Ramsar Sites of Turkey

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Preface

Turkey adheres to certain international contracts concerning the conservation of the vulnerable ecosystems and species it possesses. One of the most important international contracts 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 at 1971 and come to force in 1975. This 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 have parted in the convention. Across the parting countries, 1919 wetlands of a total size of 187.054.624 hectares have been declared Ramsar Sites. Turkey has signed 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 to be wetlands of international significance and had them covered by the convention. Countries parting in 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 concernin 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 conservation sites 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 dalmatian pelican (*Pelecanus crispus*) which is endangered all around the world breeds are Ramsar sites that matter not only for our nation but also for the world for the protection of this rare species, demonstrating that Ramsar Sites stand with gloal significance.

When we look closely at the 13 Ramsar Sites of Turkey, threats over habitats are more apparent than direct threats concerning species; industrial and residential waste causing excessive pollution in lakes and rivers, decline in water levels and expansion of man made areas due to irregular urbanization and the encircling of human activities around wilderness sites stand amoung the most important issues we face. Obviously more than 13 sites in our country deserve to be Ramsar sites. We nature protectionists, expect and demand the Ministry of Environment and Forestry which is the institution following and applying the aforementioned convention to take Ramsar Sites forwards in quality and quantity.

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

Cem Orkun Kıraç
Doğa Derneği Managing Board Member
March 2011, Ankara

Evaluation

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

While the loss of wetlands on a global level is not known accurately, it is established in several world scale researches that more than 50% of wetlands around the world have been lost. Whereas in Europe this ratio is estimated to be more than 90%. Wetlands have been ecosystems of settling value and use to humans since antiquity for their value and functions. Population rise, urbanization, food demand led to an increase of drainage especially in the USA and Europe after the 19th century, while the threats concerning wetlands in different areas have increasingly grown. In light of these developments, the significance of wetlands have become noticed and studies concerning wetland conservation have increased and are increasing. Ie. Today the fact that 160 countries part in the Ramsar Convention shows that the conservation of wetlands is of special significance. Innumerable organizations are paying effort for the conservation of wetlands around the world.
Turkey parted in the Ramsar Convention in 1994 and by declaring 13 Ramsar Sites, undertook the conservation of 179.898 hectares within its borders, but took the responsibility to protect not only Ramsar Sites but all wetlands on its land. The rise of significance attributed to wetlands have found its place in Turkey along with the world and many practices have been carried regarding wetlands.
A look at studies present before Doğa Derneği's Evaluatiıon of Management Planning Processes in Ramsar Sites completed in 2010, an emphasis on the effects of agriculture on wetlands is seen, while interventions to water regime, pollution from residential and industrial waste, the introduction of foreign fish species into wetland systems, excessive hunting are emphasized as threats. The situation today reveals that, in addition to the former threats, last years' drought will 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.
Turkey has taken big steps towards the preperation and implementation of management plans for wetlands. However, as is with other planning practices, participatory wetland management planning is a long span process. It takes a long while 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 area, 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 area or may affect in the future. While defining long and short term goals related to the area with different parties, defines the path that needs to be taken and facilitates the resolving/managing of conflicts over the area with this information. However, the benefits of wetland management plans are not limited to this; reaching defined goals for the area clearly displays the matters that need managing and defines the finance or labour necessary to carry this, making it easier to provide these with the contribution of different parties. As our interviewees asserted, wetland management plans make the importance of wetlands known to a wider public, explain why precautions are taken, strengthen communicitaion with the parties and reinforce trust with their transparent nature.
The experience of making 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 area managers, provide lessons that can be useful in many areas for the making of better plans. En example to these lessons is the planning process which contributed to the recognition and apprehension of the area to a much better level. In some areas the importance of training on wetland management planning for the success of the planning process is emphasized. Practice towards an increase in participation has shown important value for the existing situation to be better known and to collect support. En emphasis has been put on the

guidance of experience and support from NGO's and the benefits of researching income generating activities in the planning process for the success of implementation. A scientific data foundation where proposed interventions to the area would be evaluated beforehandedly, to define precautions or to cancel the intervention, is accented as useful in the improved understanding of wetland ecosystem and taking perceptinle steps towards their conservation. However we are still at the beginning and we have problems empowering participation in the preperation process and the implementation of the plan as adopted by all parties. Steps such as strengthening coordination among institutions and increasing the capacities of parties that will prepare and update the plan lay ahead of us. We need practice towards securing the financal aspect of wetland management plans with regulations, monitoring more technically, and developing awareness on the importance of wetlands at a national scale.

The current situation where local interest groups are uniting as to more actively participate in the stage of managing Ramsar sites, the İzmir Bird Area Conservation and Development Organization in the Gediz Delta and Samsun Local Wetland Commission Technical Commitee in the Kızılırmak Delta, the increasing pace of Ramsar Site Management Plan practices, bring hope both for the lessons to be gained in process and for the wise use and participatory management of wetlands. Evaluating and making use 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 in the conservation of wetlands.

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Ramsar Convention and Turkey

Signed at Ramsar/İran 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) has included Turkey in 1994. The convention came into force with the Ministry vertict 94/5434 and the decision was declared on 05.17.1994 with the official journal number 21937.

Wetland; natural or man-made, permament or temporary, continuous or seasonal, ditch or running, fresh, brackish or salt water, at a maximum of 6m during low tide, mattering as habitats to especially aquatic birds 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 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)

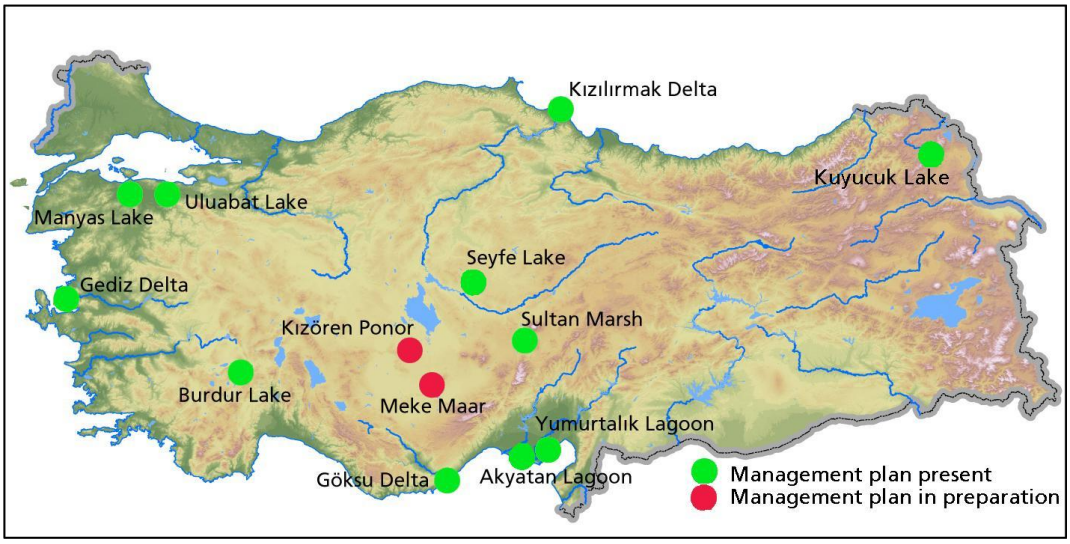
Map of Turkey’s Ramsar Sites

Table 1: Information on Turkey's Ramsar Sites

No	Name	Province	Ramsar Site Declaration Date	Area(ha)	Source Value	Management Plan
1	Sultan Marshes	Kayseri	13.07.1994	17.200	Fresh and salt water ecosystems, vast marshes and swamps, meadows, steppe, aquatic birds, plants and fish	Yes
2	Kuş (Manyas) Lake	Balıkesir	13.07.1994 1998 (change of borders)	20.400	Shallow fresh water lake, marshes, longoz meadows, scrubs, longoz willow groups, important bird area	Yes
3	Seyfe Lake	Kırşehir	13.07.1994	10.700	Shallow salt water lake, marshy meadows, halophilic steppe, steppe flora, birds	Yes
4	Göksu Delta	Mersin	13.07.1994	15.000	Lakes and marshes, halophilic wetlands, sandbanks, sand dunes, aquatic birds, mediterrenean sea seal, sea turtle, green sea turtle, butterflies, dragonflies	Yes
5	Burdur Lake	Burdur ve Isparta	13.07.1994 1998 (change of borders)	24.800	Lake, steppe, oak groups, marshes, salt swamps, birds, inland water fish, butterflies	Yes
6	Kızılırmak Delta	Samsun	15.04.1998	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
7	Uluabat Lake	Bursa	15.04.1998	19.900	Fresh water lake, delta ecosystems, scrubs and willows, aquatic plants, aquatic birds, otter, inland water fish	Yes
8	Gediz Delta	İzmir	15.04.1998	14.900	Fresh water, salt water and brackish water ecosystems, sand dunes, lagoons, halophilic coastal meadows, marshes, temporary wet meadows, gallery forests, birds, mammals, inland water fish	Yes
9	Akyatan Lagoon	Adana	15.04.1998	14.700	Lagoon, mud fields, sand dunes, marshes and fresh/salt water swamps, aquatic birds, mammals, reptiles, fish	Yes
10	Yumurtalık Lagoons	Adana	21.07.2005	19.853	Lagoons, salt swamps, fresh water swamps, wet meadows, sand dunes, aleppo pine, aquatic birds, sand flora, mammals, fish	Yes
11	Meke Maar	Konya	21.07.2005	202	Geomorphologic	In process
12	Kızören Obruk (Sinkhole)	Konya	02.05.2006	127	Geomorphologic	In process
13	Kuyucuk Lake	Kars	20.06.2009	416	bird diversity and geographical qualities	Yes

Ramsar Sites being foremost, for Turkey's wetlands conservation areas are determined and management plans are made in stages to fulfill both liabilities related to the convention and national law. In practices until now, 11 of 13 Ramsar Sites(Sultan Marshes, Burdur Lake, Göksu Delta, Gediz Delta, Kızılırmak Delta, Yumurtalık Lagoons, Uluabat Lake, Manyas Lake, Akyatan Lagoon, Seyfe Lake, Kuyucuk Lake) have taken management plans into action while plans for the other 2(Kızören Obruk, Meke Maar) are in process.

Map of Wetland Management Plans in Turkey's Ramsar Sites



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Wetlands: Habitats of Great Importance

Wetlands, considered the worlds natural wealth museums due to the biological variety they host, are the most important ecosystems in the world with their natural functşons and economic value. Wetlands:

- By fostering or evacuating subterrenean waters, balance groundwater. By storing flood waters, leveling floods, inhibiting seawater from getting in shore, regulate the region's water regime.

- Raise 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 aquatic birds.

- Possess high economic value. Fishery, agriculture and livestock farming, reed production, tourism and transportation oppurtunities 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 aquatic birds 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

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

Name of the Ramsar Site	Sultan Marshes
Location and Boundaries	Located within the boundaries of Develi, Yahyalı and Yeşilhisar districts of Kayseri province.
Area	17.200 ha
Coordinates	38º 20'N 035º 17'E
Elevation	1070 m -1260 m
Conservation status	Ramsar Site Natural Site Area Wildlife Improvement Area National Park
Population	23.714
Climate	Continental
National and International Significance	Turkey's wetland of international importance Key Biodiversity Area Important Plant Area Important Bird Area
Site significance	Important wetland system in Central Anatolia
Site symbols	Reed harvesting
Management Plan	2007-2011 Management Plan is enacted.
Facilities in the site	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 taken under protection as Sultan Marshes Wildlife Protection Site in 1971. Sultan Marshes Wildlife Protection Site has become a Natural Habitat Site pursuant to Bern Convention in 1984. An area of 17.200ha was designated as nature conservation site in 1988. An area of 39.000ha was designated as important bird area in 1990.
The 17.200ha nature conservation site was also designated as natural site of 1st degree based on its boundaries in 1993 and as Ramsar Site in 1994. In 2003, the boundaries of the nature conservation site was re-designated and increased to 24.523ha. The status of

the 24.523-hectare nature conservation site was changed as 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**
Criteria 2	The site supports threatened and vulnerable species listed in International Union for Conservation of Nature (IUCN) red list categories.	The site supports threatened white-headed duck (*Oxyura leucocephala*) as well as vulnerable red-breasted goose (*Branta ruficollis*), ferruginous duck (*Aythya nyroca*), imperial eagle (*Aquila heliaca*), greater spotted eagle (*Aquila clanga*), lesser kestrel (*Falco naumani*), corn crake (*Crex crex*), great bustard (*Otis tarda*).
Criteria 3	The site regularly supports of clusters 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 clusters due to being located on two main bird migration routes.
Criteria 4	Significant numbers of birds stage in the site during migration period.	Gray heron (*Ardea cinerea*), little cormorant (*Phalacrocorax pygmeus*), white-headed duck (*Oxyura leucocephala*), ruddy shelducks (*Tadorna ferruginea*), western marsh harrier (*Circus aeruginosus*), common kingfisher (*Alcedo atthis*) occur in the site in summer and winter seasons. Flamingo (*Phoenicopterus roseus*), Eurasian spoonbill (*Platalea leucorodia*), stork (*Ciconia ciconia*) as well as some duck and goose species use the site as stopover during migration.
Criteria 5	20.000 individual of bird species regularly inhabit in the site.	Every year between September and October bird population exceeds 500.000.
Criteria 6	A wetland, where collecting data on populations is possible, should be considered internationally important if it regularly supports 1% 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 (*Phoenicopterus roseus*) population reaches far more than 1% threshold. For example in 1998 more than 200.000 flamingos were recorded in the area.

MANAGEMENT STRUCTURE

Management of Sultan Marshes is under competency 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 authority for the implementation of management works in the site.

HYDROLOGICAL ASPECTS

Sultan Marshes is situated in the centre of a 319.000-hectare closed catchment basin. 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 Dündarlı 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 interruption until 1960s. Yahyalı and Dündarlı Streams feed the Güney Marshes that receives abundant inflows in winters and the freshwater lakes. After Güney Marshes reach maximum saturation, water flows into Lake Yay. Whereas in the north surface and ground water flows of Soysallı and Çayırözü Springs primarily fills in Kepir (Kuzey) Marshes, then spreading from the Marshes reaching Lake Yay.

Lake Yay is located at the lowest altitude of Develi Plain. A shallow lake with a maximum depth of 1.5m, Lake Yay dries totally in some years. To sustain its lowest level of 1070.2m the minimum annual water inflow amount is 20 million m3 for Lake Yay and 10 million m3 for Güney Marshes; a total of 30 million m3.

In 1960s, when the importance of swamp and wetland ecosystems was a scarce knowledge, a Develi Merhale Project by the State Waterworks Directorate (DSİ) aimed at draining the whole basin to transform it into agriculture lands. At the beginning of 1970s under a project the DSİ started to implement throughout the basin for agricultural irrigation purposes, three dams were constructed and most of the water resources inside the basin were begun to be used for irrigation. When additional drainage canals were also opened, the ground water level of the basin has remarkably decreased and the degenerated 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 Lake Yay and its environment, volcanic tuffs surround Sindelhöyük.

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 sinked, the oldest volcanic ground of Erciyes Mountain that had been formed in the middle of two

plain had also started to sink and the central cone of the mountain erected on this sank ground. This formation of the mountain determined the formation of İncesu Valley in northeast and particularly of Aliboran and Çalbama coastlines, which 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 6.953ha. 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 agriculture lands as part of the Land Reform in 1950s, the original character of the habitat has been significantly degenerated and today only a 2.034-hectare portion of it exists.

