake. These minerals condense within the lake water due to evaporation. Because of the inflow shortage in spring, Lake Yay has dried recently. Other salt lakes located within the saline area have shrunk and cover an area of only 36.5ha.

### Meadows

Meadows cover an area of 2.103ha. They are located around areas consisting freshwater: Çayağzı and Tuzla in the south, Örtülüakar and Camuzgölü Pump Station in the west and Soysallı and Çayırözü Springs in the north.

### Salt Steppes

Salt Steppes located in the eastern, northern and western portions of the protected area, where there

is no freshwater inflow and the land is covered with saline soil, cover an area of 8.777ha.

## WILDLIFE

### Flora

The occurrence of numerous different habitats such as aquatic, terrestrial, saline and freshwater has supported plant variety. 27 phytoplankton species are recorded in the site. Also 428 species of 73 families were recorded, 48 of which are endemic to Turkey. *Poa speluncarum* and *Puccinellia bulbosa caesarea* are the most vulnerable taxa among these.

Common reed (*Phragmites australis*) and narrowleaf cattail (*Typha angustifolia*) in the reedbeds; European white waterlily (*Nymphaea alba*), bladderwort (*Utricularia australis*), lesser duckweed (*Lemna minor*), opposite-leaved pondweed (*Groenlandia densa*) and common water plantain (*Alisma plantago-aquatica*) in freshwater areas; water mint (*Mentha aquatic*), sharp rush (*Juncus littoralis*), creeping buttercup (*Ranunculus repens*) and purple loosestrife (*Lythrum salicaria*) in flooded meadows; salicornia (*Salicornia europaea*), *Artiplex nitens* in halophytic areas; milk vetch (*Astragalus macrocephalus finitimus*), harmful (*Peganum harmala*) and white worm wood (*Artemisia herba-alba*) in salt steppes are the leading plant species recorded in the site.

### Fish

Seven fish species of four families are recorded. The streams in Sultan Marshes are important for the restricted range fish species named *Aphanus danfordii*. Again yag baligi (*Phoxinellus anatolicus*) recorded in the site is listed in International Union for Conservation of Nature (IUCN) Red List threatened species categories.

### Amphibians and Reptiles

Three amphibian species are recorded in Sultan Marshes. Among these species, European tree frog (*Hyla arborea*) is listed in IUCN Red List least concern category. European green toad (*Bufo viridis*) is listed in Annex II and marsh frog (*Rana ridibunda*) in Annex III of Bern Convention.

Of reptiles ten species are recorded. Among these species, spur-thighed tortoise (*Testudo graeca*) is listed in IUCN Red List vulnerable category. European pond turtle (*Emys orbicularis*) is categorized as lower risk in the same list.

### Birds

Sultan Marshes is a rather important area for birds due to being located in the junction point of two main bird migration routes from Eastern Europe, West Asia to Africa. The site is known to host 247 bird species for foraging, breeding and staging.

Sultan Marshes in Turkey is one of the important breeding sites for threatened pygmy cormorant (*Phalacrocorax pygmeus*), white-headed duck (*Oxyura leucocephala*) and marbled duck (*Marmaronetta angustirostris*). Eurasian spoonbill (*Platalea leucorodia*), glossy ibis (*Plegadis falcinellus*), gadwall (*Anas strepera*), pied avocet (*Recurvirostra avosetta*), red-crested pochard (*Netta rufina*), ferruginous duck (*Aythya nyroca*), Kentish plover (*Charadrius alexandrinus*), greater sand plover (*Charadrius leschenaultii*), common pranticole (*Glaucopis pratensis*), spur-winged lapwing (*Vanellus spinosus*), gull-billed tern (*Sterna nilotica*), little tern (*Sterna albifrons*), whiskered tern (*Chlidonias hybridus*), great-crested grebe (*Podiceps cristatus*), little bittern (*Ixobrychus minutus*), graylag goose (*Anser anser*), common teal (*Anas crecca*), mallard (*Anas platyrhynchos*), garganey (*Anas querquedula*), common pochard (*Aythya ferina*), Eurasian coot (*Fulica atra*), tern (*Sterna hirundo*), black-bellied sandgrouse (*Pterocles orientalis*), black-headed gull (*Larus ridibundus*), slender billed gull (*Larus genei*) and black-winged stilt (*Himantopus himantopus*) are the other important bird species breeding in the site.

In the last records from the region, almost 1500 pairs of flamingos are known to breed on the islands in Lake Yay in 1970.

Some bird groups reach large numbers during migration season. The total bird number exceeds half a million in September and October, the congregation period of birds.

About 185.000 flamingos were counted in Lake Yay in September 1997. This is the highest number observed so far.

### **Mammals**

21 mammal species are recorded in Sultan Marshes. Among these species, lesser mole rat (*Nannospalax leucodon*) and European marbled polecat (*Vormela peregusna*) are listed in IUCN Red List vulnerable category, while gray dwarf hamster (*Cricetulus migratorius*) is categorized as least concern/threatened in the same list.

## **CULTURAL and SOCIAL ASPECTS**

### **Past and Present Land Use**

Though there are no known historically and archeologically significant places and ruins within the boundaries of protected area, people inhabiting in the environments of Sultan Marshes have used it for settlement, grazing and agricultural activities for ages. Young reed offshoots are used as fodder and old reeds as the roof cover material of houses. Local people have organized a sustainable management system of their own understanding concerning the ecosystems they live in and use. Land use in the site, however, began to change as a result of the interventions that started in 1950 under the Land Reform. Following the land registry and cadastre works in 1968-1972, local people gained the right to use, control and manage their own lands. The authority to plan and control the land and natural resource exploitation in Sultan Marshes has been handed over to the state when the site was given a legal protection status in 1971.

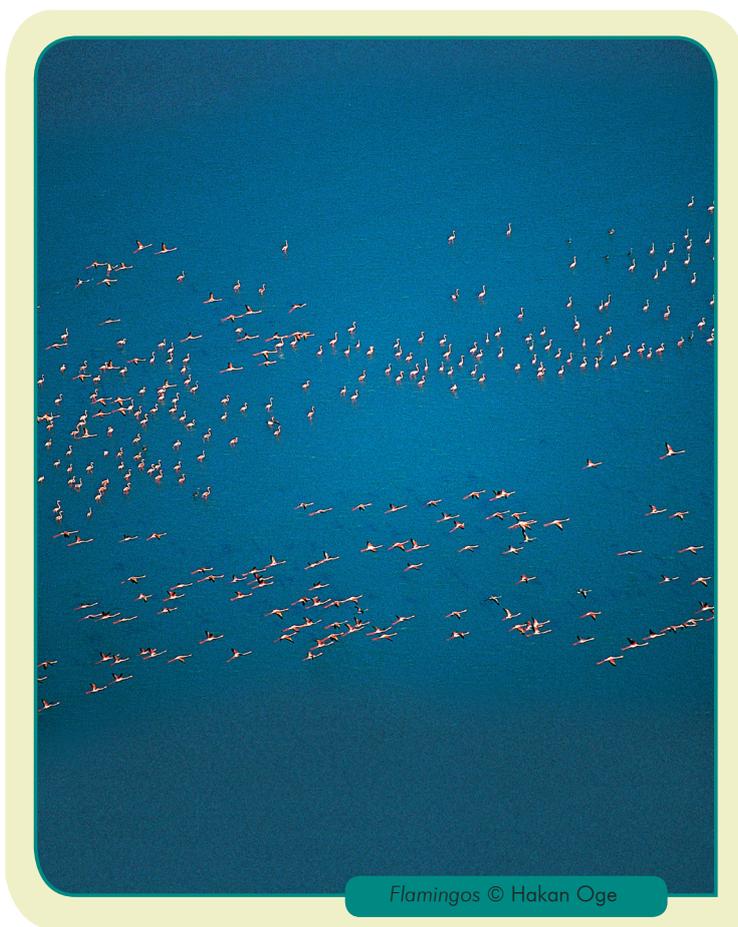
## **NATURAL RESOURCE USE**

57 percent of the people living in Sultan Marshes and its immediate surroundings own farm lands and 66.1 percent of them are occupied with livestock production.

### **Agriculture**

Agriculture is the most important source of income for the local people. Agricultural lands are clustered in northern and southern portions of the site. In Sindel, Soysallı and Çayırözü Villages in the north of the site, an area of 1897ha is utilized for agricultural purposes. Sugar beet, sunflower, wheat and barley are cultivated in these lands. In Ovaçiftlik and Yeşilova Villages in the southern parts of the site, an area of 442.8ha is used for agriculture. In this area, apple is also cultivated in addition to those produced in northern parts.

The Environmentally-Based Agricultural Land Protection (ÇATAK) Programme aiming at carrying out agricultural activities in line with the characteristics of the land and livestock production has been implemented in Kayseri since 2005. Main activities were production of plants with less irrigation need, controlled pesticide and fertilizer application, promotion of more efficient irrigation techniques exploiting less water and rehabilitating the lands.



Flamingos © Hakan Oge

## Livestock

One of the main means of living for the local people of Sultan Marshes is livestock production. It is a subordinate source of income in the region. A large portion of the meadows in and around Sultan Marshes were converted to agricultural land. The remaining seasonally flooded meadows are used as pasture except in winters. As livestock production in the region is carried out in large numbers, most of the animals of the local people graze inside or around the protected area during the year.

Local people use a total of 13.502ha area inside the protected area as pasture. Sheeps graze in the steppes while cows and buffalos graze in the swamp areas. Almost 24.000 cattle and 38.000 small ruminants are raised in the settlements in Sultan Marshes and the surrounding area. The grazing pressure in the site is accordingly high.



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## Reed Harvesting

Güney Marshes cover 3.817ha of the protected area and the local people of Sindelhöyük, Yenihayat, Ovaçiftlik and Yeşilova neighbourhoods use it as reed harvesting area to generate income. Reed harvesting is a widespread activity in Sultan Marshes and annually about 1500 tons of reed is cut. Most of the reed is exported. The amount of annually exported reed reaches up to 300.000 bundles (each bunch contains 200-400 units of reed). A reed bundling and storage facility was established in Sindelhöyük Town in 1995. Moreover, the reeds used as fodder and roof material in the region constitute a key source

of income in the area. Reed (*Phragmites australis*) and bulrush (*Thypha* sp.) species are harvested mostly in August and September.

## Recreation and Tourism

Annual number of visitors is around 1500 depending on the condition of the site. Due to the drought in the past three years, the number of visitors has generally been around hundreds. Visitors can be categorized in two groups:

- Visitors coming individually for birdwatching who are mostly foreigners.
- Visitors coming in groups for birdwatching and recreation consisted mostly of local students.

Two birdwatching towers are in service of the visitors. As there are not any walk-track arrangements, visitors use the existing pathways and routes that are also used by the local people. The owners of the guest houses organize tours by rowboats on Eğri, Bağınaltı and Sarp Lakes within the protected area. These boat tours can only be enjoyed when the water level is high.

## Research Activities

Due to its ecological characteristic and biodiversity, Sultan Marshes has served as an open laboratory for the scientific researches of Erciyes, Niğde, Ankara, Gazi, Hacettepe Universities Environment, Agriculture and Science Faculties.

## WETLAND MANAGEMENT PLAN

GEF-II Project for sustainable development supported by the World Bank, was launched in the region in 2000.

Sultan Marshes Wetland Management Plan prepared in 2007, is still being implemented.

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Map of Lake Kuş (Manyas) Ramsar Site



## LAKE KUŞ (MANYAS)

Lake Kuş (formerly Lake Manyas) is located in the depression zone lying between Uludağ and Biga Peninsula within the boundaries of Bandırma and Manyas districts of Balıkesir province in the south of Sea Marmara. The lake is fed by Manyas Stream, Sığırcı, Mürüvvetler and Dutlu creeks as well as by groundwater. Karadere in the southeast is the outlet of the lake.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Lake Kuş (Manyas)
<b>Location and Boundaries</b>	Located within the boundaries of Bandırma and Manyas districts of Balıkesir province.
<b>Area</b>	20.400 ha
<b>Coordinates</b>	40°12'N 028°00'E
<b>Elevation</b>	14.50 m – 17.50 m
<b>Conservation Status</b>	Ramsar Site Natural Heritage Site National Park Wildlife Improvement Area
<b>Population</b>	5.000
<b>Climate</b>	Marmara
<b>National and International Significance</b>	Turkey's wetland of international importance Key Biodiversity Area Important Plant Area Important Bird Area
<b>Site Significance</b>	The site has a remarkable situation on the flyways between Asia, Europe and Africa.
<b>Site Symbols</b>	Dalmatian pelican ( <i>Pelecanus crispus</i> )
<b>Management Plan</b>	2008-2013 management plan was prepared.
<b>Facilities in the Site</b>	Visitor centre, birdwatching tower

### Land Tenure / Proprietorship

The whole lake area is under state competence. Area covering 64 ha of the lake is property of Ministry of Environment and Forestry Directorate General of Nature Conservation and National Parks. Some of the lands surrounding the lake are private property, while some are village legal entity or owned by the state.

### Conservation Statuses

Lake Kuş is Turkey's first wetland known as "Kuş Cenneti" (bird heaven). Where Sığırcı Creek flows into the lake was designated as a national park in 1959 and the borders were expanded in 2006.

Dalmatian pelicans, naturally incubating on the ground or among the reeds, had started to nest on the artificial platforms situated on and by the willow trees in the west part of the national park for the first time in 1968.

Kuş Cenneti National Park was rewarded with Class A certificate in 1976, given to well preserved and managed protected areas by the European Commission. The site was included in the Ramsar Convention list in 1994.

The lake was also designated as Wildlife Improvement Site in 1996 and Natural Heritage Site of 1<sup>st</sup> Degree. Lake Kuş Management plan prepared with cooperation of European Commission Life Programme was put into force in 2001.

Lake Kuş meets 5 out of 9 criteria for identifying wetlands of international importance. These are;

RAMSAR CRITERIA	DESCRIPTION	LAKE KUŞ
<b>Criterion 2</b>	The site supports species protected under Bern Convention and European Union Habitats Directive.	<p>Immediate surroundings of the lake is an important habitat for amphibians and reptiles. Great crested newt (<i>Triturus cristatus</i>), European green toad (<i>Bufo viridis</i>), European tree frog (<i>Hyla arborea</i>), European copper skink (<i>Ablepharus kitaibelii</i>), European pond turtle (<i>Emys orbicularis</i>), tortoise (<i>Testudo graeca</i>) are the species in the site that are protected under Bern Convention and European Union Habitats Directive (Annex II and IV).</p> <p>European snow vole (<i>Microtus nivalis</i>) is protected under Bern Convention. Again Danube bleak (<i>Chalcalburnus chalcoides</i>), Barbus plebejus escherichi, spined loach (<i>Cobitis taenia</i>), wels catfish (<i>Silurus glanis</i>), monkey goby (<i>Gobius fluviatilis</i>), marine tubenose goby (<i>Proterorhinus marmoratus</i>), marbled goby (<i>Pomatoschistus microps leopardinus</i>), asp (<i>Aspius aspius</i>), amur bitterling (<i>Rhodeus sericeus</i>) are the 9 fish species under protection.</p>
<b>Criterion 3</b>	The site regularly supports significant numbers of waterbirds that show the value, fertility or richness of a wetland.	266 bird species have been observed so far.
<b>Criterion 4</b>	Particularly waterbirds use the site during migration periods.	According to the surveys conducted so far, 22 bird species breed in the lake occasionally, 66 species breed in the lake every year and 178 species use the lake during migration. The site is an important breeding site of bird species such as Dalmatian pelican ( <i>Pelecanus crispus</i> ) and pygmy cormorant ( <i>Phalacrocorax pygmeus</i> ). Great cormorant ( <i>Phalacrocorax carbo</i> ), grey heron ( <i>Ardea cinerea</i> ), glossy ibis ( <i>Plegadis falcinellus</i> ), Eurasian spoonbill ( <i>Platalea leucorodia</i> ) are other bird species breeding in the site.
<b>Criterion 5</b>	Site regularly supports 20,000 or more waterbirds.	Thousands of coastal birds are recorded to stage in the site during spring. Due to being located on African, Asian and European continents' migratory flyways, almost three million birds visit the site.
<b>Criterion 8</b>	Site is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.	Lake Kuş is a eutrophic (nutrient-rich) lake. Rich in terms of wide range of plankton and benthic organisms, the site is a safeguarded wildlife area for species. Common carp ( <i>Cyprinus carpio</i> ), wels catfish ( <i>Silurus glanis</i> ), northern pike ( <i>Esox lucius</i> ) and European chub ( <i>Leuciscus cephalus</i> ) are the leading ones of these species.

## MANAGEMENT STRUCTURE

The 64-hectare delta formed by Sığircı Creek was designated as a national park on July 27, 1959 and an additional 25.000 hectares of Lake Kuş and its immediate surroundings were designated as wildlife improvement area. Ministry of Environment and Forestry Directorate General of Nature Conservation and National Parks, Balıkesir Provincial Directorate of Environment and Forestry Nature Conservation and National Parks Chief Engineering Office are the authorities responsible for the management of the park. A total of five personnel including two administrative staff, two guards and one research associate are employed in the site.

The lake and its peripheries were designated as Natural Heritage Site of 1<sup>st</sup> Degree in 1981. Ministry of Culture is responsible for the activities within Natural Heritage Sites.

As efforts to incorporate an additional 120-hectare area of reed beds, wet meadows and mud plains in the west of the Kuş Cenneti National Park within the national park borders continue, ownership of the land is being handed over to Union for Conservation of Kuş Cenneti by the General Directorate of National Estate.

## HYDROLOGICAL ASPECTS

In Manyas Basin and its surroundings, summers are hot and dry while winters are warm and rainy. Rainy season is generally from October to April. The months with highest precipitation are December and January. 1/3 of the 700-mm mean precipitation falls in these two months. July and August are the driest months. The coldest month is January, when the lowest temperature is recorded to be -14 °C according to monthly temperature records. The recorded January average is 5 °C. The warmest months are July and August, the maximum temperature of which is measured to be 41 °C and the average of these months is 25 °C. The average annual humidity is 66-75 percent. Marmara (transition) climate prevails in the region.

Water level in Lake Kuş varies annually in a wide range (1–3 m). These variations are closely related to the amount of precipitation in the basin. Melting snow and heavy rainfall in springs result in rapid increases in the lake's water volume. Continuing successive dry and wet periods last 19-20 years.

After seawalls were constructed along the southern coast of the lake and regulators controlling water outlet were installed, there have been remarkable changes in the lake's water level. The highest lake water level was measured as 17m in 1996 and the lowest water level as 14.4m in 1983. The lake's water level reaches its highest level during March-April and its lowest level during September-October, as long-term averages indicate. Following intervention to the water regime in 1992, the water level has become 1m higher on the average particularly in summer and autumn. The utilization of the lake as a water reservoir results in remarkable water level fluctuations in summer and autumn. The water pumped out of the lake is transported to Karacabey Plain for agricultural irrigation.

In last 30 years, industrial developments and poultry production in the site resulted in degradation of water quality. The degradation of water quality and modification of natural water regime affected the ecological cycle and some species no longer use the site.

## GEOLOGICAL ASPECTS

Morphological structure of Manyas Basin is closely related to its geological structure. High and mature topography of Kapıdağ and Karadağ mountains located in the north are formed over old metamorphic rocks such as crystallized limestone and granite. While plains are covered with quaternary old alluvions, lower plateaus at skirts dispend over low-resistance Neocene aged units covering vast areas.

The region is tectonically active. This often results in dip faults and causes Kocaçay Creek to change bedload. Though Lake is located in the drainage area, there are significant faults, which are Kuş, Uluabat, Yenice-Gönen and Edincik.

## BIOLOGICAL ASPECTS

### Habitats

Lake Kuş is a vast and shallow freshwater lake surrounded by reed beds, flooded meadows, maquis and flooded willow communities. Willow communities and reed beds cover larger areas, where Kocaçay and Sığircı creeks flow into the lake. Shores, particularly where water withdraws during summers, have a rich hydrophilous flora. Agricultural lands cover the lake shores.

### WILDLIFE

#### Flora

92 plant species of 34 families are recorded in Lake Kuş and its environments. Hydrophilous vegetation in eutrophic lakes is studied under three main zones. Excluding the southern and southwestern coasts of Lake Kuş, where seawalls are located, these zones prevail in the site.

Flowering and woody plants characterize the terrestrial zone vegetation. White willow is the dominant species of Lake Kuş.

Emerald aquatic plants characterize the transitional zone. Most of the prevailing aquatic plants occur in this zone. Species such as reeping cinquefoil (*Potentilla reptans*), tamarisk (*Tamarix* sp.), bulrush (*Juncus* sp.), cattail (*Typha* sp.), sedge (*Phragmites* sp.) and nutgrass (*Carex* sp.) occur in the site.

Whether rooted or not, profundal zone plants include free-floating aquatic plants, too. *Nymphaea alba*, *Lemna* sp. and *Potamogeton* sp. are the prevailing species of this zone. Purple loosestrife (*Lythrum salicaria*), common marshmallow (*Althaea officinalis*), bittersweet (*Solanum dulcamara*), water-mint (*Mentha aquatica*), creeping thistle (*Cirsium arvensa*), buttercup (*Ranunculus saniculifolius*), yellow iris (*Iris pseudocorus*) and common galingale (*Cyperus longus*) are other common species around the lake.

#### Fish

23 fish species have been recorded in Lake Kuş as a result of the studies conducted so far. Though fish species living in the lake have no commercial value, they are remarkably significant for ecological equilibrium. Common carp (*Cyprinus carpio*), wels catfish (*Silurus glanis*), northern pike (*Esox lucius*), European chub (*Leuciscus cephalus*), freshwater sardine (*Caspialosa meotica*), common



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bleak (*Alburnus alburnus*), crucian carp (*Carassius carassius*), Danube bleak (*Chalcalburnus chalcoides*), ray-finned fish (*Cobitis* sp.) and common rudd (*Scardinius erythrophthalmus*) are some of the species the lake supports.

## Amphibians and Reptiles

The lake is rich in amphibians and reptiles. In terms of amphibians, the site supports four salamander species (*Salamandra salamandra*, *Triturus vittatus*, *Triturus vulgaris*, *Triturus cristatus*) and five frog species (*Hyla arborea*, *Bufo viridis*, *Bufo bufo*, *Pelobates syriacus*, *Rana ridibunda*). In terms of reptiles, the site supports four snake species (*Coluber caspius*, *Natrix natrix*, *Natrix tessellata*, *Ophisarus apodus*), two lizard species (*Ablepharus kitaibeli*, *Lacerta* sp.) and two turtle species (*Emys orbicularis*, *Testudo graeca*).

## Birds

Lake Kuş is an ideal habitat for birds thanks to the moderate climate providing birds with shelter in all seasons. It provides the appropriate habitats to various species for feeding, staging and breeding safely and it is rich in prey such as insects, worms, frogs and fish. 266 bird species are recorded in the site. Among these species 66 breed regularly and 22 occasionally.

Dalmatian pelican (*Pelecanus crispus*) and pygmy cormorant (*Phalacrocorax pygmeus*), species listed in threatened species in all of Europe breed in the site in high numbers. Black-crowned night heron (*Nycticorax nycticorax*), squacco heron (*Ardeola ralloides*) and Eurasian spoonbill (*Platalea leucorodia*) also breed in the site. Common tern (*Sterna hirundo*) is another bird species that breed in the lake.



Great cormorant (*Phalacrocorax carbo*), little egret (*Egretta garzetta*), grey heron (*Ardea cinerea*) and glossy ibis (*Plegadis falcinellus*) breed in Kuş Cenneti National Park in colonies. Eurasian coot (*Fulica atra*), garganey (*Anas querquedula*), great reed warbler (*Acrocephalus arundinaceus*), red-backed shrike (*Lanius collurio*) and black-headed bunting (*Emberizza melanocephala*) are other bird species breeding in significant numbers in Lake Kuş and the surrounding area.

Dalmatian pelican (*Pelecanus crispus*) and white-headed duck (*Oxyura leucocephala*) winter in the lake regularly. Great white pelicans use the lake as a stopover during migration.

Though almost 60.000 waterbirds were recorded in winter census at the end of 1960s; 13.087 waterbirds in 2005 and 19.728 in 2010 were counted in the lake.

Sığırcı and Kocaçay deltas and the reed beds surrounding the eastern coast of the lake are the most remarkable parts with lots of birds breeding in the lake.

### **Mammals**

The lake and its surroundings support southern white-breasted hedgehog (*Erinaceus concolor*), European mole (*Talpa europaea*), European snow vole (*Microtus nivalis*), long-fingered bat (*Myotis capaccinii*) and red fox (*Vulpes vulpes*). Local people had reportedly seen European otter (*Lutra lutra*) in the immediate surroundings of the former fishing port in Bereketli Village.

## **CULTURAL and SOCIAL ASPECTS**

### **Archeology**

Lake Kuş is one of the oldest settlement areas. There are findings indicating that the first human settlements in the site had begun in 1200 BC while some scientists argue that there may have been human settlements in the site as early as 4000 BC. Artifacts dating back to Bronze Age were discovered during excavations in the area. The site had been under Bithynian, Lidian, Persian, Roman, Byzantium and Ottoman rule until the Turkish Republic was founded. In some sources it is argued that the site where Kuş Cenneti National Park is located was initially named as "Paradiso" (or "Paradise" in English) by the Romans.

### **Past and Present Land Use**

Throughout history the lake has had remarkable roles in economic, cultural and social lives of the people inhabiting the area. Communities living in the peripheries of the lake benefited from the sources of the lake both for their need and trade as they do today.

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The first intervention to the lake had happened in 1940s. A regulator was installed at the outlet of the lake and the southern coasts were delineated by seawalls. In its natural structure, when water volume in the lake rose in springs, vast areas particularly in the southern coasts would have been flooded; the land surfaced following the withdrawal of the water would have been cultivated or used as pasture.

The site has fertile agricultural lands, thanks to its mild climate conditions and high-quality soil. Local people earn their living generally by agriculture and agricultural industry.

Pastures that surround the lake are used for livestock grazing. A significant part of the agricultural lands in northern portion of the lake has been allocated for industry and poultry farms after the 1980s. The lake itself is used for fishery. The 64-hectares-wide Kuş Cenneti National Park Visitor Center in the north of the lake is used for recreational purposes.

## **NATURAL RESOURCE USE**

Local people mostly rely on agriculture and agricultural industry. Cattle and sheep husbandry along with the recently developing modern poultry are important sources of income.

### **Agriculture**

Sugar beet, wheat, sunflower, corn, rice, bean and legume foods are the commonly cultivated crops in the agricultural lands around the lake. Sugar beet that used to be cultivated more widely in the past, is no more cultivated in some regions at all. Rice is cultivated in remarkable portions

of agriculture lands in the south of the lake. Apple, plum, cherry, peach, bean, okra and pepper fields also cover large areas. Vegetable cultivation becomes intense in some parts of the site where the lake withdraws during summers. Bean is cultivated particularly in Kocaçay neighborhood where the lake withdraws and is an important source of income for the local people.

### Livestock

A significant part of the agricultural lands in northern side of the lake has been allocated for industry and poultry farms after the 1980s. Cattle and sheep husbandry along with the recently developing modern poultry are important sources of income. Pastures that surround the lake are used for livestock grazing.



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### Fishery

Lake Kuş is used for fishery. There are three fisheries cooperatives. Common carp (*Cyprinus carpio*), northern pike (*Esox lucius*) and wels catfish (*Silurus glanis*) are the only commercial fish species the lake supports according to the surveys on fisheries in Lake Kuş in 1953-1954. While 300-400 ton/year fish, most of which was common carp, was being caught before 1985; today this amount has decreased significantly.

Crayfish which had a remarkable economic value in the past, used to appear in the site. However it became extinct due to a fungus disease which infected many lakes

including Lake Kuş. Freshwater sardine also went extinct as the crayfish. Black carp (*Cyprinus carpio*) was introduced to the lake as it grows rapidly.

### Recreation

Kuş Cenneti National Park Visitor Center is the most known and visited part of the site. Its diverse flora and the habitats supporting hundreds of birds attract numerous visitors. The museum and watchtower are the most favoured locations.



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## WETLAND MANAGEMENT PLAN

The Lake Kuş Wetland Management Plan activities were initiated by the Ministry of Environment and Forestry Directorate General of Nature Conservation and National Parks in 2001 and completed in 2006. The plan has been revised to include new activities that will be carried out in the 2008-2013 period.

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# LAKE SEYFE RAMSAR SITE

Map of Lake Seyfe Ramsar Site



## LAKE SEYFE

The lake is located in a tectonic depression of north-eastern Kırşehir Province. With a distance of 220 km to Ankara and 30km to Kırşehir, Lake Seyfe is situated in Mucur District of Kırşehir which has a population of 15.000 people. There are six villages around the lake, namely, Seyfe, Gümüşkümbet, Yazıkınık, Budak, Kızıldağ and Eskidoğanlı.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Lake Seyfe
<b>Location and Boundaries</b>	Situated within the boundaries of Mucur district of Kırşehir.
<b>Area</b>	10.700 ha
<b>Coordinates</b>	39°12'N 034°25'E
<b>Elevation</b>	1120 m – 1200 m
<b>Conservation Status</b>	Ramsar Site Natural Heritage Site Nature Protection Area
<b>Population</b>	15.000
<b>Climate</b>	Continental
<b>National and International Significance</b>	Turkey's wetland of international importance Key Biodiversity Area Important Plant Area Important Bird Area
<b>Site Significance</b>	The site supports rare bird species such as great bustard ( <i>Otis tarda</i> ), common kestrel ( <i>Falco tinnunculus</i> ), common crane ( <i>Grus grus</i> ), ruddy shelduck ( <i>Tadorna ferruginea</i> ) and in large congregations such as flamingo ( <i>Phoenicopterus roseus</i> ).
<b>Site Symbols</b>	Flamingo ( <i>Phoenicopterus roseus</i> )
<b>Management Plan</b>	It was prepared in 2010.
<b>Facilities in the Site</b>	Visitor center

### Management Structure

The whole area protected under the Ramsar Convention is state property. The areas outside the site boundaries are private property, village entity or owned by the state.