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

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 lake representing salt lakes within the conservation site at the best. Ground water carrying salty minerals of the soil, flowing from north and south feed the lake. These minerals become condense within the lake water due to evaporation. Because of the spring inflow shortage Lake Yay has come to completely drying recently. Other salt lakes located within the saline area has shrunk and come to 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 conservation site, where there is no freshwater inflow and the land is covered with salty soil, take up an area of 8.777ha.

WILDLIFE

Flora

The existence of numerous different habitats such as aquatic, terrestrial, salt 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 taxons 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*), harmal (*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 narrow 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. European tree frog (*Hyla arborea*) among these species 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 of 10 classes are recorded. Spur-thighed tortoise (*Testudo graeca*) among these species 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 through Europe, Asia and Africa. The site is known to provide 247 bird species with feeding, breeding and staging possibilities.

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 golden plover (*Pluvialis apricaria*), 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 (*Glareola pratincola*), 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 minutes*), 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*), slander billed gull (*Larus genei*) and black-winged stilt (*Himantopus himantopus*) are the other important bird species brooding in the site.
In the last records from the region, almost 1500 pairs of flamingos are known to brood on the islands in Lake Yay in 1970.
Some bird clusters reach large numbers during migration season. The total bird number exceeds half a million in September and Octobers, the gathering period of birds.
About 185.000 flamingos were counted in Lake Yay in September 1997. This is the highest number observed outright so far.

Mammals

21 mammal species are recorded in Sultan Marshes. Lesser mole rat (*Nannospalax leucodon*) and European marbled polecat (*Vormela peregusna*) among these species are listed in IUCN Red List vulnerable category; 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 remnants within the boundaries of conservation site, people inhabiting in the environments of Sultan Marshes has used it for settlement, grazing and agricultural activities for ages. Young sedge offshoots are used as fodder and old sedge plants as the roof material of houses. Local people have organized a sustainable management system of their own understanding concerning the ecosystems they live in and use. The land use in the site, however, began to change as a result of the interventions started in 1950 under the Land Reform. Following the land registry and cadastre works in 1968-1972, local people were given the competency to use, control and manage their own lands. The competency of determining and controlling the land use methods of lands in Sultan Marshes have been handed over to the state authority when the site was given a legal protection status in 1971.

NATURAL RESOURCE USE

57 percent of the people living in Sultan Marshes and immediates own agriculture lands and 66.1 percent of them are occupied with livestock production.

Agriculture

Agriculture is the most important source of income of the local people. Agriculture 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 used for agricultural purposes. Sugar beet, sunflower, wheat and barley are produced in these lands. In Ovaçiftlik and Yeşilova Villages in the southern parts of the site an area of 442.8ha is used for agricultural purposes. Apple is produced in this area 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 so that popularizing production of plants with less irrigation requirements, controlled pesticide and fertilizer use, more convenient irrigation techniques requiring less water and rehabilitating the lands has been implemented in Kayseri since 2005.

Livestock

One of the main means of living of local people of Sultan Marshes and its immediates 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 opened to agriculture. Seasonally flooded meadows apart from these are used for pasture except in winters. Because livestock production in the region is carried out conventionally, most of the animals of the local people graze inside or around the conservation site during the year.

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

Reed Harvesting

Güney Marshes cover 3.817ha of the conservation site and the local people of Sindelhöyük, Yenihayat, Ovaçiftlik and Yeşilova neighborhoods use it as reed harvesting area to earn a source of 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 abroad. The annually exported reed amount 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

Visitors and some groups of interest in Sultan Marshes developed tourism activities and facilities without being planned and based on any rules as usual. 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 keeps around hundreds. Visitors can be categorized in two groups:

a) Visitors coming individually for birdwatching, who are mostly foreigners,

b) Visitors coming in groups for birdwatching and recreation consisted mostly of local students.

Two birdwatching towers are built in the site for the visitors. Because there is no walk-track arrangements, visitors use the existing pathways and routes used by the local people. The owners of guest houses organize boat tours aboard caiques moved by quants on Eğri, Bağınaltı and Sarp Lakes within the conservation site. These boat tours can be done when the water level is high.

Use for Research Purposes

Due to its ecological characteristic and biodiversity, Sultan Marshes has served as an open laboratory for the scientific researches to 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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Lake Kuş (Manyas) Ramsar Site

Lake Kuş (Manyas)

Lake Kuş (formerly Lake Manyas) is situated in a depression 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 groundwater. Karadere in the southeast is the outlet of the lake.

SITE IDENTITY

Name of the Ramsar Site	Lake Kuş (Manyas)
Location and Boundaries	Located within the boundaries of Bandırma and Manyas districts of Balıkesir province.
Area	20.400 ha
Coordinates	40º12'N 028º00'E
Elevation	14.50 m – 17.50 m
Conservation status	Ramsar Site Natural Site National Park Wildlife Improvement Site
Population	973.314
Climate	Marmara
National and International Significance	Turkey's wetland of international importance Key Biodiversity Area Important Plant Area Important Bird Area
Site significance	The site has a remarkable situation on the flyways between Asia, Europe and Africa.
Site symbols	Dalmatian pelican (*Pelecanus crispus*)
Management Plan	2008-2013 management plan has been prepared.
Facilities in the site	Visitor centre, birdwatching tower

Land Tenure / Proprietorship

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

Conservation Statuses

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 human-made platforms situated on 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 conservation sites 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 Site of 1st Degree. Lake Manyas Management plan prepared with cooperation of European Commission Life Programme was put into force in 2001.

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

RAMSAR CRITERIA	**DESCRIPTION**	**LAKE KUŞ**
Criteria 2	The site supports species protected under Bern Convention and European Union Habitats Directive.	Immediates of the lake is an important habitat for amphibians and reptiles. Great crested newt (*Triturus cristatus*), European gren toad (*Bufo viridis*), European tree frog (*Hyla arborea*), European copper skink (*Ablepharus kitaibelii*), European pond turtle (*Emys orbicularis*), tortois (*Testudo graeca*) are the species in the site that are protected under Bern Convention and European Union Habitats Directive (Annex II and IV). European snow vole (*Microtus nivalis*) is protected under Bern Convention. Again Danube bleak (*Chalcalburnus chalcoides*), *Barbus plebejus escherichi*, spined loach (*Cobitis taenia*), wels catfish (*Silurus glanis*), monkey goby (*Gobius fluviatilis*), marine tubenose goby (*Proterorhinus marmoratus*), marbled goby (*Pomatoschistus microps leopardinus*), asp (*Aspius aspius*), amur bitterling (*Rhodeus sericeus*) are the 9 fish species under protection.

Criteria 3	The site regularly supports significant numbers of waterbirds that show the value, fertility or richness of a wetland.	266 bird species are recorded in the site in the observations so far. .
Criteria 4	Particularly waterbirds use the site during migration periods.	In the observations 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 threatened species as Dalmatian pelican (*Pelecanus crispus*), pygmy cormorant (*Phalacrocorax pygmeus*). Great cormorant (*Phalacrocorax carbo*), grey heron (*Ardea cinerea*), glossy ibis (*Plegadis falcinellus*), Eurasian spoonbill (*Platalea leucorodia*) are other bir species breeding in the site.
Criteria 5	There are 20.000 bird species regularly in the site.	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.
Criteria 8	Lake Kuş is an important site for fish species.	Lake Kuş (Manyas) 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 (*Cyprinus carpio*), wels catfish (*Silurus glanis*), northern pike (*Esox lucius*) and European chub (*Leuciscus cephalus*) are the leading ones of these species.

MANAGEMENT STRUCTURE

The 64-hectare delta area formed by Sığırcı Creek was designated as a national park on July 27, 1959 and the 25.000-hectare covering Lake Manyas and its immediates was designated as wildlife conservation site. 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 competent authorities responsible for the management of the park. A total of five personnel including two administrative, two guards and one research associate work in the site.

The lake with its immediate environment was designated as Natural Site of 1st Degree in 1981. Ministry of Culture is responsible for the activities within the natural site.

Works to include the 120-hectare area of reed beds, wet meadow areas and muddy plains in the west of the Kuş Cenneti National Park within the national park borders continue. In the meantime land tenure of the mentioned area is handed over to Union for Conservation of Kuş Cenneti by the General Directorate of National Estate.

HYDROLOGICAL ASPECTS

Precipitation in Manyas Basin and its immediates, where summers are hot and dry and winters are warm and rainy, generally occur between October and April. The highest precipitation months 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 and the lowest temperature is recorded to be -14 °C according to monthly temperature records. The recorded January average is 5 °C. The hottest 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 Manyas (Kuş) varies annually in a wide range (1–3 m). These variations are closely related to the rainfall amounts in the basin. Melting snows and heavy rainfalls 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 water level reaches its highest level during March-April and its lowest level during September-October, long-term averages indicate. Following interference in the water regime in 1992, the water level has become average 1m higher particularly in summer and falls. The main reason of the remarkable water level difference between summers and falls is drainage from the lake for agricultural activities. The water pumped out of the lake is used for agriculture in Karacabey Plain.

In 30 years, developing industry and poultry resulted in degradation of water quality. The degradation of lake water quality and natural water regime affected the ecological cycle and some species got receded from 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 old units covering vast areas.

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

BIOLOGICAL ASPECTS

Habitats

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

WILDLIFE

Flora

92 plant species of 34 families are recorded in Lake Kuş and its immediates. 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 characterizes the terrestrial zone vegetation. White willow is the dominant species of Lake Kuş that has a rich flora.

Emersed 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 (*Pharagmites* 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 so far. Though fish species occurring in the lake have no commercial value, they bear remarkable importance regarding ecological equilibrium. Common carp (*Cyprinus carpio*), wels catfish (*Silurus glanis*), northern pike (*Esox lucius*), European chub (*Leuciscus cephalus*), freshwater sardine (*Caspialosa meotica*), common 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 and its immediates are rich habitat in terms of amphibians and reptiles. In terms of amphibians, the site supports four salamander species (*Salamandra salamandra*, *Triturus vittatus*, *Triturus vulgaris*, *Triturus crisiatus*) and six frog species (*Hyla arborea*, *Bufo viridis*, *Bufo bufo*, *Pelobates syriacus*, *Rana ridibunda*, *Rana macronelis*). 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 orbicular, Testudo graeca*).

Birds

Lake Kuş is an ideal habitat for birds thanks to the moderate climate providing birds with shelter in all seasons; the appropriate habitats providing various species with feeding, staging and brooding safely; rich food chain such as insects, worms, frogs and fish. As a result of observations so far, 266 bird species are recorded in the site. Among these species 66 regularly and 22 occasionally use the site for brooding.
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 remarkable bird species among birds breeding in other parts of 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 remarkable numbers in Lake Kuş and surrounds.

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 for the birds breeding in the lake.

Mammals

The lake and its immediate 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 immediates of the former fishing port in Bereketli Village.

CULTURAL AND SOCIAL ASPECTS

Archeology

Lake Kuş is one of the oldest settlement areas. Though there are signs indicating the first human settlements in the site had begun in 1200 BC; estimations argue it may have started in 4000 BC. Remnants dating back to Bronze Age were discovered in excavations in the area. The area had been under Bithynian, Lidian, Persian, Roman, Byzantium and Ottoman rule until the Turkish Republic was founded. During history the lake has had remarkable roles in economic, cultural and social lives of the people inhabiting in the area. Some sources argue the site Kuş Cenneti National Park is located in was named as Paradiso referring to Paradise itself in Roman times.

Past and Present Land Use

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

The first intervention to the lake had happened in 1940s. A regulator was installed at the outlet leg 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 areas surfaced following the withdrawal of the lake waters would have been cultivated or used as meadow.

The area owns parts of the most fertile agriculture lands of Turkey thanks to its mild climate conditions and quality soil. Local people earn their livings generally on agriculture and agricultural industry.

Meadow areas in the surrounds of the lake are used for livestock grazing. A significant part of the agriculture lands in northern portion of the lake have been allocated for industry and poultry farms following 1980s. The lake itself is used for fishery. The 64-hectare Kuş Cenneti National Park, in the north of the lake is used for recreational purposes.

NATURAL RESOURCE USE

Local people earn their livings generally on agriculture and agricultural industry. Cattle and sheep raising as well as relatively developed modern poultry farming are important sources of income.

Agriculture

The area owns parts of the most fertile agriculture lands of Turkey thanks to its mild climate conditions and quality soil. The inefficient water resources in the area as well as convenience and inexpensiveness of using the lake water resulted in perception of Lake Kuş as irrigation water source.

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

is cultivated in remarkable portions of agriculture lands in the south of the lake. Of fruits and vegetables apple, plum, cherry, peach, bean, okra and pepper fields also cover large land portions. Vegetable cultivation becomes intense in some parts of the lands where water withdraws during summers. Bean is cultivated particularly in Kocaçay neighborhood, where lake water withdraws and is an important source of income for the local people.

Livestock

A significant part of the agriculture lands in northern portion of the lake have been allocated for industry and poultry farms following 1980s. . Cattle and sheep raising as well as relatively developed modern poultry farming are important sources of income for the local people. Meadow areas in the surrounds of the lake are used for livestock grazing.

Fishery

Lake Kuş is used for fishery. There are three fishery 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 surveys regarding fisheries in Lake Manyas in 1953-1954. While 300-400 ton/year fish, most of which was common carp, was caught before 1985; this amount has decreased significantly today. Crayfish that had a remarkable economic value in the past used to occur in the site, however got extinct in Lake Kuş as well due to the fungus disease, which infected lakes including Lake Kuş. Freshwater sardine as well went extinct as the crayfish. Black carp (cyprinus carpio l.) was released into the lake for growing rapidly.

Recreation

Kuş Cenneti National Park is the most renown and visited part of the site. With its intense and diverse flora as well as its habitats supporting hundreds of birds attracts numerous visitors' attraction. The museum and watchtower are the leading points of attraction.

WETLAND MANAGEMENT PLAN

The Lake Manyas Wetland Management Plan works 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 as to include activities between 2008-2013.

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Lake Seyfe Ramsar Site

LAKE SEYFE

The lake is located in the tectonic depression in northeastern Kırşehir Province. 220 km to Ankara and 30km to Kırşehir, Lake Seyfe is situated in Mucur District of 15.000 population of Kırşehir. There are six villages around the lake that are Seyfe, Gümüşkümbet, Yazıkınık, Budak, Kızıldağ and Eskidoğanlı.

SITE IDENTITY

Name of the Ramsar Site	Lake Seyfe
Location and Boundaries	Situated within the boundaries of Mucur district of Kırşehir.
Area	10.700 ha
Coordinates	39º12'N 034º25'E
Elevation	1120 m – 1200 m
Conservation status	Ramsar Site Natural Site Nature Conservation Site
Population	15.000
Climate	Continental
National and International Significance	Turkey's wetland of international importance Key Biodiversity Area Important Plant Area Important Bird Area
Site significance	The site supports rare bird species such as great bustard (*Otis tarda*), common kestrel (*Falco tinnunculus*), common crane (*Grus grus*), ruddy shelduck (*Tadorna ferruginea*) and in large clusters such as flamingo (*Phoenicopterus roseus*).
Site symbols	Flamingo (*Phoenicopterus roseus*)
Management Plan	It was prepared in 2010.
Facilities in the site	Visitor center

Management Structure

The whole area within the boundaries of the Ramsar Site is state property. There are state, village entity and private property areas outside the site boundaries.

Conservation Statuses

A 23.585-hectare portion of the site was designated as Natural Site of 1st Degree in 1989. The site was designated as nature conservation site in 1990 and listed in Ramsar Convention in 1994.