### Conservation Statuses

A 23.585-hectare portion of the site was designated as Natural Heritage Site of 1<sup>st</sup> Degree in 1989. The site was designated as Nature Protection Area in 1990 and listed in Ramsar Convention in 1994.

There is a visitor center, run by Directorate General of Nature Conservation and National Parks in Seyfe Village.

Wetland management plan studies continue in the site, which is planned to be completed in 2010.

Lake Seyfe Ramsar Site meets 3 out of 9 criteria for identifying wetlands of international importance. These are;

RAMSAR CRITERIA	DESCRIPTION	LAKE SEYFE
<b>Criterion 2</b>	The site supports species listed in International Union for Conservation of Nature (IUCN) red list categories.	The site supports vulnerable species such as great bustard ( <i>Otis tarda</i> ), imperial eagle ( <i>Aquila heliaca</i> ), greater spotted eagle ( <i>Aquila clanga</i> ).
<b>Criterion 4</b>	Large congregations of birds stage in the site during migration periods.	Flamingos ( <i>Phoenicopterus roseus</i> ) inhabit the site in large numbers in winters (32.000 flamingos were recorded in 1987). Moreover storks ( <i>Ciconia ciconia</i> ) congregate in the site (1300 individuals were recorded during migration period).
<b>Criterion 5</b>	Site regularly supports 20,000 or more waterbirds.	The highest number of birds was recorded as 152.380 in 1969-1970. A total of 32.000 birds were counted in censuses in 1986.

## MANAGEMENT STRUCTURE

Lake Seyfe is under the jurisdiction of Ministry of Environment and Forestry Directorate General of Nature Conservation and National Parks, Kırşehir Provincial Directorate of Environment and Forestry for its Ramsar Site and Nature Protected Area statuses; and Ministry of Culture and Tourism Kırşehir Provincial Directorate of Culture and Tourism for its Natural Heritage Site conservation status.

## HYDROLOGICAL ASPECTS

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Akpınar, Horla, Seyfe and Özlühüyük streams flow in to Lake Seyfe. Seyfe Stream is the most important inflow to the lake. The water volume of Seyfe Stream has been observed to decrease recently.

Central Anatolia is characterized by continental climate (Central Anatolian steppe climate). Since the site is topographically low-pitched, lake surface area fluctuates depending on precipitation and seasons. Its average depth is 1m in winter. Since the area gets low precipitation, streams feeding the lake dry and due to high evaporation the surface area of Lake Seyfe falls to 1.560ha, its depth to 60-70cm, most parts of it turn into salt swamps. Brackish and freshwater marshes, which are very important for breeding or wintering birds in the lake, are located in the east and southeast of the temporary lake.



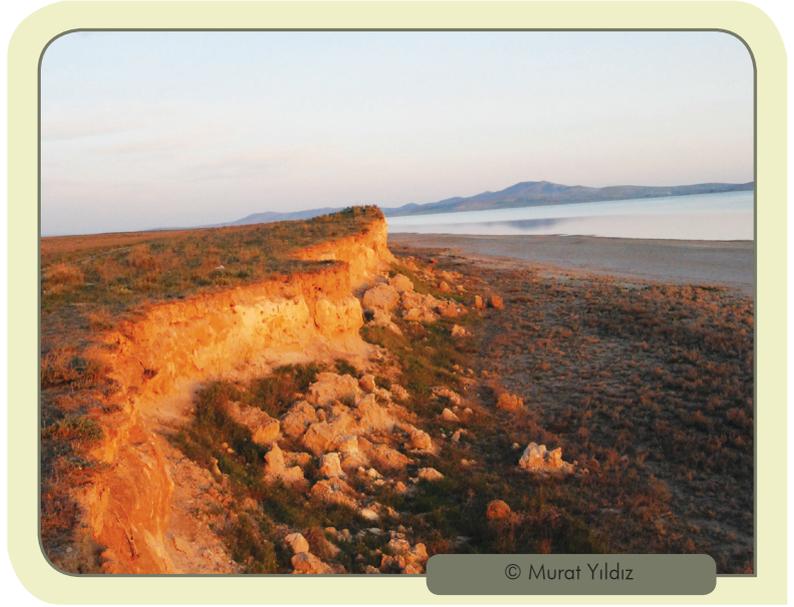
© Serhan Çağırankaya

There is not any significant surface water flowing to the site. Underground water that feeds the lake is used in excessive amounts in agriculture. Groundwater resources were adequate until 2000, but decreased substantially after 2002.

Lake water is briny and contains sodium, so it cannot be used for agricultural purposes. The underground water feeding the lake is utilized for household needs, as well as for irrigation. The main cause of water pollution is the waste water disposals from surrounding villages.

## GEOLOGICAL ASPECTS

(Metamorphic) rocks prevail in the basin. They were formed when the existing proliith containing organism residues (sedimentary rocks) were transformed due to being subjected to high pressure and heat. Formations, dating back to 545 million years until 251 million years from today, constitute the base of the basin. Existing in north-western and southwestern portions of the lake, these formations consisted of schist and marble. During these orogenesis activities, granite and diorite type of intrusions occurred. With a deep-sea medium effect, having been loaded discordantly on the former base, calcareous rocks formed within the basin, which had



begun to remain under water as of Eocene period. The sea started to become shallow and faults were formed by the occurring intrusions. The most important fault-line lies in Gümüşkent-Yenidoğanlı direction. The water sources feeding the lake surface through faulted zones. The quaternary took its current form having been filled with silt, sand and pebbles coming from the immediate surroundings of the plain. These loaded materials minimize the groundwater inflow to the lake constituting a natural seawall for the lake area. Neogene units are also recorded on the Paleozoic formations.

## BIOLOGICAL ASPECTS

### Habitats

The Ramsar Site consists of a salty shallow lake and wet meadows around the lake. There are steppe areas and rainfed agricultural lands surrounding the wetland.



## WILDLIFE

### Flora

Flora landscape around Lake Seyfe does not contain any trees or bushes. There are globally endangered *Centaurea pergamacea* and *Lepidium caespitosum* species in the steppes around the lake. There are *Lycium depressum* in semi-shrub forms located at the north of the lake. The name of the lake is coming from the Seyfe Village at the west of the lake. In Seyfe Village there are fruit gardens and poplar and willow groves. There are

no aquatic plants as the lake is salty. In the salt marshes, there are plant species such as *Halocnemum strobilaceum*, *Salicornia prostrata*, *Salsola inermis*, *Panderia pilosa*, *Petrosimonia brachiata*, *Krascheninnikovia ceratoides*, *Camphorosma monspeliaca*, *Gypsophila perfoliata*, *Rankenia hirsuta*, *Limonium iconicum* and *Limonium globuliferum*.

In addition, in the channels and where water flows into the lake, there are fresh water plants such as bulrush (*Phragmites australis*), *Sparganium erectum*, sedge (*Thypha angustifolia*), fennel pondweed (*Potamogeton pectinatus*) and yellow iris (*Iris pseudocorus*).

## Fish

No fish species are found since the lake is salty and with sodium. There are only two little fish species which are 5-6 cm long, such as *Aphanius chantra* and *Spirlinus* sp. where fresh water enters and disperses into the lake. Although those fish species have no economic significance, their ecologic importance is high as they are part of the diet of the pelicans and egrets.

## Amphibians and Reptiles

There are 5 amphibian species and 28 reptile species recorded at Seyfe Lake. According to the International Union for the Conservation of Nature (IUCN) red list criteria, Clarks' Lizard (*Lacerta clarkorum*) is classified as Endangered (EN), Spur-thighed Tortoise (*Testudo graeca*) is classified as Vulnerable (VU) and European Pond Turtle (*Emys orbicularis*) is classified as Near Threatened (NT).

## Birds

Salt marshes at the east of Lake Seyfe are important feeding and breeding area for birds. Islets in the lake used to be the breeding sites for birds. Habitats, rich in food substances, having different ecological characters with safe islets far away from hunters, large steppes, varying gradually from salt to fresh water swamps, salt lake, provide ideal breeding, feeding and sheltering area for thousands of birds from different species. It has a special importance for rare species such as Great bustard (*Otis tarda*) and Crane (*Grus grus*) as well as for congregating species such as Flamingo (*Phoenicopterus roseus*).

According to the results of the observations, there are 205 bird species recorded in and around the lake in 1999. The number of birds at the lake reaches record levels at migration and winter times. Greater White-fronted Goose (*Anser albifrons*), Common shelduck (*Tadorna tadorna*), Ruddy shelduck (*Tadorna ferruginea*), Common teal (*Anas crecca*) and Coot (*Fulica atra*) are the species gathering at large flocks. Lake Seyfe is also one of the important breeding areas for water birds in the country. At the islets at the east of the Lake, the important breeding species used to be flamingo (*Phoenicopterus roseus*), Great white pelican (*Pelecanus onocrotalus*), Eurasian spoonbill (*Platalea leucorodia*), Little egret (*Egretta garzetta*), Red-crested Pochard (*Netta rufina*), Black-winged Stilt (*Himantopus himantopus*), Pied Avocet (*Recurvirostra avosetta*), Spur-winged Lapwing (*Vanellus spinosus*), Mediterranean Gull (*Larus melanocephalus*), Black-headed Gull (*Larus ridibundus*) and Gull-billed Tern (*Sterna nilotica*). Hundreds of thousands of ducks stop over at the site in autumn. According to the local people, the number of birds at the lake has decreased dramatically. In addition to the water birds, white storks also congregate around the lake. Steppes around the lake are feeding and breeding area for great bustard, one of the globally threatened bird species.



## Mammals

There are 31 mammal species recorded around Seyfe Lake. According to the IUCN red list criteria, the classification of the mammal species is as follows: Lesser Horseshoe Bat (*Rhinolophus hipposideros*) as Least Concern (LC), Long-fingered Bat (*Myotis capaccinii*) as Vulnerable (VU), Lesser Blind Mole Rat (*Spalax leucodon*) as Data Deficient (DD), Common Otter (*Lutra lutra*) as Near Threatened (NT), Greater Mouse-eared Bat (*Myotis myotis*) as Least Concern (LC), the Common Bent-wing Bat (*Miniopterus schreibersii*) as Near Threatened (NT), Anatolian

Squirrel (*Sciurus anomalus*) as Least Concern (LC), Gray Dwarf Hamster (*Cricetulus migratorius*) as Least Concern (LC), Forest Dormouse (*Dryomys nitedula*) as Least Concern (LC).



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## CULTURAL and SOCIAL ASPECTS

### Archeology

The findings of the archaeological excavations have revealed that the first settlements occurred in the Bronze Age (between 3500-200 BC). There are 20 ancient tombs and tumulus from this age around the lake and its surroundings. Studies have shown that the people settled at the coasts have engaged with agricultural activities throughout history. It is thought that the residents of the lake lived by hunting migratory birds and farming. Historical artifacts excavated from the tombs are being exhibited in the Kirşehir Museum.

### Past and Present Land Use

In the past, Lake Seyfe used to be a remarkable area for birds. It used to support significant number of birds, particularly in winter and during.

The site has been adversely affected at a huge scale by drainage channels, overexploitation of ground water and a shift to irrigation-dependent crops. There is a 20 cm thick salt layer on the lake, which completely dries in summer. The salt from this layer moves to the farmlands around the lake and threatens human health causing a financial loss that amounts to millions of liras per year. Ground-water level has decreased due to an excessive use of the water of the lake. Nowadays, the depth of an average well is up to 200 m.

In addition to the ongoing reduction in the agricultural yield due to droughts in the region, reed harvesting has also been adversely affected due to loss of the reed beds. Moreover, poplar and willow grooves are desiccated. Since the water volume decreased gradually, frost incidents have increased and apple production had come to a standstill.

## NATURAL RESOURCE USE

90 percent of the local people living around the lake rely on agriculture and animal husbandry.

### Agriculture

Rainfed agriculture is practiced in 91,7 percent of the basin while the rest is utilized for irrigated agriculture. Main agricultural products are wheat, sugar beet, barley, lentil, chick-pea, bean, oats and sunflower. There are almost a thousand caisson wells at a depth of maximum 10m for irrigation purposes. However, due to water shortage it is getting harder to produce those crops. In the past 3 years, to provide transition from irrigated agriculture to rainfed clover and trefoil cultivation was introduced. Under the Environmentally-Based Agricultural Land Protection (ÇATAK) Programme, promotion works have been initiated. In the 4 villages surrounding Lake Seyfe, a total of 1350 ha area is included in the project area. The water and humidity ratios, which were adequate to grow certain crops such as wheat in the past, have decreased as of 2000 and in 2007. Farmers in the region have reported that cultivation has become harder when compared to the past.

### Livestock

Since there are large grazelands in the basin, small ruminant husbandry is a prominent occupation. Livestock production in the region is also carried out in combined facilities.

### Recreation and Tourism

Historical and cultural treasures such as tombs and tumuluses, the bird diversity, and the beautiful landscape of the lake have increased the site's significance in terms of nature tourism.

## WETLAND MANAGEMENT PLAN

35

The wetland management plan was planned to be completed by 2010 but preparations are still in progress.

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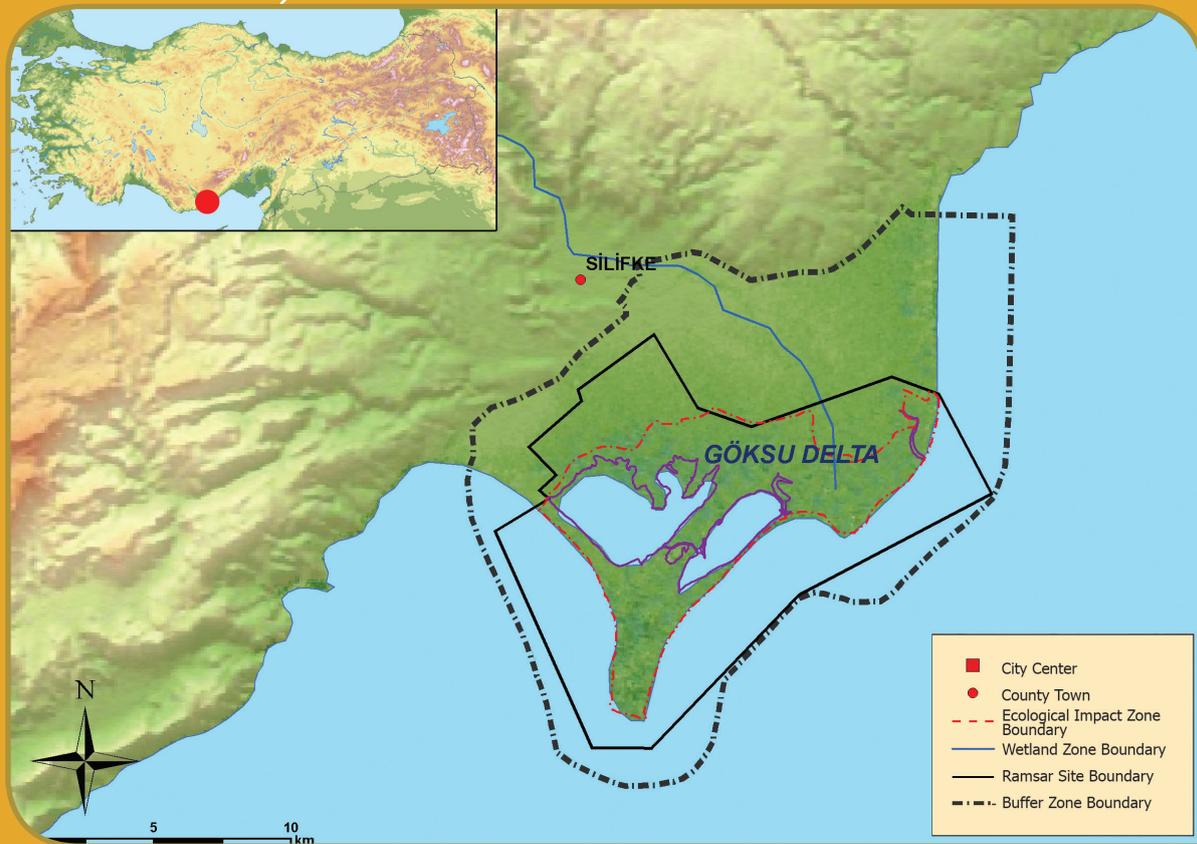
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<http://www.seyfeolu.org/>

# GÖKSU DELTA RAMSAR SITE

Map of Göksu Delta Ramsar Site



## GÖKSU DELTA

Göksu Delta is located in the southern edge of Silifke (a district of Mersin province) at the skirts of Central Taurus Mountains and on the coastal plain formed by Göksu River. Demarcated by Erdemli district in the east, Gülnar in northwest, Mediterranean Sea in the south and Karaman in the north, the delta is 85 kilometers to Mersin city center. It is situated between Silifke and Taşucu districts at Göksu River's mouth where the river flows into the sea.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Göksu Delta
<b>Location and Boundaries</b>	Located within the boundaries of Silifke district of Mersin.
<b>Area</b>	15.000 ha
<b>Coordinates</b>	36°18'N 033°58'E
<b>Elevation</b>	0 m – 90 m
<b>Conservation Status</b>	Ramsar Site Special Environment Protection Area Natural Heritage Area
<b>Population</b>	39.987
<b>Climate</b>	Mediterranean
<b>National and International Significance</b>	Turkey's internationally important wetland site Key Biodiversity Area Important Plant Area Important Bird Area
<b>Site Significance</b>	One of the rare wetlands in the Mediterranean Region that could preserve its natural structure.
<b>Site Symbols</b>	Marbled duck ( <i>Marmaronetta angustirostris</i> )
<b>Management Plan</b>	A management plan for 2009-2013 has been enforced.
<b>Facilities in the Site</b>	Birdwatching towers and barracks

### Land Tenure / Proprietorship

The total ownership territory is 10816.88 ha in 10.748 parcels of land in Göksu Delta. The mentioned lands are used by 18.469 shareholders. 9004.92 ha of the total area is agricultural land, while the remaining 1811.97 ha involves estates, houses, mosques, roads, marshes, lakes, etc. 7635.96 ha of 9004.92 ha agricultural land is owned by real people, 1287.79 ha by finance treasury and 81.17 ha by the legal entity of the village. 7635.96-hectare individual property is 6.632 parcels and used by 13.279 shareholders.

### Conservation Statuses

In 1990, 23.600 hectares of Göksu Delta were designated and decreed as "Special Environment Protection Area" in order to protect its natural, historical and cultural heritage and ensure that these values are transferred to the future generations.

An area of 4.35 hectares that consists Akgöl and Paradeniz Lagoons was designated as Wildlife Protection Area by the Ministry of Environment and Forestry, Directorate General of National Parks, Game and Wildlife to take poaching under control.

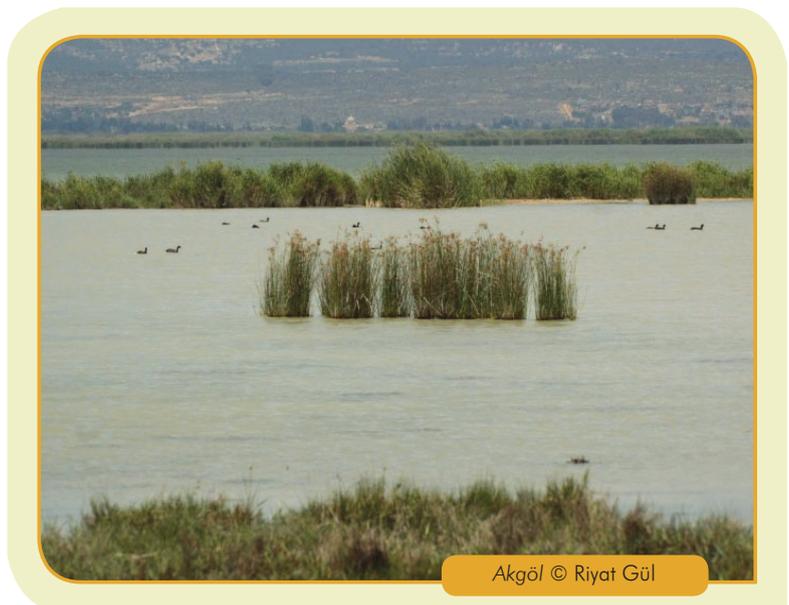
In 1994, 15.000 hectares was decreed as Ramsar site. In 1996, the Natural Heritage Site Area of 1<sup>st</sup> Degree was demarcated.

Göksu Delta Ramsar Site meets three internationally important wetland criteria out of nine. These are;

RAMSAR CRITERIA	DESCRIPTION	GÖKSU DELTA
<b>Criterion 2</b>	The site supports species that are protected under Bern Convention, Convention on Migratory Species (CMS) and European Union Bird Directive.	Bird species in the site protected according to the Bern Convention are; Little grebe ( <i>Tachybaptus ruficollis</i> ), black-necked grebe ( <i>Podiceps nigricollis</i> ), Gannet ( <i>Morus bassanus</i> ), Pygmy cormorant ( <i>Phalacrocorax pygmeus</i> ), Dalmatian pelican ( <i>Pelecanus crispus</i> ), Great bittern ( <i>Botaurus stellaris</i> ), Black-crowned Night-heron ( <i>Nycticorax nycticorax</i> ), Cattle egret ( <i>Bubulcus ibis</i> ), Little egret ( <i>Egretta garzetta</i> ), White stork ( <i>Ciconia ciconia</i> ), Alpine chough ( <i>Pyrrhocorax pyrrhocorax</i> ), Carrion crow ( <i>Corvus corone</i> ), Starling ( <i>Sturnus vulgaris</i> ), House sparrow ( <i>Passer domesticus</i> ), European serin ( <i>Serinus serinus</i> ), Goldfinch ( <i>Carduelis carduelis</i> ), Greenfinch ( <i>Carduelis chloris</i> ), Rock bunting ( <i>Emberiza cia</i> ), Reed bunting ( <i>Emberiza schoeniclus</i> ). Species in the site protected according to the EU Birds Directive are European shag ( <i>Phalacrocorax aristotelis</i> ), Great egret ( <i>Casmerodius albus</i> ), Spoonbill ( <i>Platalea leucorodia</i> ), Greater flamingo ( <i>Phoenicopterus roseus</i> ). Bird species in the site protected according to the CMS are Red-necked grebe ( <i>Podiceps grisegena</i> ), Great white pelican ( <i>Pelecanus onocrotalus</i> ).
<b>Criterion 3</b>	The site has a special feature to ensure ecologic and genetic diversity of the region with its flora and fauna.	The site has a special feature with rich plant species and habitats. There are 6 endemic plant species and 38 taxonomic plants which are classified in red data book of International Union for Conservation of Nature (IUCN). 332 bird species are counted in this wetland ecosystem. 70 of these species certainly and 20 of them probably breed in the Göksu Delta.
<b>Criterion 4</b>	The Göksu Delta has a special importance because it supports critical periods of biological cycle of waterbirds and reptiles.	The site is one of the rare areas in the Mediterranean with its protected natural structure. Suitable climate conditions provide feeding, breeding and wintering grounds for a high number of waterbirds. Additionally, important nesting areas of the Sea Turtles ( <i>Caretta caretta</i> ) are located in the Göksu Delta beaches. The site also supports threatened soft shelled Nile Turtles ( <i>Trionyx tringuis</i> ).

## MANAGEMENT STRUCTURE

Conservation activities in the protected area are carried out by the Ministry of Environment and Forestry, Environmental Protection Agency for Special Areas. Activities around the site are organized by Silifke Directorate of Special Environment Protection. Officers in the site monitor visitors coming to the site for birdwatching and/or research or for hunting activities.



Akgöl © Riyat Gül



## HYDROLOGICAL ASPECTS

The site receives heavy precipitation as it is exposed to the rain clouds coming from the Mediterranean (700 mm/year). The source that directly affects the hydrological structure of the site, is also the largest river of eastern Mediterranean basin: the 250-kilometer-long Göksu River. Fed by underground resources and creeks that receive water from heights with heavy precipitation; the flow rate of Göksu River is 118 m<sup>3</sup>/s (minimum 26 m<sup>3</sup>/s, maximum 1680 m<sup>3</sup>/s). Akgöl and Paradeniz Lagoons are 1,312 ha in size. Akgöl (820 ha) has slightly salty and briny water. The lake contains 1.0 gram of lime per liter. Its deepest point is 0.5-1.0 meter and it is linked to Paradeniz with a canal which was constructed for fisheries. Freshwater through drainage canals feeds the lake.

With a maximum depth of 1.5 meters, Paradeniz Lagoon (492 ha) is slightly salty and constantly linked to the sea via a canal. Göksu is an extremely rich delta in terms of hydrological sources. The groundwater contains high concentrations of lime, while the parent material bears karstic characteristics.

## GEOLOGICAL ASPECTS

Silifke Plain was formed in the IVth period. Göksu Delta was formed by the canal deposits such as clay, silt, sand and gravel and flood plain sediments which Göksu River has carried and deposited, as well as coastal sands and sand dunes. Elevations are 0-5 m and slope is 15 percent at the most in the delta. The waves the sand mounds create reach the sea, though the morphological structure varies within the region.

## BIOLOGICAL ASPECTS

### Habitats

Göksu Delta comprises agriculture lands, lakes and reed bed areas, lagoons, halophytic steppes, beaches, sand dunes, agricultural areas and urban centers. There are two large lakes in the site. These are Paradeniz Lagoon that is connected to the sea and separated from the sea with a sandbank and Akgöl that bears freshwater characteristics. Kuğu Lake located between Akgöl and Paradeniz and highly salty Arpalanı Lake located in the east of Paradeniz are also within the delta. There are numerous seasonal small lakes within the site. Salinity values of the lakes change in line with the tide. There is an area of fine sand in the edge of the delta known as İncekum Burnu (Cape). After Göksu River had started to flow in its current bed, this sand foreland started to erode away.



## WILDLIFE

### Flora

The delta supports a rich variety of plants due to the existence of diverse habitats with different ecological characteristics. At two meters of altitude from sea level, vegetation cover in Göksu Delta consists of Mediterranean maquis formations, intensive sand dune plants as well as halophyte steppes. *Pinus brutia*, also known as Red pine, is dominant in these forests. The sand dune system supports common myrtle, oleander, salix, restharrow, thorny burnet, south furze and elecampane. The northern part of Akgöl, where freshwater flows in, is covered with bulrush (*Typha* sp.), weaver reed and reed (*Phragmites* sp.). An area





of sea clubrush, shrubs, salt cedars (*Tamarix smyrnensis*), bog bulrush (*Scirpus* sp.) and common bulrush (*Juncus* sp.) lies between reed beds and dune vegetation. Saltwater floods surrounding Paradeniz Lagoon supports sparse reed beds, glasswort (*Salicornia* sp.) and spiral ditchgrass (*Ruppia cirrhosa*). Vast areas around Akgöl and Paradeniz in the delta are covered with halophytes. Eight endemic plant species out of 442 plant species in total have been identified in Göksu Delta.

Among these are *Aristolochia krausei*, *Bellevalia modesta*, *Beta adanensis*, *Beta trojana*, *Bromus psammophilus* and *Stachys pseudopinardii*, which are endemic to Turkey and most of which are sand dune plants.

### **Fish**

Lakes and the area where Göksu River flows to the Mediterranean and the adjacent coasts located in Göksu Delta are unique breeding and sheltering areas for fish. Akgöl supports eel, flathead mullet, carp and Paradeniz supports sea bass, sea bream, common dentex, sharpnout seabream, saddled seabream, white seabream, striped seabream and red porgy.

### **Amphibians and Reptiles**

Göksu Delta, which has a remarkable importance for reptiles, hosts 34 amphibian and reptile species. Green toad, tree toad, red-headed whip snake, lebetine viper, ocellated skink and common chameleon are some of these species. The fine sand dune area of Göksu Delta is one of the most important nesting areas of sea turtles (*Caretta caretta*) and green sea turtles (*Chelonia mydas*) through the Mediterranean coasts. Endangered Nile soft-shelled turtle is also known to exist in the site.

### **Birds**

Göksu Delta is one of the rare coastal wetlands in the East Mediterranean region. Göksu Delta provides

feeding, breeding, wintering and stopover opportunities for numerous waterbirds with its convenient climate conditions, varying habitats and available nutrients. So far 328 bird species are recorded in the site. Purple heron (*Ardea purpurea*), squacco heron (*Ardeola ralloides*), black-crowned night-heron (*Nycticorax nycticorax*), marbled duck (*Marmaronetta angustirostris*), ferruginous duck (*Aythya nyroca*), purple swamphen (*Porphyrio porphyrio*), stone curlew (*Burhinus oediconemus*), collared pratincole (*Glareola pratincola*), kentish plover (*Charadrius alexandrinus*), spur-winged lapwing (*Hoplopterus spinosus*), little tern (*Sterna albifrons*), Smyrna kingfisher (*Halcyon smyrnensis*) are the bird species breeding in the site that enables the site to earn the status of a wetland of international importance. As it is highly rich in bird species, local and foreign birdwatchers visit the site frequently. There are five birdwatching hides and a birdwatch tower in the delta.



Marbled Teal © Riyat Gül

## Mammals

Wild boar, wolf, fox, badger, squirrel, weasel, hedgehog and rabbit are the primary mammals seen in the site.

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## CULTURAL and SOCIAL ASPECTS

### Archeology

Göksu Delta and its immediate environment are very rich in terms of historical and archeological values. Three mounds within the delta are presumed to belong to Hittite period. Great building ruins from Roman and Byzantium times were discovered in the sand dunes around Paradeniz Lagoon. There are some other ruins in the sand dunes nearby İncekum and in the south of Akgöl. The two tombs discovered in Altinkum and Gazi Çiftliği are two of the seven-siblings tombs. There are Roman, Byzantium and Armenian ruins in the west of the delta dating back to 13-14<sup>th</sup> centuries. A remarkable faith center during Christian ages, Meryemlik or Hagia Techla, was established in Roman and early Byzantium periods. Because Silifke was a developed settlement during Roman and Byzantium periods, it now abounds with historical remnants.

### Past and Present Land Use

Agriculture, livestock production and some tourism activities are carried out in the region. Agricultural lands constitute the remarkable part of the land use. In the areas of both rainfed and irrigated agriculture, olive groves and vineyards lie between the coastal areas and heights.

Livestock production that had a significant place in the past lost its significance in economy after grazelands had been transformed into agricultural lands and settlement areas. Anatolian nomads known as Yuruks, who frequent the area in summers, raise livestock in the region.

## NATURAL RESOURCE USE

### Agriculture

Agricultural activities cover the largest part of land in Göksu Delta. Silifke Plain is divided into two portions as east and west coasts by Göksu River. Soil structure and climate conditions provide a great variety of crops and high amount of production. This structure of Göksu Delta comprising a very rich agricultural land offers the opportunity to cultivate continental climate crops such as wheat, barley, as well as warm climate crops such as peanut, citrus fruits and early-season vegetables.

Rice is cultivated in 3.230 ha (3.3 percent of total agriculture production) and wheat in 2.790 ha (9.7 percent of total agriculture) of a total of 10.180 ha agriculture land.

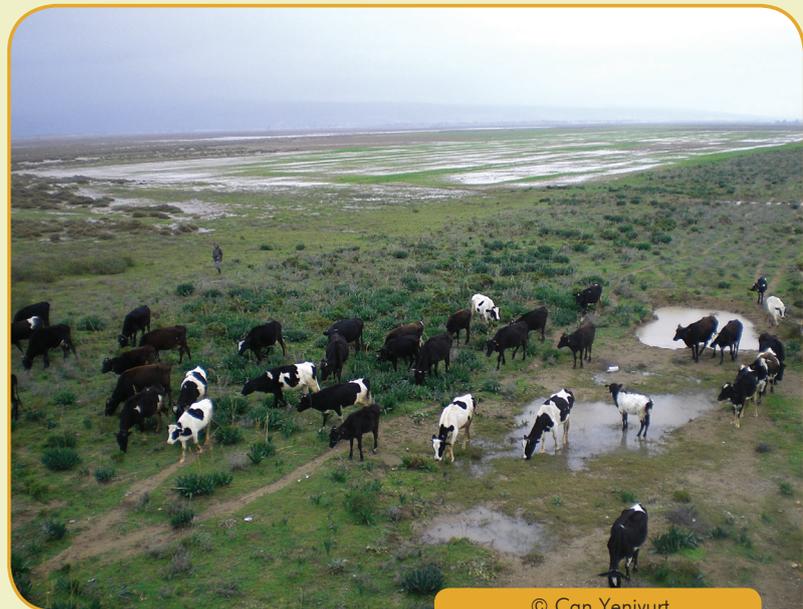
Olive groves and vineyards lie in the transition zones stretching between the coastal areas and the high altitudes. Among the citrus orchards which gradually gain more significance in the area, various vegetables such as tomato, eggplant and pepper are cultivated. Greenhouses are widespread, as well as orchards.

### Livestock

Livestock production used to have a significant place in Göksu Delta in the past. After rangelands had been converted to agricultural land and settlements, livestock lost its importance. Only 10-15 families of Anatolian nomads who spend the summer in the area, continue raising livestock. Therefore, during summer grazing pressure in the area increases. Especially the people living in the mountainous areas earn their living on livestock production. Anatolian black goat, sheep and cattle are the most common livestock in the area. Apart from a few corporate farms, poultry production is widespread as family business.

### Fishery

Four species of fish are harvested in Akgöl. Two of them are salt-tolerated strong fish species, namely, eel (*Anguilla anguilla*) and flathead mullet that travel to Paradeniz Lagoon. Two freshwater species, carp (*Cyprinus carpio*) and bluefish (*Clarias lazera*) lay eggs in this lake. Eel and bluefish are mostly exported while the rest of the species are consumed in the region. Fishery activities are carried out with traditional methods in Paradeniz Lagoon. Sea bass (*Dicentrarcus labrax*), sea bream (*Sparus auratta*), common dentex (*Dentex dentex*), sharp snout seabream (*Cantharus lineatus*), two-banded seabream (*Diplodus vulgaris*), saddled seabream (*Oblada melenura*), white seabream (*Diplodus sargus*), striped seabream (*Lithognathus mormyrus*) and red porgy (*Pagrus pagrus*) are harvested. Fishery activities degrade due to sediment load in the lakes.



© Can Yeniurt

## WETLAND MANAGEMENT PLAN

The first management plan was prepared by Environmental Protection Agency for Special Areas, in cooperation with Society for Nature Protection (DHKD) in 1999. The plan has been implemented by 65-70 percent so far. Environmental Protection Agency for Special Areas revised the plan in 2008.

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# LAKE BURDUR RAMSAR SITE

Map of Lake Burdur Ramsar Site



## LAKE BURDUR

Located within the Mediterranean Region, Lake Burdur is situated within Keçiborlu, Gönen and Burdur central district boundaries of Burdur and Isparta provinces. Lake Burdur is a tectonic lake located between Söğüt and Suludere-Yayladağ Mountain Blocks in western Burdur province.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Burdur Lake
<b>Location and Boundaries</b>	Located within the boundaries of Burdur and Isparta provinces.
<b>Area</b>	24.800 ha
<b>Coordinates</b>	37°44'N 030°11'E
<b>Elevation</b>	835 m – 880 m
<b>Conservation Status</b>	Ramsar Site Natural Heritage Site Wildlife Improvement Area
<b>Population</b>	141.800
<b>Climate</b>	Mediterranean
<b>National and International Significance</b>	Turkey's wetland site of international importance Key Biodiversity Area Important Bird Area
<b>Site Significance</b>	Almost 70 percent of globally endangered white-headed duck ( <i>Oxyura leucocephala</i> ) population has been wintering in Burdur Lake until recently.
<b>Site Symbols</b>	White-headed duck ( <i>Oxyura leucocephala</i> )
<b>Management Plan</b>	Burdur Lake Wetland Management Plan that designates the activities to be done between 2008 and 2012 has been enforced in 2008.
<b>Facilities in the Site</b>	Birdwatching tower

### Land Tenure / Proprietorship

Burdur Lake is public property. Lands surrounding the lake are owned by public and private bodies as well as village legal entities.

### Conservation Statuses

Burdur Lake was decreed as a Waterbirds Wildlife Protection Site (38.125 ha) under the Law on Terrestrial Hunting in 1993. The site was transformed to become Burdur Lake Wildlife Improvement Site (26.229 ha) in 2006.

Half of the lake (12.600 ha) in 1994 and the whole lake in 1998 was included in the list of Ramsar Convention. The site was also designated as Natural Heritage Site of 1st Degree by the Ministry of Culture in 1998.

Burdur Lake Ramsar Site meets 5 out of 9 criteria of Wetlands of International Importance. These are:

RAMSAR CRITERIA	DESCRIPTION	LAKE BURDUR
<b>Criterion 2</b>	The site supports endangered bird species included in International Union for Conservation of Nature (IUCN) red list categories.	The site supports significant numbers of endangered species of white-headed duck ( <i>Oxyura leucocephala</i> ). The site also supports a vulnerable diatom species, <i>Arctodiaptomus burduricus</i> as well as the endemic fish species <i>Aphanius sureyanus</i> .
<b>Criterion 3</b>	The site bears a special importance for wetland plant species.	As a result of the surveys, a total of 49 families, 204 orders and 315 species were recorded in the area surrounding the lake. Species of sedge (Cyperaceae), rush (Juncaceae), typha (Typhaceae) and true grass (Poaceae) families consist the major dominant flora.
<b>Criterion 4</b>	The site is a wintering and breeding area for birds.	White-headed duck ( <i>Oxyura leucocephala</i> ) winters in the site while Eurasian coot ( <i>Fulica atra</i> ) and European spoonbill ( <i>Anas clypeata</i> ) breed in the site.
<b>Criterion 5</b>	The site regularly supports 20,000 or more waterbirds.	300.000 waterbirds are recorded to inhabit the site. 252.726 Eurasian coots ( <i>Fulica atra</i> ) and 26.075 black-necked grebes ( <i>Podiceps nigricollis</i> ) are recorded in 1997 censuses.
<b>Criterion 6</b>	Site regularly supports 1 percent of the individuals in a population of one species or subspecies of waterbird.	70 percent of the white-headed ducks ( <i>Oxyura leucocephala</i> ) around the world winter in the site.

## MANAGEMENT STRUCTURE

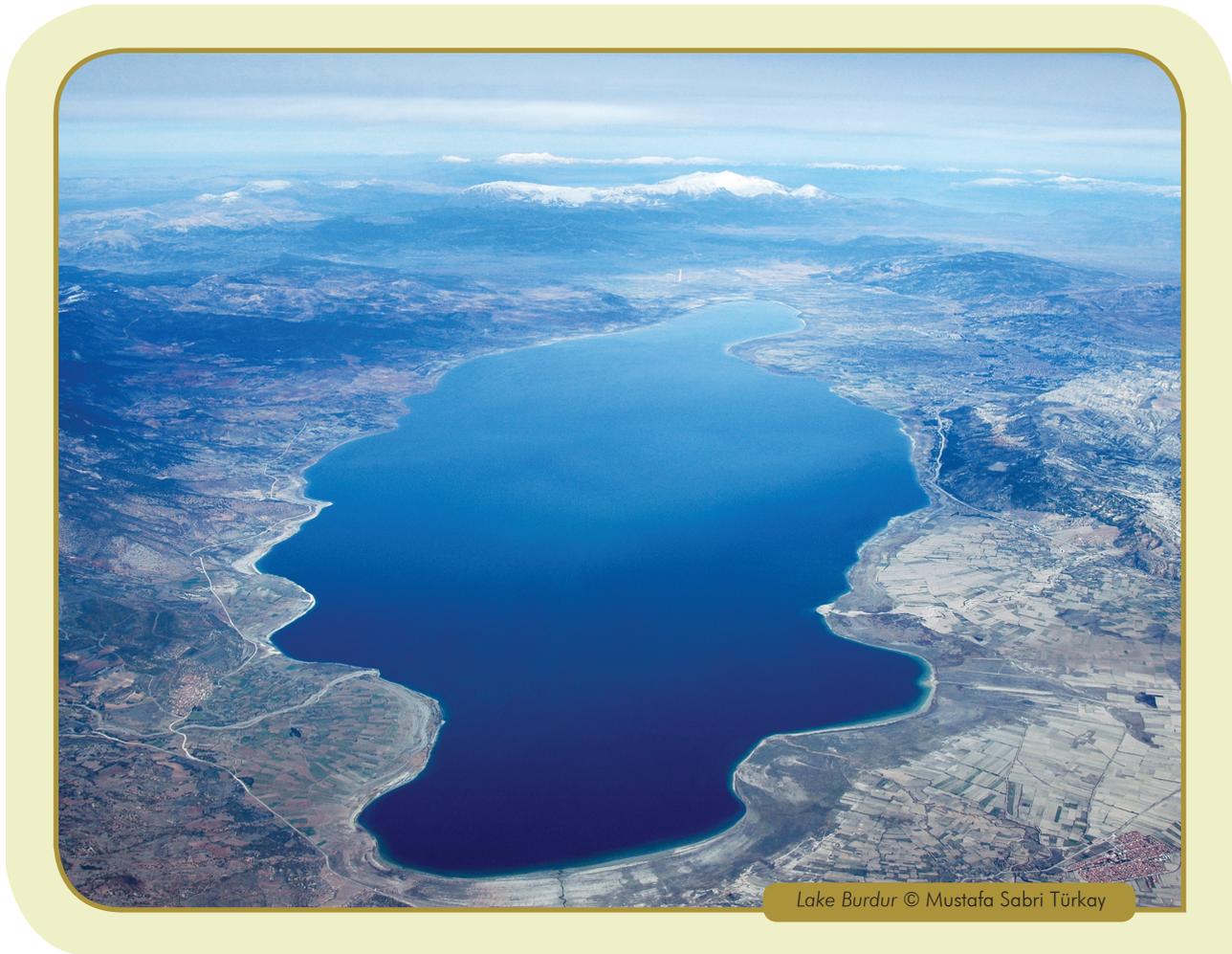
Ministry of Environment and Forestry carries out the conservation and management activities for Lake Burdur since it is designated as wildlife improvement site and Ramsar Site. The site is also under the jurisdiction of Ministry of Culture and Tourism for being Natural Heritage Site of 1<sup>st</sup> Degree.

## HYDROLOGICAL ASPECTS

One of the deepest lakes of Turkey, Lake Burdur is of tectonic origin. Rainfall, surface flows, aquifers in the lake basin and groundwater flows feed the closed basin lake. Lake discharges by evaporation. The lake stretches from northeast towards southwest. The temperature of the lake is about 25 –30 °C in summers, 15 – 16 °C in falls. The temperature is about 7 – 8 °C in other inland waters for the same season with similar climate conditions.

The water level and surface area of the lake fluctuate seasonally and annually depending on the rainfall, as the basin has no outlet. During observation period of 1959-1996 water level reached 857.45 m in May 1970, 848.15 in May 1996. This decrease has caused a great wetland habitat loss and shallow parts that bear great importance for waterbirds have dried up.

In May when the 1971 earthquake took place, the average water level of Lake Burdur was recorded to be 857.53 m by State Water Works. The water level of the lake had rapidly increased from 1964 until the



year the earthquake took place. Since then it decreased by 1241 cm until November 2002, according to the measurements of the same institution. The reasons of this decline is the reduced amount of surface and groundwater inflows reaching the lake due to the expansion of irrigated agriculture and the storage of water in dams and reservoirs at the upper parts of the catchment.

There are underground wells at a depth of 100-120 m and water in these wells used to reach a depth of 45-50 m two years ago. Studies on Lake Burdur revealed that the quality of lake water is not good to use for irrigation. The lake water comprises high concentration of sulfate, chloride, sodium and magnesium ions. Some factories used to discharge their wastes into the lake, although they now have waste treatment facilities. Inorganic wastes of the sulphur mines and manufactories in Keçiborlu located 15 km in the north of the lake were loaded into Lake Burdur via Adalar stream and used to decrease the pH level of the water where the stream joins the lake. The manufactory, however, was closed in 1994. Other polluters are the irrigation waters drained from agriculture lands and wastes of Burdur province. While Lake Burdur has not shown much of a difference concerning the general water quality parameters in the past 20 years, heavy metal concentrations increase in line with the decrease in water level. However, the concentrations are expected to increase depending on the decrease of the water volume in the lake; the amount is thought to remain limited due to ground water inflows and meteorological factors.

During the 27 years of measurements in Lake Burdur reveal that the lake surface shrunk by almost 10 meters and lake volume by 27 percent.

## GEOLOGICAL ASPECTS

There are geological formations dating back to II. III. and IV. periods in Lake Burdur Basin. The bedrock is generally of calcareous structure.

Situated between Taurus karstic system and Saruhan-Menteşe metamorphic block, Burdur Basin geologically elongates in the direction of Northwest-Southwest. Lake Burdur situated within this basin elongates in the same direction. Vast plains of 860-1000 m lie within the Burdur Basin. These plains edge in with Keçiborlu district in the north and Yarışlı Lake in the south. Heights surrounding the basin were fragmented by fluvial and karstic factors. Söğüt Mountains

with an altitude of 1600-1700 m are located in the west of the basin and Beşparmak Mountains stretching towards its east with an altitude over 2000 m, that mount next to the Neocene formations, with erosion surfaces over, with an altitude of 1250-1300 in its east. While Büyük Damıkdağı Mountain (1375 m) formed of Mesozoic limestone in the south of Yarışlı Lake demarcates the south part of the basin, mountainous areas with an altitude of 1500 m surround its north. The north-eastern part of the basin opens to Isparta Plain through the sill where Kırkçayır station is located at an altitude of 965 m.



Lake Burdur © Tamer Yılmaz

Post-Alpine tectonic movements and climate changes that occurred during quaternary led to fragmentations which gave the basin its current shape. Paleocene (Eocene-Oligocene) formations occurred in Burdur Basin that had a synclinal character at the beginning of tertiary. These and older formations became dislocated and deformed during Alpine orogenesis. In early Miocene the area where Burdur Basin was located got depressed. The sediments carried from the elevations was loaded in this basin and sedimentary layers, named as Burdur lake deformation consisted of clayey, marl limestone occurred. Volcanic material emanating in the immediate environment during this era also diffused through the basin in patches.

## BIOLOGICAL ASPECTS

### Habitats

The lake surface covering the biggest part of the site is surrounded by steppes, oak communities, reed beds, saltmarshes and agricultural lands. There are little hills around the lake. These elevations support plain steppe structure that is typical in Central Anatolia. Steppe type oak communities, also typical in Central Anatolia, occur in some parts. Small lagoons partly covered with reeds have been formed due to alluvial load in the south and north of the lake. There is a small freshwater lake named Soğanlı Lake in the southwestern edge of the site. Agricultural lands occur in patches by the sides of the lake.

## WILDLIFE

### Flora

Lake Burdur is located within the Mediterranean floristic region of the plant geography. Plant communities occur only in southern parts between Yazikent and Karakent Villages where rivers flow

into the lake and the salinity content level is less; due to the sodium sulfate and chloride amounts in the lake water is rather high besides being arsenical. Species of umbrella plant (Cyperaceae), bulrush (Juncaceae), cattail (Typhaceae) and true grasses (Poaceae) families represent the flora of Lake Burdur.

There are mountains covered with forests and shrubs around the lake. European black pine (*Pinus nigra*) forests dominate the flora at the higher parts of the mountains in the surroundings of the lake.

As a result of the study of the plant specimens collected from the lake, agricultural lands and steppe areas of Lake Burdur during field works in 1998-1999, 49 families, 204 orders and 315 species are recorded. Among these, 20 species are identified as endemic to the region.

A total of 41 orders were identified among the phytoplankton specimens found in the lake. *Amphiprora* sp. of Bacillariophyta division, *Navicula* sp., *Synedra* sp., *Cyclotella* sp., *Spirogyra* sp. of Chlorophyta, *Cladophora* sp., *Oscillatoria* sp. of Cyanophyta constitute the dominant orders of the lake. When the phytoplankton organisms of Lake Burdur are studied with respect to the stations; *Amphiprora* sp., the dominant order of the lake, is recorded as the characteristic species of salty and briny waters.

## Fish

Lake Burdur and the streams feeding it are not rich in terms of fish species. The only fish species in the region is *Aphanius sureyanus*, the endemic inland water fish species.

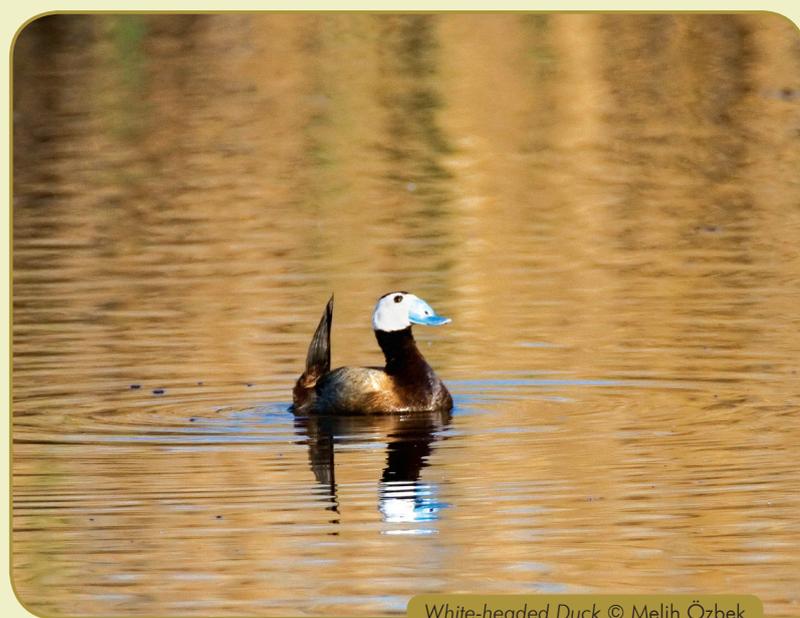
## Amphibians and Reptiles

The amphibians frequently seen in and around Lake Burdur are toads. Marsh frog (*Rana ridibunda*) and European Green Toad are the most common species. The environment of the lake is very rich in terms of reptiles. Spur-thighed tortoise (*Testudo graeca*), Balkan green lizard (*Lacerta trilineata*), Caucasian rock lizard (*Lacerta saxicola*), snake-eyed lizard (*Ophisops elegans*), javelin sand boa (*Eryx jaculus*), European blind snake (*Typhlops vermicularis*), Caspian whip snake (*Coluber caspius*), dotted dwarf racer (*Eirenis modestus*), four lined snake (*Elaphe quatuorlineata*), Montpellier snake (*Malpolon monspessularis*), grass snake (*Natrix natrix*), rock viper (*Natrix xanthina*) are the most common reptile species inhabiting the site.

## Birds

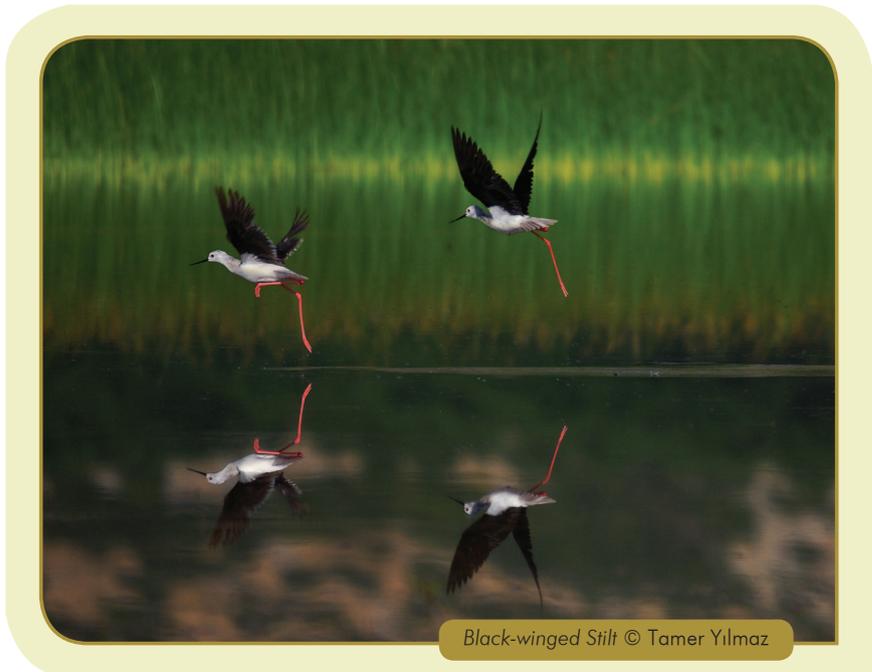
Lake Burdur is a highly important wetland for birds both in wintering and breeding periods. Among bird species breeding in the site is white-headed duck (*Oxyura leucocephala*), the globally endangered flag species for Burdur province. Until recently 70 percent of the world population of globally endangered white-headed duck has been wintering in Lake Burdur whereas today this rate decreased to 50 percent. 740 individuals in 1967, 8988 in 1973, 6483 in 1990, 1314 in 2002 and 920 individuals in 2010 were recorded in the lake.

Apart from white-headed duck common teal (*Anas crecca*), Eurasian wigeon (*Anas penelope*),



White-headed Duck © Melih Özbek

common pochard (*Aythya ferina*), Tundra swan (*Cygnus columbianus*), Eurasian coot (*Fulica atra*), red-crested pochard (*Netta rufina*) and black-necked grebe (*Podiceps nigricolis*) also winter in the site. Tawny pipit (*Anthus campestris*), stone curlew (*Burhinus oedicephalus*), long-legged buzzard (*Buteo rufinus*), stork (*Ciconia ciconia*), great white pelican (*Pelecanus onocrotalus*), flamingo (*Phoenicopterus roseus*), European spoonbill (*Platalea leucorodia*), spur-winged lapwing (*Vanellus spinosus*) and black-winged stilt (*Himantopus himantopus*) are the bird species breeding in the site.



Black-winged Stilt © Tamer Yilmaz

## Mammals

Mammals generally live in the shrubs and forests around the lake. European hedgehog (*Erinaceus europaeus*), blind mole (*Talpa caecea*), European hare (*Lepus europaeus*), wolf (*Canis lupus*), jackal (*Canis aureus*) and fox (*Vulpes vulpes*) are the principal mammal species the site supports.

## SOCIAL and CULTURAL ASPECTS

### Archeology

The area, where Burdur is located is a very old settlement. Archeological remnants dating back to 6500s B.C. were discovered in the excavations carried out in Kuruçay tumulus of Burdur region. Prehistoric settlements of early Bronze Age were discovered nearby today's Burdur Station. "Pisidia Region" which includes Burdur, was independent in some periods while subject to Hittite, Phrygian and Lydian rule in other periods in ancient times. Persians reigned in the region after defeating Lydians in the 6<sup>th</sup> century B.C. Later on Burdur and its surroundings were taken over by Alexander who brought an end to the Persian reign in Anatolia. Remaining within the boundaries of the Pergamon Kingdom for a short period, Burdur later fell under Roman rule when the kingdom's lands were joined with the Asian Province of Rome. When the Roman Empire was divided in 395 A.D., Burdur and its surroundings became subject to Byzantium rule. During Byzantium times the city that corresponded to today's Burdur was named as "Polydorion," giving Burdur its contemporary name. Some locals still use the name "Buldur" which sounds more like the original name of the area. Whereas according to some sources the city of Burdur was named as "Limobrama" which means "city of lake". According to another myth regarding the origin of the city's name, an Anatolian Seljuk Sultan heard a voice telling him "burada dur" meaning "stop here" in Turkish when passing by the city and the city was named "Burdur" afterwards.

### Past and Present Land Use

The major land use in Lake Burdur and its surroundings has involved agricultural activities from past to present. Though rainfed farming activities have been the main sources of agricultural production until recently, irrigated farming started to prevail in the region with the increase in underground irrigation. Another common form of land use involves activities in grazelands. Generally steep slopes with shallow soil situated in the north and northeast of the lake are used as pastures. There are also forest and moor lands in the surroundings of the lake.

## NATURAL RESOURCE USE

Almost 61 percent of the working population in Burdur is employed in agriculture, livestock production and forestry sectors while 98.4 percent out of them concentrate on agriculture and livestock production. Agricultural and animal product value rate per capita in Burdur is much higher than Turkey average.

### Agriculture

The immediate surroundings of Lake Burdur are cultivated. These lands are irrigated with underground water. Main crops are cereals, grape, fruit, vegetable, almond, sugar beet, sesame, opium poppy and cannabis. Rosary production is another agricultural activity particular to the region within the boundaries of Isparta Province. The valuable rose oil is used in perfume and food industry. Rosaries are widespread in the north and northeast. There are large poplar groves in many places starting from north-western Burdur province. The agricultural lands of Burdur are used as vineyard and orchards to grow arable crops and some parts of it are lain fallow.

The prevailing irrigation method in agriculture is wild irrigation which is based on excessive water use, while only a little part of the fruit and vegetable cultivators adopted drip irrigation. Dams and boreholes drilled individually also lead to excessive water use.

### Livestock

Small ruminants graze in the highlands and coastal pastures in the surroundings of Lake Burdur. The surface area of pastures and meadows is 96.057 ha and the rate is 13.61 percent. These areas are used for livestock production. Cattle population with more meat and milk production is widespread in the area. Various dairy companies purchase the milk produced in the villages.

### Fishery

Since the lake supports no commercial fish species, there is no fishery activity.



Lake Burdur © Ersan Berberoğlu

## WETLAND MANAGEMENT PLAN

There have been systematic activities carried out to preserve Lake Burdur's ecological functions and landscape integrity. Initially, Ministry of Environment and Forestry commissioned Ankara University Faculty of Agriculture carried out a study as a preparatory project in 1999. Based on the findings of the study, the management plan was prepared by local stakeholders including Doğa Derneği under the coordination of Ministry of Environment and Forestry. Lake Burdur Wetland Management Plan (2008-2012) was enforced in 2008 after being approved by the National Wetland Commission.