There is a visitor center owned by Directorate General of Nature Conservation and National Parks in Seyfe Village.
Wetland management plan studies continue in the site, which is aimed 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
Criteria 2	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 (*Otis tarda*), imperial eagle (*Aquila heliaca*), Greater spotted eagle (*Aquila clanga*).
Criteria 4	Large clusters of birds stage in the site during migration periods.	Flamingos (*Phoenicopterus roseus*) inhabit the site in large numbers in winters (32.000 flamingos were recorded in 1987). Moreover storks (*Ciconia ciconia*) make up large colonies in the site (1300 individuals were recorded during migration period).
Criteria 5	20.000 individual of bird species regularly inhabit the site.	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 competency of Ministry of Environment and Forestry Directorate General of Nature Conservation and National Parks, Provincial Kırşehir Directorate of Environment and Forestry for its Ramsar Site and nature conservation site statuses; and Ministry of Culture and Tourism Provincial Kırşehir Directorate of Culture and Tourism for its natural site conservation statuses.

HYDROLOGICAL ASPECTS

Akpınar, Horla, Seyfe and Özlühüyük streams feed Lake Seyfe. Seyfe Stream is the most important source feeding 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 highly fluctuates depending on the precipitation and seasons. Its average depth is 1m in winters. Since the area gets low precipitation, streams feeding the lake dry and due to high evaporation effects; 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 the birds breeding or wintering in the lake, are located in the east and southeast of the temporary lake area.

There is no significant stream source in the site. Local people use the groundwater feeding the lake for agricultural purposes. Groundwater resources were enough until 2000, but decreased substantially after 2002.

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

GEOLOGICAL ASPECTS

(Metamorphic) rocks, which are formed when the existing prolith containing organism remnants (sedimentary rocks) were transformed when subjected to high pressure and heat, prevail in the basin. Formations, dating back to 545 million years until 251 million years from today, constitute the base of the basin. Existing in northwestern and southwestern portions of the lake, these formations consisted of schist and marble. During these orogenesis activities granite and diorite type of intrusions had occurred. With a deep-sea medium effect, having been loaded discordantly on the former base, calcareous rocks had been formed within the basin, which had begun to remain under water as of Eocene period. The sea had 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 immediates 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.

BIOLOGIC ASPECTS

Habitats

The Ramsar Site is formed by a shallow salty lake and wet grasslands around the lake. There are steppe areas and dry agricultural lands surrounding the wetland.

Wildlife

Flora

Landscape around the Lake Seyfe have no trees nor bushes. There are globally endangered *Centaurea pergamacea* and *Lepidium caespitosum* species in the steppes

around the lake. There are *Lycium depressum* at 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 because the lake is salty. In the salt marshes, there are plant species such as *Halocnemum strobilaceum*, *Salicornia prostrata*, *Salsola inermis*, *Panderia pilosa*, *Petrosimonia brachiata*, *Kraschenninnikovia ceratoides*, *Camphorosma monspeliaca*, *Gypsophila perfoliata*, *Rankenia hirsuta*, *Limonium iconicum*, *Limonium globuliferim*.

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

Fish

No fish species are seen since the lake is salty and with sodium. There are only two little fish species, 5-6 cm long, such as *Aphanius chantra* and *Spirlinus sp.* where fresh water enters into the lake and where it disperses into the lake. Despite that those fish species is not important commercially, their ecologic importance is high due to being in the diet of pelican 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 the lake are important feeding and breeding area for birds. Islets in the Lake Seyfe are 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. Number of birds at the lake reaches high records 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 brooding areas for water birds in our country. At the islets at the east of the Lake, the important brooding species are 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 information from local people, the number of birds at lake decreased dramatically. In addition to the water birds, white storks gather 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 the Seyfe Lake. According to the IUCN red list criteria, the classification of the mammal species is as followed; 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).

CULTURAL AND SOCIAL ASPECTS

Archeology

The findings obtained from the archaeological excavations have shown that the first settlements occurred in the Bronze Age (between 3500-200 BC). There are 20 hoyuks and tumulus from this age around the lake and its surroundings. Studies have shown that the people settled at the coasts engaged with agricultural activities throughout history. It is thought that the residents of the lake lived on hunting migratory birds, as well as agricultural products. Historical artifacts excavated from the hoyuks have been preserved in the Kırşehir Museum.

Past and Present Land Use

Lake Seyfe was a remarkable area regarding the bird species at past. Especially at winter and migration times it was very rich with respect to bird species and number.

The site has been adversely affected at an important scale due to drainage channels, overuse of ground water, shifting to the thirsty crops at agricultural pattern. There is a 20 cm thick salt layer on the lake which completely dry at summer months. Salt from this salty layer spreading over the agricultural lands around the lake, threatens human health and causes financial loss as an amount of millions of liras per year. Ground water level has been decreased due to using the water of the lake. Nowadays, the depth of the wells is up to 200 m.

Apart from the existing decrease on the agricultural yield due to droughts in the region, reed harvesting has also been adversely affected due to destroying of the reed beds. Moreover, poplar and willow grooves are drought to extinction. Since the lake surface decreased gradually, frost incidents are increased and apple production had come to a standstill.

NATURAL RESOURCE USE

The main occupation of the local people around the lake is agriculture and husbandry. 90 % of the people make their livings with these practices.

Agriculture

Dry agricultural activities are practiced in the 91,7 % of the basin while the rest is used for irrigated agricultural activities. Main agricultural products are wheat, sugar beet, barley, lentil, chick-pea, bean, oats and sunflower. There are also orchards and groove practices, though rare. There are almost a thousand caisson wells at a depth of maximum 10m for irrigation purposes. However, due to water shortage it is harder to produce those productions. In the past 3 years, to provide transition from irrigated agriculture to dry agriculture clover and trefoil cultivation was started to be promoted. 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 ratio, which was adequate to grow agricultural plants as wheat in the past, has decreased as of 2000 and in 2007, farmers in the region have reported cultivating plants as wheat has become harder when compared to past.

Livestock

Since there are large meadows in the basin, small ruminant husbandry in pasture lands has become a prominent occupation. Livestock production activities in the region are carried out in combined facilities.

Recreation and Tourism

The historical and cultural treasures the hoyuks and tumuluses in the area bear, the bird population the lake supports, the beauty of the view of the lake and its immediates has increased the site's significance in terms of nature tourism.

Wetland Management Plan

The wetland management plan development studies for the site, which is planned to be completed in 2010, still continues.

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Göksu Delta Ramsar Site

GÖKSU DELTA

Göksu Delta is located in the southern edge of Silifke district of Mersin province, settled at the skirts of Central Taurus Mountains, 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 the city center. It is situated at Göksü River's mouth between Silifke and Taşucu districts, where the river flows into the sea.

SITE IDENTITY

Name of the Ramsar Site	Göksu Delta
Location and Boundaries	Located within the boundaries of Silifke district of Mersin.
Area	15.000 ha
Coordinates	36º18'N 033º58'E
Elevation	0 m – 90 m
Conservation status	Ramsar Site Special Environment Protection Area Natural SIT Area
Population	39.987
Climate	Mediterranean
National and International Significance	Turkey's internationally important wetland site Key Biodiversity Area Important Plant Area Important Bird Area
Site significance	One of the rare wetlands in the Mediterranean Region that could preserve its natural structure.
Site symbols	Marbled duck (*Marmaronetta angustirostris*)
Management Plan	A management plan for 2009-2013 has been enforced.
Facilities in the site	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 agriculture land, while the remaining 1811.97 ha is used for other purposes such as estate, house, mosque, roads, marsh, lake, etc. 7635.96 ha of 9004.92 ha agriculture land is owned by persons, 1287.79 ha by finance treasury and 81.17 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 was designated and decreed as "Special Environment Protection Area" aiming at protecting its natural, historical and cultural heritage and ensuring 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. Illegal and undue hunting was taken under control.

In 1994, 15.000 hectares was decreed as Ramsar site. And in 1996, the Natural Site Area of 1st Degree was demarcated.

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

RAMSAR CRITERION	**DESCRIPTION**	**GÖKSU DELTA**
Criteria 2	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 (*Tachybaptus ruficollis*), black-necked grebe (Podiceps nigricollis), Gannet (*Morus bassanus*), Pygmy cormorant (*Phalacrocorax pygmeus*), Dalmatian pelican (*Pelecanus crispus*), Great bittern (*Botaurus stellaris*), Black-crowned Night-heron (*Nycticorax nycticorax*), Cattle egret (*Bubulcus ibis*), Little egret (*Egretta garzetta*), White stork (*Ciconia ciconia*), Alpine chough (*Pyrrhocorax pyrrhocorax*), Carrion crow (*Corvus corone*), Starling (*Sturnus vulgaris*), House sparrow (*Passer domesticus*), European serin (*Serinus serinus*), Goldfinch (*Carduelis carduelis*), Greenfinch (*Carduelis chloris*), Rock bunting (*Emberiza cia*), Reed bunting (*Emberiza schoeniclus*). Species in the site protected according to the EU Birds Directive are European shag (*Phalacrocorax aristotelis*), Great egret (*Casmerodius albus*), Spoonbill (*Platalea leucorodia*), Greater flamingo (*Phoenicopterus roseus*). Bird species in the site protected according to the CMS are Red-necked grebe (*Podiceps grisegena*),

		Great white pelican (*Pelecanus onocrotalus*).
Criteria 3	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.
Criteria 4	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 high number of waterbirds. Additionally, important nesting areas of the Sea Turtles (*Caretta caretta*) are located in the Göksu Delta beaches. The site also supports threatened soft shelled Nile Turtles (*Trionxy tringuis*).

MANAGEMENT STRUCTURE

Conservation works in site is carried out by the Ministry of Environment and Forestry, Environmental Protection Agency for Special Areas. Works covering its surrounding areas are organized by Silifke Directorate of Special Environment Protection. Officials in the site control visitors coming to the site for birdwatching and/or research and hunting activities are also controlled.

HYDROLOGICAL ASPECTS

The site receives heavy precipitation due to being open to the rain clouds coming through Mediterranean (700 mm/year). The source, directly affecting the hydrological structure of the site, is the largest river of eastern Mediterranean basin, the 250-kilometer-long Göksu River. Fed by underground resources, creeks and collecting water from heights of heavy precipitation; the flow rate of Göksu River is 118 m3/s (minimum 26 m3/s, maximum 1680 m3/s). Akgöl and Paradeniz Lagoons are 1.312 ha in size. Akgöl (820 ha) has slightly salty and briny water characteristic. The depth of the lake that contains 1.0 gram of lime per liter is 0.5-1.0 meter and is linked to Paradeniz with a canal the fishers opened. 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 volumes of lime, while the sources bear karstic characteristics.

GEOLOGICAL ASPECTS

Silifke Plain was formed in the IV. period. Göksu Delta is formed by the canal deposits as clay, silt, sand and gravel and flood plain sediments, which Göksu River have 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, halophytic wetlands, 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 has been flowing in its current bed, the edge of this fine sand area has started to erode away.

WILDLIFE

Flora

The delta supports a rich array of plants thanks to the existence of habitats in varying ecological characteristics. At two meters of altitude from sea level, natural plant cover in Göksu Delta consists of Mediterranean maquis formations and intensive sand dune plants as well as halophyte steppes. Pinus brutia, also known as Turkish 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 dominates, is covered with bulrush (*Typha* sp.), weawer reed and reed (*Phragmites* sp.). Among reed beds and salty steppes or plant cover dominating the sand dunes, stretch a zone of sea clubrush, shrubs, salt cedars (*Tamarix smyrnensis*), bog bulrush (Scirpus sp.) and common bulrush (*Juncus* sp.). The surrounding saltwater areas of Paradeniz Lagoon supports sparse reed beds, glasswort (*Salicornia* sp.) and spiral ditchgrass (*Ruppia cirrhosa*). Besides the rich plant cover, the sand system also supports great amounts of productive herbs. Vast areas around Akgöl and Paradeniz in the delta are covered with low and sloping halophytes. Eight endemic plant species out of 442 plant species in total have been recorded in Göksu Delta.

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

Fish

Lakes and the area, where Göksu River empties into Mediterranean and the immediate coasts located in Göksu Delta are unique breeding and sheltering areas for fish fry. Akgöl supports eel, flathead mullet, carp and bluefish and Paradeniz supports sea bass, sea bream, common dentex, sharpsnout seabream, saddled seabream, white seabream, striped seabream and red porgy.

Amphibians and reptiles

Göksu Delta that bears a remarkable importance for reptiles as well supports 34 amphibian and reptile species. Green toad, tree toad, plain frog, 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 exists in the site.

Birds

One of the rare coastal wetlands in Mediterranean region, natural structure of which could be preserved, Göksu Delta provides numerous waterbirds with feeding, breeding, wintering and stopover opportunities with its convenient climate conditions, varying habitats and available nutrients. In the observations 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 (*Ayhya nyroca*), purple swamphen (*Porphyrio porphyrio*), stone curlew (Burhinus oedicnemus), 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 earn the site status of wetland of international importance. For being highly rich in terms of bird species, local and foreign birdwatchers have haunted the site. There are five birdwatching towers, one of them bigger, in the delta.

Mammals

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

CULTURAL AND SOCIAL ASPECTS

Archeology

Göksu Delta and its immediate environment are very rich in terms of historical and archeological values. Three mound remnants within the delta are presumed to belong to Hittite period. Great building remnants from Roman and Byzantium times were discovered in the sand dunes around Paradeniz Lagoon. There are some other remnants in the sand dunes nearby İncekum and in the south of Akgöl. The two tombs discovered in Altınkum and Gazi Çiftliği are two of the seven-siblings tombs. There are Roman, Byzantium and Armenian remnants in the west of the delta dating back to 13-14th

centuries. A remarkable faith center during Christian times, Meryemlik or Hagia Techla was established in Roman and early Byzantium periods. Because Silifke had developed very much during Roman and Byzantium periods, it is now full of historical remnants. In Corasium, Atakent (Susanoğlu) remnants of a Byzantium Port could endure its importance and existence until the 7th century.

Past and Present Land Use

Agriculture, livestock production and some tourism activities are carried out in the region. Agricultural activities make up the remarkable part of the land use. In the areas of both dry and irrigated farming, olive groves and graperies lie between the coastal areas and heights.

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

Agriculture

Agricultural activities cover the largest part of land use in Göksu Delta. Silifke Plain is divided into two portions as east and west coasts by Göksu River. Soil structure and climate conditions that is effective in determining the agricultural potential, also leads to variation of crops and increase in the amount of production. Various agricultural products are cultivated in the area thanks to these characteristics. This structure of Göksu Delta comprising a very rich agricultural lands offer the opportunity to cultivate continental climate crops such as wheat, barley as well as hot climate crops such as peanut, citrus fruits, early-season vegetables.

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

Olive groves and graperies lie in the transition zones stretching between the coastal areas and the heights. Among the citrus orchards that gradually gaining more significance in the area, various vegetables such as tomato, eggplant and pepper are cultivated. Greenhouse cultivation is widespread as well as orchards. Early season and plain graperies also have a significant place.

Livestock

Livestock production has a remarkable place in Göksu Delta in the past. After meadows had been used for agricultural purposes and settlements, livestock lost its importance. Only 10-15 families of Anatolian nomads, who frequent the area in summers, continue raising livestock; that is why in this season grazing suppression in the area increases. Especially the people living in the mountainous areas earn their livings on livestock production. Livestock production is developed as breeding farms in the plains, leaves its place to pasture breeding in the heights. Anatolian black goat, sheep and cattle are the most widespread breeding animals in the area. Apart from a few private farms, poultry activities are widespread as family business.

Fishery

Four species of fish are harvested in Akgöl. Two of them are salt-tolerated strong fish species eel (*Anguilla anguilla*) and flathead mullet travel to Paradeniz Lagoon. Two freshwater species carp (*Cypinus carpio*) and bluefish (*Clarias lazera*) lay eggs in this lake. Eel and bluefish are mostly harvested for exportation, while the rest of the species are consumed in the region. Fishery activities are carried out with traditional methods since equipments are inadequate 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.

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 fulfilled 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

LAKE BURDUR

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

SITE IDENTITY

Name of the Ramsar Site	Burdur Lake
Location and Boundaries	Located within the boundaries of Burdur and Isparta provinces.
Area	24.800 ha
Coordinates	37º44'N 030º11'E
Elevation	835 m – 880 m
Conservation status	Ramsar Site Natural Site Wildlife Improvement Area
Population	141.800
Climate	Mediterranean
National and International Significance	Turkey's wetland siteof international importance Key Biodiversity Area Important Bird Area
Site significance	Almost 70 percent of globally endangered white-headed duck (*Oxyura leucocephala*) population has wintered in Burdur Lake until recently.
Site symbols	White-headed duck (*Oxyura leucocephala*)
Management Plan	Burdur Lake Wetland Management Plan that designates the activities to be done between 2008 and 2012 has been enforced in 2008.
Facilities in the site	Birdwatching tower

Land Tenure / Proprietorship

Burdur Lake is public property. Lands surrounding the lake are owned by public, private and village legal entity.

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 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**
Criteria 2	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 (*Oxyura leucocephala*). The site also supports a vulnerable diatom species, Arctodiaptomus burduricus as well as the endemic fish species Aphanius sureyanus.
Criteria 3	The site bears a special importance for wetland plant species.	As a result of the studies 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.
Criteria 4	The site is a wintering and breeding area for birds.	White-headed duck (*Oxyura leucocephala*) winters in the site and Eurasian coot (*Fulica atra*), European spoonbill (*Anas clypeata*) breeds in the site.
Criteria 5	The site supports numerous waterbirds.	300.000 waterbirds are recorded to inhabit the site. 252.726 Eurasian coots (*Fulica atra*) and 26.075 black-necked grebes (*Podiceps nigricollis*) are recorded in 1997 censuses.

Criteria 6	A wetland, in a place with opportunity to obtain information about the populations, should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbirds.	70 percent of world wintering population of white-headed duck (*Oxyura leucocephala*) occurs 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 Site of 1st Degree.

HYDLOLOGICAL ASPECTS

One of the deepest lakes of Turkey, Lake Burdur is of tectonic origin. Rainfall, surface flows; aquifers in the lake basin, groundwater flows feed the closed basin lake. Discharge of the lake happens 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 in the same season with similar climate conditions.

The water level and surface area of the lake fluctuates seasonally and annually depending on the rainfall because 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 wetland habitat losses in serious proportions 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 measures by the same institution. The reasons of this decrease are reported to be the meteorological phenomena and partly the lesser surface and ground water inflows reaching the lake.

There are underground wells at a depth of 100-120 m and water in these wells could be reached at a depth of 45-50 m until two years ago, since when this level decreased by 10 m, the local people argue. Studies on Lake Burdur revealed the lake water characteristic is not appropriate to use for irrigation. The lake water comprises high concentration of

sulfate, chloride, sodium and magnesium ions. Some manufactories continue discharging their wastes into the lake, although they have waste treatment facilities. Inorganic wastes of the sulphur mines and manufactories in Keçiborlu located 15 km in the north of the lake are loaded into Lake Burdur via Adalar stream and decrease the pH level of the water, where the stream empties into 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 more 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-year of measurements in Lake Burdur reveal that the lake surface decreased 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 kink 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 Yaraşlı Lake in the south. Heights surrounding the basin were fragmentized 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 Damikdağı Mountain (1375 m) formed of Mesozoic limestone in the south of Yaraşlı Lake demarcates the south part of the basin, mountainous areas with an altitude of 1500 m surround its north. The northeastern part of the basin opens to Isparta Plain through the sill, where Kırkçayır station is located at an altitude of 965 m.

Post-Alpine tectonic movements and climate changes that occurred during quaternary lead to fragmentations, which had played a remarkable role for the basin to take its current nature. Paleocene (Eocene-Oligocene) formations occurred in Burdur Basin that had a synclinal character at the beginning of tertiary. These and older formations had become dislocated and deformed during Alpine orogenesis. In early Miocene the area where Burdur Basin is located had got depressed. The sediments carried from the elevations was loaded in this basin and sedimentary layers, named as Burdur lake deformation consisted of clayey, marly 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 agriculture lands. There are little heights around the lake. These elevations support plain steppe structure, particular to Central Anatolia. Oak communities in steppe structure, again particular to Central Anatolia, are also supported in certain 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. Agriculture lands stretch 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 Yazıkent 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 heights and mountains covered with forests and shrubs around the lake. European black pine (Pinus nigra) forests dominate the flora at the elevations of the mountains in the surroundings of the lake.

The plant specimens collected from the lake surface as well as the agriculture and steppe areas of Lake Burdur during field works in 1998-1999 have been identified. As a result of the identification studies a total of 49 families, 204 orders and 315 species were recorded. Among these 20 species are identified as endemic to the region.

A total of 41 orders were identified among the phytoplankton specimens identified in the lake. Amphiprora sp. of Bacillarophyta division, *Navicula* sp., *Synedra* sp., *Cyclotella* sp., *Spirogyra* sp. of *Chlorophyta*, *Cladophora* sp., *Oscillatoria* sp. of Cyanophyta constitutes the dominant orders of the lake. When the phytoplanktonic organisms of Lake Burdur are studied with regards 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 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*), 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 oedicnemus*), Long-legged buzzard (*Buteo rufinus*), stork (*Cicconia cicconia*), great white pelican (*Pelecanus onocrotalus*), flamingo (*Phoenicopterus roseus*), European spoonbill (*Platalea leucorodia*), spur-winged lapwig (*Vanellus spinosus*) and black-winged stilt (*Himantopus himantopus*) are the bird species breeding in the site.

Mammals

Mammals generally live in the shrubs and forests around the lake. European hedgehog (*Erinaceus europaeus*), blind mole (*Talpa caece*), European hare (*Lepus europaeus*), wolf (*Canis lupus*), jackal (*Canis aureus*) and fox (*Vulpes vulpes*) are the leading 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" including Burdur as well had sometimes been independent or bound to Hittite, Phrygian and Lydian states in ancient times. Persians reigned in the region after defeating Lydians in the 6th century B.C. Later on Burdur and its surrounds were taken over by Alexander, who brought an end to the Persian reign in Anatolia. Remaining within the boundaries of Pergamon Kingdom for a while, Burdur fell under Roman rule, when the kingdom's lands were joined with Asian Province of Rome. When the Roman Empire had gone into division in 395 A.D., Burdur and surrounds become bound to Byzantium Empire. During Byzantium times the city that corresponded to today's Burdur was named as "Polydorion," giving Burdur its name today. The people today still use the name "Buldur" which sounds more like that name. Whereas according to some sources this city was named as "Limobrama," which means city of lake. As usual, this name had been transformed to "Burdur" in time. Because some clairaudience

of his ancestors told one of the Anatolian Seljuk Sultans "burada dur" or "stop here," while moving for conquest, the city is called with its current name is also another rumor.

Past and Present Land Use

The major land use in Lake Burdur and environments has been agricultural activities from past to present. Though dry farming activities have been main agricultural production until recently, irrigated farming started to dominate in the region after increasing underground irrigation. Another dominant land use is meadows. Generally sharp slopes with shallow soil situated in the north and northeast of the lake are used for meadows. 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 and forestry sectors and 98.4 percent out of them concentrate on agriculture and livestock production. Vegetative and animal product value rate per capita in Burdur, where the population is concentrated on agriculture and livestock production, is much higher than Turkey average.

Agriculture

The immediate surroundings of Lake Burdur are opened to agriculture. These lands are irrigated with groundwater. 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 very precious 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 northwestern 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 fact that drip irrigation has not yet been completely adopted as the irrigation technique occurs as a serious problem in agriculture. The prevailing irrigation is in flooding method in agriculture, while only a little part of those fruit and vegetable cultivators adopted drip irrigation. Dams and boreholes drilled individually also lead to great sum of water lose.

Livestock

Small ruminants are grazed in the heights and the coastal plains in the surroundings of Lake Burdur. The surface area of pastures and meadows is 96.057 ha and rate is 13.61 percent. These areas are used for livestock production. Cattle population with high meat and milk production is dominant 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.

WETLAND MANAGEMENT PLAN

There have been systematic works carried out to preserve Lake Burdur's ecological functioning and landscape integrity. In this context, Ministry of Environment and Forestry commissioned Ankara University Faculty of Agriculture to carry out a study as a preparatory project in 1999. Parallel to the Lake Burdur Management Plan studies by Ankara University in 1999, a Lake Burdur Management Plan studies including stakeholders, with legal sanction decisions and applicable in a changing and improving environmental understanding was completed in coordination of Ministry of Environment and Forestry, with contributions by Doğa Derneği in 2008. Lake Burdur Wetland Management Plan 2008-2012 was enforced after being approved by National Wetland Commission.

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Kizilirmak Delta Ramsar Site

Kizilirmak Delta

Kizilirmak Delta is the biggest wetland in Black Sea Region, as well as being one of the largest and the richest wetlands of Turkey in terms of ecological system. Kizilirmak Delta was formed by the alluvions carried by the longest river of Turkey, Kizilirmak, meandering to the Black Sea. The delta lies in the boarders of Ondokuzmayis, Bafra and Alacam districts of Samsun province, where Kizilirmak River flows into Black Sea, at the north of the Samsun – Sinop Highway.

SITE IDENTITY	
Name of the Ramsar Site	Kizilirmak Delta
Location and boarders	Located in the boarders of Ondokuzmayis, Bafra and Alacam districts of Samsun province. A 12 km long of wetland covered by a 1,5 km wide of forest area in the Kizilirmak Basin, parallel to the Black Sea. Distance to the sea is 2 km.
Area	21,700 ha.
Coordinates	41º40'N 036º05'E
Elevation	0–100 meters
Protection status	Ramsar Area Natural Sit Area Wildlife Development Area
Population	ca. 20,000 individuals
Climate	Black Sea climate
National and International Importance	International Important Wetlands of Turkey Key Biodiversity Area Important Plant Area Important Bird Area
Importance of the site	Being one of the most important wetlands ecosystems in the Black Sea coast of Turkey.
Symbols of the site	Water buffalos and cranes
Management plan	Prepared in 2006–2007. A management plan for 2008-2012 exists.
Facilities in the site	Visitor centre, management centre, bird-watching tower

Delta is defined as Important Bird Area, Important Plant Area and Key Biodiversity Area in different publications, due to its importance and the criterion met. Kizilirmak Delta draws interest of naturalists due to its landscape features and biological diversity and providing opportunity for activities such as bird watching, hiking and camping. Moreover, the delta has an important position in agriculture and livestock of Turkey with Bafra Plain, situated in the boarder of the delta.

Kizilirmak Delta is one of the richest wetlands of Turkey because of these features.

Ownership Status

The possession of land within the Kizilirmak Delta can be categorized as public property, private property, unregistered and appealed (not clear whether public or private). Main part of the public property is the forestry areas which are under ruling and possession of the Ministry of Environment and Forestry. Private properties are the agricultural lands and housing zones.

Protection Status

Different protection statuses with various boarders are identified to protect the wild life in Kizilirmak Delta. The statuses in the site are first, second and third degree Natural Sit Area with, Wildlife Development Area and Ramsar Site.

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

Ramsar Criterion	**Description**	**Kizilirmak Delta**
Criterion 1	Representing the vulnerable habitats, typical to the Black Sea, in good grade.	- Broad-leaved, mixed, flooded forest – Wet grasslands
Criterion 2	- Endangered flora species - Endangered fauna species - Endangered habitats	- *Jurinea kilaea* - *Leucojum aestivum* - *Pancratium maritimum* - *Rhaponticum serratuloides* - *Thelypteris palustris* - White-headed duck (*Oxyura leucocephala*) - Crane (*Grus grus*) are some of the endangered species.
Criterion 3	Delta meets this criterion due to being one of the most important habitats in Black Sea for a large number of species.	The most important habitat for *Alosa tanaica,* black stork (*Ciconia nigra*) and common otter *(Lutra lutra)* in Blak Sea.
Criterion 4	Kizilirmak Delta meets this criterion because many bird and fish species concentrate in particular period (wintering, breeding, feeding, overnight stays) of their life cycle in this area.	An important habitat for crane (*Grus grus),* white-headed duck *(Oxyura leucocephala),* common spoonbill (*Platalea leucorodia)* and *Acipenser gueldenstaedtii, Huso huso, Acipenser stellatus*.

Criterion 5	Delta meets this criterion due to hosting more than 20,000 water birds.	The number of birds and the observation years of the Mid-Winter Waterfowl Counts 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.
Criterion 6	Delta meets this criterion due to hosting % 1 of regional and/or world population of many avian species.	Holding more than 1% of the world population of Common pochard (*Aythya ferina),* Common teal (*Anas crecca), Coot (Fulica atra),* Red-crested pochard *(Netta rufina)*.
Criterion 7	Delta meets this criterion because many of the endangered fish species concentrates in critical stage of their life cycles.	Ship Sturgeon (*Acipenser nudiventris)*, Star Sturgeon (*Acipenser stellatus*) use Delta in their life cycles.
Criterion 8	Kizilirmak Delta is one of the three sites hosting Ship Sturgeon in Turkey. Delta meets this criterion due to holding 1% of the Turkey population of Ship Sturgeon in breeding period.	Russian Sturgeon (*Acipenser gueldenstaedtii),* Ship Sturgeon *(Acipenser nudiventris),* Star Sturgeon *(Acipenser stellatus),* Common Sturgeon *(Acipenser sturio),* Giant Sturgeon *(Huso huso*) breeds in Delta.

Management Structure

Kizilirmak Delta is under several institutions' jurisdiction due to having big diversity. The institutions are as follows; Ministry of Environment and Forestry due to biological diversity aspects, General Directorate of State Hydraulic Works and Ministry of Agriculture and Rural Affairs due to agricultural activities as one of the main sources of income in the region, Cultural and Natural Areas Conservation Board and Ministry of Culture and Tourism due to natural site aspects of the site. In addition, there are three different district governorships (Ondokuzmayis, Bafra, Alacam), three district municipality (Ondokumayis, Bafra, Alacam) and five town municipalities (Doganca, Ikizpinar, Cetinkaya, Yorukler, Derekoy). 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 for the wetlands and in the Ramsar Site boarders, the Cultural and Natural Areas Conservation Board is the main authority for the natural site.

Hydrological Features

Kizilirmak Delta is located in Kizilirmak Basin, one of the 26 water basins in Turkey. Bafra plain and its close environment, consists of eight sub-basins, has 1810.84 km^2 drainage area.

Kizilirmak River, the second biggest river of Turkey in terms of drainage basin after Euphrates, is the most important river flowing through the site. Other main rivers

than Kizilirmak River are Engiz and Pilic stream with Darbogaz and Mera streams at the east of Bafra Plain and Ilyasli Stream, Gokcesu, Sogutluk, Gokcebogaz and Ulucay (Alacam) streams at the east of Bafra Plain.

Natural circumstances creating delta and coast structure in east and west part of Kizilirmak Delta are the reason of different size of lakes. There are ten lakes at east coast; namely Balik, Uzun, Gici, Tatli, Alintili, Parali, Cernek, Liman, Tuzlu and Suluklu lakes and two lakes at west coast of Kizilirmak Delta which are Karabogaz and Mulk lakes.