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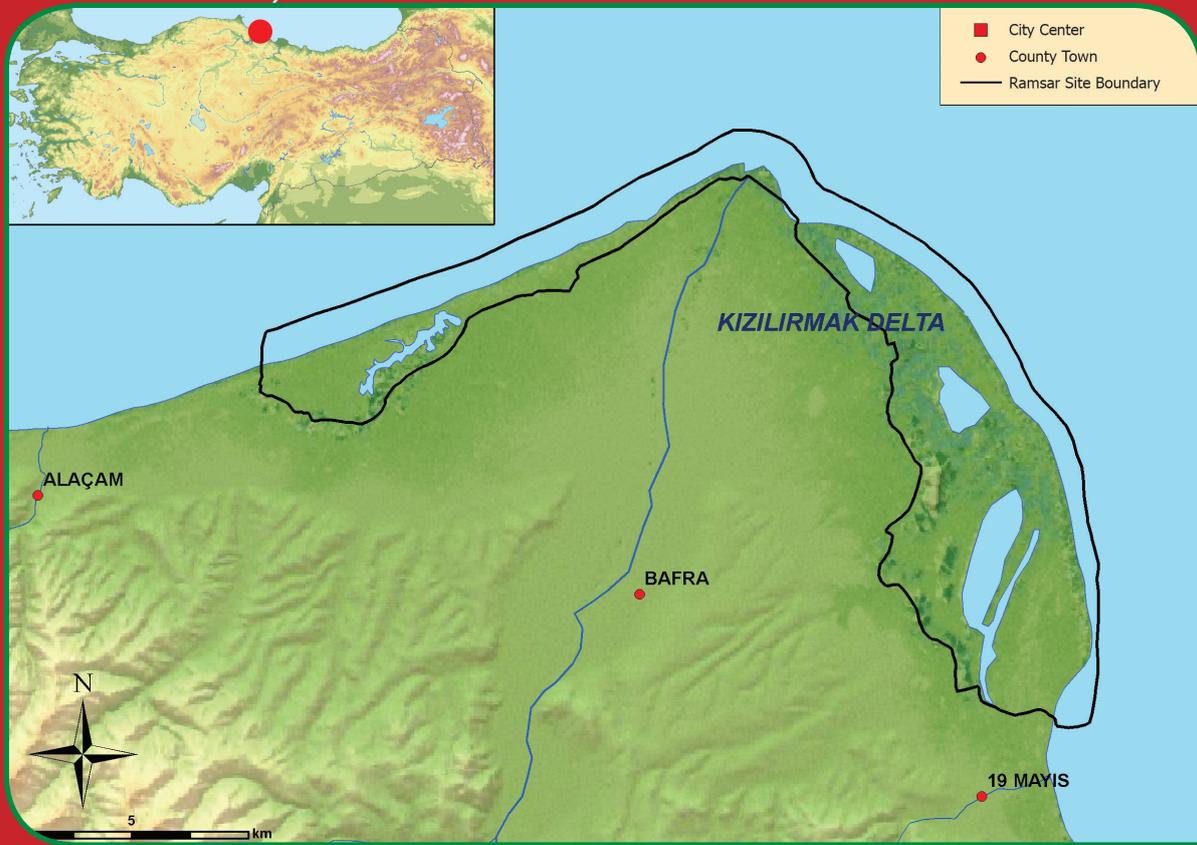
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# KIZILIRMAK DELTA RAMSAR SITE

Map of Kızılırmak Delta Ramsar Site



## KIZILIRMAK DELTA

Kızılırmak Delta is the largest wetland in the Black Sea Region. Known as one of the richest wetlands of Turkey, Kızılırmak Delta was formed by the alluvions carried by the longest river of Turkey, Kızılırmak, meandering to the Black Sea. The delta lies in Ondokuzmayıs, Bafra and Alaçam districts of Samsun province where Kızılırmak River flows into the Black Sea. It's located at the north of the Samsun – Sinop Highway.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Kızılırmak Delta
<b>Location and Borders</b>	Located in the borders of Ondokuzmayıs, Bafra and Alaçam districts of Samsun province. A 12 km long wetland covered by a 1,5 km wide forest area in the Kızılırmak Basin, parallel to the Black Sea. Distance to the sea is 2 km.
<b>Area</b>	21,700 ha.
<b>Coordinates</b>	41°40'N 036°05'E
<b>Elevation</b>	0–100 m
<b>Protection Status</b>	Ramsar Area Natural Heritage Area Wildlife Improvement Area
<b>Population</b>	ca. 20,000 individuals
<b>Climate</b>	Black Sea climate
<b>National and International Importance</b>	Internationally Important Wetland of Turkey Key Biodiversity Area Important Plant Area Important Bird Area
<b>Importance of the Site</b>	One of the most important wetlands ecosystems in the Black Sea coast of Turkey.
<b>Symbols of the Site</b>	Water buffalos and cranes
<b>Management Plan</b>	Prepared in 2006–2007. A management plan for 2008-2012 exists.
<b>Facilities in the Site</b>	Visitor centre, management centre, bird-watching tower

The delta is defined as an Important Bird Area, Important Plant Area and Key Biodiversity Area in different publications due to its importance and the criteria met. Kızılırmak Delta draws interest of nature enthusiasts with its landscape features and biological diversity and it is suitable for activities such as bird watching, hiking and camping. Moreover, the Bafra Plain situated in the border of the delta has an important place in the agricultural and livestock production of Turkey.

### Ownership Status

The pattern of land ownership in the Kızılırmak Delta may be classified in three categories: public property, private property, unregistered and appealed (unclear whether public or private). Forest areas which are under the management and possession of the Ministry of Environment and Forestry comprise the main part of the public property. Private properties involve the agriculture fields and housing zones.

### Protection Status

Different protection statuses with different borders are identified to protect wild life in Kızılırmak Delta. The statuses of the site are first, second and third degree Natural Heritage Area, Wildlife Improvement Area and Ramsar Site.

Kızılırmak Delta meets the 8 criterion out of 9 of Ramsar.  
These are;

RAMSAR CRITERIA	DESCRIPTION	KIZILIRMAK DELTA
<b>Criteria 1</b>	Representing the vulnerable habitats, typical to the Black Sea, in good grade.	- Broad-leaved, mixed, flooded forest - Wet grasslands
<b>Criteria 2</b>	- Endangered flora species - Endangered fauna species - Endangered habitats	- <i>Jurinea kilaea</i> - <i>Leucojum aestivum</i> - <i>Panocratium maritimum</i> - <i>Rhaponticum serratuloides</i> - <i>Thelypteris palustris</i> - White-headed duck ( <i>Oxyura leucocephala</i> ) - Crane ( <i>Grus grus</i> ) are some of the endangered species.
<b>Criteria 3</b>	The delta is one of the most important habitats in the Black Sea for supporting a large number of species.	<i>The delta is the most important habitat for Alosa tanaica, black stork (Ciconia nigra) and common otter (Lutra lutra) in the Black Sea.</i>
<b>Criteria 4</b>	Many bird and fish species congregate in the delta in a particular period (wintering, breeding, feeding, overnight stays) of their life cycle.	The site is an important habitat for crane ( <i>Grus grus</i> ), white-headed duck ( <i>Oxyura leucocephala</i> ), common spoonbill ( <i>Platalea leucorodia</i> ) <i>Acipenser gueldenstaedtii</i> , <i>Huso huso</i> and <i>Acipenser stellatus</i> .
<b>Criteria 5</b>	The site regularly supports 20,000 or more waterbirds.	The number of birds and the observation years of the Mid-Winter Waterfowl Counts are as follows: 51,718 individuals in 1993; 91,735 ind. in 1996; 99,396 ind. in 1999; 23,745 ind. in 2002; 182,456 ind. in 2005; 80,517 ind. in 2006; and finally 57,502 ind. in 2007 and 108,527 ind. in 2008 and 124,182 in 2009.
<b>Criteria 6</b>	The site regularly supports 1 percent of the individuals in a population of one species or subspecies of waterbird.	The site supports more than 1 percent of the world population of Common pochard ( <i>Aythya ferina</i> ), Common teal ( <i>Anas crecca</i> ), Coot ( <i>Fulica atra</i> ) and Red-crested pochard ( <i>Netta rufina</i> ).
<b>Criteria 7</b>	The site supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.	Ship Sturgeon ( <i>Acipenser nudiiventris</i> ), Star Sturgeon ( <i>Acipenser stellatus</i> ) use the delta in their life cycles.
<b>Criteria 8</b>	The site is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.	The delta supports 1 percent of the Turkey population of Ship Sturgeon in breeding period. Russian Sturgeon ( <i>Acipenser gueldenstaedtii</i> ), Ship Sturgeon ( <i>Acipenser nudiiventris</i> ), Star Sturgeon ( <i>Acipenser stellatus</i> ), Common Sturgeon ( <i>Acipenser sturio</i> ) and Giant Sturgeon ( <i>Huso huso</i> ) breed in the delta.

## MANAGEMENT STRUCTURE

Kızılırmak Delta is under jurisdiction of several institutions. These institutions are as follows: Ministry of Environment and Forestry (biodiversity aspects of the site); General Directorate of State Hydraulic Works and Ministry of Agriculture and Rural Affairs (since agricultural activities are one of the main sources of income in the site); Cultural and Natural Heritage Conservation Board and Ministry of Culture and Tourism (natural heritage aspects of the site). In addition, there are three different district governorships (Ondokuzmayıs, Bafra, Alaçam), three district municipalities (Ondokuzmayıs, Bafra, Alaçam) and five town municipalities (Doğanca, İkizpınar, Çetinkaya, Yörükler, Dereköy). Total number of the public

institutions is sixteen. While the Ministry of Environment and Forestry, General Directorate of Nature Conservation and National Parks is the main authority in wetlands and Ramsar Sites, the Cultural and Natural Areas Conservation Board is the main authority for Natural Heritage Sites.



Kızılırmak Delta © Can Yeniurt

## HYDROLOGICAL FEATURES

Kızılırmak Delta is located in the Kızılırmak Basin, one of the 26 water basins in Turkey. Kızılırmak River, the second longest river of Turkey after Euphrates in terms of drainage extend , is the most important river flowing through the site. Other main rivers in the site are Engiz and Pilic Stream; Darbogaz and Mera streams at the east of Bafra Plain and Ilyasli Stream, Gökçesu, Söğütlük, Gökçeboğaz and Ulucay (Alaçam) streams at the east of Bafra Plain.

Natural conditions forming delta and coast structure in the east and west parts of the Kızılırmak Delta results in different lake sizes. There are ten lakes at the east coast of the delta; namely Balık, Uzun, Gıcı, Tatlı, Alıntılı, Paralı, Cernek, Liman, Tuzlu and Suluklu lakes and two lakes at the west coast which are Karaboğaz and Mülk lakes.

Kızılırmak Delta, like many of the coastal wetland systems, suffers from pollution. Main cause of the pollution in surface and underground water of Kızılırmak Delta is chemicals used for agricultural activities. The part of the river in the borders of the delta does not meet the drinking water criteria because of the pollution.

While the waste water treatment unit in Bafra district helps to improve the water quality, it is still poor.

## GEOLOGICAL FEATURES

Kızılırmak Delta, which rises in steps from sea to the south, has an alluvial plain characteristic with a low slope, mainly composed of gravel, sand, silt and clay.

Main part of the land in Kızılırmak Basin consists of soil under water (hydromorphic soil) in the wetlands and reed beds. There are coastal dunes at sea sides, brown forest soils at inner sides and a kind of soil formed by sediments (colluvial) of surface water and adjacent rivers.

## BIOLOGICAL FEATURES

### Habitats

There are 3 main habitat types in Kızılırmak Delta which are classified as threatened according to Bern Convention: Auxin saline swamps, South Black Sea permanent dunes and Southeast Europe ash-oak forests. There are 14 habitat types identified as a result of the studies undertaken within the framework of the Kızılırmak Delta Management Plan Sub-Projects.

**Brakish lake:** Balık, Uzun, Cernek, Liman, Karaboğaz and Mülk Lakes have been classified as bitter lakes by salt ratio. In Liman Lake, there is rich vegetation of rock plants from Characeae family.

**Freshwater lake:** Tatlı and Gıcı lakes are freshwater lakes. Many species of Potamogeton Family and other water plants are very rare at the east lakes of Delta. In coastal sides of lakes, *Phragmites australis* and *Typha sp.* or *Juncus acutus* are seen.

**River:** This habitat includes Kızılırmak River bed and riparian forest nearby the river.

**Wet meadows:** In some periods of the year, wet meadow land close to the lakes are accumulated with water. This is *Paspalum paspalodes* meadow land. Apart from this species, some of the plant species live in the salt and freshwater wetlands. These meadows are quite important as they provide the main resources for livestock grazing.

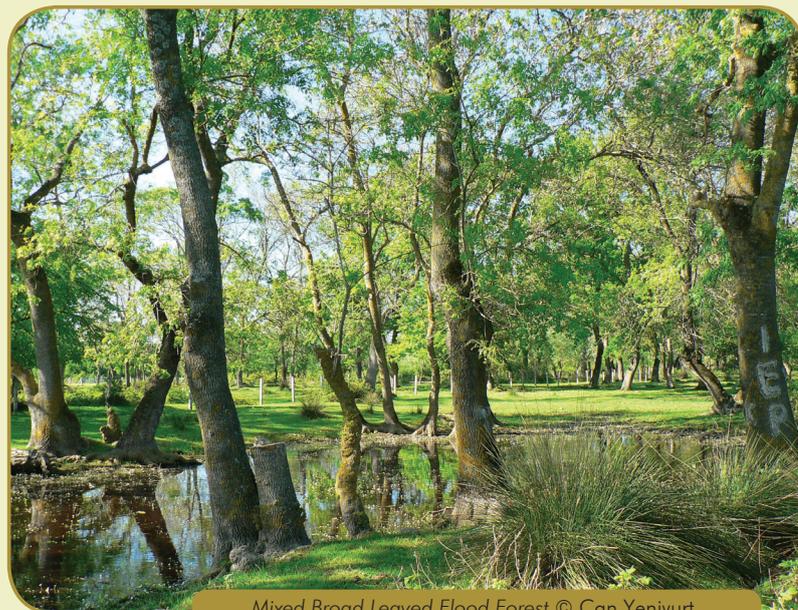
**Mixed broad leaved forests:** Generally, *Quercus robur* and *Carpinus betulus* species form these forests.



**Reed beds:** This habitat group includes *Phragmites australis* and *Typha angustifolia*, in patches *Schoenoplectus lacustris* groups.

**Salt marshes:** *Juncus littoralis* - *Artemisia santonicum* - *Tamarix* - *Vitex agnus-castus* and in saltier areas *Salicornia europaea* are dominant species.

**Mixed broad leaved flood forest:** *Fraxinus angustifolia* - *Frangula alnus* - *Quercus robur* - *Smilax excelsa* compose seasonal flood forests. *Fraxinus angustifolia* is the dominant species.



Mixed Broad Leaved Flood Forest © Can Yeniyurt

**Coastal sand dune:** Sand dunes at western part are larger and higher compared to the sand dunes at eastern part. Surroundings of Cernek Lake are where the largest eastern sand dunes located. The most common plant species of the sand dunes are *Euphorbia* sp., *Pancratium maritimum*, *Verbascum* sp. and *Cyperus capitatus*. The most common plant species of the gravelous sand dunes (primer dunes) are *Euphorbia paralias*, *Medicago marina*, *Eryngium maritimum*, *Xanthium strumarium*, *Pancratium maritimum*, *Juncus acutus*, *Salsola kali* and *Tournefortia sibirica*.

**Shrub community in sand dunes:** The shrub communities consist of species of *Hippophae rhamnoides* - *Paliurus spina-christii* in high sand dunes and *Rubus sanctus* - *Juncus littoralis* in sand dunes. Additionally, there is a coppice area where 6-8 metres long *Laurus nobilis* is dominant species in the location between Cernek Lake and the coast.

**Vegetation communities of inner sand dunes:** There are vegetated sand dunes, apart from the sand dunes with bushes and shrubs, covering the flat areas formed between the woody areas, especially nearby Cernek Lake. Vegetation communities with rich composition of annual plants, grow on drier soil.

**Agricultural areas:** Main crops in the agricultural areas are cereal and rice. There are segetal communities (temporary communities composed of invasive species in the agricultural areas) in and at the edge of the fields while the ruderal communities (the communities in the soil with wastes such as garbage and gravel) are on the road and at the edge of the channel.

**Residential areas:** These areas cover the centres of the districts, villages, secondary houses and treatment units.

**Other habitat types:** Sea, maquis, etc.



## WILDLIFE

### Flora

Kızılırmak Delta is an important area for plants with 355 species. The delta is identified as one of the 122 Important Plant Areas due to its rare plant species. There are nine endangered species among the plant species of the delta. *Rhaponticum serratuloides*, one of the “Endangered” (EN) species, lives only in Sakarya River valley and Kızılırmak Delta in Turkey. One of the other important plant species of the delta is “Endangered” (EN) sea lily (*Pancratium maritimum*), which is threatened by a collection of the bulbs and tourism activities in the sand dunes and which used to have a wide range in the Mediterranean and West Black Sea regions. “Vulnerable” *Jurinea kilaea*, lives in the delta and in very few coastal areas of the Black Sea in Turkey. Another “Vulnerable” (VU) species of the Kızılırmak Delta is Loddon lily (*Leucojum aestivum*) known for its medicinal importance.

### Fishes

Kızılırmak Delta is an important area for many fish species. There are 29 fish species that belong to 11 family in the delta. Sturgeons (*Acipenseridae* sp.), one of the “Critically Endangered” (CR) fish family, is the most important fish species of the Kızılırmak Delta. The fact that Kızılırmak Delta is one of the two remaining areas that host the last habitats for sturgeons illustrates the importance of the delta for prevention of the extinction of species. Russian Sturgeon (*Acipenser gueldenstaedtii*), Ship Sturgeon (*Acipenser nudiiventris*), Star Sturgeon (*Acipenser stellatus*) and Giant Sturgeon (*Huso huso*) are also recorded in the Kızılırmak Delta.

### Amphibians and Reptiles

150 amphibians and reptiles live in Turkey. Almost 14 percent of these species (9 amphibians, 12

reptiles) live in Kızılırmak Delta. Reptiles in the delta are dispersed over a wide area ranging from deciduous forests and scrubs to dry rocky areas, as well as from wet soils at the shores of the rivers to grasslands in the steppe areas above the forests.

2 species of the 9 amphibian species are salamanders and the remaining 7 species are frogs. Southern Banded Newt (*Triturus vittatus*), Southern Crested Newt (*Triturus karelinii*), Common Toad (*Bufo bufo*), European Green Toad (*Bufo viridis*), Levant Water Frog (*Rana bedriagae*), Agile Frog (*Rana dalmatina*) and Long-legged Wood Frog (*Rana macrocnemis*) are the main species of the delta.

2 of the 12 reptiles in the Kızılırmak Delta are tortoises; 5 of them are lizards and 5 of them are snakes. They are listed as follows: Globally "Vulnerable" (VU) Spur-thighed Tortoise (*Testudo graeca*), "Near threatened" (NT) European pond tortoise (*Emys orbicularis*), Rock Lizard (*Lacerta saxicola*), European Green Lizard (*Lacerta viridis*), Balkan Green Lizard (*Lacerta trilineata*), Slow Worm (*Anguis fragilis*), Sheltopusik or European Legless Lizard (*Ophisaurus apodus*), Cat Snake (*Telescopus fallax*), Caspian Whipsnake (*Coluber caspius*), Grass Snake (*Natrix natrix*), Dice Snake (*Natrix tessellata*) and Nose-horned Viper (*Vipera ammodytes*).

## Birds

There are 469 bird species observed in Turkey. Kızılırmak Delta hosts extremely diverse bird species. 321 bird species, 68 percent of the Turkish birdlist, have been recorded in the Delta.

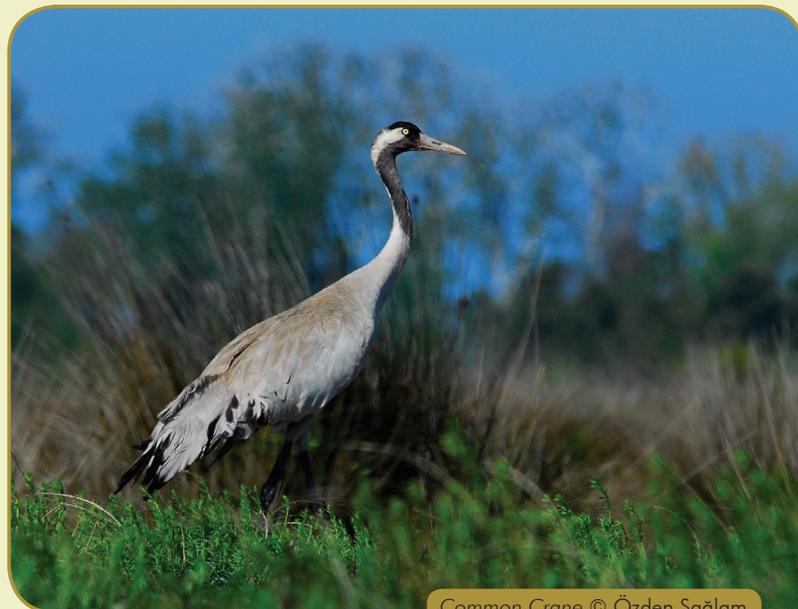
Kızılırmak Delta is an important site not only for wintering and breeding birds but also for migratory birds. More than 10,000 shorebirds migrate over the Delta. It was reported that 100,000 water birds winter in the Delta.

The delta hosts rare and endangered bird species, as well as wintering and migratory species congregating at big numbers. Especially water birds benefit from the delta during the wintering period. The delta is very special in terms of bird species and their density at regional scale (Western Palearctic).

Kızılırmak Delta is also very important for the bird species migrating in autumn and spring. There are pygmy cormorant (*Phalacrocorax pygmeus*, max. 88), little egret (*Egretta garzetta*, max. 3200), glossy ibis (*Plegadis falcinellus*, max. 590), white-headed duck (*Oxyura leucocephala*, max. 1240), little gull (*Larus minutus*, max. 41.000) and white-winged tern (*Chlidonias leucopterus*, max. 3000) recorded in the Delta. In addition, more than 10,000 shorebirds migrate over the Delta.

Other breeding birds in the region include herons (Ardeidae), ducks (Anatidae), waders (Charadriiformes) and passerines (Passeriformes).

According to the surveys conducted in 1992, 140 species of which 88 are confirmed, incubate in the delta.



Common Crane © Özden Sağlam

## Mammals

More than 160 mammal species are recorded in Turkey. Studies undertaken in Kızılırmak Delta show that 33 mammal species (20 percent of the species in Turkey) live in the delta.

One of these species is Mediterranean Monk Seal (*Monachus monachus*), globally important species (Critically Endangered – CR) which were assumed to be extinct in the Black Sea region and Kızılırmak Delta. “Vulnerable” Geoffroy’s Bat (*Myotis emarginatus*) is another important species in the Delta. In addition, there are “Near threatened” (NT) Blasius’s Horseshoe Bat (*Rhinolophus blasii*), Greater

Horseshoe Bat (*Rhinolophus ferrumequinum*), Caucasian Squirrel (*Sciurus anomalus*) and Gray Dwarf Hamster (*Cricetulus migratorius*) living in the delta. Finally, Eurasian otter (*Lutra lutra*) is another “Near threatened” (NT) species living in the delta.



## CULTURAL and SOCIAL FEATURES

### Archeology

65

There are lots of archeological remnants pointing out to the history of civilizations and settlements in and around the Kızılırmak Delta.

İkiztepe ruin, an important location for Anatolian and civilization history, is the main archeological value in the delta. In the excavations carried out in İkiztepe ruins which is located in İkiztepe Village of Bafra District, archeologists found 57 tumulus, 6 plain settlement areas, 5 rock graves, 1 bath, 1 bridge, and 25 other monuments originating from the ancient times.

It is known that there have been settlements for 2300 years in the region from the late Choleolithic age to the beginning of the middle bronze age. The highest hill was used as the cemetery in the first Bronze Age (B.C. 2300 – 2100). In the cemetery, which is known to be one of the biggest cemeteries in Turkey, 623 graves - including one mausoleum - were found originating from the Hellenistic time (B.C. 330 – 30).

### Past and Recent Land Use

The natural formation process of Kızılırmak Delta was interrupted after the construction of Altinkaya Dam (1987) and Derbent Dam (1991) in the beginning of the 1990s due to the alluvial material blockage.

The main change in land use after the construction of the dam is the expansion of the agricultural areas although its impact was limited. The number of illegal wells, interception and drainage channels have increased from past to present. Growth in the settlement areas does not make any serious pressure in terms of population and development in the region. While there were no industrial areas in 1987, there are currently new ones established at small scale.

Forest degradation and illegal housing that started in the 1990s, spread continuously resulting in more than 300 summer houses built on an area of 73 hectares.

## NATURAL RESOURCE USE

### Agriculture

Agriculture is the most common form of natural resource use in Kızılırmak Delta. Intensive agricultural activities are carried out in an area of 56,000 ha. Rice is one of the most widely cultivated agricultural products; it is cultivated in an area of 6,735 ha.

In around 32 villages in the delta, local people live by agriculture. The main agricultural products are rice, wheat, chilli pepper to make sauce, melon, white cabbage, red cabbage, leek, tomato and sugar beet. Industrial crops, listed according to the extend of the cultivation areas, are sugar beet, sunflower and tobacco at higher places.

The greenhouse covers 60 decares in total and has an average size of 480 m<sup>2</sup>. There are two harvest seasons per year for the greenhouse and the main products are cucumber, tomato, eggplant and lettuce.

### Livestock

Livestock is one of the main sources of income for the local people. Main livestock breeders are the villages located nearby the wetland. Although the common livestock is cattle and sheep, it is also possible to see wild horses (jade) and camels in the Delta.

Moreover, the biggest water buffalo population of Turkey lives in Kızılırmak Delta. However, water buffalo husbandry decreases sharply due to the shift to agriculture.

In fact water buffalo is one of the important elements of pasture vegetation, lake sedimentation and wetlands ecosystem just like birds and fishes. Water buffalos' presence is crucial for controlling the spread of wetland plants, structuring the reed beds and forming secure areas for bird nests.



Water Buffalos © Can Yenyurt

### Number of Water Buffalo in the Delta Between 1990-2006

Years	1990	1999	2000	2001	2002	2003	2004	2005	2006
Number of Buffalos	10.000	5.750	4.950	4.700	4.550	4.100	3.750	3.550	2.800



Fishery © Can Yenyurt

## Fishery

Main sources of income in Kızılırmak Delta are fisheries, reed cutting and disrooting rushes.

Fisheries are important sources of income in Kızılırmak Delta which has suitable habitats for fishes and other aquaculture.

There are 4 aquaculture cooperatives in the region. These are Yorukler, Sarıköy, Doganca and Emenli Aquaculture Cooperatives.

Sturgeons (*Acipenser* sp.), wels catfish (*Siluris glanis*), common carp (*Cyprinus carpio*) and common rudd (*Scardinius erythrophthalmus*) are some of the fish species found in Kızılırmak Delta.

The lakes of delta which are 2,440 ha wide at dry seasons and 9,250 ha wide at wet seasons are important lagoons of Turkey. Common carp (*Cyprinus carpio*), zander (*Stizostedion lucioperca*), striped mullet (*Mugil cephalus*) and crawfish hunting is undertaken in the lakes of Balık, Uzun, Gıcı, Tatlı, Alintili, Parali, Cernek, Liman, Tuzlu, Suluklu, Karabogaz and Mulk.

## Reed Harvesting

Reed harvesting is one of the most important economical activities in the delta. Common reed (*Phragmites australis*), lesser bulrush (*Typha angustifolia*) and common club-rush (*Scirpus lacustris*) are harvested and marketed.

Reed harvesting is a source of income for nearly 130 households in Doganca, Yorukler and Sarıköy. Most of the reeds are exported to be used as roof insulation material.



Reed Harvesting © Can Yeniuyurt

Additionally, the reeds harvested are used for producing whisket, roofing of the houses – especially animal shelters, and groundings barns. Reeds are used as cordwoods to cook bread in the traditional ovens.

### **Disrooting Rushes**

One of the rush species (*Jungus* sp.) in Kızılırmak Delta, known as goga, is traded to several places in Turkey after being disrooted and dried by the villagers. This plant is used to wreath or make bouquet in the florist shops.

### **Hunting**

Hunting of the resident and migratory birds in Kızılırmak Delta is an ongoing activity since the early ages.

The number of the legal hunters in the Kızılırmak Delta is approximately 500 people and poaching is an important problem. According to a study undertaken in 2006, the number of the poachers is around 1000 people. Almost all the hunters in the Kızılırmak Delta hunt birds.

Hunting is banned in the 5,175 ha area in the east part of the delta (Cernek Lake and its surroundings) due to its protection status as Wildlife Improvement Area (see Kızılırmak Delta Protected Areas Map). Despite the legal ban and the controls, illegal hunting goes on.

## WETLAND MANAGEMENT PLAN

Under the coordination of the Ministry of Environment and Forestry General Directorate of Nature Conservation and National Parks, Doga Derneği Commercial Enterprise prepared the Wetland Management Plan of Kızılırmak Delta with the participation of relevant institutions and individuals in 2006 and 2007. The plan comprises the period of 2008 – 2012 and it has been in effect since 2008.

Wetland Management Plan of the Kızılırmak Delta aims to establish an active management body to implement the plan in order to improve biological diversity, agricultural production, tourism, fishery and other production activities in the wetlands along with developing other alternative sources of income to sustain the ecological balance.

A technical team was established under the Samsun Local Wetlands Commission to implement the Wetlands Management Plan of the Kızılırmak Delta and to engage local people actively in the management of the site.

The main laws and bylaws regulating the priority activities in the management plan of the site are Law of Environment, Bylaw of Protection of the Wetlands, Law of Protection of the Cultural and Natural Properties and Bylaw of the Protection and Improvement of the Wild Life.

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# LAKE ULUABAT RAMSAR SITE

Map of Lake Uluabat Ramsar Site



## LAKE ULUABAT

The lake is located 20km far from the south of Sea Marmara, 35km far from Lake Kuş and 40km far from the west of Uludağ Mountain. It is within the boundaries of Karacabey, Nilüfer and Mustafakemalpaşa districts of Bursa province.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Lake Uluabat
<b>Location and Boundaries</b>	Located within the boundaries of Karacabey, Nilüfer and Mustafakemalpaşa districts of Bursa province.
<b>Area</b>	19.900 ha
<b>Coordinates</b>	40°10'N 028°35'E
<b>Elevation</b>	9m - 350m
<b>Conservation Status</b>	Ramsar Site
<b>Population</b>	10.356
<b>Climate</b>	Black Sea and Mediterranean
<b>National and International Significance</b>	Turkey's wetland of international importance Member of Living Lakes Network Key Biodiversity Area Important Plant Area Important Bird Area
<b>Site Significance</b>	Supports the largest European white waterlily ( <i>Nymphaea alba</i> ) beds in Turkey
<b>Site Symbols</b>	Stork ( <i>Ciconia ciconia</i> ) and European white waterlily ( <i>Nymphaea alba</i> )
<b>Management Plan</b>	Came into force in 2002. The plan was revised in 2007 and 2007-2011 plan is being implemented.
<b>Facilities in the Site</b>	Visitor center and watch tower.

### Land Tenure / Proprietorship

Lake Uluabat is under public ownership. Areas surrounding the lake are public and private property.

### Conservation Statuses

Lake Uluabat gained the status of Ramsar Site in 2001. It joined the Living Lakes Network in 2001. Currently Lake Uluabat is one of the 24 partners for 55 lakes included in this network.

Lake Uluabat Ramsar Site meets 4 out of 9 criteria for identifying wetlands of international importance. These are:

RAMSAR CRITERIA	DESCRIPTION	LAKE ULUABAT
<b>Criterion 2</b>	The site supports threatened and vulnerable species listed in International Union for Conservation of Nature (IUCN) red list categories.	The site supports threatened pelican ( <i>Pelecanus crispus</i> ), near threatened medicinal leeches ( <i>Hirudo medicinalis</i> ), as well as vulnerable plant species such as <i>Sagittaria sagittifolia</i> and <i>Stachys palustris</i> .
<b>Criterion 4</b>	The site is important for the critical phases of biological cycle of mammal and bird species.	European river otter ( <i>Lutra lutra</i> ) is an internationally protected species inhabiting the surroundings of Lake Uluabat. Additionally, many waterbirds use the site for resting, wintering and breeding every year.
<b>Criterion 5</b>	The site regularly supports 20,000 or more waterbirds.	429.437 waterbirds in 1996, 25.000 in 2002 and 55.089 in 2007 are recorded in the site.
<b>Criterion 8</b>	The site is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.	The site is critical for the breeding and nutrition of fish.

## MANAGEMENT STRUCTURE

Ministry of Environment and Forestry Directorate General of Nature Conservation and Natural Parks is the authority responsible for the activities within the wetland and Ramsar site boundaries. The executive local authority is Bursa Directorate of Environment and Forestry.

## HYDROLOGICAL ASPECTS

The most important water source flowing to Lake Uluabat is Mustafakemalpaşa Stream. Karst springs in the bottom and immediate surroundings of the lake and the streamlets reaching the lake during rainy seasons also feed the lake. The drainage water of the agricultural lands in the southeast of the lake is another inflow. The inflow to the lake remarkably varies per season and in years. The lake's excess water flows into Uluabat and Susurluk Streams and reaches to the Sea of Marmara through these streams. When the lake water decreases below Uluabat Stream's level, the stream starts flowing into the lake to feed it back.

Some publications define the surface area of Lake Uluabat as 160 km<sup>2</sup>. The mentioned area, however, has been narrowed down by the seawalls of the State Waterworks (DSİ) which were constructed in southern/south-eastern coasts of Lake Uluabat in order to obtain additional agriculture fields and to prevent low level agricultural grounds from floods. The surface area and volume assessment studies carried out by the DSİ in 1995, reveal that the lake's surface area at maximum water level is 155 km<sup>2</sup>, and water volume is 346 hm<sup>3</sup>. An earlier study of DSİ in 1965 estimates the lake's surface area as 161 km<sup>2</sup> and water volume as 387 hm<sup>3</sup>.

The study point out that the water volume of the lake has decreased by 41 hm<sup>3</sup> (41 million m<sup>3</sup>) due to sediment load in the last 30 years. Another study claims that the lake's surface area has shrunk by 14 percent to 116 km<sup>2</sup>.

The lake's water regeneration period in its western portions is 2-5 weeks, while it takes up to six months in its eastern portions. According to Water Pollution Control Regulation, surface water classification in 1970s the lake water was classified to vary between 1<sup>st</sup> and 2<sup>nd</sup> degrees; however the same control in 1999-2000 measurements classified the lake water varying between 2, 3, 4<sup>th</sup> (the most polluted levels).

Recently, the lake water is always blurred. Depending on the phytoplanktons' prevalence in the lake, sometimes greenish-yellow and sometimes grayish-yellow colors dominate the water. The light transmittance is very low. In line with the high amount of the suspending substances mixing into the lake in springs, transparency can decrease to 22 cm. According to a 1995 study, heavy metal accumulation, especially cadmium, is detected in the fish. Moreover, lead use in terrestrial hunting results in lead poisoning in birds and fish. The density of the suspending substance in the water flowing into the lake is measured as 200mg/lt in 2000.



Lake Uluabat © Can Yeniurt

## GEOLOGICAL ASPECTS

The common hypothesis for the formation of Lake Uluabat states that the lake was a pocket of the sea. The tectonic movements that had happened during the ice age which had prevailed since upper Miocene (five million years ago) gave way to the current morphologic structure of the lake.

Old limestones of Jura period (dating back to 205.1 million and 142 million years ago) dominate in the surroundings of Lake Uluabat in a large scale which shows that the region went through a sedimentary process similar to that of the Sea of Marmara. The movements that started in early Miocene and continued almost 500.000 years resulted in a topographic elevation throughout the southern area of the Sea of Marmara and subsidence in the Sea of Marmara. Karacabey and İznik Plains had been covered with alluviums while Lakes İznik, Kuş and Uluabat gained their current structures as a result of these movements.



Lake Uluabat © Serhan Çağırankaya

## BIOLOGICAL ASPECTS

### Habitats

Lake Uluabat comprises freshwater lake, delta ecosystems, maquis and willow communities. The hills located at the lake's south and north have a stony and rocky structure, which rather run perpendicular to the lake, so there is no large reed beds and muddy areas in these parts. Supporting the richest habitat variety, the delta has been formed where Mustafakemalpaşa Stream joins the lake. The delta consists of reed beds, sand plains, seasonal swamps and flood areas, as well as large willow communities. One

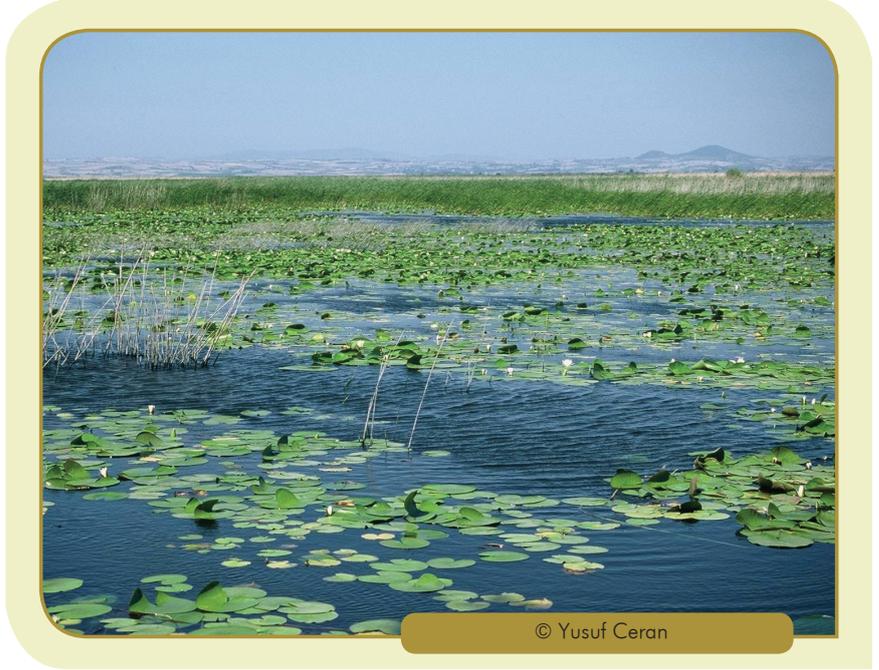
of Turkey's largest white waterlily and reed beds is located in a bay in southern coast of Gölyazı Peninsula. There are large reed beds located in the north-western coasts of the lake as well. Maquis prevail at the hills in the south. Wild olive groves mixed with maquis also occur in this area.

## WILDLIFE

### Flora

Lake Uluabat is a rather important site within the Mediterranean phytogeographic region as it supports the largest European white waterlily (*Nymphaea alba*) beds. The large and shallow Lake Uluabat is one of the richest wetlands in terms of aquatic plants. Almost all of the lake's coasts are covered with large reed beds and shallow areas support many aquatic plants. Wet meadows, willows, tamarixes, chaste trees, aquatic plants, reed beds, white waterlily beds and water hyacinth are common plants.

As seen in many wetlands the most widespread plant group in the coasts of Lake Uluabat is bulrush (*Typha* sp.) and sedge (*Phragmites australis*). Common club-rush (*Schoenoplectus lacustris*) and flowering rush (*Butomus umbellatus*) are the other prevailing species of the plant cover in the lake.



European white waterlily beds cover a wide area in the south-eastern coasts of the lake and in the entering mouth of Mustafakemalpaşa Stream through the seawall. In the southwestern edge of the lake and where Mustafakemalpaşa Stream empties into the lake rigid hornwort (*Ceratophyllum demersum*) and in north-eastern and eastern coasts of the lake loddon lily (*Leucojum aestivum*) occur in large groups. Nationally vulnerable *Gratiola officinalis* occur particularly in the coastal zone of Fadıllı Village.

Tamarix (*Tamarix symnensis*), halophyte salicornia (*Salicornia* sp.) members, *Artemisia santericum*, *Hordeum marinum* and *Bromus*

*hordeaceus* prevail in southwestern portions of the lake. Vegetation communities consisting of willow (*Salix alba*) and tamarix occur in where Mustafakemalpaşa Stream empties into the lake.

### Fish

Fish in Lake Uluabat are recorded to be typical fish varieties that occur in a shallow lake that supports aquatic plants. In the 11 settlements that are close to the lake and particularly in Gölyazı that are close

to the lake, exploit the fishery resources of the lake. Almost 85 percent of the households of Gölyazı, Akçalar, Fadıllı, Dorak, Uluabat, Eskikaraağaç earn their living by fishery while the rest by agriculture. The fish are sold at auctions.

Common carp (*Cyprinus carpio*), northern pike (*Esox lucius*), Danube bleak (*Chalcalburnus chalcoides*), vimba bream (*Vimba vimba*), common bleak (*Alburnus alburnus*), silver bream (*Blicca bjoerkna*), common rudd (*Scardinius erythrophthalmus*), Black Sea shad (*Alosa maeotica*), common roach (*Rutilus rutilus*), wels catfish (*Silurus glanis*), pipefish (*Syngnathus* sp.), amur bitterling (*Rhodeus sericeus*), ray-finned fish (*Cobitis* sp.) are the principal fish species recorded in Lake Uluabat. There are records of European eel (*Anguilla anguilla*) being hunted in the past.

The most harvested fish is common rudd (29.113 percent) according to the fish stock determination study in 2000. This species is followed by common roach (27.349 percent), silver bream (16.681%), Black Sea shad (11.681%), vimba bream (5.054%), common bleak (3.543%), northern pike (3.148%), Danube bleak (2.909%), crucian carp (0.545%), common carp (0.348%), wels catfish (0.027%), grey mullet (0.026%), common barbell (0.021%) and tench (0.004%).

The rate of fish species with economic value among all fish species that the lake supports is very low. The rate of fish species with economic value such as northern pike, common carp, wels catfish, grey mullet and crucian carp is only 4.094 percent of all fish species in the lake. On the other hand, the rate of carnivorous fish species is only 3.175 percent (almost 1/33) when the carnivorous/noncarnivorous balance among the current fish species is considered. These low rates have a negative impact on the lake's economic value and fishery.

## Amphibians and Reptiles

The site supports large numbers of marsh frog (*Rana ridibunda*) and grass snake (*Natrix natrix*).

## Birds

Due to being rich in nutrient, the site provides the bird species with feeding, wintering and breeding opportunities. According to Mid-winter Waterbird Census, the total number of wintering waterbirds in the site is as follows: 429.423 in 1996, 288.452 in 1999, 30.441 in 2009 and 25.868 in 2010.

The site also supports threatened species such as pygmy cormorant (*Phalacrocorax pygmeus*), Dalmatian pelican (*Pelecanus crispus*), whiskered tern (*Chlidonias hybridus*) and ferruginous duck (*Aythya nyroca*).

The site is the most important breeding site for pygmy cormorant in Turkey. 1075 individuals in 1995 and 1072 in 2004 were recorded in the site. The site is also one of the important feeding and wintering areas of Dalmatian pelican, another globally threatened species. 136 Dalmatian pelicans were recorded in the site in October 1994. Squacco heron, Eurasian spoonbill, little egret, night heron, purple heron, marsh harrier, collared pranticole, spur-winged lapwing, black tern are the bird species brooding in the site. Dalmatian pelicans (*Pelecanus onocrotalus*) winter in the site during migration period.



White Pelican © Serhan Çağırankaya

## Mammals

Eurasian otter, jackal, fox, badger and hare are the mammal species recorded in the environment of Lake Uluabat.

## CULTURAL and SOCIAL ASPECTS

### Archeology

There are Aktopraklık Hoyuk, Apollon Temple, antique road, necropolises, stone gate, stadion, inner castle and city walls, antique theatres and churches in the vicinity of Lake Uluabat.

Gölyazı has 87 buildings with significant architectural value, 4 monumental constructions and city walls, as well as 17 monumental trees. The settlement was registered as an Urban Archeological Heritage Site by the Council of Monuments in 1998.

### Past and Present Land Use

Human settlements in Lake Uluabat have existed since ancient times (100 BC). "Apollonia ad rhyndacum" (Gölyazı), the antique city by the lake, was located on the trade routes between antique cities in those ages. Freight shipment was carried out on the Sea of Marmara, Uluabat Stream, Lake Uluabat and Bursa route. For thousands of years, the area had also been an important centre for silkworm breeding and silk trade due to its location. Silkworm breeding ceased with the spread of synthetic threads in the 1960s.

Today, the area is inhabited by the farmers engaged in agriculture, fishery; workers employed in the industrial establishments and tradesmen providing services for those establishments.

There are industrial facilities relying on agriculture and fisheries which employ significant amount of people in the area. Tomato paste is widely produced in the region. Tomatoes along with other vegetables and fruits are processed or frozen. Dairy products are also processed in the region.

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## NATURAL RESOURCE USE

### Agriculture

There are intensive agricultural activities in the surroundings of Lake Uluabat except for the south-eastern portion which consists of steep slopes and forest areas. The agricultural pattern in the immediate vicinity of the lake and on the islands varies with respect to the source of the water used for irrigation, crop range and agricultural engagements of households.

Tomato, onion, potato, sugar beet, corn, eggplant, bean, sesame, sunflower, wheat and barley are the principal products. Olive groves and orchards also cover a significant area. 6350 ha of the agricultural land is irrigated by water that is pumped out of the lake.



### Livestock

Livestock production is losing its significance currently, though it used to be a more widespread and remarkable business in the past. In the deltas formed by Mustafakemalpaşa and Uluabat Streams livestock production is a prevailing occupation. 300 water buffalos and hundreds of sheep occupy Mustafakemalpaşa Stream Delta. Some of the sheep are brought from Manisa to graze.

Insufficiency of land to grow fodder in Gölyazı Town keep livestock production in a minimum level and the existing grazelands are rented by the municipality. There are seven poultries with 10.000 chicken capacity and three active milk-houses.

### Reed Harvesting

Reed harvesting used to be prevailing among Eskikaraağaç, Akçalar, Gölyazı inhabitants in the past. Still, there are some seasonal migrants coming to the region for reed harvesting. The reeds are reaped and sold in Karacabey or to the traders who come to the village. Those that cannot be sold are used to manufacture saddle, rope and matting or utilized as isolation material in walls and roofs. Reeds are also exported.

### Hunting

A hunter with a rifle can be seen in almost every village in the surroundings of Lake Uluabat. The lake is one of the important hunting areas for those particularly coming from Istanbul and Bursa. Hunters sail on the lake either with the camouflaged small boats or fisher boats they hire from the villagers or with their own boats.

Inside the lake is where the most intensive hunting is practiced. The outlet of the lake (Uluabat Stream) and Karaoğlan Pumpin Station are also among hunting areas. There is no adequate control in Lake Uluabat due to capacity shortage.

### Fishery

The 11 settlements (Gölkıy, Eskikaraağaç, Gölyazı, Akçalar, Fadıllı, Akçapınar, Onaç, Dorak, Yeşilova, Kumkadı, Uluabat) that are close to the lake and particularly Gölyazı still benefit from the aquatic products (fish and crayfish) in the lake.

Almost 80 percent of the households in Gölyazı Village are occupied with fishery as the main source of income because of agricultural land deficiency. The rest practice agricultural production.

Today, carp and northern pike are the two most important fish species besides crayfish. Though rare, valuable species are catfish, eel and grey mullet. Another important product is caviar.

Fishery in the lake is organized by Gölyazı Aquatic Products Cooperative. The cooperative had 680 members by the end of 2007. There are almost 500 boats in Gölyazı. According to 1999 figures, the harvest of carp is 28 tons, that of northern pike is 79 tons and other fish are 259 tons. The annual sum of other fish species apart from carp and northern pike is reported to differ between 15 and 20 tons in recent years. November and December are the intensive fishing periods, although the practice continues the whole year round.

One of the most significant products in the site is crayfish. 311 tons of crayfish were harvested in 1986 while the fungus disease the same year resulted in a decrease by 8 tons in 1987. This amount increased in time and went up to 40 tons in 1999. Local fishermen also confirm that the effects of



Fishery © Serhan Çağırankaya

the disease have started to fade and the amount of crayfish harvest has increased recently.

## Recreation

Lake Uluabat contains two natural and cultural heritage elements significant for recreation. Forming an interaction, these two points attract many foreign and domestic tourists to the region. It is possible to see numerous bird species breeding, wintering and staging in large numbers. Many tourists visit the site to birdwatch.

Lake Uluabat Information and Visitor Centre established by Nilüfer District Municipality and Bosch Industry and Trade Co. is located close to the site. There is a watch tower in the yard of the centre in the coast of Eskikaraağaç Village.



6<sup>th</sup> International Eskikaraağaç Stork Festival © Can Yeniurt

Settled on an ancient city, the fishing village, Gölyazı, reaches up inside the lake on a peninsula. Many churches and historical remnants can be seen in Gölyazı and surrounding villages. None of these historical sites are under restoration. There is no conservation work or arrangement for visitors. International Eskikaraağaç Stork Festival is organized annually since 2005 with the aim of protecting storks and other migratory birds visiting the village and sharing the works carried out so far with the public.

## WETLAND MANAGEMENT PLAN

Management plan preparations have started under the coordination of Ministry of Environment and Forestry and with the contributions of Wildlife Protection Society (DHKD) in 1998. With the participation of central and local administrations, universities, NGOs, unions, fishers, industrialists, farmers, hunters and representatives of other groups of interest the Lake Uluabat Wetland Management Plan was concluded in 2002 and enforced with approval of the National Commission on Wetlands.

Moreover, for the first time in Turkey a management plan decree was prepared and implemented for Lake Uluabat.

The management plan was implemented under the coordination of Uluabat Execution Committee and with the contributions of the World Wildlife Foundation between 2002 and 2007. The plan was revised in 2007 and a 2007-2011 Plan was put into force.

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# GEDİZ DELTA RAMSAR SITE

Map of Gediz Delta Ramsar Site



## GEDİZ DELTA

Gediz Delta is a wetland system formed in the western coast of İzmir Bay where Gediz River meets with Aegean Sea. Yamanlar Mountain delineates the east and southeast of the delta, Dumanlıdağ Mountain the northeast and Foça Heights the north of the delta.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Gediz Delta
<b>Location and Boundaries</b>	Located in the boundaries of Çiğli, Foça and Menemen districts of İzmir province.
<b>Area</b>	14.900 ha
<b>Coordinates</b>	38°30'N 026°55'E
<b>Elevation</b>	0 m – 130 m
<b>Conservation Status</b>	Ramsar Site Natural and Archeological Heritage Site
<b>Population</b>	21.375
<b>Climate</b>	Mediterranean
<b>National and International Significance</b>	Turkey's internationally important wetland site Key Biodiversity Area Important Plant Area Important Bird Area
<b>Site Significance</b>	One of the two sites where flamingos breed in Turkey (the other one is in Tuz Lake).
<b>Site Symbols</b>	Flamingo ( <i>Phoenicopterus roseus</i> )
<b>Management Plan</b>	Gediz Delta Management Plan was approved in 2007.
<b>Facilities in the Site</b>	Visitor center

### Land Tenure / Proprietorship

There are public and private areas. The area within the boundaries of the buffer zone comprises settlements, agricultural lands, military zones, treatment facilities and industrial establishments, besides the wetland ecosystems.

### Conservation Statuses

An 8.000-ha part of Gediz Delta had been designated as Wildlife Protection Site in 1982 and widely credited as "İzmir Bird Paradise" thanks to the high diversity and big congregations of birds. This status was terminated in 2007 and the site gained the Wetlands Protection Area status. The status of Wildlife Protection Site is desired to be regained to the site.

The site was decreed as Ramsar Site in 1998.

The Ministry of Culture decreed the whole site a Natural Heritage Area of 1<sup>st</sup> Degree in 1999 and in 2002 the marine boundaries of the Natural Heritage Area of 1<sup>st</sup> Degree were delineated. Üçtepeler location located in the site was designated as an Archeological Heritage Site because of the Leukai antique city established 2400 years ago.

Gediz Delta Ramsar Site meets 4 criteria out of 9 for identifying internationally important wetlands. These are:

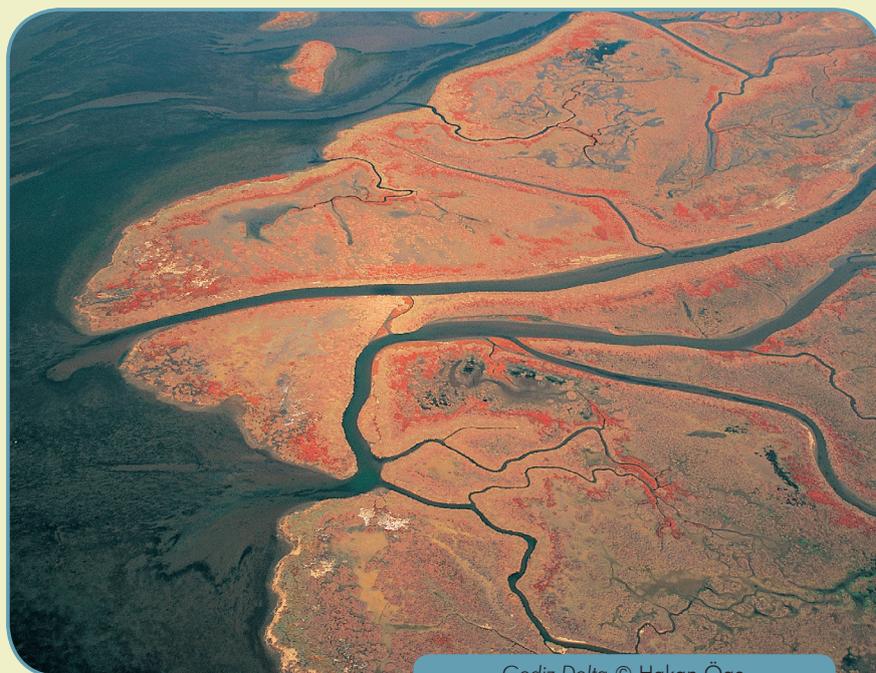
RAMSAR CRITERIA	DESCRIPTION	GEDİZ DELTA
<b>Criterion 2</b>	The site supports endangered bird species included in the International Union for Conservation of Nature (IUCN) red list categories.	Dalmatian pelican ( <i>Pelecanus crispus</i> ), Lesser kestrel ( <i>Falco naumanni</i> ) are the critically endangered species that live in the site.
<b>Criterion 3</b>	Plant and animal species have a special importance for the region to maintain its ecological and genetic characteristics. The site supports endemic species.	The site plays a remarkable role for the maintenance of biological diversity. It is one of the significant breeding areas for particularly water birds in the Mediterranean region. The site supports endemic species and subspecies such as <i>Puccinellia kociana anatolica</i> , <i>Stachys cretica smyrnaea</i> , <i>Carex divisia</i> , <i>Sueda prostrate prostrate</i> and <i>Salsola kali</i> .
<b>Criterion 4</b>	The site is the habitat of the bird species at a critical stage of their biological cycle.	The site is one of the important breeding locations of sea birds, such as common tern ( <i>Sterna hirundo</i> ) and Mediterranean gull ( <i>Larus melanocephalus</i> ). Thousands of sea bird pairs breed on the mud islands. Caspian tern ( <i>Sterna caspia</i> ) regularly breeds only in Gediz Delta at the Mediterranean coasts. Additionally, it is an important stopover area for thousands of shore birds during migration.
<b>Criterion 5</b>	The site regularly supports 20,000 or more waterbirds.	The site holds 5000 pairs of breeding and 25,000 individuals of wintering flamingo ( <i>Phoenicopterus roseus</i> ). According to the mid-winter water birds counts in 2000, there are 49,015 individuals recorded.

## MANAGEMENT STRUCTURE

Union for Protection and Improvement of İzmir Bird Paradise was founded in 2003 to unite the activities executed in Gediz Delta and the bird sanctuary. The union comprises special provincial administrations, relevant municipalities, founding members of village administrations, relevant institutions, universities and relevant NGOs.

The conservation work in the site has been run by the financial resources of the Union. The management body of the Ramsar Site comprises Ministry of Environment

and Forestry General Directorate of Nature Conservation and National Parks (DKMP) and Union for Protection and Improvement of İzmir Bird Paradise. Both institutions work in coordination for the management of the site. Natural and Archeological Heritage Areas are under the authority of the Ministry of Culture and Tourism.



Gediz Delta © Hakan Öge



## HYDROLOGICAL ASPECTS

Gediz River, known as Hermos in antique times, is the second largest river of Aegean Region. With its almost 1.7-million-ha catchment basin, Gediz catchment covers 2.2 percent of Turkey's surface area. The river originates from Murat and Saphane Mountains in central western Anatolian hinterland. In its east to west flow in general, Gediz joins with important tributaries such as Selendi, Alaşehir and Kum Streams, passes through Menemen Strait and empties into the Aegean Sea in its delta located in the north of İzmir Gulf. Gediz Basin is located between Bakırçay and Susurluk Basins in its north, and Küçük and Büyük Menderes Basins in its north.

Annual average precipitation of the region is 544.2 cubic millimeters and average temperature is 16.8 degrees Celsius. The water requirement of İzmir Bird Paradise on a monthly basis is recorded to be 2 liter/second in May, 178 liter/second in June, 211 liter/second in July, 181 liter/second in August, 176 liter/second in September and 45 liter/second in October.

Tap water for the use of the households in the villages is extracted by wells. The local people, however, point out to the decreasing ground water level. They report that they have difficulties in finding underground water even at 170-180 meters and that the water entering the lagoon is highly polluted due to untreated disposal of some nearby factories. They also point out to a salinization increase in the water.

## GEOLOGICAL ASPECTS

The heights surrounding Gediz Delta are mostly volcanic rock structures. The stratigraphic stacks of these heights surrounding Gediz Delta and its close environment are formed of components such as upper cretaceous flysch, sediment, volcanic, volcanosediment units, as well as Quaternary alluviums.

## BIOLOGICAL ASPECTS

### Habitats

The delta comprises four different habitats such as saltwater ecosystems (salines), freshwater ecosystems (reed beds), meadows and heights. It consists of numerous habitats such as lagoons, reed beds, salines, fresh and salt water marshes, salt meadows, seasonally flooded meadows, alluvial islets, agriculture lands and Mediterranean shrub lands.

Gediz Delta wetland ecosystem – from north to south – is basically formed by Kirdeniz and Homa Lagoons, Çamaltı Saline, Çilazmak and Ragıppaşa Lagoons as well as fresh and saltwater meadows of Northern Gediz Delta. Moreover, the reed beds, located in the north and fed by freshwater, are highly important in terms of biological diversity.

Thin sand banks and islets separate lagoons from the sea. The halophile swamp system that also comprises the freshwater swamp forms the south-eastern parts of the Special Protection Area situated between the salines and İzmir province.



Gediz Delta © Serhan Çağırankaya

The area located in the north of the salines comprises meadows, pasturelands, agricultural lands and small woods. Although draining canals in the east of Kirdeniz Lagoon trap forms a freshwater swamp of 500 hectares covered with red beds, it dries from time to time due to freshwater shortage in the region.

## WILDLIFE

### Flora

Flora of the site consists of mostly annual herbaceous plants, herbaceous perennials at a lower level, as well as ligneous plants. Dominated by halophytes, the site supports 306 species under 206 genera of 60 families; while Homa Lagoon supports 63 phytoplankton species. Buttercup (*Ranunculus lateriflorus*), salicornia (*Salicornia europaea*), tamarisk (*Tamarix smyrnensis*), common duckweed (*Lemna minor*), golden samphire (*Inula crithmoides*), Brittle Waternymph (*Najas minor*), common reed (*Phragmites australis*), river red gum (*Eucalyptus camaldulensis*) and acacia saligna (*Acacia cyanophylla*) are the common plant species in the delta.

### Fish

The site supports 20 fish species in lagoons, freshwater sources and reed beds such as sea bass, (*Dicentrarchus labrax*), sea bream (*Sparus aurata*) and gray mullet (*Mugil cephalus*).

### Amphibians and Reptiles

Among amphibians, common toad (*Bufo bufo*), European green toad (*Bufo viridis*), European tree frog (*Hyla arborea*) and marsh frog (*Rana ridibunda*) are observed in the site.

In the delta, 24 reptile species are recorded, including Ottoman viper. Among these are two endangered reptile species: sea turtle (*Caretta caretta*) and green sea turtle (*Chelonia mydas*).

## Birds

In the wildlife of Gediz Delta, birds have a significant place. The delta is one of the sites with the highest bird diversity. According to the studies and observations of amateur birdwatchers, so far 218 bird species have been recorded in the site. Some of these species are the great bustard (*Otis tarda*), the little bustard (*Tetrax tetrax*), white-tailed eagle (*Haliaeetus albicilla*), Smyrna kingfisher (*Halcyon smyrnensis*) which have not been seen for years; corn crake (*Crex crex*), long-eared owl (*Asio otus*), Finsch's wheatear (*Oenanthe finschii*) that can accidentally be seen; white-headed duck (*Oxyura leucocephala*), common goldeneye (*Bucephala clangula*), smew (*Mergus albellus*) that are rarely seen. The 235 avian species observed in the site within the year 2006 are very significant in highlighting the importance of the site in terms of species. Every year, 30.0000-127.000 water birds are counted during the regular midwinter bird census. In the February 2008 census, 90.000 water birds are counted.



Flamingos © Yusuf Ceran

Gediz Delta is one of the two important breeding sites for flamingos (*Phoenicopterus roseus*) in Turkey.

Since Gediz Delta is a wetland system, waterfowl make up the biggest part of the avian species observed in the site. Among these waterbirds, shore birds constitute a significant group. In Homa Lagoon, shore birds can be found in high numbers.

Gediz Delta is one of the sites where dunlin (*Calidris alpina*), little stint (*Calidris minuta*), red knot (*Calidris canutus*), broad-billed sandpiper (*Calidris falcinellus*), sanderling (*Calidris alba*), Eurasian golden plover (*Pluvialis apricaria*), gray plover (*Pluvialis squatarola*), black-tailed godwit (*Limosa limosa*), bar-tailed godwit (*Limosa lapponica*), Eurasian curlew (*Numenius arquata*), ruddy turnstone (*Arenaria interpres*), kentish plover (*Charadrius alexandrinus*), ringed plover (*Charadrius hiaticula*), little ringed plover (*Charadrius dubius*), common redshank (*Tringa totanus*), spotted redshank (*Tringa erythropus*), greenshank (*Tringa nebularia*), Eurasian oystercatcher (*Haematopus ostralegus*) are regularly observed in high numbers, particularly in winter.