Kizilirmak Delta, as many of the coastal wetland systems, suffers from pollution. Main reason of the pollution in surface and underground water of Kizilirmak Delta is chemicals used for agricultural activities. Kizilirmak River in the boarders of the delta does not meet the drinking water values because of this pollution.

While operating of the waste water treatment unit in Bafra district helps to improve the water quality, it is still not at the required level of water quality in the wetlands system of Kizilirmak Delta.

Geological Features

Kizilirmak Delta, 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 Kizilirmak Basin consists of soil under water (hydrmorphic soil) in the wetlands and reed fields. There are coastal dunes at sea sides, brown forest soils at inner sides and kind of soil formed by sediments (colluvial) of surface water and adjacent rivers

Biological Features

Habitats

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

Bitter lake mirror: Balik, Uzun, Cernek, Liman, Karabogaz and Mulk 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 mirror: Tatli and Gici 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 *Thypa sp*. or *Juncus acutus* are seen.

River: This habitat includes Kizilirmak River bed, and Geleric Forest nearby of the river.

Wet meadows: Some periods of the year, wet meadow land close to the lakes are accumulated with water. That is *Paspalum paspalodes* meadow land. Apart from this species, some of the plant species live in the salt and freswater wetlands. These meadows have high importance due to being one of the main resources for livestock grazing.

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

Reedy lands: This habitat grop includes *Phragmites australis* and *Typha angustifolia,* in patches *Schoenoplectus lacustris* groups.

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

Mixed wide leaved mangrove forest: In Geleric Forest, *Fraxinus angustifolia – Frangula alnus - Quercus robur - Smilax excelsa* are composed seasonally mangrove forest. *Fraxinus angustifolia* is the dominant species.

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

Shrub community in sand dunes: The shrub communities consits 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.

Herbaceous communities at inner sand dunes: There are herbaceous sand dunes, apart from the sand dunes with bushes and shrubes, covering the flat areas formed between the woody areas, especially nearby Cernek Lake. Herbaceous 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 by 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 at road and at the edge of the channel.

Residential areas: This areas cover centre of the districts, villages, secondary houses and treatment units.

Other habitat types: Sea, maquis, etc.

Flora

Kizilirmak Delta is an important area for plants with 355 species, in Turkey. Delta is designated 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 the Delta in Turkey. One of the other important plant species of the Delta is "Endangered" (EN) sea lily (*Pancratium maritimum*), because of gathering the bulbs and tourism activities in the sand dunes, used to have a wide range in Mediterranean and West Black Sea regions. "Vulnerable" *Jurinea kilaea*, lives in the Delta and in a very few coastal areas of the Black Sea, in Turkey. Another "Vulnerable" (VU) species of the Kizilirmak Delta is *Leucojum aestivum* known with its medicinal importance.

Wild Life

Fishes

Kizilirmak Delta is an important area for many fish species. There are 29 fish species, belonging to 11 family, identified in the Delta. Sturgeons (*Acipenseridae sp.*), one of the "Critically Endangered" (CR) fish species, is the most important one among those fish species of the Kizilirmak Delta. Knowing that Kizilirmak Delta with only two remaining areas is the last habitats for sturgeons highlights the importance of the Kizilirmak Delta to stop extinction of the species. There are records for Russian Sturgeon

(*Acipenser gueldenstaedtii*), Ship Sturgeon (*Acipenser nudiventris*), Star Sturgeon (*Acipenser stellatus*) and Giant Sturgeon (*Huso huso*) in the Kizilirmak Delta.

Amphibians and Reptiles

There are 150 amphibians and reptiles in Turkey. Almost 14% of these species (9 amphibians, 12 reptiles) live in Kizilirmak Delta. Reptiles in the Delta have a distribution in various areas from deciduous forests and scrubs to dry rocky areas, as well as from wet soils at the cost of the rivers to grasslands in the steppe areas above the forest level.

2 species of the 9 amphibian species are salamanders where the rest 7 species are frogs. Southern Banded Newt (*Triturus vittatus*), Southern Crested Newt (*Triturus karaelinii*), 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.

There are 2 tortoises, 5 lizards and 5 snakes out of 12 reptiles in the Kizilirmak Delta. These 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*), Nose-horned Viper (*Vipera ammodytes*).

Birds

It is known that there are 469 bird species in Turkey. Kizilirmak Delta is extremely important in terms of bird species. 321 bird species, 68% of the birds in Turkey, have been recorded in the Delta.

Kizilirmak Delta has an important location not only for the wintering and breeding birds but also for the migratory birds. More than 10,000 shorebirds also migrate over the Delta. It was recorded that almost 100,000 of water birds winter in the Delta.

Delta holds 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. Delta is very special in terms of bird species and their density at regional scale (Western Palearctic). Kizilirmak Delta is also very important for the bird species migrating at autumn and spring. There are pygmy cormorants (*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 in 1992, 140 species, where 88 are confirmed, recorded incubating in the Delta.

Mammals

More than 160 mammal species recorded in Turkey. Studies undertaken in Kizilirmak Delta showed that 33 mammal species (20% 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 known as extinct in the Black Sea region and Kizilirmak Delta. "Vulnerable" Geoffroy's Bat (*Myotis emarginatus*) is one of the most 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.

Culture and Social Features

Archeology

There are lots of archeological and cultural monuments reflecting the historical summation of the civilizations and periods of settlement history in and around the Kizilirmak Delta.

İkiztepe ruin, known as an important one in terms of Anatolia and even civilization history, is the main archeological value in the Delta. In the investigations carried out in İkiztepe ruins located in İkiztepe Village of Bafra District, 57 tumuluses, 6 plain settlement areas, 48 tumuluses, five rock graves, one bath, one bridge, and 25 findings belonging to the ancient age and just after it, have been found.

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 known as one of the biggest one in Turkey, 623 graves - including one mausoleum - have been found belongs to the Hellenistic time (B.C. 330 – 30).

Past and Recent Land Use

The natural progress of Kizilirmak Delta stopped after construction of Altınkaya Dam (1987) and Derbent Dam (1991) in the beginning of 1990's due to cutting off the alluvial materials formed by collecting the large and small gravels, sand, silt and soil of Kizilirmak River at low-pitched areas.

While it is not remarkable in numbers, the main change in land use after the construction of the dam is the increase in the agricultural areas. The number of illegal wells, interception and drainage channels are 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 new ones established at low scale.

Forest degradation and illegal housing, started in 1990's, increasingly continue with a result of more than 300 secondary houses built on 73 hectare area.

Using Natural Resources

Agriculture

Agriculture is the most common way of using natural resource in Kizilirmak Delta. Intensive agricultural activities are carried out in 56,000 ha big Kizilirmak Delta. Rice is one of the most intensely cultivated agricultural product on 6,735 ha areas close to water annually.

Around 32 villages earning their life with agriculture in the Delta where the main intensive agricultural products are rice, wheat, pepper to make sauce, melon, white cabbage, red cabbage, leek, tomato, sugar beet. Industrial crops, according to the extensity of the cultivation areas, are sugar beet, sunflower and tobacco at higher places.

The greenhouse area in the Kizilirmak Delta is 60 decares. There are two seasonal products, one in winter season and one in summer season, in the greenhouses which have an average size of 480 meter square. Main products are cucumber, tomato, eggplant and lettuce.

Livestock

Livestock is one of the main income source for the local people. Main livestock villages in Kizilirmak Delta are the ones located nearby the wetland. Although the main 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 is in Kizilirmak Delta. However, water buffalo husbandry decreases sharply due to shifting to agricultural activities.

Number of water buffalo in the Delta between 1990–2006

Years	1990	1999	2000	2001	2002	2003	2004	2005	2006
No. of Buffalos	10.000	5.750	4.950	4.700	4.550	4.100	3.750	3.550	2.800

In fact water buffalo is one of the important elements for pasture vegetation, lake sedimentation and wetlands ecosystem, just like birds and fishes. Water buffalo's presence is important due to controlling the dispersion of many wetland plants, recreating of the reed beds and making protected areas for bird nests.

Main income sources provided by Kizilirmak Delta: Fisheries, reed cutting and disrooting rushes

Fisheries is an important income source in Kizilirmak Delta where has suitable habitats for fishes and other aquacultures.

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 Kizilirmak Delta.

Another water resource in the Kizilirmak Delta is the lakes. The lakes with 2,440 ha at dry seasons and 9,250 ha at wet seasons are the important lagoon lakes of Turkey. Common carp (*Cyprinus carpio*), zander (*Stizostedion lucioperca*), striped mullet (*Mugil cephalus*) and crawfish hunting are undertaken in the lakes of Balik, Uzun, Gici, Tatli, 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*) have been harvested and marketed.

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

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 owens.

Disrooting Rushes

One of the rush species (*Jungus sp.*) in Kizilirmak Delta, known as goga, transported to several places in Turkey after disrooted and dried by the villagers. This plant species disrooted by hands of the local people in the end of the summer time to wreathe or make bouquet in the flourist shops.

Hunting

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

The number of the legal hunters in the Kizilirmak Delta is approximately 500. Illegal hunting in the Kizilirmak Delta is an important problem. According to a study undertaken in 2006, the number of the illegal hunters is 1000. Almost all of the hunters in the Kizilirmak Delta hunts birds. No hunting for food is occured for last 10 years.

The 5,175 ha of the east part of the Delta (Cernek Lake and environs) is banned completely due to declaring as Wild Life Development Area (see Kizilirmak Delta Protected Areas Map). Despite the legal ban and inspections, illegal hunting recorded in this area.

Wetland Management Plan

The Ministry of Environment and Forestry, General Directorate of Nature Conservation and National Parks have Doga Dernegi Commercial Enterprise to prepare the Wetland Management Plan of Kizilirmak Delta in 2006 and 2007 in a participatory way with consulting to relavant institutions and individuals. The plan includes the activities of 2008 – 2012 to be undertaken in Kizilirmak Delta. The activities in the plan are started to be implemented in 2008.

Wetland Management Plan of the Kizilirmak Delta aims to establish an active management structure to implement the plan for improving the biological diversity, agricultural production, tourism, fishery and other products of wetlands along with the other alternative income sources to sustain the ecological balance.

A technical team was established under the Samsun Local Wetlands Commission to implement the Wetlands Management Plan of the Kizilirmak Delta and to enable local people more active in the management of the site.

The main laws and bylaws regulating the priority activities in terms of the management plan in 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 Development of the Wild Life.

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Lake Uluabat Ramsar Site

LAKE ULUABAT

The lake is located almost 20km in the south of Sea Marmara, 35km in the east of Lake Kuş (Manyas) and 40km in the west of Uludağ Mountain. It is within the boundaries of Karacabey, Nilüfer and Mustafakemalpaşa districts of Bursa province.

SITE IDENTITY

Name of the Ramsar Site	Lake Uluabat
Location and Boundaries	Located within the boundaries of Karacabey, Nilüfer and Mustafakemalpaşa districts of Bursa province.
Area	19.900 ha
Coordinates	40º10'N 028º35'E
Elevation	9m - 350m
Conservation status	Ramsar Site
Population	10.356
Climate	Black Sea and Mediterranean
National and International Significance	Turkey's wetland of international importance Member of Living Lakes Network Key Biodiversity Area Important Plant Area Important Bird Area
Site significance	Supports the largest European white waterlily (*Nymphaea alba*) beds
Site symbols	Stork (*Ciconia ciconia*) and European white waterlily (*Nymphaea alba*)
Management Plan	Enforced in 2002. The plan was revised in 2007 and 2007-2011 plan is being implemented.
Facilities in the site	Visitor Centre 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 was given the Ramsar Status in 2001. It was included in Living Lakes Network in 2001. Today 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	SULTAN MARSHES
Criteria 2	The site supports threatened and vulnerable species listed in International Union for Conservation of Nature (IUCN) red list categories.	The site supports threatened pelican (*Pelecanus crispus*), near threatened medicinal leeches (*Hirudo medicinalis*) as well as vulnerable plant species such as *Sagitaria sagittifolia* and *Stachys palustris.*
Criteria 4	An important site for the critical phases of biological cycle of mammal and bird species.	European river otter (*Lutra lutra*) is an internationally protected species inhabiting in the environs of Lake Uluabat. Additionally many waterbirds use the site for resting, wintering and breeding every year.
Criteria 5	The site regularly supports large numbers of waterbirds.	429.437 waterbirds in 1996, 25.000 in 2002, 55.089 in 2007 are recorded in the site.
Criteria 8	An important site for fish species.	The site is critical for fish in terms of breeding and feeding.

MANAGEMENT PLAN

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

HYDROLOGICAL ASPECTS

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

In the books and articles, sometimes even recent publications mention the surface area of Lake Uluabat as 160 km2. The mentioned area, however, has been narrowed down by the seawalls the State Waterworks (DSİ) has constructed in southern/southeastern coasts of Lake Uluabat to obtain fertile agriculture lands and prevent flat or almost flat

agriculture lands from floods. The surface area and volume assessment studies carried out by the DSİ in 1995 reveal that the lake's surface area with a maximum water level is 155 km2, and water volume is 346 hm3. A similar study again by the DSİ in 1965 reports the lake's surface area as 161 km2 and water volume as 387 hm3.

The study point out the water volume of the lake has decreased by 41 hm3 (41 million m3) due to sediment load in the past 30 years period. Another study determines that the lake's surface area has shrunk by 14 percent to 116 km2.

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 classifications in 1970s the lake water was classified as changing between 1st and 2nd degrees; however the same control in 1999-2000 measurements classified the lake water changing between 2, 3, 4th (the most polluted levels).

Recently the lake water is always blurred. Depending on the phytoplanktons' dominancy conditions in the lake sometimes greenish-yellow and sometimes grayish-yellow colors dominate the water. The light transmittance is very low due to the opacity of the water. In line with the amount of the suspending substances entering the lake in springs, light transmittance can decrease to 22cm. According to a 1995 study, heavy metal load, especially cadmium, is detected in the fish. Moreover, lead pollution as a side effect of 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.

GEOLOGICAL ASPECTS

The common idea as being the source of Lake Uluabat is that the lake is a remnant 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 and its immediates.

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

BIOLOGICAL ASPECTS

Habitats

Lake Uluabat comprises freshwater lake, delta ecosystems and maquis and willow communities. The elevations in 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 empties into the lake. The delta consists of reed

beds, sand plains, seasonal swamps and flooded meadows 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 is large reed beds located in the northwestern coasts of the lake as well. Maquis prevail in the elevations in the south. A habitat of wild olive groves mixed with maquis also occurs in this area.

WILDLIFE

Flora

Lake Uluabat is a rather important site within the Mediterranean phytogeographic region for supporting 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 is covered with large reed beds and shallow areas support many aquatic plants. Flooded meadows, willows, tamarixes, chaste trees, aquatic plants, reed beds, white waterlily beds and water hyacinth are widely supported plants.

As seen in many wetlands the most widespread plant group in the coasts of Lake Uluabat is bulrush (*Typha* sp.) and sedge (*Pharagmites 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 large scale of areas in southeastern coasts of the lake and from the entering mouth of Mustafakemalpaşa Stream, through the seawall. In southwestern edge of the lake and where Mustafakemalpaşa Stream empties into the leake rigid hornwort (*Ceratophyllum demersum*) and in northeastern and eastern coasts of the lake loddon lily (*Leucojum aestivum*) occur in clusters that are worth to see and protect. Nationally vulnerable Gratiola officinalis occur particularly in the coastal zone of Fadıllı Village.

Tamarix (*Tamarix symrnensis*), halophyte salicornia (*Salicornia* sp.) members, Artemisia santericum, *Hordeum marinum* and *Bromus hordeaceus* prevail in southwestern portions of the lake. Plant clusters consisted 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 clusters that can occur in a shallow lake that supports aquatic plants. Particularly Gölyazı, the 11 settlements that are close to the lake boundaries benefit from the water products in the lake. Almost 85 percent of the households of Gölyazı, Akçalar, Fadıllı, Dorak, Uluabat, Eskikaraağaç earn their livings by fishery and 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 björkna*), 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 leading fish species recorded in Lake Uluabat. There are records of European eel (*Anguilla angulla*) being hunted in the past.

The most harvested fish is common rudd by 29.113 percent according to the fish stock determination study in 2000. This species is followed by common roach (% 27.349), 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) in row.

The population rate of economic fish species among those the lake supports is very low. The population rate of economic fish species such as northern pike, common carp, wels catfish, grey mullet and crucian carp is only 4.094 percent of all fish species. 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. This ratio is a negative aspect in terms of the lake's economic condition 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 food substance, located on the migration routes entering Anatolia from northwest and very close (35km) to Lake Kuş (Manyas), one of the important bird areas, as well as its convenient climate conditions; the site provides the bird species with feeding, wintering and breeding possibilities. According to Mid-winter Waterbird Census, the number of waterbirds is as followed: 429.423 in 1996, 288.452 in 1999, 30.441 in 2009 and 25.868 in 2010.

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

It is the most important breeding site for globally threatened 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 and a population of 136 individuals were recorded in the site in October 1994. Squacco heron, Eurasian spoonbill, little egret, night heron, purple heron, marsh harrier, collared pranticole, spur-wing lapwing, black tern are the bird species brooding in the site. Dalmatian pelican (*Pelecanus onocrotalus*) winters in the site during migration period.

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 surrounding areas of Lake Uluabat.

Gölyazı contains 87 civil architecture templates, four monumental constructions and city walls as well as 17 registered trees. The settlement was registered as an Urban Archeological Site by the Council of Monuments in 1998.

Past and Present Land Use

Human settlements in Lake Uluabat have continued since ancient times (100 BC). The antique city in the lake "Apollonia ad rhyndacum" (Gölyazı) was located on the trade routes between antique cities in those ages. Then freight shipment was carried out on the Sea 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 has come to cease following synthetic threads has become widespread as of 1960.

Today farmers engaged in agricultural activities, fishers and workers employed in the industrial establishments in the area as well as the tradespeople providing services for those establishments and meeting local needs compose the social structure of the area.

There are industrial facilities based on agricultural activities and water products, providing employment and production in significant ratios. Widely produced in the region, tomatoes are transformed to tomato paste as well as other vegetables and fruits to frozen or processed food. Dairy products are also processed in these facilities.

NATURAL RESOURCE USE

Agriculture

There is intensive agricultural activities in the environs of Lake Uluabat except for the southeastern portion consisted of elevated slopes and forest areas. The agricultural activities in the immediates of the lake and on the islands vary 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 leading products. Olive cultivation and orcharding also have a significant place in the area. Water is pumped out of the lake and used for irrigating the agriculture lands of 6350ha.

Livestock

Livestock production today is losing its significance, whereas it was a more widespread and remarkable business in the past. Breeding in a few facilities and cattle raising for

milk at household level. In the deltas formed by Mustafakemalpaşa and Uluabat Streams livestock production is a prevailing occupation. Almost 300 water buffalos and hundreds of sheep are grazed in Mustafakemalpaşa Stream Delta. Some of the sheep are brought from Manisa for grazing.

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

Reed Harvesting

Reed harvesting was prevailing among Eskikaraağaç, Akçalar, Gölyazı inhabitants in the past, whereas there are people coming to the region for reed harvesting in recent years. The reeds are reaped and sold in Karacabey or to the traders coming to the village. Those that cannot be sold are used to manufacture saddle, rope, matting and as isolation material in walls and roofs. The reeds are also exported.

Hunting

A hunting rifle can be seen in almost every village in the surrounds 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 some deficiencies.

Fishery

Particularly Gölyazı, the 11 settlements (Gölkıyı, Eskikaraağaç, Gölyazı, Akçalar, Fadıllı, Akçapınar, Onaç, Dorak, Yeşilova, Kumkadı, Uluabat) that are close to the lake boundaries still benefit from the water products (fish and crayfish) in the lake.

As distinct from the others, almost 80 percent of Gölyazı Village households 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 Water Products Cooperative. The cooperative has 680 members by the end of 2007. There are almost 500 boats in Gölyazı. According to 1999 records the amount of carp is 28 tons, 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 change between 15 and 20 tons in recent years. November and December are the intensive fishery period, though the practice continues whole year.

One of the most remarkable water products is crayfish. 311 tons of crayfish was harvested in 1986, whereas the fungus disease in 1986 resulted in a decrease to 8 tons in 1987. This amount increased in time and went up to 40 tons in 1999. Local fishers also confirm the effects of 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 within. Forming an interaction, these two draw many foreign and domestic tourists to the region. It is possible to watch numerous bird species breeding, wintering, staging in large numbers. Many tourists visit the site to birdwatch.

Lake Uluabat Information and Visitor Centre that is 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.

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 assets are under restoration or conservation work or are organized for visit. International Eskikaraağaç Stork Festival is organized annually since 2005 aiming at 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 works has started in coordination of Ministry of Environment and Forestry and with contributions by Wildlife Protection Society (DHKD) in 1998. In meetings with attendance 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 National Commission on Wetlands.

In terms of participation the Lake Uluabat Management Plan could manage the highest attendance as a protected zone in Turkey.

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

The management plan was implemented in coordination of Uluabat Execution Committee with contribution of the Wildlife Conservation Fund between 2002 and 2007. The plan was revised in 2007 and a 2007-2011 Plan was put into force.

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Gediz Delta Ramsar Site

GEDİZ DELTA

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

SITE IDENTITY

Name of the Ramsar Site	Gediz Delta
Location and Boundaries	Located in the boundaries of Çığlı, Foça and Menemen districts of İzmir province.
Area	14.900 ha
Coordinates	38º30'N 026º55'E
Elevation	0 m – 130 m
Conservation status	Ramsar Site Natural and Archeological SIT Area
Population	21.375
Climate	Mediterranean
National and International Significance	Turkey's internationally important wetland site Key Biodiversity Area Important Plant Area Important Bird Area
Site significance	One of the two sites where flamingos breed in our country (the other one is in Tuz Lake).
Site symbols	Flamingo (*Phoenicopterus roseus*)
Management Plan	Gediz Delta Management Plan was acceded in the year of 2007.
Facilities in the site	Visitor center

Land Tenure / Proprietorship

There are public and private areas. The area within the boundaries of the buffer zone comprises settlements, agriculture 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 area in 1982 and started to be mentioned as İzmir Bird Paradise thanks to the high number and variety of birds. This status was terminated in 2007 and the site was given the wetlands status. The status of wildlife protection site is desired to be regained to the site.

It was decreed as Ramsar Site in 1998.

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

Gediz Delta Ramsar Site meets 4 internationally important wetland criterion out of 9. These are;

RAMSAR CRITERION	**DESCRIPTION**	**Gediz Delta**
Criterion 2	The site supports endangered bird species included in International Union for Conservation of Nature (IUCN) red list categories.	Dalmatian pelican (*Pelecanus crispus*), Lesser kestrel (*Falco naumanni*) are critically endangered species.
Criterion 3	Plant and animal species have a special importance the region to maintain its ecological and genetic aspects. The site supports endemic species.	The site plays a remarkable role for the maintenance of biological diversity. One of the significant breeding areas for particularly water birds in the Mediterranean region. The site supports endemic species and subspecies such as *Puccinellia kociana anatolica, Stachys cretica smyrnaea, Carex divisia, Sueda prostrate prostrate* and *Salsola kali*.
Criterion 4	It is the habitat of a significant part of the	It is one of the important breeding point of the sea birds such as common tern (*Sterna*

	bird species at a critical stage of their biological cycle.	*hirundo*) and Mediterranean gull (*Larus melanocephalus*). Thousands of sea bird pairs breed in the muddy islands. Caspian tern (*Sterna caspia*) regularly breeds only in Gediz Delta in Mediterrenean costs. Additionally, it is an important stopover area for thousands of shore birds during migration.
Criterion 5	High numbers of water bird species regularly use the site.	The site holds 5000 pairs of breeding and 25,000 individuals of wintering flamingo (*Phoenicopterus roseus*). According to the mid-winter water birds counts in 200, there are 49,015 individuals are recorded.

MANAGEMENT STRUCTURE

Union for Protection and Improvement of İzmir Bird Paradise was founded in 2003 to provide unity between the works done in Gediz Delta and the bird sanctuary. The union comprises special provincial administration, relevant municipalities, and founder members of village administrations, relevant institutions, universities and relevant NGOs.

While association was provided by the foundation of the union, work to align the site with the international standard has been done by the financial sources 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 instutions work in coordination for the management of the site. Natural and archeological SIT areas are bound to the Ministry of Culture and Tourism.

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 covers 2.2 percent of Turkey’s surface area.

The river rises 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 need 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.

Household water needs in villages is provided by wells. The local people, however, point out the decreasing ground water level. They say they had difficulties of finding ground water even at 170-180 meter and that the water entering the lagoon is highly polluted due to untreated disposal by some nearby factories. They also mentioned an increasing salinization of 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 Kırdeniz 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.

Little sand banks and islets separate lagoons from the sea. The halophile swamp system that also comprises the freshwater swamp forms the southeastern parts of the special protection area situated between the salines and İzmir province.

The area located in the north of the salines comprises meadow and pasturelands, agriculture lands and small woods. Though draining canals in the east of Kırdeniz 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 leading 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.

Following the observations 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

Among wild animals in Gediz Delta, birds have a highly significant place. The delta is one of the sites with the highest bird variety. According to 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*) that 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, however, observed in the site within the year of 2006 are very significant to prove 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.

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

Since Gediz Delta is a wetland system, water birds make up the biggest part of the avian species observed in the site. Among these water birds, coastal birds make up the significant group. Particularly in Homa Lagoon, coastal birds can be observed 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 the highest numbers, particularly in terms of winter populations in Turkey.

Apart from water birds, the delta supports a rich variety of avian species starting from those living in relation to wetlands as well as Passeriformes and raptors. Especially during migration periods in spring and summers, the delta is an area, where Passeriformes species can be seen in high numbers.

Gediz Delta is the site, where a rare eagle species Bonelli's Eagle (*Hieraatus fasciatus*) can be seen most frequently in Turkey.

The delta is one of the five sites in Turkey, where Dalmatian pelican (Pelecanus crispus), an endangered species across the world with a world population of 15.000, breeds. Almost 70 couples of Dalmatian pelicans every year brood 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.

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

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 during the year.

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 these 103, 61 of them certainly, 25 almost certainly 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.

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 the 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 southeastern 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, lying 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 bear countryside aspects such as low density housing and low population. Maltepe, located in the south of the two towns, is a town bound to Menement 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, bearing countryside aspects. Especially in Seyrek town 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 been constructed recently via cooperatives. There are two military airports located between Sasalı, Kaklıç and Çiğli settlements. The south of 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 agriculture lands that meets 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 vegetable products.

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

Livestock Production

One of the remarkable economic input components is livestock production activities that are particularly widespread in Seyrek-Süzbeyli regions. Livestock production activities are scarce in Menemen Plain and its surroundings; so cover a limited area of 8.045 ha. Small ruminants dominate the livestock production, while cattle and poultry animals are also raised. Sheep, goat and cattle are the most widespread livestock. Livestock farming is also done.

Fishery

Marine products are harvested in Homa and Kırdeniz lagoons. Sea mullet, lidaki, tonguefish and sea bass are fished in Homa lagoon between June and December. The amount of fish harvest in the lagoon was 70 tons in 1980, whereas 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 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

Project for Gediz Delta Management Plan started in the year of 2004. The management plan was foreseen to be completed until the end of 2005 and the project aimed at ensuring the conservation-use balance of 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 stakeholder groups and the Provincial Directorate of Environment and Forestry co-manage the site and General Directorate of Nature Conservation and National Parks undertake the supervision role.

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Akyatan Lagoon Ramsar Site

AKYATAN LAGOON

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

SITE IDENTITY

Name of the Ramsar Site	Akyatan Lagoon
Location and Boundaries	Located in Karataş district of Adana province
Area	14.700 ha
Coordinates	36º37'N 035º16'E
Elevation	0 m – 58 m
Conservation status	Ramsar Site Wildlife Improvement Area Natural SIT Area
Population	32.375 (Karataş district, 2000)
Climate	Mediterranean
National and International Significance	Turkey's internationally important wetland site Key Biodiversity Area Important Plant Area Important Bird Area
Site significance	Turkey's largest lagoon lake
Site symbols	Jungle cat (*Felis chaus),* Green sea turtle *(Chelonia mydas)*
Management Plan	Wetland management plan is being prepared
Facilities in the site	Fire watch tower, bird watch tower

Land Tenure / Proprietorship

Areas surrounding Akyatan Lagoon are both public and private property. There is illegal agriculture lands opened in public property since the surrounding areas are fertile.

Conservation Status

Akyatan-Kapı Sand Dune Designation and Afforestration Area and the part that remains 500 meters inside the reed beds surrounding the lagoon situated in the South of Akyatan Lagoon was taken under protection as Waterbirds and Black Francolin Conservation and Recreation Area in 1986. The name of the conservation site was then changed as Akyatan Lagoon Wildlife Protection Area in 1987, taking the rich local and migrant bird potential of the site that is an important stopover and breeding area for waterbirds into consideration.

Akyatan Lagoon was designated as archeological and natural SIT 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 after having been included in the list of Ramsar Convention together with Gediz Delta, Kızılırmak Delta and Uluabat Lake. The lagoon is one of the important brooding areas of 1st degree in Turkey's coasts for green sea turtle (*Chelonia mydas*).

Akyatan Lagoon Ramsar Site meets seven internationally important wetland criteria out of nine.