Flamingos © Hakan Öge

Gediz Delta is the site where a rare eagle species Bonelli's Eagle

(*Hieraatus fasciatus*) can frequently be seen in Turkey. The delta is one of the five sites in Turkey where Dalmatian pelican (*Pelecanus crispus*), a globally endangered species with a world population of 15.000, breeds. Almost 70 pairs of Dalmatian pelicans every year breed in the islets of Homa Lagoon. The delta is also a very important wintering site for this species. Almost 700 Dalmatian pelicans spend winters in Gediz Delta.

30 pairs of lesser kestrels (*Falco naumanni*), another endangered species, breed in Süzbeyli and Tuzçullu neighborhoods of the delta.



Dalmatian Pelican © Serhan Çağırkaya

Gediz Delta is the only known breeding site for sandwich tern (*Sterna sandvicensis*) in Turkey. It is also the site where common tern (*Sterna hirundo*) breeds in the highest numbers in Turkey.

Gediz Delta is the only known regular wintering site for black stork (*Ciconia nigra*). It is possible to see black storks all year long.

According to Breeding Birds Atlas study of 2006 spring in Gediz Delta, in total 103 bird species are recorded to breed in the site. Among them, 61 of them certainly, 25 most probably and 17 probably breed in the delta.

### Mammals

Hedgehog, fox, European rabbit, mole, wolf, jackal, water vole, jungle cat, wildcat, suidae, European hare and wild horses were recorded in the site.



Wild Horses © Can Yeniurt

## CULTURAL and SOCIAL ASPECTS

### Archeology

Water has always been the main factor to determine settlement quarters for many civilizations. By virtue of its water and fertile lands, Gediz Delta has been home to three different civilizations in history. Leukai Antique City was founded by a Persian admiral in 352 BC in Üçtepeler location. The lower parts of Panaztepe antique city located in Taşlı Tepeler nearby Maltepe Town dates back to the early 2000s BC, whereas the upper part of the city was founded in the second half of the 2000s BC.

### Land Use

Urban settlements surround the south-eastern parts of Gediz Delta which is delineated by Aegean coast in its south, west and northwest. These urban areas start from Karşıyaka, Mavişehir and Çiğli districts, extending through İzmir-Çanakkale highway, reach eastern parts of Menemen district as well as Bağarası, Foça in northwest. Military airports, Atatürk Organized Industrial Zone and commercial properties are situated in the southeast of Gediz Delta while Çamaltı Saline is located in its west.

Bağarası and Gerenköy Towns of Foça district in the north are located on the connection point of İzmir-Foça highway. Both settlements have countryside characteristics such as low density housing and low population. Maltepe, located in the south of the two towns, is a town bound to Menemen district of İzmir. A Leather Industry Zone that comprises leather processing manufactories is located in the southeast of the town. Seyrek and Günerli situated in the southeast and Tuzçullu and Süzbeyli situated in the south of Maltepe are other towns of Menemen with countryside characteristics. Especially in Seyrek, many houses have been constructed in recent years via cooperatives. Sasalı town and Kaklıç neighborhood are settlements located within the boundaries of Çiğli district. Sasalı is also a town where many houses have recently been constructed via cooperatives. There are two military airports located between Sasalı, Kaklıç and Çiğli settlements. The south of the delta where it reaches the sea, is a Ramsar Site, a part of which is separated as a waste-water treatment facility area.

## NATURAL RESOURCE USE

### Agriculture

Parts of Gediz Delta, particularly the lands known as Menemen Plain comprises highly fertile agricultural lands that meet almost 40 percent of Turkey's spinach consumption by itself. Cotton, wheat, corn, clover, tobacco, sesame, faba bean, bean, potato and onion are among the most cultivated crops. Tomato, spinach, watermelon, melon, parsley, eggplant, leek and lettuce are the vegetables cultivated in the area.

Peach, strawberry, mandarin, plum, pomegranate, pear, apricot, walnut, citrus are important fruit crops of the region. Rainfed and irrigated farming are practiced in the alluvial areas.

### Livestock

One of the main economic activities in the site is livestock production, particularly in Seyrek-Süzbeyli regions. Livestock production activities are scarce in Menemen Plain and its surroundings; they cover a limited area of 8.045 ha. Small ruminants dominate the livestock production while cattles and poultry are also raised. Sheep, goat and cattle are the most common livestock.

### Fishery

Marine products are harvested in Homa and Kirdeniz lagoons. Sea mullet, lidaki, tonguefish and sea bass are harvested in Homa lagoon between June and December. The amount of fish harvest in the lagoon was 70 tons in 1980, then it decreased to 20 tons in 1995 and was recorded to be 22 tons in 1998. According to 1998 data, the rate of sea mullet is 69 percent, the rate of lidaki is 28 percent and



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the amount of dried caviar derived from sea mullets is recorded to be 116 kilograms. Moreover 7482 individual lidaki was derived from the lagoon for fish farms in 1998.

## WETLAND MANAGEMENT PLAN

Gediz Delta Management Plan Development and Implementation Project began in 2004. The management plan was foreseen to be completed until the end of 2005 and the project aimed at ensuring conservation-use balance in the delta that covers an area of 40.000 ha.

In the Gediz Delta Wetland Management Plan, management authority was shared with Union for Protection and Improvement of İzmir Bird Paradise (İZKUŞ) with a protocol for the first time in our country. With the protocol signed with İZKUŞ, local stakeholders and the Provincial Directorate of Environment and Forestry co-manage the site and General Directorate of Nature Conservation and National Parks undertakes supervision.

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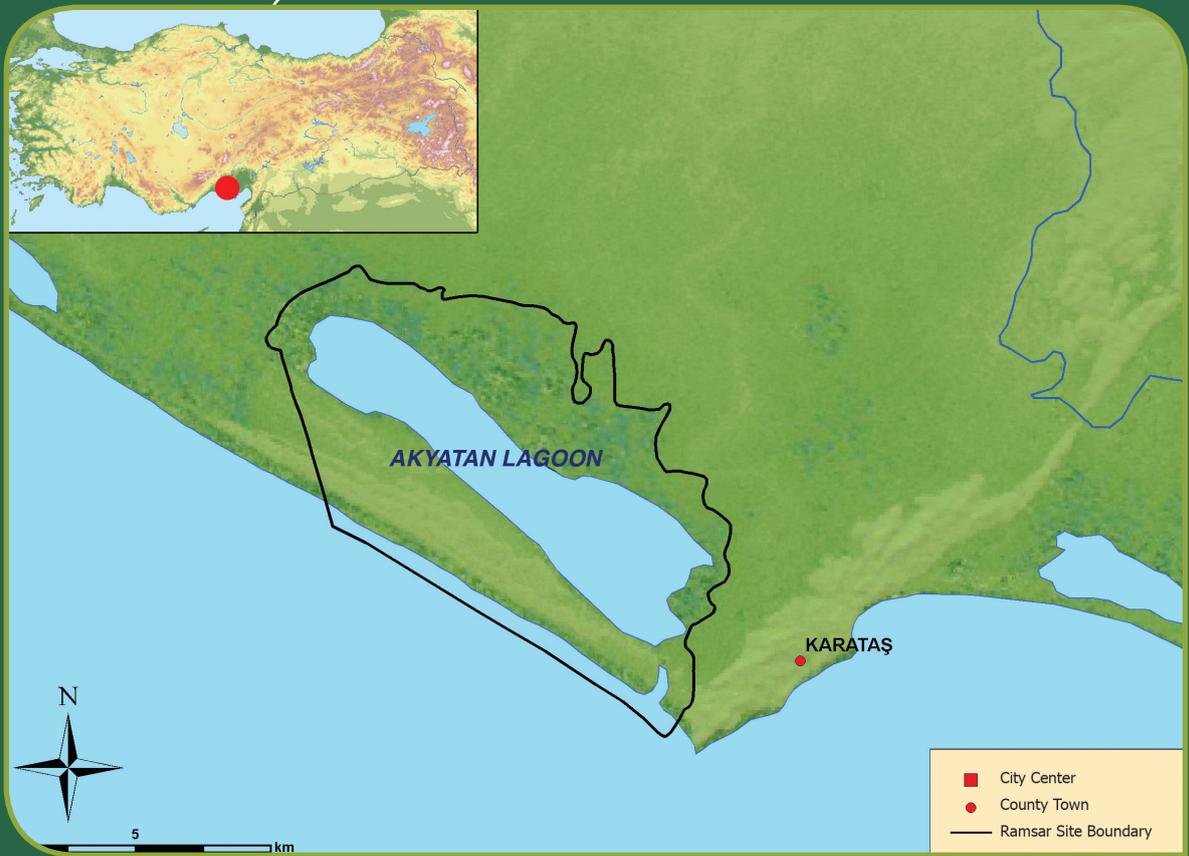
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# AKYATAN LAGOON RAMSAR SITE

Map of Akyatan Lagoon Ramsar Site



## AKYATAN LAGOON

Akyatan Lagoon is the largest lagoon in Turkey. Its average surface area at the average water level is 4.900 ha. Located in Seyhan Delta, the lagoon is 48 kilometers far from Adana province and lies within the boundaries of Karataş district.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Akyatan Lagoon
<b>Location and Boundaries</b>	Located in the Karataş district of Adana province
<b>Area</b>	14.700 ha
<b>Coordinates</b>	36°37'N 035°16'E
<b>Elevation</b>	0 m – 58 m
<b>Conservation Status</b>	Ramsar Site Wildlife Improvement Area Natural Heritage Area
<b>Population</b>	32.375 (Karataş district, 2000)
<b>Climate</b>	Mediterranean
<b>National and International Significance</b>	Turkey's internationally important wetland site Key Biodiversity Area Important Plant Area Important Bird Area
<b>Site Significance</b>	Turkey's largest lagoon lake
<b>Site Symbols</b>	Jungle cat ( <i>Felis chaus</i> ), Green sea turtle ( <i>Chelonia mydas</i> )
<b>Management Plan</b>	Wetland management plan is being prepared.
<b>Facilities in the Site</b>	Fire watch tower, bird watch tower

### Land Tenure / Proprietorship

Areas surrounding Akyatan Lagoon are both public and private property. Illegal agricultural activities are undertaken in the public property around the site, as the surrounding land is composed of fertile agricultural land.

### Conservation Status

Akyatan-Kapı Sand Dune Stabilization and Afforestation Area and the part that remains 500 meters inside the reed beds, in the South of Akyatan Lagoon, was taken under protection for Waterbirds and Black Francolin Conservation and Recreational use in 1986.

The name of the protected area was then changed to Akyatan Lagoon Wildlife Protection Area in 1987, due to the rich local and migrant bird potential of the site as an important stopover and breeding area for waterbirds.

Akyatan Lagoon was designated as an archeological and natural heritage area under the Law on Conservation of Cultural and Natural Assets in 1983. In 1998, the lagoon was decreed to be one of Turkey's Ramsar sites along with Gediz Delta, Kızılırmak Delta and Uluabat Lake. The lagoon is one of the important breeding areas of 1st degree for green sea turtle (*Chelonia mydas*) in Turkey's coasts.

Akyatan Lagoon Ramsar Site meets seven criteria out of nine for identifying internationally important wetland criteria. These are:

RAMSAR CRITERIA	DESCRIPTION	AKYATAN LAGOON
<b>Criterion 1</b>	The site comprises three different ecosystems in the Eastern Mediterranean.	The site comprises freshwater (streams and small inland lakes), coastal and freshwater ecosystems (salty coasts, moving and fixed sand mounds, saltwater marshes, salt surfaces and flooded forests) and agricultural lands.
<b>Criterion 2</b>	The site supports species that are protected under Bern Convention and European Union Bird and Habitat Directives. There are endangered species in the site which are included in the International Union for Conservation of Nature (IUCN) red list categories.	European green toad ( <i>Bufo viridis</i> ), European tree frog ( <i>Hyla arborea</i> ), eastern spadefoot toad ( <i>Pelobates syriacus</i> ), snake-eyed lizard ( <i>Ophisops elegans</i> ), Aegean Bogenfingergecko ( <i>Cyrtodactylus kotschyi</i> ), chameleo ( <i>Chamaleo chamaleon</i> ), black whip snake ( <i>Coluber jugularis</i> ), spotted turtle ( <i>Emys orbicularis</i> ), tortoise ( <i>Testudo graeca</i> ), sea turtle ( <i>Caretta caretta</i> ) and gres sea turtle ( <i>Chelonia mydas</i> ) are species protected under Bern Convention, European Union Bird and Habitat Directives. Sea turtle ( <i>Caretta caretta</i> ) is critically endangered at global level according to the IUCN Criteria.
<b>Criterion 3</b>	The site is important for waterfowl groups and regularly supports high numbers of waterfowls.	Mudplains are the stopover areas for many bird species during migration. Every year 50-80 thousand waterbirds use the site to avoid cold weather. Some species are Marbled duck ( <i>Marmaronetta angustirostris</i> ), purple swamphen ( <i>Porphyrio porphyrio</i> ), black francolin ( <i>Francolinus francolinus</i> ), red-crested pochard ( <i>Netta rufina</i> ), mallard ( <i>Anas Platyrhynchos</i> ), ferruginous duck ( <i>Aythya nyroca</i> ) breed in the lagoon and Eurasian stone curlew ( <i>Burhinus oedicnemus</i> ), Kentish plover ( <i>Charadrius alexandrinus</i> ), spur-winged lapwing ( <i>Hoplopterus spinosus</i> ), little tern ( <i>Sterna albifrons</i> ).
<b>Criterion 4</b>	The site is a critical habitat for life cycles of bird and reptile species.	Thousands of bird species are observed during migration because the site is on the Palearctic-Africa migration route (Criteria 2 and 6). It is a regularly used stopover site for migratory birds to rest. In addition to the breeding birds, i.e. Black Francolin ( <i>Francolinus francolinus</i> ), Kentish Plover ( <i>Charadrius alexandrinus</i> ) and Little Tern ( <i>Sterna albifrons</i> ), Wigeon ( <i>Anas penelope</i> ), Pied Avocet ( <i>Recurvirostra avosetta</i> ) and Little Stint ( <i>Calidris minuta</i> ) are also wintering in the area (5 <sup>th</sup> Criterion). This area is very important for the survival of two globally threatened species of sea turtle <i>Caretta caretta</i> and particularly <i>Chelonia mydas</i> .
<b>Criterion 5</b>	The site regularly supports 20,000 or more waterbirds.	Each year between 50,000 and 80,000 water birds winter in this area. 57,319 individuals are counted in 2007 mid-winter counts. Each year ca. 10,000 flamingos ( <i>Phoenicopterus roseus</i> ) winter at the lake.
<b>Criterion 6</b>	The site regularly supports 1 percent of the individuals in a population of one species or subspecies of waterbird.	Common Coot ( <i>Fulica atra</i> ), 28.100-46.000 individuals (1% are 20,000), Wigeon ( <i>Anas Penelope</i> ), 5.921 – 13.900 Individuals (1% are 3,000), Pied Avocet ( <i>Recurvirostra avosetta</i> ), 430-1.589 individuals (1% are 470), Kentish Plover ( <i>Charadrius alexandrinus</i> ), 1.210-1690 pairs (1% are 410 individuals), White-headed Duck ( <i>Oxyura leucocephala</i> ), 230-978 individuals (1% are 75)
<b>Criterion 8</b>	The site is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.	According to the seasons, fishes migrate to the lagoon to spawn and breed and to finally migrate back to the sea. Amongst these are Mullet species ( <i>Mugil sp.</i> ) sea bream ( <i>Sparus aurata</i> ), sea bass ( <i>Dicentrarchus labrax</i> ) and European eel ( <i>Anguilla anguilla</i> ).

## MANAGEMENT STRUCTURE

General Directorate of Nature Conservation and National Parks under Ministry of Environment and Forestry is the responsible authority for activities within the boundaries of Ramsar Sites, while Cultural and Natural Assets Protection Commission under the Ministry of Culture and Tourism is the responsible authority for Natural Heritage Sites.

Adana Local Wetland Commission (AYSAK) was founded in 2005. The commission consists of representatives from Yumurtalık district administration, Karataş district administration, Provincial Directorate of Environment and Forestry, Provincial Directorate of Agriculture, Regional Directorate of State Waterworks, Regional Directorate of Cultural and Natural Assets, of Provincial Chamber of Agriculture Presidency, Çukurova University Faculty of Marine Products, Çukurova University Department of Landscape Architecture, district cooperative of marine products, Karataş Association of Game and Marksmanship and local NGOs. Convening in every four months under presidency of Adana governor, the commission works actively.

## HYDROLOGICAL ASPECTS

The average depth of Akyatan Lagoon fluctuates between 1 meter and 0.5 meter. In earlier years, the deepest place of Akyatan Lagoon used to be 2.5 meters, but it decreased to 2 meters by the end of 1990s. The freshwater enters the lagoon via precipitation, YD3 drainage canal, Acıkulak and Sırınsıkulağı Creeks, the canal the farmers opened for irrigation in the northwest of the lagoon, waters flowing from the nearby sinks and leaking from agriculture lands. The annual evaporation and rainfall values (annual evaporation 1550 mm, annual rainfall 730 mm) reveal that evaporation value is twice the rainfall.



### General Information on the Water Quality of the Wetland

The lake is linked to the sea via a 2-km narrow canal that flows out from the southwest. Water flows toward the sea from the lake via the canal when the lake's water level is high, and vice versa. So the salinity of the lake water varies seasonally. The lake water gets fresher due to rainfall and the water carried via the drainage canals during winters and springs, whereas lake water salinity increases due to evaporation and salt water inflow from the sea during summers. Salinity is higher in the part that has links to the sea and less in the northern parts. The lake water gets polluted because of the pesticides and fertilizer remnants transported by the drainage water. Akyatan Lagoon is highly polluted by the organic materials coming with the drainage water of agricultural areas. The ground water is also recorded to have been polluted as a 1996 study reveals.

Since the freshwater carried by the drainage canals lower the salinity, sea prey fish species such as sea bream cannot enter the lagoon as local people note. According to them, water level and quality decrease due to the pesticides, fertilizers and alluviums brought by the water canals.

## GEOLOGICAL ASPECTS

The units formed in Akyatan Lagoon and its immediate surroundings are divided into two tectonic and stratigraphic groups such as Lower-Middle Miocene old Propylite Formation and Quaternary old units. Propylite Formation is formed as a result of the intercalation of sandstone, sandy limestone and limestone whereas Quaternary old units consist of caliche, alluvial and sand dunes.

## BIOLOGICAL ASPECTS

### Habitats

The Ramsar site comprises various habitats such as open water surfaces, reed beds, fresh and saltwater swamps, freshwater puddles, ponds, wide sand dune ecosystems and sandbanks.

The lagoon area shrinks in summers due to the decrease in the amount of water feeding the lake and high evaporation.

The largest sand dunes of Turkey – with an elevation of 20 meters and a width of a few kilometers– are situated in the region, between Akyatan Lagoon and the Mediterranean Sea. There are pits under sea level, situated among sand mounds that lie in row which are filled with water during rainy periods. Ecologically important freshwater puddles and swamps that never dry are located in the northeast of the sand dunes.



## WILDLIFE



### Flora

The sand dunes situated between the sea and the lagoons are particularly important for oleander (*Nerium oleander*) and globe thistles (*Echinops* sp.). Broomrape (*Orobanche* sp.), scarlet pimpernel (*Anagallis arvensis*), vetches (*Vicia* sp.) and clover (*Trifolium* sp.) are common in more central areas. The site also supports reed (*Phragmites* sp.) and bulrush (*Typha* sp.), as well as European white waterlily (*Nymphaea alba*) and yellow iris (*Iris pseudocorus*) where freshwater prevails. Tamarix or salt cedar (*Tamarix* sp.) and glasswort (*Salicornia* sp.) prevail in the saltwater marshes.

Plantations comprising acacia (*Acacia cyanophylla*), river red gum (*Eucalyptus camaldulensis*), black locust (*Robinia pseudoacacia*), Mediterranean cypress (*Cupressus sempervirens*), stone pine (*Pinus pinea*), maritime pine (*Pinus maritima*) and Red pine (*Pinus brutia*) have been formed particularly on the 2500-ha sand dune belt that stretches between Karataş and the location where Seyhan River flows into the sea to prevent sand dune erosion since 1960.

## Fish

In total, 11 fish species from 7 families were recorded in Akyatan Lagoon in the previous studies. There are reported to be 5 species of Mugilidae family, 1 species of Sparidae family, 1 species of Serranidae family, 1 species of Cyprinodontidae family, 1 species of Gobiidae family, 1 species of Anherinidae family and 1 species of Anguillidae family.

### Turkish, Latin and English Names of the Fish in Akyatan Lagoon

No.	Turkish Name	Latin Name	English Name
1	Yılan Balığı	<i>Anguilla anguilla</i>	European eel
2	Gümüş Balığı	<i>Atherina boyeri</i>	Big-scale sand smelt
3	Has Kefal	<i>Mugil cephalus</i>	Flathead mullet
4	Sarı Kulak Kefal	<i>Liza aurata</i>	Golden mullet
5	Kastrol Kefali	<i>Liza saliens</i>	Leaping mullet
6	Dudaklı Kefal	<i>Oedalechilus labeo</i>	Boxlip mullet
7	Bıldırcın Kefali	<i>Mugil carinata</i>	Keeled mullet
8	Levrek	<i>Dicentrachus labrax</i>	European sea bass
9	Çipura	<i>Sparus aurata</i>	Gilt-head bream
10	Kaya Balığı	<i>Gobius ophiocephalus</i>	Goby fish
11	Dişli Sazancık	<i>Aphanius cypris</i>	Orientkilli

## Amphibians and Reptiles

Seyhan Delta coastal sand dunes are very important habitats for lizards, snakes, tortoises, sea turtles, common agama and tree frogs. Striped-neck terrapin and European pond turtle are often found in the freshwater poodles and canals while tortoises are often found in the sand dunes of Akyatan Lagoon. Montpellier snake, Dahl's whip snake, snake-eyed lizard, *Mabuya aurata*, chameleon, *Cryptodactylus kotschyii* and *Agama stellio* are other reptile species the site supports.

Reptile species that Akyatan Wildlife Improvement Area supports are chameleon, tortoise, ghost crab and blue crabs.

Chameleons (*Chamaeleon chamaeleon*) are rarely seen in the thick shrubs and woods close to the water sources. Chameleons feed on insects and other invertebrates. The main threat to the predator mammals is pesticides used in the agricultural lands located close to the Wildlife Improvement Area. Blue crabs (*Callinectes sapidus*) are found in high numbers in Akyatan Lagoon and the coast. Entering

the lagoon particularly for reproduction, blue crabs get caught in the nets of fishermen and are thrown back in the water after being dismembered. Dead or wounded crabs washed ashore are consumed by jackals and mongooses.

Globally endangered green sea turtles (*Chelonia mydas*) and sea turtles (*Caretta caretta*) in limited numbers nest in the site. *Eirenis aurolineatus*, a restricted range snake species belonging to the Mediterranean biome, is another important reptile species found in the site.

## Birds

Many waterfowl winter in the wetlands in the south of Turkey, since wetlands in Central Anatolia freeze in winters. Moreover the site provides groups of numerous avian species with foraging and roosting areas due to being on the migration route. According to the studies carried out in 1990, 250 bird species are recorded in Akyatan Lagoon. In the censuses during 2009, 152 different bird species were recorded in Akyatan and Tuzla Lagoons in total and in the censuses in winter of the same year 65.521 bird species of 47 families in total were counted.

Pied avocet (*Recurvirostra avosetta*), Kentish plover (*Charadrius alexandrinus*), little stint (*Calidris minuta*), curlew sandpiper (*Calidris ferruginea*), dunlin (*Calidris alpina*), ruff (*Philomachus pugnax*) and black-tailed godwit (*Limosa limosa*) form big flocks in migration.

Besides globally endangered white-headed duck (*Oxyura leucocephala*), the site supports crowded groups of common pochard (*Aythya ferina*), European wigeon (*Anas penelope*), common shelduck (*Tadorna tadorna*) and Eurasian coot (*Fulica atra*). Another important species wintering in the site is flamingo (*Pheonicopterus roseus*).

The lagoon is one of the important breeding sites for globally endangered marbled duck (*Marmaronetta angustirostris*), as well as rarely seen purple swamphen (*Porphyrio porphyrio*) and black francolin (*Francolinus francolinus*).

## Mammals

With its natural formations and artificial habitats, Akyatan Lagoon hosts suitable areas for many mammal species. Wild boar (*Sus scrofa*), jackal (*Canis aureus*), jungle cat (*Felis chaus*), Egyptian mongoose (*Herpestes ichneumon*), European hare (*Lepus europaeus*), and fox (*Vulpes vulpes*) are the principal mammals the site supports. In addition to these mammals red deer (*Cervus elaphus*), Indian crested porcupine (*Hystrix indica*), southern white-breasted hedgehog (*Erinaceus concolor*), weasel family (Mustelidae), Trsitram's jird (*Meriones tristrami*), brown rat (*Rattus norvegicus*), black rat (*Rattus rattus*), Macedonian mouse (*Mus macedonicus*), Middle East blind mole rat (*Nannospalax ehrenbergi*) and lesser white-toothed shrew (*Crocidura suaveolens*) are relatively rare mammals that the site supports. There were records of fallow deer (*Dama dama*), gazella (*Gazella* sp.) and hyaena (*Hyaena hyaena*) in the past.

## CULTURAL and SOCIAL ASPECTS

### Archeology

The very first settlements in the immediate environment of Akyatan Lagoon date back to late Neolithic Age (800-5500 BC). Antique city of Mallos was settled nearby Karataş Town located in the east of the lagoon. The city of Magarsos, the first seaport city of Çukurova, was settled in the southwest of Mallos. The harbor of the city, surrounded by city walls in its north, has a castle, theatre, Temple of Athena, church, bath, tomb and remnants of a cistern. Collapsed in the Middle Ages, the castle was restored by Abbacies. The Assyrians, Greeks, Romans, Byzantines, Seljuqs and Ottomans ruled in the area which was under Hittite sovereignty in the 17<sup>th</sup> century B.C., until the proclamation of the Turkish Republic.

## Past and Present Land Use

Karataş district has a rich potential with its natural and cultural values. Concurrently, the expansion of agriculture in the sand dunes increased concerns about degradation of the wetland.

In 1996, the Ministry of Environment and Forestry in cooperation with the Ministry of Public Work and Housing prepared the environment plan. The environment plan designated core zones, ecological impact zones and buffer zones of the site taking the wetland ecosystem and related habitats into consideration. Special planning decrees, which regulate conservation and use principles, were developed.



Akyatan Lagoon © Can Yeniyurt

Despite all the protection measures agricultural activities on the public property in peripheria of Kapıköy that is located in the sand dunes at the South of Akyatan Lagoon have spread so far. Excessive ground water use for strawberry, melon and water melon cultivation leads to salt water intrusion. Marshes in the Seyhan and Ceyhan riverbeds were destroyed in order to fight with malaria and the chemicals used for this purpose harmed the food chain in Akyatan Lagoon.

## NATURAL RESOURCE USE

Akyatan Lagoon is a wetland ecosystem that makes major contributions to the local economy with agriculture, livestock production and fishery. Additionally, the site is a significant haunt for tourism, birdwatching and photography.

### Agriculture

A significant part of Seyhan Delta is used for agriculture. Along with cotton, grains, fruits, vegetables and rice are commonly cultivated. Peanut, strawberry, cucumber, melon and watermelon cultivation on the plains located between the sand dunes and the lake has intensified recently.

When the entire delta is taken into consideration, population density and soil fertility are observed to be lower in the surrounding areas of the lake. Following the conversion of agricultural lands to be used for settlement and industrial activities, rapid population growth and intensive migration led to increasing pressure on the natural areas of the delta. Almost all of the seasonal wetlands around the lake have been drained and converted to cultivated land. Sand dunes surrounding the lake have been flattened to grow melon, watermelon and strawberry. Acacia saligna plantations established in the site in 1972 aimed at ceasing the sand dune movements in the predominant wind direction. The main objective of the sand dune stabilisation was to gain the fertile lands in the north of the site. Today, watermelon, peanut, corn and cotton are cultivated in these lands.

### Livestock

Livestock production in the region involves cattle, small ruminant and poultry breeding. A part of the site is used as grazeland. Grazing in the afforested sand dunes is prohibited. The effects of over-grazing,

however, is seen in the sand dunes near Kapı and İnaplıhüyük villages.

### Fishery

A traditional lagoon trap has been built at the part of the lake that opens to the sea. Fishermen of Karataş district operate the lagoon trap. Mullet, sea bream, sea bass, eel, bullhead, brown bullhead, common barbell, carp, common carp, rainbow trout and ray-finned fish are the species found in the lake. Some of the fish captured in the lake are exported. Blue crab is caught in the eastern parts of the lake. Illegal and irregular fishing, collection of juvenile fish and the pollution stemming from the agricultural lands threaten fish

populations in the lake. The amount of fish produced in Akyatan Lagoon was 236.200 tons in 1976; it decreased to 98.376 tons in 1990 and to 29.346 tons in 2006.



Akyatan Lagoon © Can Yeniurt

## WETLAND MANAGEMENT PLAN

Bird Research Society has been preparing Akyatan and Tuzla Lagoons Management Plan since 2008. The plan will be completed by the end of 2010 and come into effect after being approved by the National Wetland Commission.