These are;

RAMSAR CRITERION	**DESCRIPTION**	**AKYATAN LAGOON**
Criteria 1	The site comprises three different ecosystems in 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 agriculture lands.
Criteria 2	The site supports species that are protected under Bern Convention, European Union Bird and Habitat Directives. There are endangered species included in International Union for Conservation of Nature (IUCN) red list	European green toad *(Bufo viridis)*, European tree frog *(Hyla arborea)*, eastern spadefoot toad (*Pelobates syriacus)*, snake-eyed lizard (*Ophisops elegans*), Aegean Bogenfingergecko (*Cyrtodactylus kotschyi*), chameleo (*Chamaleo chamaleon*), black whip snake (*Coluber jugularis*), spotted turtle (*Emys orbicularis*), tortoise (*Testudo graeca*), sea turtle (*Caretta caretta*) and gres sea turtle (*Chelonia mydas*) are species protected under Bern Convention, European

	categories.	Union Bird and Habitat Directives. Sea turtle *(Caretta caretta)* is globally critically endangered according to the IUCN criteria.
Criteria 3	Important for waterfowl groups, the site supports high numbers of waterfowls regularly.	Muddy plains are the stopover areas for many bird species during migration. Every year 50-80 thousand waterbirds use the site to avoid cold weather. Marbled duck (*Marmaronetta angustrirostris*), purple swamphen (*Porphyrio porphyrio*), black francolin (*Francolinus francolinus*), red-crested pochard (*Netta rufina*), mallard (*Anas Platyrhynchos*), ferruginous duck (*Aythya nyroca*) breed in the lagoon and Eurasian stone curlew (*Burhinus oedicnemus*), Kentish plover (*Charadrius alexandrinus*), spur-winged lapwing (*Hoplopterus spinosus*), little tern (*Sterna albifrons*) in the lake side.
Criteria 4	The site is an important habitat for critical periods 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 stop-over site for migratory birds to rest. In addition to the breeding birds, i.e. Black Francolin (*Francolinus francolinus*), Kentish Plover (*Charadrius alexandrinus*) and Little Tern (*Sterna albifrons*); Wigeon (*Anas penelope*), Pied Avocet (*Recurvirostra avosetta*) and Little Stint (*Calidris minuta*) are wintering in the area. (5th criteria). This area is very important for the survival of two threatened species of sea turtle *Caretta caretta* and particularly *Chelonia mydas*.
Criteria 5	The site regularly holds high number of waterfowls.	Each year between 50,000 and 80,000 water birds winters in this area. 57,319 individuals are counted in 2007 mid-winter counts. Each year ca. 10,000 Flamingos (*Phoenicopterus roseus*) winters at the lake.
Criteria 6	The site regularly supports 1% of the individuals in a population of one species or subspecies	• Common Coot (*Fulica atra*), 28.100-46.000 individuals (1% are 20,000) • Wigeon (*Anas Penelope*), 5.921 – 13.900 Individuals (1% are 3,000) • Pied Avocet (*Recurvirostra avosetta*), 430-

	of waterbird.	1.589 individuals (1% are 470) • Kentish Plover (*Charadrius alexandrines*), 1.210-1690 pairs (1% are 410 individuals) • White-headed Duck (*Oxyura leucocephala*), 230-978 individuals (1% are75)
Criteria 8	This area is very important for the reproduction of fish species.	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 (*Mugil* sp.) sea bream (*Sparus aurata*), sea bass (*Dicentrarchus labrax*) and European eel (*Anguilla anguilla*).

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 Site, while Cultural and Natural Assets Protection Commission under the Ministry of Culture and Tourism is the responsible authority for natural 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 is 1 meter in the seasons the water level rises and 0.5 meter in the season the water level decreases. Previously, the deepest place of Akyatan Lagoon was 2.5 meters, while it decreased to 2 meters at 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 evaporation1550 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 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 lake water varies seasonally. The lake water gets fresher due to rainfall and the water carried via the drainage canals during winters, 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, where leaking and drainage waters are effective. The lake water gets polluted because of the pesticides and fertilizer remnants carried by the drainage water. Akyatan Lagoon is detected to have been highly polluted by the organic remnants carried from the drainage water of agriculture lands. The ground water is also recorded to have been polluted, a 1996 study reveals.

Since the freshwater carried by the drainage canals freshens the lagoon water, sea prey fish species such as sea bream cannot enter the lagoon, local people note. According to them the water level and quality decreases due to the pesticides, fertilizer remnants and alluviums carried 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 calishe, alluvial and sand dunes.

BIOLOGICAL ASPECTS

Habitats

The Ramsar site comprises various habitats 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 decrease in water amount feeding the lake and high evaporation.

The largest sand dunes of Turkey – with an elevation of 20 meters and a few kilometers in width – 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 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.), bulrush (*Typha* sp.) as well as European white waterlily (*Nymphaea alba*) and yellow iris (Iris pseudocorus), where freshwater prevails. Tamarisk or salt cedar (*Tamarix* sp.) and glasswort (*Salicornia* sp.) prevail the saltwater marshes.

Plantation forest vegetations 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 Turkish pine (*Pinus brutia*) have been formed particularly on the 2500-ha sand dune belt that stretches between Karataş and where Seyhan River empties into the sea, to prevent sand dune erosion since 1960.

Fish

In total 11 fish species of 7 families were recorded in Akyatan Lagoon in the previous studies. These 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 Anguilidae family.

Turkish and Latin names of the fish in Akyatan Lagoon

No.	Turkish name	Latin name	English name
1	Yılan Balığı	*Anguilla anguilla*	European eel
2	Gümüş Balığı	*Atherina boyeri*	Big-scale sand smelt
3	Has Kefal	*Mugil cephalus*	Flathead mullet
4	Sarıkulak kefal	*Liza aurata*	Golden mullet
5	Kastrol kefali	*Liza saliens*	Leaping mullet
6	Dudaklı kefal	*Oedalechilus labeo*	Boxlip mullet
7	Bıldırcın kefali	*Mugil carinata*	Keeled mullet
8	Levrek	*Dicentrachus labrax*	European sea bass
9	Çipura	*Sparus aurata*	Gilt-head bream

10	Kaya balığı	*Gobius ophiocephalus*	Goby fish
11	Dişli sazancık	*Aphanius cypris*	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, Crytodactylus kotschyii and Agama stellio are other reptile species the site supports.

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

Chameleons (*Chamaeleon chamaleon*) are rarely seen in the thick shrubs and woods close to the water sources. Chameleons generally feed every kind of insect and other invertebrates. The threat to the predator mammals is the negative effects of pesticides in the agriculture 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 fishers and 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 narrowly distributed snake species particular to Mediterranean biome, is another important reptile species in the site.

Birds

Many waterfowls 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 in high numbers with feeding and resting areas due to being on the migration route. According to studies in 1990 250 bird species are recorded in Akyatan Lagoon. In the censuses during the year of 2009 152 different bird species were recorded in Akyatan and Tuzla Lagoons in total and in the censuses in winter of the same year 65521 bird species of 47 families in total were counted.

Pied avocet (*Recuvirostra avosetta*), Kentish plover (*Charadrius alexandrinus*), little stint (*Calidris minuta*), curlew sandpiper (*Calidris ferruginea*), dunlin (*Calidris alpina*), ruff (*Philomacus pugnax*) and black-tailed godwit (*Limosa limosa*) form crowded groups during 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*), 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 angustrirostris*) as well as rarely seen purple swamphen (*Porphyrio porphyrio*) and black francolin (*Francolinus francolinus*).

Mammals

With its natural formations and artificial habitats created by human intervention, Akyatan Lagoon constitutes appropriate habitats 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 primary 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, the site also supports. There are records of fallow deer (*Dama dama*), Gazella (*Gazella* sp.) and Hyaena (*Hyaena hyaena*) to have been supported in the site 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 part of the city, surrounded by city walls in its north, reserves a castle, theatre, Temple of Athena, church, bath, tomb and remnants of a cistern. Collapsed in the Middle Age, the castle was restored by Abbacies. Karataş Inn, built during Ottoman times, however, has collapsed on a large scale. The Assyrians, Greeks, Romans, Byzantines, Seljuqs and Ottomans dominated the area, which was under Hittite sovereignty in the 17th century B.C., until the proclamation of the Turkish Republic.

Past and Present Land Use

Karataş district bears a rich potential with its natural and cultural values. Akyatan Lagoon have been suppressed by rapidly growing and diversifying land use due to the potential of its natural aspects such as the coastal area it is located, its geographical position, landscape, soil structure. Having been designated as a protection site brought up the obligations of necessary precautions regarding local people's agricultural activities. Land profitability increased after the district was designated as a tourism region, suppressing sand dunes of delicate balance. Concurrently, the agricultural activities on the sand dunes additionally increased concerns about degeneration 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 including the entire natural areas in the delta. The environment plan designated core zones, ecological impact zones and buffer zones of the site, taking the wetland ecosystem and related habitats into consideration,n. Special planning decrees, which regulate conservation and use principles, were developed.

In the planning area, however, starting from sand dunes, intensive human activities are observed in the surrounding areas of the wetlands. Despite all the protection measures; agricultural activities on the treasury lands surrounding Kapıköy that is located in the sand dunes delineating Akyatan Lagoon from south have continued increasingly so far. Excessive ground water use for strawberry, melon and water melon cultivation leads to salt water leaks into the ground water. Marshes in the Seyhan and Ceyhan riverbeds were degenerated in order to fight with malaria and the chemicals use for this purpose harmed the food chain in Akyatan Lagoon.

NATURAL RESOURCE USE

Akyatan Lagoon is an all-purpose wetland ecosystem making major contributions in the local economy with agriculture, livestock production and fishery. Additionally, the site is a significant haunt for tourism, birdwatching and photography.

Agriculture

A remarkable part of Seyhan Delta is used for agricultural purposes. Starting from cotton; grains, fruits, vegetables and paddy are cultivated. Peanut, strawberry, cucumber, melon and watermelon cultivation on the plains located between the sand dunes and the lake has intensified recently.

Taking the entire delta into consideration; population density and agricultural fertility are observed to be lower in the surrounding areas of the lake. Following the allocation of agriculture lands for settlement and industrial activities, rapid population growth and intensive migration led to increasing suppression over the natural areas of the delta. Almost all of the seasonal wetlands around the lake have been drained and allocated for agriculture. Sand dunes surrounding the lake have been flattened to be transformed into

melon, watermelon and strawberry cultivation areas. Acacia saligna plantation works in the site that started in 1972 aimed at ceasing the sand dune moves nearest to the sea and in the predominant wind direction. The main objective of stopping the sand dune is to transform 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 is focused on cattle, small ruminant and poultry breeding. A part of the site is allocated as meadow. 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. Fishers 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 captured in the lake. Some of the fish captured in the lake are exported. Blue crab is captured in the eastern parts of the lake. Illegal and irregular fishing, collecting juvenile fish and the pollution from the agriculture lands have endangered fish populations in the lake. The amount of fish produced in Akyatan Lagoon was 236.200 tons in 1976 decreased to 98.376 tons in 1990 and to 29.346 tons in 2006.

WETLAND MANAGEMENT PLAN

Bird Research Society has been preparing Akyatan and Tuzla Lagoons Management Plan since 2008. The plan will be complete by the end of 2010 and enforced after being acceded by National Wetland Commission.

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Yumurtalık Langoons Ramsar Site

YUMURTALIK LAGOONS

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

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

The lagoons are the most 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

Name of the Ramsar Site	Yumurtalık Lagoons
Location and Boundaries	Located in Yumurtalık district of Adana province.
Area	19.853 ha
Coordinates	36°42'N 35°38'E
Elevation	0 m – 90 m
Conservation status	Ramsar Site Nature Conservation Site Natural SIT Area of 1st degree
Population	3.967
Climate	Mediterranean
National and International Sıgnificance	Turkey's internationally important wetland site Key Biodiversity Area

	Important Plant Area Important Bird Area
Site significance	It contains one of the largest dune ecosystems of Mediterranean that could preserve its natural character.
Site symbols	Kentish Plover (*Charadrius alexandrinus*)
Management Plan	Yumurtalık Lagoons Management Plan was enforced in the year of 2008.
Facilities in the site	Presentation and visitor center

Land Tenure / Proprietorship

Since shores and the environment of the lagoons was flooded under 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 farmlands and used by the local people.

Conservation Statuses

The site has been taken under protection after being designated as Natural SIT Area 1st degree under the Conservation Law on Cultural and Natural Assets in 1993 and as Nature Conservation Site under the Law on National Parks in 1994. In the year of 2005, Turkish government pledged at an international level to preserve the ecological aspects of the site as it is, by including Yumurtalık in the Ramsar Convention List. Yumurtalık Lagoons Management Plan was enforced in 2008.

Yumurtalık Lagoons Ramsar Site meets seven internationally important wetland criteria out of nine. These are;

RAMSAR CRITERION	DESCRIPTION	YUMURTALIK LAGOONS
Criterion 1	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.
Criterion 2	There are rare habitats. Endangered reptile species included in the IUCN red list live in the site.	It is a rare habitat where Aleppo Pine (*Pinus halepensis*) exist. The threatened sea turtles *Caretta caretta* and green sea turtles *Chelonia mydas* are supported.
Criterion 3	Supports many rare habitats in eastern Mediterranean.	One of the rare habitats that supports Aleppo Pine (*Pinus halepensis*). The site comprises lagoons, salt and freshwater marshes, flooded forests, sand mounds, Seyhan and Ceyhan Rivers and delta formed by these rivers as well as important habitats of Mediterranean.
Criterion 4	An important habitat for the critical stages of lives 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 (*Francolinus francolinus*), Kentish Plover (*Charadrius alexandrinus*), Little Tern (*Sterna albifrons*), Eurasian Wigeon (*Anas penelope*), Pied Avocet (*Recurvirostra avosetta*), Little Stint (*Calidris minuta*) are breeding in the site in winters. The site is one of the key points for sea turtle (*Caretta caretta*) and green sea turtle (*Chelonia mydas*) to assure their long term existence.
Criterion 5	Water bird are found in hig numbers regularly.	In the census carried out in 2004 more than 20.000 water birds are recorded.

Criterion 6	There are species that includes more than one percent of the population of waterbirds.	Eurasian Coot (*Fulica atra*) 26.000 individuals (1% 20.000), stork (*Ciconia ciconia*) 12.439 individuals (1% 4.000), flamingo (Phoenicopterus roseus) 5.000 individuals (1% 2.900), Eurasian Wigeon (*Anas penelope*) 14.320- 27.190 individuals (1% 3.000), pied avocet (*Recurvirostra avosetta*) 1.217 individuals (1% 470), kentish plover (*Charadrius alexandrinus*) 1200 individuals (1% 410), dunlin (*Calidris alpina*) 7.239 individuals (1% 3.000), white-headed duck (*Oxyura leucocephala*) 191 individuals (1% 75) are recorded.
Criterion 8	This area is very important for the reproduction of fish.	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 (*Mugil* sp.) sea bream (*Sparus aurata*), sea bass (*Dicentrarchus labrax*), European eel (*Anguilla anguilla*) and blue crap (*Callinectes sapidus*)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 a building in site for management, inadequacy of transportation and control means and absence 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 significant streams of Turkey in terms of its high volume of flow though its length is 509 km and has a 22.300-square-kilometer catchment area. The plain had become scene for huge floods and due to frequent changes 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, one of the 26 hydrologic basins of Turkey, and its tributaries has been dammed for energy generation, irrigation, flood prevention, drinking water. Kesikkuyu (1971), Menzelet (1972), Kılavuzlu (1994) and the last one Berke (2003) are the dams constructed on the river and its tributaries.

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 Arapboğazı 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 with waters of Ömer Lake, when it floods in winters and dries in summers due to heavy evaporation. The lakes are getting filled rapidly because of sediment load 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 Avcıali Lakes. The two lakes are considered as separate lakes since they have slight separations; though they indeed compose one single system. The 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 the 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, freshwater feeding to the lagoons is also prevented. Currently the freswater sources of the lagoons are precipitation water falling on the surface and the basin of the lagoon, leaking effects and artesianic feeding.

The saltwater entrance into the lagoons happens via lagoon-sea links. The facts that the total annual evaporation in the region is almost double of the annual precipitation amount and the typical Mediterranean climate – warm, wet 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 Deveciuşağı, Brooks are the ones flowing into the site during wet seasons. Many canals are opened for drainage and irrigation of the farm lands located in or outside of 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 dominant 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, which comprises a highly rich as well as a complex and dynamic lagoon, lake and marshes system with its almost 30-kilometer coastal cord formed in almost a-2500-year time span, changed its direction to south once again during a flood in 1932 emptying into Ağyatan Lagoon first. Ceyhan then starts emptying into the sea in its current place 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 on. Since Ceyhan River stopped carrying sediments as it used to in the past after the floods were taken under control by dams constructed on it, the delta growth has totally stopped as well. Between 1992 and 2005 its coastal strip is recorded to have eroded rapidly and the sea is moving in by nearly 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 conservation site. Alluviums comprising clay, sand, pebble and sporadic swamps are formed by accumulation of the sediments Ceyhan River carries. 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 our country. 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 is the most important part of the site in terms of flora. Besides Aleppo pine (*Pinus halepensis*), a rare species for Turkey, forms a forest, there are six species of top priority in conservation. All of these species survive in glades. After the site was designated as a nature conservation site, human use was totally prohibited. The prohibition enabled Aleppo pine and maquis communities to develop and prosper in the glades.