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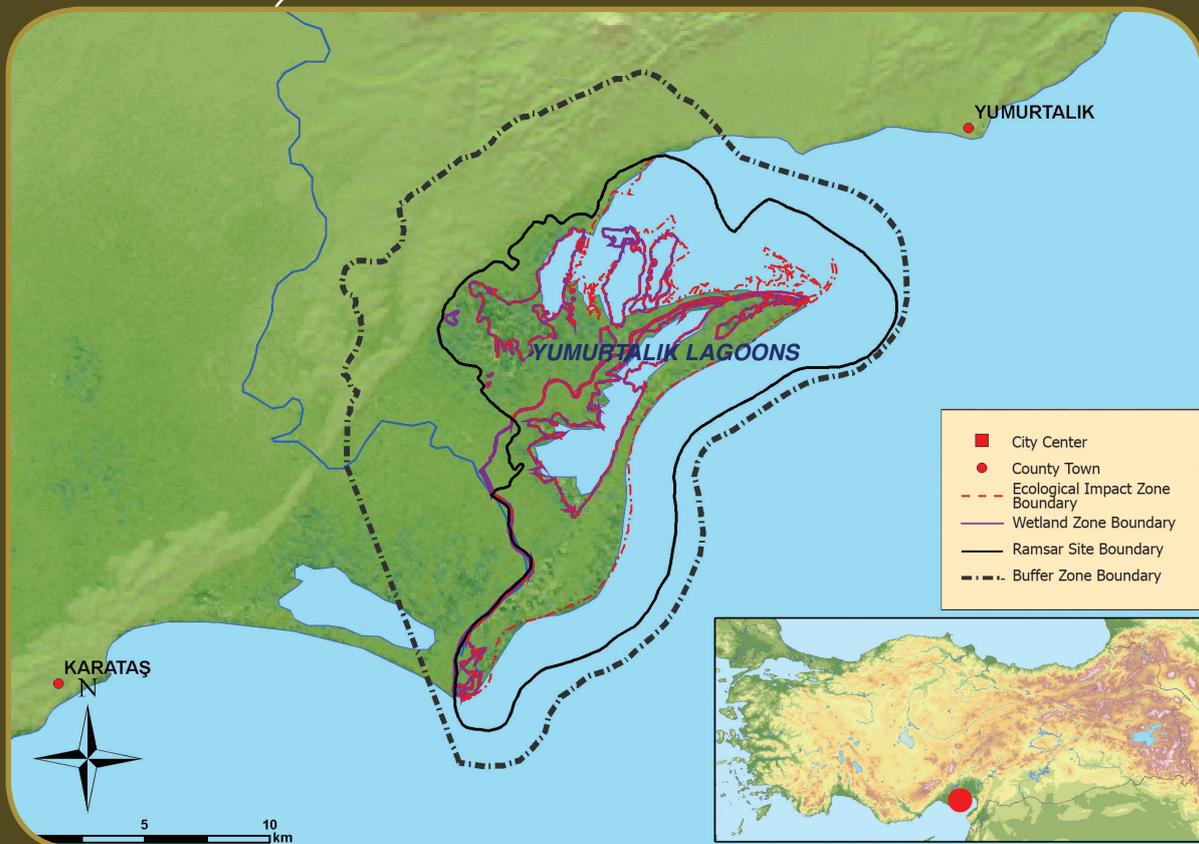
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# YUMURTALIK LAGOONS RAMSAR SITE

Map of Yumurtalik Lagoons Ramsar Site



## YUMURTALIK LAGOONS

Yumurtalık Lagoons are located within the boundaries of Yumurtalık district of Adana, except for a small part of it that falls inside the boundaries of Karataş district of the city. The site is located 30 kilometers far from the city center of Yumurtalık and 35 kilometers far from Karataş.

Yumurtalık Lagoons is a complex wetland system composed of lagoons, fresh and saltwater marshes, arid plains, mud plains, reed beds, wet meadows, dunes and Aleppo Pine forests situated between the location where Ceyhan River reaches to the sea and Yumurtalık Gulf.

The lagoons are important parts of the biggest delta of Turkey, Çukurova wetland ecosystem. Çukurova Delta is formed with the alluvial deposit of Seyhan and Ceyhan Rivers as well as Berdan, or Tarsus, Stream.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Yumurtalık Lagoons
<b>Location and Boundaries</b>	Located in Yumurtalık district of Adana province.
<b>Area</b>	19.853 ha
<b>Coordinates</b>	36°42'N 35°38'E
<b>Elevation</b>	0 m – 90 m
<b>Conservation Status</b>	Ramsar Site Nature Park Natural Heritage Area of 1st Degree
<b>Population</b>	3.967
<b>Climate</b>	Mediterranean
<b>National and International Significance</b>	Turkey's internationally important wetland site Key Biodiversity Area Important Plant Area Important Bird Area
<b>Site Significance</b>	It contains one of the largest dune ecosystems of the Mediterranean that could preserve its natural character.
<b>Site Symbols</b>	Kentish Plover ( <i>Charadrius alexandrinus</i> )
<b>Management Plan</b>	Yumurtalık Lagoons Management Plan was enforced in 2008.
<b>Facilities in the Site</b>	Presentation and visitor center

### Land Tenure / Proprietorship

Since shores and the environment of the lagoons were flooded by the waters of Ceyhan River in the past, those parts remained as public property. When floods prevented by dams constructed on Ceyhan River and waters withdrew, the lands that surfaced have been transformed into agricultural lands and used by the local people.

### Conservation Statuses

The site has been taken under protection after being designated as Natural Heritage Area 1<sup>st</sup> Degree under the Conservation Law on Cultural and Natural Assets in 1993 and as Nature Park under the Law on National Parks in 1994.

In 2005, Turkish government pledged internationally to preserve the ecological aspects of the site, by adding Yumurtalık in the Ramsar Convention List. Yumurtalık Lagoons Management Plan was enforced in 2008.

Yumurtalik Lagoons Ramsar Site meets seven criteria out of nine for identifying internationally important wetlands. These are:

RAMSAR CRITERIA	DESCRIPTION	YUMURTALIK LAGOONS
<b>Criterion 1</b>	The site includes three different ecosystems in the eastern shores of Mediterranean.	There are freshwater (streams and small inland lakes), coastal and freshwater ecosystems (salty shores, active and permanent sand mounds, salt marshes, salt flats, flooded forests) and farm lands.
<b>Criterion 2</b>	There are rare habitats in the site. Endangered reptile species included in the IUCN red list live in the site.	The site is a rare habitat where Aleppo Pine ( <i>Pinus halepensis</i> ) exists. The threatened sea turtles <i>Caretta caretta</i> and green sea turtles <i>Chelonia mydas</i> lay eggs in the site.
<b>Criterion 3</b>	The site supports many rare habitats in the Eastern Mediterranean.	The site is one of the rare habitats that supports Aleppo Pine ( <i>Pinus halepensis</i> ). The site comprises lagoons, salt and freshwater marshes, flooded forests, sand mounds, Seyhan and Ceyhan Rivers, a delta formed by these rivers, as well as important habitats of the Mediterranean.
<b>Criterion 4</b>	The site is an important habitat for the critical stages in lifecycles of bird and reptile species.	Since the site is on the Palaearctic-Africa migration route, thousands of birds are observed during migration in the site. Birds are regularly using the site as a stopover for resting during migration. Black Francolin ( <i>Francolinus francolinus</i> ), Kentish Plover ( <i>Charadrius alexandrinus</i> ), Little Tern ( <i>Sterna albifrons</i> ), Eurasian Wigeon ( <i>Anas penelope</i> ), Pied Avocet ( <i>Recurvirostra avosetta</i> ), Little Stint ( <i>Calidris minuta</i> ) breed in the site. The site is one of the key points for loggerhead sea turtle ( <i>Caretta caretta</i> ) and green sea turtle ( <i>Chelonia mydas</i> ) to assure their long term existence.
<b>Criterion 5</b>	The site regularly supports 20.000 or more waterbirds.	In the census carried out in 2004 more than 20.000 water birds are recorded.
<b>Criterion 6</b>	The site regularly supports 1 percent of the individuals in a population of one species or subspecies of waterbird.	Eurasian Coot ( <i>Fulica atra</i> ) 26.000 individuals (1% 20.000), stork ( <i>Ciconia ciconia</i> ) 12.439 individuals (1% 4.000), flamingo ( <i>Phoenicopterus roseus</i> ) 5.000 individuals (1% 2.900), Eurasian Wigeon ( <i>Anas penelope</i> ) 14.320- 27.190 individuals (1% 3.000), pied avocet ( <i>Recurvirostra avosetta</i> ) 1.217 individuals (1% 470), kentish plover ( <i>Charadrius alexandrinus</i> ) 1200 individuals (1% 410), dunlin ( <i>Calidris alpina</i> ) 7.239 individuals (1% 3.000), white-headed duck ( <i>Oxyura leucocephala</i> ) 191 individuals (1% 75) are recorded.
<b>Criterion 8</b>	The site is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.	According to the seasons, fishes migrate into the lagoon to spawn and growing up and finally migrating back to the sea. Amongst these, Mullet species ( <i>Mugil sp.</i> ) sea bream ( <i>Sparus aurata</i> ), sea bass ( <i>Dicentrarchus labrax</i> ), European eel ( <i>Anguilla anguilla</i> ) and blue crap ( <i>Callinectes sapidus</i> ) are primary species.

## MANAGEMENT STRUCTURE

Adana Provincial Directorate of Environment and Forestry is responsible for the management of the site. A site guard of the Provincial Directorate is assigned to pursue the controls through the site. Lacking any building infrastructure for management in the site, inadequacy of transportation and lack of personnel leads to a deficiency in the management of the site.

## HYDROLOGICAL ASPECTS

Ceyhan River is significant in the formation of the delta. Ceyhan is among the important streams of Turkey in terms of its high volume of flow although its length is 509 km and it has a 22,300-square-kilometer catchment area. The plain had witnessed huge floods and due to the frequent change of river beds, numerous lakes, lagoons, meanders and marshes are formed. The last flood had happened in 1932 changing Ceyhan's course towards the south and the river started flowing in its current bed. The former riverbed still keeps its form and though limited, freshwater is released to the lagoons through it via a tap placed inside the riverbed. Ceyhan River, which is one of the 26 hydrologic basins of Turkey, and its tributaries has been dammed for energy generation, irrigation, flood prevention and drinking water. Kesikkuyu (1971), Menzelet (1972), Kılavuzlu (1994) and the last one Berke (2003) are the dams constructed on the river and its tributaries.



Yumurtalık Lagoons © Murat Bozdoğan

There are numerous lakes and lagoons within the site. They are the sub-components of Çamlık (located in the former riverbed of Ceyhan) and Yelkoma (located in the South) lagoon systems.

Çamlık Lagoon System comprises Yapı and Ömer Lakes, Çamlık Bay, Darboğaz and Arapboğazi lagoons which are connected to each other with natural canals. These lakes merge with each other as one lake during winter when their water levels rise. Yapı Lake is fed by the waters of Ömer Lake when it floods in winters. Those lakes might dry in summers due to heavy evaporation. The lakes are getting filled rapidly because of the sediment load brought by the streams and canals flowing from the north. The depth is 0-30 cm in Yapı Lake and 30-60 cm in Ömer Lake.

Yelkoma Lagoon System comprises Eşemen and Avciali Lakes. The two lakes are considered as separate lakes since there are slight obstacles between them, though they indeed compose one single system. Its depth has decreased to 30-50 cm from 1.5-2 meters in the past 20 years. The sands carried from the sand dunes by wind erosion has been effective in siltation. Apart from those mentioned, there are many lakes in the site, not shown on the maps. Lagoons used to be fed by the regular floods of Ceyhan River in the past. Since the floods are prevented by the dams constructed on Ceyhan River and its tributaries, the flow of freshwater feeding the lagoons is also prevented. Currently the freshwater sources of the lagoons are the precipitation along with their surface runoff and underground sources.

The saltwater entrance into the lagoons happens via lagoon-sea links. The fact that the total annual evaporation in the region is almost double of the annual precipitation amount and that the typical Mediterranean climate – mild, rainy winters and hot, dry summers – prevails in the region leads an increase in the salt concentration of the lagoon.

There is no remarkable brook flowing permanently through the site. Kaldırım, Zeynepli and Kamışlı, passing through Deveciüşağı, Brooks are the ones flowing into the site during rain seasons. Many canals are opened for drainage and irrigation of the farm lands located in or outside the site.

In the areas close to the sea or lakes, the underground water is salty and fresh or less salty as it gets farther. Freshwater prevails through Ceyhan River's bed within the delta; saltwater becomes more prevalent closer to the sea.

## GEOLOGICAL ASPECTS

After Ceyhan and Seyhan Rivers had formed Yüreğir Plain, they started to form Yumurtalık Lagoons due to having changed their course towards the southeast nearby Karataş district, emptying into İskenderun Gulf, almost 2500 years ago. Ceyhan River comprises a highly rich as well as a complex and dynamic lagoon, lake and marsh system.

Ceyhan River has a 30-kilometer coastal cord formed in almost a-2500-year time span, and then it changed its direction to south again during a flood in 1932 and began to flow through Ağyatan Lagoon. Later it changed its path again and gained its current path passing over the former sand dune ranges nearby İncekum.

In this new place Ceyhan River is emptied into the sea (Hurma Boğazı). The delta mouth is recorded to grow 2 kilometers into the sea and evolved up to 2-2.5 kilometers until 1992. However, the floods were taken under control by dams. Since Ceyhan River stopped carrying sediments as it used to in the past after the floods were taken under control by the dams constructed on it, the delta growth has totally stopped. Between 1992 and 2005 its coastal strip is recorded to have eroded rapidly and the sea moved in by 400-500 meters. Since 1992 in Kokar Cape, where Ceyhan empties into the sea, the sea is recorded to have moved almost 400-500 meters into the mainland.

Alluviums, dunes, beaches and lakes cover the whole of the protected area. Alluviums comprising clay, sand, pebble and sporadic swamps are formed by the accumulation of the sediments that were transported by Ceyhan River. There are sand mounds in ranges, the height of which rises towards the inland, behind the 0-250-meter breadth beaches. The most virgin dunes of the whole Mediterranean exist in Yumurtalık Lagoons.

## BIOLOGICAL ASPECTS

### Habitats

The important habitats in the site are lakes and lagoons, salt marshes that surround these areas, broad sand dunes situated between the sea and the lagoons, as well as the Aleppo Pine forest situated in the northeast of the site.

### WILDLIFE

#### Flora

The site is located within the Mediterranean Phytogeographical Region. Yumurtalık Lagoons are located inside the Ceyhan Delta Important Plant Area (IPA), one of the 112 IPAs in Turkey. In a study carried out in 2005, 272 taxons of 68 families were recorded in the site. Aleppo pine forest, Kaldırım Saline and sand dunes are among the important habitats in terms of species.



Aleppo Pine Forest © Osman Erdem



© Serhan Çağırankaya

Aleppo pine forest is the most important part of the site in terms of flora. Besides Aleppo pine (*Pinus halepensis*), a rare species for Turkey, which forms a forest, there are six species of top priority in conservation. All of these species survive in forest openings. After the site was designated as a protected area, human use was totally prohibited. The prohibition enabled Aleppo pine and maquis communities to develop and prosper.

The best population of *Limonium ocymifolium* is nearby the mud marshes.

The first and only record of *Halopeplis amplexicaulis* species is in Berdan Stream Delta almost 100 years ago, the second record is in Kaldırım Saline. The species stretches as a narrow strip from north to south in the west of Yapı Lake where the water tides.

The different dune structures in the site support different floras. The dune plant variety is so rich that it resembles a botanic garden. Plant species, their distribution and canopy coverage is diverse according to the sand structure. The variety of sand dune vegetation changes according to their distance to the sea, whether the sand dune is active or permanent, the ground water level and the structure of the sand dune.

### Fish

Ceyhan Delta supports 27 fish species of 10 families. Apart from these, it also supports Mosquitofish (*Gambusia affinis*), an exotic species of Poeciliidae family.

### Amphibians and Reptiles

6 amphibian species of 4 families and 42 reptile species of 11 families are recorded in Ceyhan Delta.

Nile softshell turtle (*Trionyx triunguis*) copulates at the river mouth and breeds by nesting in the coastal dunes. Yumurtalık Bay is the only known wintering area of endangered green sea turtle (*Chelonia mydas*) in the Mediterranean.

### Birds

Birds are the leading elements for the site to be qualified as important. Yumurtalık Lagoons is the important stopover, resting and feeding area on the bird migration roads passing through Anatolia.

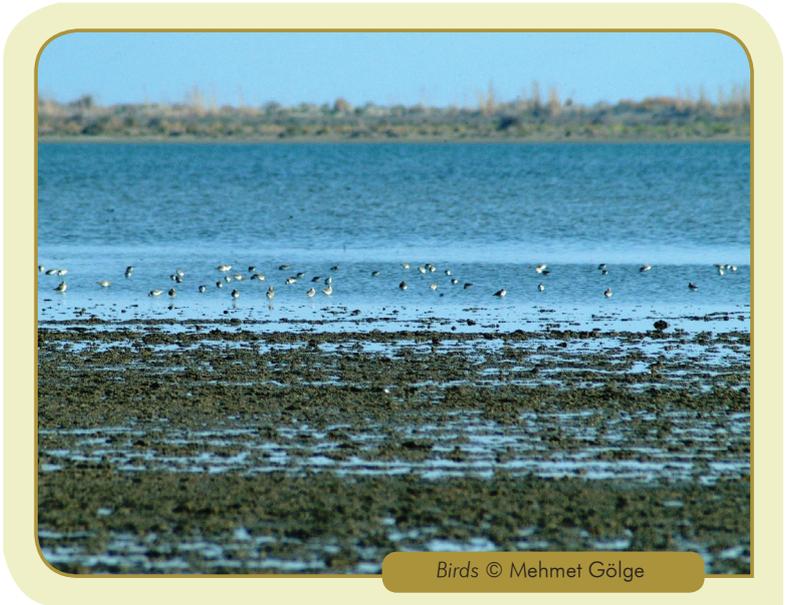


© Süleyman Ekşioğlu

252 bird species have been recorded in the site so far. The number of the bird species wintering in the Yumurtalık Lagoons in the past is said to have been more than 70.000. According to the bird censuses carried out during migration periods, among the birds observed in high numbers are stork (*Ciconia ciconia*) (12439), great white pelican (*Pelecanus onocrotalus*) (1550), flamingo (*Phoenicopterus roseus*) (5000), Eurasian spoonbill (*Platalea leucorodia*) (147), dunlin (*Calidris alpina*) (650) and ruff (*Philomachus pugnax*) (3200).

In 2005, 163 bird species are observed in the site. Among these, 48 bird species are recorded as breeding in the site. Kentish plover (*Charadrius alexandrinus*) 390 pairs, little tern (*Sterna albifrons*) 357 pairs, collared pranticole (*Glareola pratincola*) pairs, spur-winged plover (*Vanellus spinosus*) pairs, Smyrna kingfisher (*Halcyon smyrnensis*) 2 pairs and marbled duck (*Marmaronetta angustirostris*) 1 pair are the species that provide justification of the Important Bird Area criterion.

3.259 waterbirds are counted in 2005 mid-winter waterbird census and 32.954 in 2010.



Birds © Mehmet Gölge

## Mammals

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European Hare © Özden Sağlam

Ceyhan Delta supports 35 mammal species of 12 families. Egyptian mongoose (*Herpestes ichneumon*), a rare mammal species, ranges in Aleppo pine forest. The Egyptian mongoose is thought to be endangered and its population is decreasing due to the degradation in its habitats.

Persian squirrel (*Sciurus anomalus*), European hare (*Lepus europaeus*), gray dwarf hamster (*Cricetulus migratorius*), Nehring's blind mole rat (*Nannospalax nehringi*), black rat (*Rattus rattus*), gray wolf (*Canis lupus*), European badger (*Meles meles*) and European otter (*Lutra lutra*) are among the mammal species in the site.

## CULTURAL and SOCIAL ASPECTS

### Past and Current Land Use

The Ceyhan Lower Basin used to comprise wide areas of fresh and saltwater marshes, meadows, sand dunes and lagoons until the end of the 1940s. However, the site has started to change due to flood control via the dams constructed on Ceyhan River.

As a result of flood control, unoccupied land started to be transformed into agricultural lands. Since the sandy soil is suitable for peanut production, this process has accelerated and it has been going on

even after the site is designated as a Protected Area.

There used to be no agricultural lands in Protected Area boundaries in the 1940. Today the agricultural lands cover 7.9 percent (1.294,5 ha) of the Protected Area. The agricultural lands within the Protected Area are situated as two thin strips in both sides of former Ceyhan riverbed around the pine forest environment in the north and in Ceyhan river bank in the south.

There are also four settlement areas situated in the Protected Area which are Deveciüŝađı, Zeynepli and Kaldırım villages in the north and Adalı village in the south.



Yumurtalık Lagoons © Murat Bozdođan

## NATURAL RESOURCE USE

The users of the site are farmers, livestock herders, fishermen and a limited number of campers.

### Agriculture

The main style of living is rural. 76 percent of the local people are active in producing vegetables and 84 percent out of this cultivate their own lands. Agriculture is in the forefront in Kaldırım, Haylazlı, Deveciüŝađı and Kuzupınarı towns. Kaldırım town has the largest agricultural land within the site. The average number of the agricultural lands per household in Haylazlı village is larger when compared to those in the other three villages.

Agricultural lands are widespread in the areas that had been washed with the floods of Ceyhan River in the past and had become available for agriculture with sediment loads. These areas are located in the west of the protected area and stretch as thin strips in the both sides of the former riverbed of Ceyhan. As the agricultural lands get closer to the lagoons and the salt marshes surrounding the lagoons, agricultural fertility decreases remarkably due to rising salt and alkali levels, as well as the high groundwater level.

The main problem of agriculture is the lack of irrigation water which is a great necessity due to hot and dry summers. Therefore, rainfed or greenhouse agriculture is widespread. The prevailing crops are wheat, early-season watermelon, cotton, maize, as well as vegetables on a limited scale.

Wheat and cotton production in the site is gradually decreasing while maize, watermelon and vegetables are replacing them. Wheat is still cultivated where the soil is partly poor with less water holding capacity. These places are found mostly in the areas on the way to the winter shelters while cotton lands are located where the salt level is high and where there are irrigation opportunities, particularly in the lower parts of Ceyhan River.

Greenhouse watermelon production has increased remarkably in the past years. Salt meadows and marshes are drained and buried under 15-20-centimeter sand cover to produce watermelon. In these areas where sandy soils are widespread, peanut farming has also increased recently. Vegetables are cultivated in the lands close to the villages in very limited areas while greenhouse zucchini and tomatoes production are gradually increasing. Maize is usually in rotation with wheat and cropped as the second harvest on the same areas.

The total agricultural land of Kaldırım town is 64.365 da. 421 families (90 percent) make their livings by farming. Main agricultural productions are wheat, peanut, maize, cotton and vegetable. 12.800 da of the agricultural lands are irrigated via the canals opened by the local people.

In Deveciüşağı village, agricultural production is carried out in 17.354 da and 119 families (46 percent) make their living farming. Wheat, peanut, cotton, maize and vegetable are the most produced crops. A total of 6.500 da (37.4) agricultural lands are irrigated.

The main impact of agriculture on the protected area is the conversion of wild habitats into agricultural land. The pesticide and chemical fertilizer leftovers carried into the lagoons from the agricultural lands also negatively affect the protected area. Adana ranks first in Turkey in terms of the amount of pesticides and chemical fertilizers used in agriculture.

## Livestock production

Livestock production has increased recently since the local people cannot obtain expected amount of yield and income from farming activities. While cattle raising was more common in the past, nowadays small ruminants are increasing.

Almost all of the livestock raised in the surrounding areas of the protected area are grazed in the natural areas within the site. The most widespread livestock production is in Kaldırım town. The 4388 animals in the town belong to 133 families. Out of these, 1063 are cattle and 3325 are small ruminants. 23 families staying in winter shelters have 508 cattle and 2045 small ruminants. As the nomadic life style has totally been abandoned, animals are grazing in the protected area the whole year round. The increasing number of livestock leads to degradation and loss of the plant cover, particularly in the sand dunes which are prone to overgrazing. The degradation of the vegetation cover accelerates the sand dune erosion.

## Fishery

Besides agriculture and livestock production, fishery is the most important source of income for the local people. Two important lagoons of Turkey (Çamlık and Yelkoma lagoons) are located in the site. There are five central fisheries products cooperatives in the site (Haylazlı, Sadiye Kırmızıdam, Deveciüşağı, Kaldırım and Yumurtalık) with a total of 504 members.

These cooperatives manage the lagoons. There are 115 fishermen who are not member to any of these cooperatives. The fishermen working in the lagoon are paid monthly according to the days they worked. Provincial Administrations rent the lagoons to the cooperatives. Fishery activities are carried out in parts of the former Ceyhan riverbed that are close to the Yumurtalık Bay, Hurma Boğazı, Çamlık location and all the lagoons. Research shows that 14.1 percent fish in summer, and 7.5 percent fish yearlong, as the results of the research with household members show. 20 percent of those who fish in their spare times, fish in open sea and 22.9 percent fish in the bay.

The number of fishermen families in Haylazlı and Deveciüşağı Villages are higher than that of the

<b>Fisheries Products Cooperatives active in the site</b>	<b>Membership</b>
Haylazlı Fisheries Products Cooperative	397
Sadiye Kırmızıdam Fisheries Products Cooperative	47
Deveciüşağı Fisheries Products Cooperative	34
Kaldırım Fisheries Products Cooperative	29
Yumurtalık Central Fisheries Products Cooperative	15
<b>Total</b>	<b>504</b>

other settlements. There is almost no fisher families in Kaldırım and Zeynepli. Sea bass, grey mullet, sea bream, bluefish and meagre are the commercial fish species caught in the region.

Though the data particularly about the amount of the fish that has been caught, fishermen point out the amount of the fish has decreased by 2/3 in the past 15-20 years. Both scientific studies and the fishermen's statements point out to the fresh and saltwater imbalance in the lagoons due to flood prevention, siltation of the lagoons due to sediment intrusion, water pollution and illegal fishing, trolling until the 1990s and fry fishing have been effective on the decline in fish stocks.

Increasing costs (such as rent, tax) against the declining fish stocks force fishermen to catch higher amounts of fish. Fishing immature fish, not letting the fish into the sea for spawning and illegal troll fishing leads to overexploitation of fish stocks and endanger the long-term sustainability of fishery.

### Hunting

Despite hunting within the boundaries of the protected area is totally forbidden, poaching is scarcely practiced. The lack of controlling mechanisms and guards enable poaching at the wide hunting areas of Kaldırım Town. Moreover, the fact that the only site guard carries out the controls by a tractor is another reason for insufficient control.

### Tourism

There are no tourism activities in the site, although it is very close to the sea. Yumurtalık and Karataş districts that are very close to the site are very active in terms of coastal tourism, particularly in summers. On the other hand, the protected area is not directly affected by these activities. In the close surroundings of the protected area, day tripping and camping are more common as tourism activities. Local people are not sympathetic to campers since tents serve no benefit to them. They, however, look forward to possible hotel constructions, believing such investments might provide new employment opportunities.

Alleppo pine forest had been a significant recreational area, especially for the local people before it was designated a protected area. The site was allocated to the Ministry of Forestry and Environment in 1991 and activated as a forest recreation facility. Restaurants and open air coffee houses had been established in the area and it became a popular destination for the people living in nearby settlements. Following the designation of



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the site as a Protected Area, entrance was forbidden and restaurants and other facilities were closed down. Random picnickers can still be seen during spring and summer months, even though forbidden.

The 22-kilometer-long and 1.5-kilometer-wide coastal dune located between the south-eastern boundary of the site, former Ceyhan riverbed, and the southern boundary, Ceyhan River is used by the inhabitants of the surrounding settlements who come to the site with tents and tugboats.

Ecological tourism is scarce in the site despite numerous alternatives. Both from Turkey and abroad, birdwatchers visit the site the whole year round.

## **WETLAND MANAGEMENT PLAN**

Yumurtalık Lagoons Management Plan is prepared under "Preparation of Yumurtalık Lagoons Management Plan and Designation of Erzurum Marshes Conservation Zones Project" carried out under Baku-Tbilisi-Ceyhan Pipeline Environmental Investment Programme with the leadership of Kuş Araştırmaları Derneği in cooperation with Çevre ve Tüketici Koruma Derneği (Environment and Consumer Protection Association) Tour du Valat Biological Station, Ministry of Environment and Forestry Directorate of Wetlands and BTC pipeline company.

The plan was enforced in 2008 after being approved by the National Wetlands Commission meeting.

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# MEKE MAAR RAMSAR SITE

Map of Meke Maar Ramsar Site



## MEKE MAAR

The site is situated in the South of Konya Closed Basin within the boundaries of Karapınar district of Konya province. Meke Maar is 981m above sea level.

The crater (pyroclastic cone) formed as a result of a volcanic eruption 4-5 million years ago (in Pleistocene age) had filled with water in time and later on, 9000 years ago, with a second volcanic eruption an additional volcanic cone was formed in the middle of the lake which also filled with water in time creating a second lake.

The second lake in the volcanic cone that is 50 meters above the water level and situated in the middle of the main Meke, is a saltwater lake with a depth of 25 meters. The volcanic mass that forms the island has a capacity to immediately absorb even the heaviest rainfall. This is the reason why Meke could preserve its shape for thousands of years. Known as "Anatolia's eye," the lake resembles a blue bead in aerial images; so it is believed to bring good luck. The site has remarkable potential for ecological tourism with its geological appearance.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Meke Maar
<b>Location and Boundaries</b>	Located within the boundaries of Karapınar district of Konya province.
<b>Area</b>	202 ha
<b>Coordinates</b>	37°41'N 33°38'E
<b>Elevation</b>	1004 m - 1280 m
<b>Conservation Status</b>	Ramsar Site Natural Heritage Site Natural Monument
<b>Population</b>	59.823 (Karapınar)
<b>Climate</b>	Continental
<b>National and International Significance</b>	Turkey's wetland of international importance Key Biodiversity Area Important Bird Area
<b>Site Significance</b>	The site is a volcanic wetland
<b>Site Symbols</b>	None
<b>Management Plan</b>	Preparation
<b>Facilities in the Site</b>	None

### Land Tenure / Proprietorship

The area within the Ramsar Site boundaries is public property and there are no private property lands. There are private property agriculture lands and public property steppe areas outside the site boundaries.

### Conservation Statuses

Meke Crater Lake Natural Monument was designated as a Natural Heritage Site of 1<sup>st</sup> Degree in 1989 and a 260-hectares part of it was designated as a Natural Monument in 1998. Opening new wells in the region was banned in 2003. The site was designated as a Ramsar Site in 2005.

Meke Maar Ramsar Site meets 3 out of 9 criteria for identifying wetlands of international importance. These are:

RAMSAR CRITERIA	DESCRIPTION	MEKE MAAR
<b>Criterion 1</b>	The site is a rare wetland area.	Though Anatolian lands are rich with crater lakes, Meke Maar with its acidic lake in the caldera is a rare wetland.
<b>Criterion 2</b>	The site supports species listed in International Union for Conservation of Nature (IUCN) red list categories, as well as species protected under Bern Convention and European Union Habitats Directive.	<i>Allium sieheanum</i> , <i>Astragalus cicerellus</i> , <i>Gladiolus halophilus</i> , <i>Lepidium caespitosum</i> , <i>Limonium lilacinum</i> , <i>Sphaerophysa kotschyana</i> , <i>Verbascum pyroliforme</i> are the threatened endemic plant species in the site. Marsh harrier ( <i>Circus aeruginosus</i> ), black-winged stilt ( <i>Himantopus himantopus</i> ), great bustard ( <i>Otis tarda</i> ), little bustard ( <i>Tetrax tetrax</i> ) are the bird species in the site that are protected under Birds Directive.
<b>Criterion 3</b>	The site sustains biological diversity. It also supports numerous endemic plant species.	<i>Allium sieheanum</i> , <i>Astragalus cicerellus</i> , <i>Gladiolus halophilus</i> , <i>Lepidium caespitosum</i> , <i>Limonium lilacinum</i> , <i>Sphaerophysa kotschyana</i> , <i>Verbascum pyroliforme</i> are the threatened endemic plant species in the site.

## MANAGEMENT STRUCTURE

Since Meke Maar is a Ramsar Site, it is under the jurisdiction of Ministry of Environment and Forestry and Konya Provincial Directorate of Environment and Forestry. The site is also under the jurisdiction of Konya Provincial Directorate of Culture and Tourism as it is a Natural Heritage Site.

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## HYDROLOGICAL ASPECTS

Total annual precipitation in Konya province varies significantly between 294.9mm (Karapınar) and 764.0mm (Seydişehir). Most of the precipitation occurs during falls and particularly during winters throughout the province. The mean humidity of districts where meteorological data is collected from is 61.2 percent; mean temperature is 10.9 °C and the number of the days the temperature exceeds the mean temperature is 198.4. There are around 10 wells spread in a 10 km<sup>2</sup> area around the maar. The lake is very shallow with high rate of salinity (32 percent).

## GEOLOGICAL ASPECTS

The vast and flat Karapınar Plain (19 km<sup>2</sup>) lies in the east of Konya. The depth of Meke Maar is 1.2m at most. Its surface area is 0.5 km<sup>2</sup>. Since the maar was formed as a result of volcanic activities, its acidic water contains magnesium and sodium sulfate. Therefore the site supports little biodiversity.

## BIOLOGICAL ASPECTS

### Habitats

Steppe vegetation dominates the immediate surroundings of the lake which is situated in the centre of the salt steppes of central Anatolia.



Meke Maar © Hakan Oge

## WILDLIFE

### Flora

Arid and dry plant cover adapted steppes dominate the site.

The soils of fine sands generally support deep rooted, thorny, shrub, perennial and drought-resistant plant species growing spontaneously such as milk-vetch (*Astragalus* sp.), speedwell (*Veronica* sp.), sage (*Salvia* sp.), starthistles (*Centaurea* sp.), couch grass (*Elytrigia* sp.) and wood hedgehog (*Hydnum repandum*).

### Amphibians and Reptiles

Since volcanic ashes absorb the light, the lake and its immediate surroundings are warmer than the rest of the area with a micro-climate affect. So the site supports reptile species occurring in warmer areas such as horn-scaled agama (*Trapelus ruderata*), star lizard (*Laudakia stellio*) and snake-eyed lizard (*Mabuya aurata*). The site also supports spur-thighed tortoise (*Testudo graeca*).

### Birds

Although there are not many species ornithologically, bird species such as grayleg goose (*Anser anser*), ruddy shelducks (*Tadorna ferruginea*), common shelduck (*Tadorna tadorna*), Egyptian vulture (*Neophron percnopterus*), long-legged buzzard (*Buteo rufinus*), golden eagle (*Aquila chrysaetos*), saker falcon (*Falco cherrug*) and black-winged stilt (*Himantopus himantopus*) are recorded in the site.

### Mammals

European hare (*Lepus europaeus*), red fox (*Vulpes vulpes*) and various mouse species are the mammals observed in the site.

## CULTURAL and SOCIAL ASPECTS

### Archeology

Meke Maar was formed through the transformation of a crater (formed 400 million years ago due to a previous volcanic eruption) and a second volcanic cone (formed 9000 years ago due to a second volcanic eruption) into two separate lakes via filling with water.

### Past and Present Land Use

Almost all the local people live by agricultural and livestock production activities. Although the area is on Konya-Adana highway described as the old Silk-Road, industrialization is rare today. Domestic and foreign tourists visit the lake throughout the year.



Meke Maar © Can Yenyurt

## NATURAL RESOURCE USE

### Agriculture

The lake water cannot be used in agriculture since the conductivity rate of irrigation water should be 2.250ec at the highest while the electric conductivity of the lake is 65.000ec. However from almost 10 wells within a 10km<sup>2</sup> area around the lake, water is pumped for irrigational uses.

### Livestock

There is no livestock production in the site.

## WETLAND MANAGEMENT PLAN

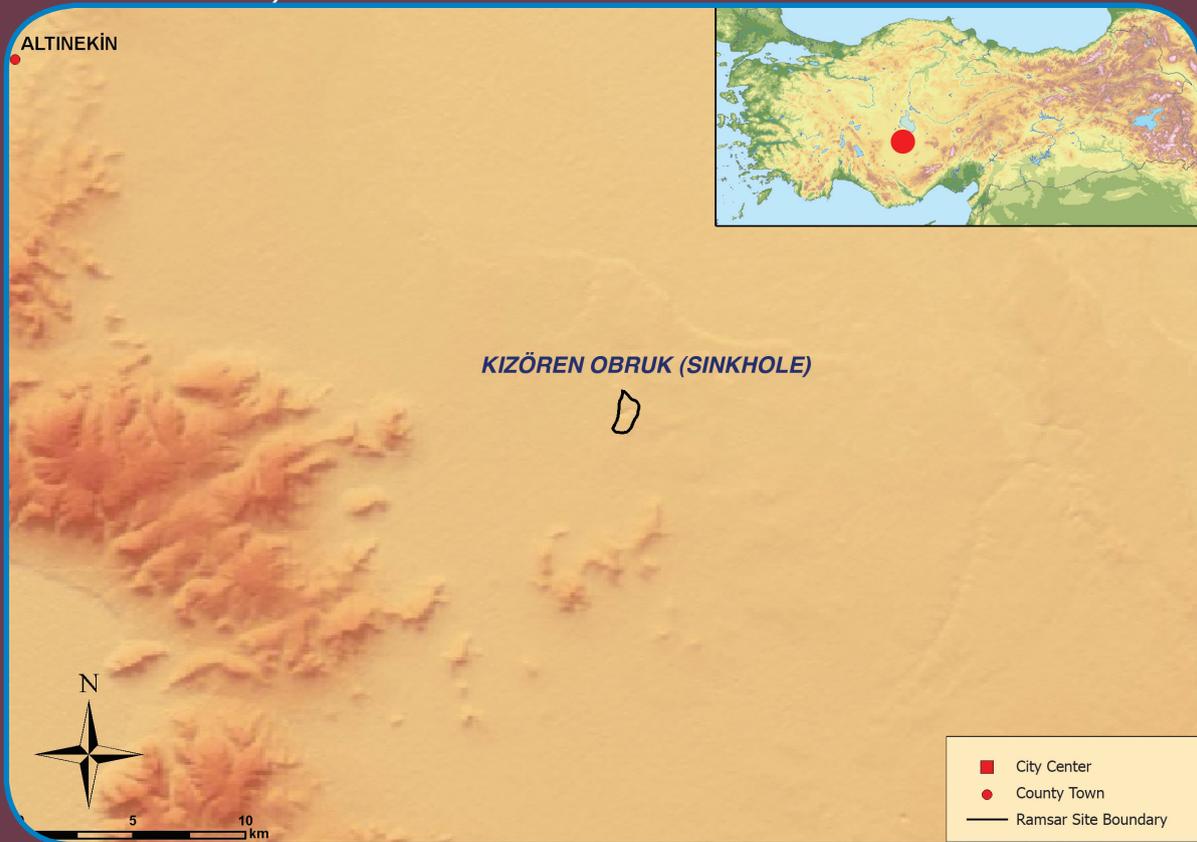
The site has no wetland management plan as human activities in the site are rare.

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# KIZÖREN OBRUK (SINKHOLE) RAMSAR ALANI

Map of Kizören Obruk Ramsar Site



## KIZÖREN OBRUK

Situated in the centre of Konya Closed Basin nearby Kizören Village on Konya-Aksaray highway, Kizören Obruk (Sinkhole) has an elliptical shape. The sinkhole's long-axis is 180 m and short-axis is 150 m. The deepest point of the sinkhole is 145 m from the surface. Water volume variance between summer and winter is about 1-2 meters. Kizören Sinkhole is in Obruk Town of 186.552-populated Karatay district in north-eastern part of Konya. It is one of the many in Obruk (Sinkhole) Plato in the south of Tuz (Salt) Lake.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Kizören Obruk (Sinkhole)
<b>Location and Boundaries</b>	Located in Obruk Town of Karatay district in north-eastern part of Konya.
<b>Area</b>	127 ha
<b>Coordinates</b>	38°20'N 33°20'E
<b>Elevation</b>	1000 m - 1080 m
<b>Conservation Status</b>	Ramsar Site Archeological Site Area
<b>Population</b>	202 (Kizören Village)
<b>Climate</b>	Continental
<b>National and International Significance</b>	Turkey's wetland of international importance Key Biodiversity Area Important Bird Area
<b>Site Significance</b>	Karstic wetland ecosystem
<b>Site Symbols</b>	Non-existent
<b>Management Plan</b>	Preparation
<b>Facilities in the Site</b>	Non-existent

### Land Tenure / Proprietorship

The area within the boundaries of Ramsar site is public property and there is no private property in this area. There are agricultural lands which are private property, as well as public property shrublands in the surrounding area of the site.

### Conservation Statuses

The site was designated as a Ramsar Site for being a karstic wetland by the Ministry of Environment and Forestry in 2006. The site also has an Archeological Site Area status by Ministry of Culture and Tourism.

Kizören Obruk Ramsar Site meets two out of nine criteria for identifying wetlands of international importance. These are;

RAMSAR CRITERIA	DESCRIPTION	KIZÖREN OBRUK
<b>Criterion 1</b>	The site is a rare wetland area.	The site has a special significance due to its karstic structure. It differentiates from other sinkholes since its diameter and depth is far more.
<b>Criterion 2</b>	The site supports endangered bird species which are included in the International Union for Conservation of Nature (IUCN) red list categories and species protected under Bern Convention.	The site supports nine plant species, which are endemic and/or endangered and/or protected under Bern Convention.

## MANAGEMENT STRUCTURE

The site is under the jurisdiction of Ministry of Environment and Forestry Konya Provincial Directorate General of Environment and Forestry.

## HYDROLOGICAL ASPECTS

Annual precipitation in Konya varies to a great extent between 294.9 mm (Karapınar) and 764.0 mm (Seydişehir). Precipitation increases throughout the province in autumns and especially winters.

According to the meteorological data collected from some districts of the province, average relative humidity is 61.2 %, average temperature is 10.9 °C. Due to its formation, the sinkhole has the same volume of water as the groundwater. That is why Kızören Obruk contains the same level of water as the wells surrounding it. In the period of 1996-2006 water level has decreased by an additional 10 m, as data from a very close well reveals. The groundwater flow trend is towards north in and around the sinkhole.



## GEOLOGICAL ASPECTS

The top unit is Upper Paleozoic (dating back to 545-251 million years ago) old marble. With an expansion in limited area, the unit is gray in color with a lot of fissure and fractures, as well as cellular solution. Neocene (dating back to 23.8 – 1.81 million years ago) is represented with conglomerate, marl, silt, clay, limestone and siliceous limestone levels in a vast area. The limestone that caused karstification and formation of sinkholes also belongs to this period and is almost 3.000 m in thickness. Over the Paleozoic and Neocene, come the Quaternary (covers the past 2 million-year period) alluvions. Besides these, basaltic lava, tuffite and pyroclastic material formed as a product of young volcanism in Üzecek Mountain and Karapınar are also the geological units in the site.

## BIOLOGICAL ASPECTS

### Habitats

There are no living organisms recorded in Kızören Obruk and there is no record of microorganisms in the water. The sinkhole is surrounded by plains, natural structure of which used to be shrublands and later transformed into agriculture lands.

## WILDLIFE

### Flora

The site supports nine plant species, endemic and/or endangered and/or protected under Bern Convention.

<i>Acantholimon halophilum</i>	Endemic
<i>Allium sieheanum</i>	Endemic and threatened
<i>Allium vuralii</i>	Endemic, Bern Convention
<i>Astragalus cicerellus</i>	Endemic and threatened
<i>Gladiolus halophilus</i>	Endemic and threatened
<i>Lepidium caespitosum</i>	Endemic and threatened
<i>Limonium lilacinum</i>	Endemic and threatened
<i>Sphaerophysa kotschyana</i>	Endemic, Bern Convention
<i>Verbascum pyroliforme</i>	Endemic and threatened

## Birds

The sharp cliffs of the sinkhole constitute a very important shelter and nesting area for birds. Among these birds are Tawny pipit (*Anthus campestris*), Stone curlew (*Burhinus oedicephalus*), long-legged buzzard (*Buteo rufinus*), greater short-toed lark (*Calandrella brachydactyla*), greater sand plover (*Charadrius leschenaultii*), Calandra lark (*Melanocorypha calandra*) and black-bellied sandgrouse (*Pterocles orientalis*). A couple of white-headed duck (*Oxyura leucocephala*) were recorded in the site in 2010.

## CULTURAL and SOCIAL ASPECTS

### Archeology

Kızören Obruk has hosted many civilizations starting from the Byzantium period as if proving the fact that all civilizations began around wetlands.

Located 30 m to the south of the sinkhole, Konya-Karatay Obruk Hanı (Inn) which bears traces of Byzantium, Seljuk and Ottoman cultures, has managed to remain for more than a thousand years. Following the designation of the sinkhole as a Ramsar site, activities in the area increased and the inn was included in the restoration program by the Directorate General of Foundations. The restoration which started in 2008 still continues. Together with Kızören Village right by the sinkhole, the inn is an attractive and representative example of the nature-human interaction in the sinkhole.



Konya-Karatay Obruk Hanı (Inn) © Selim Erdoğan



Water Pump © Selim Erdoğan

### Past and Present Land Use

The groundwater in the sinkhole was drawn via a pump installed on the sinkhole crown in the past. In other words, the sinkhole water was used for drinking and irrigation purposes. The water provided from Kızören Obruk is crucial since the region has heavy drought problems. Kızören Village and the Seljuk-era caravansary placed just by the sinkhole proves the sinkhole's significance. Today the pump has remained over the water level, so sinkhole water cannot be drawn anymore. Agricultural activities around the sinkhole continue.

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## NATURAL RESOURCE USE

### Agriculture

The most intensive agricultural activity in the site is sugar beet cultivation. Recently the state has promoted sunflower cultivation which needs less water. However, as sugar beet cooperatives provide support to the farmers, sugar beet cultivation continues.

## WETLAND MANAGEMENT PLAN

No management plan has been prepared because human activities in Kızören Obruk is rare.

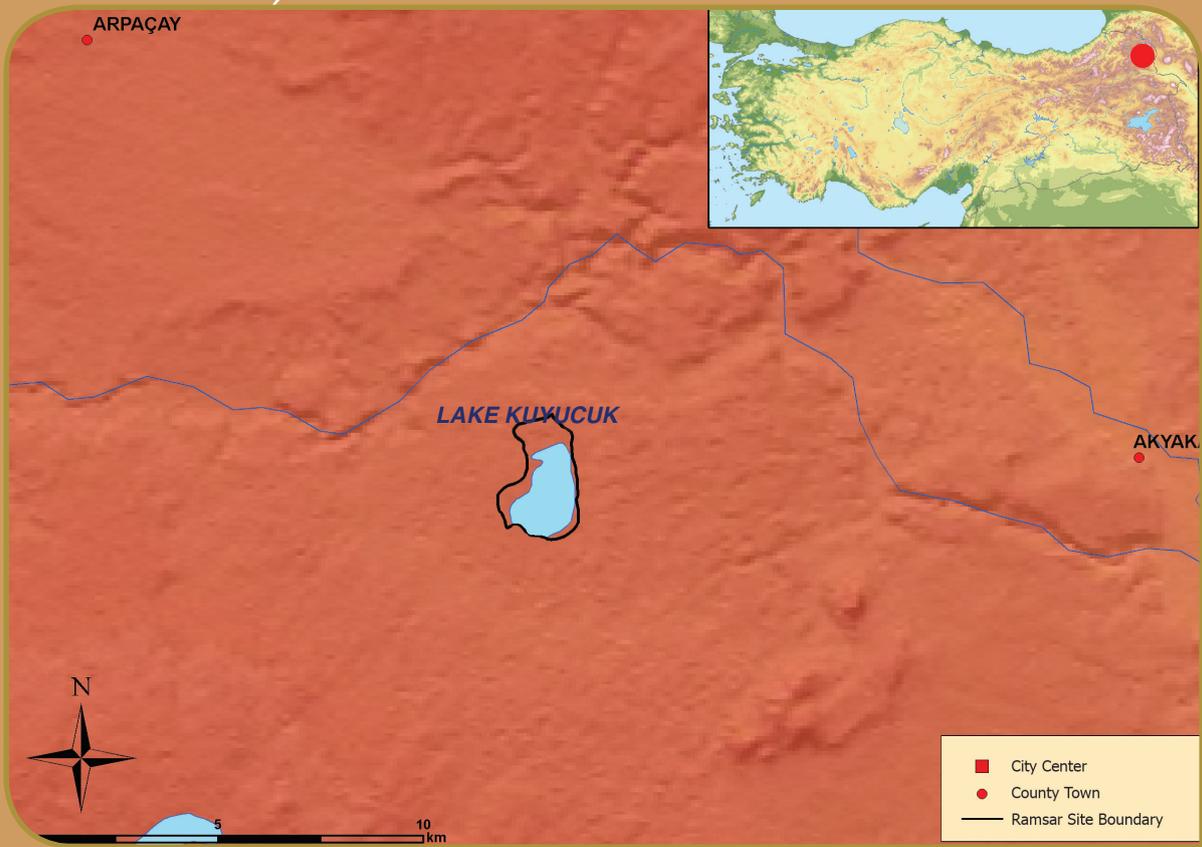
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# LAKE KUYUCUK RAMSAR SITE

Map of Lake Kuyucuk Ramsar Site



## LAKE KUYUCUK

The only Ramsar Site in Eastern Anatolian Region in Turkey, Lake Kuyucuk is a little freshwater lake situated in the centre of Kars-Akyaka Plato. Kars-Akyaka highway passes through the north of the lake. The lake's distance to the city center is 37 km.

### SITE IDENTITY

<b>Name of the Ramsar Site</b>	Lake Kuyucuk
<b>Location and Boundaries</b>	Located within the boundaries of Kuyucuk and Duraklı Villages, Akyaka and Arpaçay districts of Kars province.
<b>Area</b>	416 ha
<b>Coordinates</b>	40° 45'N 43° 27'E
<b>Elevation</b>	1.627 m
<b>Conservation Status</b>	Ramsar Site Wildlife Improvement Site
<b>Population</b>	302 (Kuyucuk Village)
<b>Climate</b>	Continental
<b>National and International Significance</b>	Turkey's wetland of international importance Key Biodiversity Area Important Bird Area
<b>Site Significance</b>	The shallow lake supports a broad variety of bird species as it is situated on African-Eurasian migration route.
<b>Site Symbols</b>	Ruddy shelduck ( <i>Tadorna ferruginea</i> ), white-headed duck ( <i>Oxyura leucocephala</i> ), red-breasted goose ( <i>Branta ruficollis</i> ), ferruginous duck ( <i>Aythya nyroca</i> )
<b>Management Plan</b>	The wetland management plan of the site is expected to be completed by early 2011.
<b>Facilities in the Site</b>	There is a former teachers' lodge with a capacity of six beds transformed into a guest house by Kuzey Doğa Association and Kars governorate.

### Land Tenure / Proprietorship

There are public, private and meadow properties around the lake. The east of the lake is owned by Duraklı Village, while the west and south is owned by Kuyucuk Village. There is a line of meadow area from Kuyucuk Village centre down to the west of the lake.

### Conservation Statuses

Lake Kuyucuk has been designated as the only Ramsar Site in Turkey's Eastern Anatolian Region in 2009. It was also designated as a wildlife reserve for waterbirds.

Lake Kuyucuk Ramsar Site meets 6 out of 9 criteria for identifying wetlands of international importance. These are;

RAMSAR CRITERIA	DESCRIPTION	LAKE KUYUCUK
<b>Criterion 1</b>	Lake Kuyucuk is a rare wetland in its biogeographic region.	Lake Kuyucuk is situated in a transition zone between Caucasian and Irano-Anatolian hotspots. It is on the African-Eurasian migration route which millions of birds follow to migrate in falls and springs.
<b>Criterion 2</b>	20 threatened or near threatened species out of 27 in Turkey can be observed in Lake Kuyucuk. The site also supports 7 threatened and 9 near threatened bird species.	Dalmatian pelican ( <i>Pelecanus crispus</i> ), red-breasted goose ( <i>Branta ruficollis</i> ), ferruginous duck ( <i>Aythya nyroca</i> ), white-headed duck ( <i>Oxyura leucocephala</i> ), red kite ( <i>Milvus milvus</i> ), Egyptian vulture ( <i>Neophron percnopterus</i> ), cinereous vulture ( <i>Aegypius monachus</i> ), pallid harrier ( <i>Circus macrourus</i> ), imperial eagle ( <i>Aquila heliaca</i> ), lesser kestrel ( <i>Falco naumanni</i> ), red-footed falcon ( <i>Falco vespertinus</i> ), black-tailed godwit ( <i>Limosa limosa</i> ), great spine ( <i>Gallinago media</i> ), great bustard ( <i>Otis tarda</i> ), black-winged pranticole ( <i>Glareola nordmanni</i> ), European roller ( <i>Coracias garrulous</i> ) are the threatened or near threatened bird species recorded in Lake Kuyucuk.
<b>Criterion 3</b>	With its flora and fauna characteristics, Lake Kuyucuk has a significant importance for the long-term existence of the region's genetic and ecological richness.	With 214 bird species Lake Kuyucuk supports 77 percent of the bird species recorded in Kars, 45 percent of the bird species all around Turkey and more than half of the bird species recorded in Caucasian hotspot. The lake supports thousands of ruddy shelducks and hundreds of black-necked grebe in falls, springs and summers.
<b>Criterion 4</b>	Lake Kuyucuk is a stopover, feeding and breeding area for many bird species with respect to its location.	Since it is the only shallow lake in the region, Lake Kuyucuk supports 214 bird species during their migration and breeding periods. Including white-headed duck ( <i>Oxyura leucocephala</i> ) 14 species breed in the site.
<b>Criterion 5</b>	The site regularly supports 20,000 or more waterbirds.	Lake Kuyucuk supports thousands of ruddy shelduck, grayleg goose and Eurasian coot during migration in falls. In 2004 census, more than 20.000 ruddy shelduck, almost 10.000 grayleg goose, about 10.000 Eurasian coot and 40 other waterbird species are observed in the lake.
<b>Criterion 6</b>	The site regularly supports 1 percent of the individuals in a population of one species or subspecies of waterbird.	This number corresponds to almost 5-12 percent of the estimated world population of ruddy shelduck (170.000-220.000). In 2004, 2006 and 2007, 20.000, 13.000 and 10.000 ruddy shelducks were recorded in the lake.

## MANAGEMENT STRUCTURE

The site is under the jurisdiction of Ministry of Environment and Forestry Kars Provincial Directorate General of Environment and Forestry, due to having Ramsar Site and Wildlife Reserve conservation statuses.



Lake Kuyucuk © Serhan Çağırankaya

The management plan of the site is expected to be completed by early 2011. The management plan will be executed by Kars Local Wetland Commission that consists of local administrations, relevant village authorities, Caucasian University and Kuzey Doğa Association.

## HYDROLOGICAL ASPECTS

Situated in Kars-Akyaka Plato, the lake is fed by spring water. The deepest point of the lake is 13 meters. Surfacewater containing nitrate, phosphate and other chemicals from the surrounding agriculture lands may leak into the lake. Chemical measurements conducted in springs of 2006 and 2007 revealed that the lake water is relatively clean and the lake is an ideal candidate for ecological restoration.



Lake Kuyucuk © Can Yeniurt

## GEOLOGICAL ASPECTS

The Kalkankale formation in Lake Kuyucuk and its surrounding area, consisted of early Pliocene old sandstone, mudstone and schist, covers vast areas forming the plain and low-pitched areas. Early Pliocene old Kura volcanites (agglomerate, tuff, and andesite) form the elevations in the north of the lake while Dumanlıdağ pyroclastics (tuff, andesite, perlite, pumice, obsidian) form the elevations in southwest.

Lake Kuyucuk and its immediate surroundings are generally plain and low-pitched. Its elevation ranges around 1.630 m - 1.640 m. Perkit Creek located in a deep valley in the north of Lake Kuyucuk flows through 1.567 m and 1.548 m. Hills have 1.665- 1.675 m of elevation values. Average slope in the immediates of the lake is 0-5 percent whereas hills vary between 5-15 percent. The highest slope in the site is through the valley where Perkit Creek flows.

Topographic elevations of Lake Kuyucuk are as follows: Cadalı Heights (1.772 m) in the southwest; Büyükalmet Heights (1.676 m), Küçükalmet Heights (1.657 m), Kızılgüney Heights (1.646 m) and Uzungüney Heights (1.660 m) in the north; Alaca Heights (1.693 m) in the west; Yumru Heights (1.656 m) and Mevzili Heights (1.655 m) in the southwest.

## BIOLOGICAL ASPECTS

### Habitats

The surface of the lake covers most of the site. There are wet meadows around and small reed beds particularly in southern parts of the lake. The unwooded steppes surrounding the lake are utilized for cereal and fodder cultivation along with livestock production.

### WILDLIFE

#### Flora

Lake Kuyucuk supports the globally threatened plant species named *Elymus sosnowskyi* that is endemic to Turkey. Though bulrush (*Typha* sp.), reed (*Phragmites* sp.) and common cattail (*Juncus* sp.) occur by the lake, the shores of the lake are, indeed, poor in terms of plant cover.

#### Fish

The lake supports no species due to its highly acidic water.

#### Amphibians and Reptiles

European green toad (*Bufo viridis*) and marsh frog (*Pelophylax ridibundus*) are the amphibian species while sand lizard (*Lacerta agilis*) is the reptile species recorded in the site.

#### Birds

The site supports a high variety of bird species as it is situated on the African-Eurasian migration route. The site is very important for bird communities and have great nature tourism potential, particularly for the symbolic species of ruddy shelducks (*Tadorna ferruginea*). In September 2004, almost 12 percent of the world ruddy shelduck population (over 20.000 individuals) was observed on the lake just



Lake Kuyucuk © Serhan Çağırankaya



in one day. Including globally endangered white-headed duck (*Oxyura leucocephala*) and red-breasted goose (*Branta ruficollis*), velvet scoter (*Melanitta fusca*), western marsh-herrier (*Circus aeruginosus*) and common crane (*Grus grus*), 214 bird species are recorded in the site.

### **Mammals**

Fox (*Vulpes vulpes*), southern vole (*Microtus rossiaemeridionalis*), Nehring's blind mole rat (*Nannospalax nehringi*) and marbled polecat (*Vormela peregusna*) are the mammals recorded in the site.

## **CULTURAL and SOCIAL ASPECTS**

### **Archeology**

Kuyucuk Village used to be a Molokan Village before, however Molokans have left after 1920. Later on, Karapapaks settled in the village that was deserted coming from regions, which are currently within Georgian and Armenian borders.

Since Kuyucuk was a Molokan village, early constructions were built by them. The most remarkable ones are the village school built in 1907 and the mosque in 1909. The village school has remained unchanged. The village mosque – meaning the church of Molokans, – however, used to be a three-storey building. Having been damaged and torn down in time, only a single storey is left intact. A church bell of three tons at the top storey was demounted and damaged.

Other Molokan constructions are the village chambers. These works could preserve their beauty on the outside.

### **Past and Present Land Use**

Livestock production and agricultural activities shape the past and present land use in Lake Kuyucuk.

## **NATURAL RESOURCES USE**

The most important human activities in the surrounding area of the lake are agriculture and livestock production. Mostly fodder crops are cultivated. Cattle raising is also one of the most important sources of income.

Bird ringing and wetland restoration activities are conducted in Lake Kuyucuk. Birdwatchers and nature tourists visit the site from the first months of spring till the end of fall. Students attending local schools and colleges celebrate special days such as World Biodiversity Day, Environment Day, Migratory Birds Day and Birdwatching Day in the site.

### **Agriculture**

Rainfed agriculture is common around Lake Kuyucuk. Wheat, barley, trefoil, oat and clover fields that are harvested at the end of July or at the beginning of August surround the lake. Cattles are grazed in the same area following the harvest. Viilagers make hay for winter by binding the weed from the ungrazed rangelands.

### **Livestock**

Cattle farming in the region is intense. There are 5000 cattle grazing by the lake in Kuyucuk, Carcioğlu and Duraklı villages. Despite the prohibition of animal entrance into the site, early-grazing during April, when the grass is just starting to grow, leads to serious degradation of the grass and reeds around the lake.



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## **WETLAND MANAGEMENT PLAN**

Preparation of Lake Kuyucuk Wetland Management Plan was put out to tender by the Ministry of Environment and Forestry in 2010. The management plan is expected to be completed by December 2010 and enforced as of early 2011.

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