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 diverse according to the sand structure. The variety of sand dune vegetation diverse 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 Poecilidae family.

Amphibians and Reptiles

Six amphibian species of four families and 42 reptile species of 11 families are recorded in Ceyhan Delta. The Luschan's Salamander or Lycian Salamander (*Mertensiella luschani*) the Salamandridae is endemic to west Mediterranean.

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. 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 thousand. 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 couples, little tern (*Sterna albifrons*) 357 couples, collared pranticole (*Glareola pratincola*) 79 couples, spur-winged plover (*Vanellus spinosus*) 12 couples, Smyrna kingfisher (*Halcyon smyrnensis*) 2 couples and marbled duck (*Marmaronetta angustirostris*) 1 couple 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.

Mammals

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 degradation in its habitats.

Persian squirrel (*Sciurus anomalus*), European hare (*Lepus europaeus*), gray dwarf hamster (*Crice-tulus 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 great part of Ceyhan Lower Basin used to comprise fresh and saltwater marshes, meadows, sand dunes and lagoons until the end of 1940s. However, the site has started to change due to the flood controls by the dams constructed on Ceyhan River.

Following the flood controls, natural areas started to be transformed into agriculture lands. Since the sandy soil is appropriate for peanut production and with the increasing early greenhouse vegetable production this process has accelerated. The transformation

of natural areas of the delta into agricultural lands has continued even after it was designated as Nature Conservation Site.

While there was no agriculture lands, where the conservation site is located, in 1940s; today the agriculture lands cover 7.9 percent (1.294.5 ha) of the conservation site. The agriculture lands within the conservation site 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.

The lands of the conservation is divided within the boundaries four settlement areas: Deveciuşağı, Zeynepli and Kaldırım in the north and Adalı villages in the south.

NATURAL RESOURCE USE

The users of the site are farmers and livestock producers, fishers and limited number of campers.

Agriculture

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

Agriculture lands are widespread in the areas that had washed with the floods of Ceyhan River in the past and become available for agriculture with sediment loads. These areas are located in the west of the conservation site and stretch as thin strips in the both sides of the former riverbed of Ceyhan. As the agriculture 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 ground water level.

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

Wheat and cotton production in the site is gradually decreasing while corn, watermelon and vegetables are replacing them. Still existing wheat lands are located, where the soil is partly poor with no possibility of holding water, particularly in the areas on the way to the winter shelters; while cotton lands are located, where the salt level is high with 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. Again in these areas, where light soils are widespread, peanut farming has also increased recently. Vegetable production is done in the lands close to the villages in very limited areas, while greenhouse zucchini and tomatoes production is gradually increasing. Corn is usually in rotation with wheat and cropped as the second harvest on the same lands.

The total agriculture land of Kaldırım town is 64.365 da. 421 families (90%) make their livings by farming. Main agriculture productions are wheat, peanut, corn, cotton and vegetable. 12.800 da of the agriculture lands are irrigated with waters provided with the canals opened by the local people.

In Deveciuşağı village, agricultural production is carried out in 17.354 da and 119 families (46%) make their livings by means of farming. Wheat, peanut, cotton, corn and vegetable are the most produced crops. A total of 6.500 da (37.4) agriculture lands are irrigated.

The agriculture effects on the conservation site are the transformation of the natural lands into agriculture lands particularly those surrounding the private registered agriculture lands and less affected by saltwater. The pesticide and chemical fertilizer leftovers carried into the lagoons from the agriculture lands also effects the conservation site. The highest amount of pesticides and chemical fertilizer use in Turkey is in Adana.

Livestock production

Livestock production has increased recently since the local people cannot obtain expected amount of yield and income from agricultural activities. While cattle raising was more common in the past, nowadays small ruminant raising is observed to extend.

Almost all of the livestock raised in surrounding areas of the conservation site 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. Because nomadic life traditions have totally disappeared, animals are grazing in the conservation site for the whole year. The increasing number of livestock leads to degeneration and disappearance of the plant coverage, particularly in the sand dunes, degenerates due to overgrazing. The degradation of the plant cover increases the sand dune erosion.

Fishery

Besides agriculture and livestock production, fishery is the most important means of living of 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, Deveciuşağı, Kaldırım and Yumurtalık) and 504 members of these cooperatives.

These cooperatives operate the lagoons. There are 115 fishers, who are not a member of any of these cooperatives. The fishers working in the lagoon are paid monthly according to the days they worked. Special 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. Among those who go out on fishing 14.1 percent fish in summers, 7.5 percent fish during the whole year and others in various months, the results of the research on 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 fisher families in Haylazlı and Deveciuşağı Villages are higher than the other settlements. There is almost no fisher families in Kaldırım and Zeynepli. Sea bass, grey mullet, sea bream, bluefish and meagre are the main fish species caught in the region.

Though the data particularly about the amount of the fish that has been caught, fishers point out the amount of the fish has decreased by 2/3 in the past 15-20 years. Both scientific studies and the fishers' statements show 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 decrease of fish stocks.

Increasing costs (such as rent, tax) against the decreasing fish stocks force fishers to catch higher amounts of fish. Fishing immature fish, not letting the fish into the sea for

spawning and illegal troll fishing leads to over-consumption of fish stocks and endangers the long-term sustainability of fishery.

Fisheries Products Cooperatives active in the site	**Membership**
Haylazlı Fisheries Products Cooperative	397
Sadiye Kırmızıdam Fisheries Products Cooperative	47
Deveciuşağı Fisheries Products Cooperative	34
Kaldırım Fisheries Products Cooperative	29
Yumurtalık Central Fisheries Products Cooperative	15
Total	**504**

Hunting

Despite hunting within the boundaries of the conservation site is totally forbidden, illegal hunting occurs, although scarcely. Widespread hunting habits, lacking a guard in the surroundings of Kaldırım Town and inefficient controlling mechanisms enables illegal hunting. Moreover, the fact that the only site guard carries out the controls by a tractor is another reason to inadequate control.

Tourism

There are no activities in terms of tourism, though the site is very close to the sea. Yumurtalık and Karataş districts that are very close to the site are very active in terms of sea tourism particularly in summers. The conservation site is not directly effected by these activities. In the close surroundings of the conservation site, day tripping and camping are more common tourism activities. Local people are not sympathetic to camping activities considering tents have no input for them. They, however, keep a warm prospect for possible hotel facilities thinking such tourism activities might provide new employment opportunities.

Alleppo pine forest had been a significant recreational area especially for the local people before it was designated a Nature Conservation Site. The site was allocated to the Ministry of Forest in 1991 and activated as forest recreation facility. Restaurants and open air coffee houses had been opened in the area and became a preferred location for the people of close settlements. Entrances to the site was forbidden, restaurants and other facilities were closed after the area had been designated a Nature Conservation Site. Random picnickers can still be seen during spring and summer months, though forbidden.

The 22-kilometer-long and 1.5-kilometer-breadth coastal dune located between the southeastern 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.

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 under the leadership of Kuş Araştırmaları Derneği in cooperation with Çevre ve Tüketici Koruma Derneği, or 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 acceded in the 1st National Wetlands Commission convention.

References

Altan, T. (2005) Yumurtalık Lagünleri Bitki Örtüsü, Habitatı, Arazi Kullanımı ve Kıyı Çizgisinde Meydana Gelen Değişikliklerin Belirlenmesi Araştırması Raporu

Erdem, O., Saraç, B. (2007). Yumurtalık Lagünleri Yönetim Planı. Kuş Araştırma Derneği, Ankara.

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 before today, a second volcanic eruption a second 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 50-meter above the water level situated in the middle of the main Meke, is a saltwater lake with a depth of 25 meters. The formation of the volcanic mass that forms the island has a capacity to immediately absorb even the heaviest rainfall. This is the reason why Meke could contain 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 due to its geological structure.

SITE IDENTITY

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

Land Tenure / Proprietorship

The area within the Ramsar Site boundaries are public property, 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 Site of 1st Degree in 1989 and a 260-hectare part of it was designated as a natural monument in1998. 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
Criteria 1	The site is a rare wetland area.	Though Anatolian lands are rich with crater lakes, this one with its acidic lake in the caldera is a rare wetland.
Criteria 2	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.	*Allium sieheanum*, *Astragalus cicerellus*, *Gladiolus halophilus*, *Lepidium caespitosum*, *Limonium lilacinum*, *Sphaerophysa kotschyana*, *Verbascum pyroliforme* are the threatened endemic plant species. Marsh harrier (*Circus aeruginosus*), black-winged stilt (*Himantopus himantopus*), great bustard (*Otis tarda*), little bustard (*Tetrax tetrax*) are the bird species protected under Birds Directive.
Criteria 3	The site sustains biological diversity. It also supports numerous endemic plant species.	*Allium sieheanum*, *Astragalus cicerellus*, *Gladiolus halophilus*, *Lepidium caespitosum*, *Limonium lilacinum*, *Sphaerophysa kotschyana*, *Verbascum pyroliforme* are the threatened endemic plant species.

MANAGEMENT STRUCTURE

Since it is a Ramsar Site, it is under competency of Ministry of Environment and Forestry, Provincial Konya Directorate of Environment and Forestry as well as under competency of Provincial Konya Directorate of Culture and Tourism for being a Natural Site.

HYDROLOGICAL ASPECTS

Total annual rainfall in Konya province alters significantly between 294.9mm (Karapınar) and 764.0mm (Seydişehir). Most of the precipitation occurs during falls and particularly during winters throughout the province. Rainfall during April-May-June that bears great significance for vegetation growth, ratio to average provincial total rainfall is 27.3 percent. 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 10 km2 around the maar. The lake is very shallow with high rate of salinity (32%).

GEOLOGICAL ASPECTS

The vast and flat Karapınar Plain (19 km2) lies in the east of Konya. The depth in Meke Maar is 1.2m at most. Its surface area is 0.5 km2. Since the maar was formed as a result of volcanic activities, its acidic water contains magnesium and sodium sulfate, due to why the site supports little biodiversity.

BIOLOGICAL ASPECTS

Steppe vegetation dominates the immediates of the lake situated in the centre of the salt steppes of central Anatolia.

WILDLIFE

Flora

Arid and dry plant cover adopted steppes dominate the site. In the soils of fine sands, generally

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.), wood hedgehog (*Hydnum repandum*).

Amphibians and Reptiles

Since volcanic ashes absorb the light, the lake and its immediates are warmer that 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

Though 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*), black-winged stilt (*Himantopus himantopus*) are recorded. According to the information obtained from the local people, the site reportedly supported almost 100 bird species until 2003, which, however, degraded recently. Most of the birds do not frequent the lake anymore.

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 after an initial crater by a volcanic eruption 400 million years ago had been filled in with water transforming into a lake and a second volcanic cone by a second volcanic eruption 9000 years ago was outcropped in the middle of the initial crater lake filled with water yet again, transforming into a secondary lake.

Past and Present Land use

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

NATURAL RESOURCE USE

Agriculture

The lake water cannot be used for agricultural purposes since the highest conductivity rate of irrigation water should be2.250ec at the highest; the electric conductivity of the lake is 65.000ec. However from almost 10 wells within 10km2 around the lake, water is pumped for irrigational uses.

Livestock

There are no livestock production activities in the area.

WETLAND MANAGEMENT PLAN

Wetland Management Plan is not prepared since human activities in the area are rare.

References

Taban, Ş.D., Dıvrak, B.B., Ayas, C., İş, G., Beton, D., Çakıroğlu, İ. 2008. *Türkiye'deki Ramsar Alanları Değerlendirme Raporu*. Doğal Hayatı Koruma Vakfı (WWF-Türkiye).

Kızören Obruk (Sinkhole) Ramsar Site

KIZÖREN OBRUK

Situated in the centre of Konya Closed Basin, nearby Kızören Village on Konya-Aksaray highway, Kızören 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. Kızören Sinkhole is in Obruk Town of 186.552-populated Karatay district in northeastern part of Konya. It is one of the many in Obruk (Sinkhole) Plato in the south of Tuz (Salt) Lake.

SITE IDENTITY

Name of the Ramsar Site	Kızören Obruk (Sinkhole)
Location and Boundaries	Located in Obruk Town of Karatay district in northeastern part of Konya.
Area	127 ha
Coordinates	38°20'N 33°20'E
Elevation	1000 m - 1080 m
Conservation status	Ramsar Site Archeological Site Area
Population	202 (Kızören Village)
Climate	Continental
National and International Significance	Turkey's wetland of international importance Key Biodiversity Area Important Bird Area
Site significance	Karstic wetland ecosystem
Site symbols	Non-existent
Management Plan	Non-existent
Facilities in the site	Non-existent

Land Tenure / Proprietorship

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

Kızören Obruk Ramsar Site meets two out of nine criteria of wetland of international importance. These are;

RAMSAR CRITERION	DESCRIPTION	KIZÖREN OBRUK
Criteria 1	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.
Criteria 2	The site supports endangered bird species included in International Union for Conservation of Nature (IUCN) red list categories and species protected under Bern Convention.	The site supports nine plant species, endemic and/or endangered and/or protected under Bern Convention.

MANAGEMENT STRUCTURE

The site is controlled under the competence 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). The precipitation trend throughout the province concentrates in autumns and especially winters. The of the districts, where meteorological data is collected,

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 same level of water as the wells surrounding it. In the period 1996 to 2006 the water level has decreased 10 m more, data from a very close well reveals. The ground water 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 before today) 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 before today) 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 pyroklastic material formed as a product of young volcanism in Üzecek Mountain and Karapınar are also the geological units in the site.

BIOLIGICAL ASPECTS

Habitats

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

WILDLIFE

Flora

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

Acantholimon halophilum	Endemic
Allium sieheanum	Endemic and threatened
Allium vuralii	Endemic, Bern Convention
Astragalus cicerellus	Endemic and threatened
Gladiolus halophilus	Endemic and threatened
Lepidium caespitosum	Endemic and threatened
Limonium lilacinum	Endemic and threatened
Sphaerophysa kotschyana	Endemic, Bern Convention
Verbascum pyroliforme	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 *oedicnemus*), 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*) was recorded in the site in 2010.

CULTURAL AND SOCIAL ASPECTS

Archeology

Kızören Obruk has hosted many civilizations starting from Byzantium period as if proving the fact that all civilizations occur in the surrounds of water.

Located 30 m in the south of the sinkhole, Konya-Karatay Obruk Hanı (Inn) has managed to remain standing for more than a thousand years, as a common creation of Byzantium,Seljuk and Ottoman cultures. Following the sinkhole was designated as a Ramsar site, activity in the area increased and the inn was included in the restoration program by the Directorate General of Foundations. The restorations works started in 2008 still continue. Together with Kızören Village right by the sinkhole the inn is an attractive and representative model with respect to the sinkhole's nature-human interaction and the common culture.

Past and Present Land Use

The groundwater the sinkhole contains was operated 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 bears a remarkable importance since the region has heavy drought problems. Kızören Village and the Seljuk-era caravansary placed just by the sinkhole prove's the sinkhole's significance. Today visitors can observe that the pump has remained over the water level, so sinkhole water cannot be drawn anymore. Agricultural activities around the sinkhole continue.

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, sugar beet cooperatives provide more help for the farmers, so they choose to continue sugar beet cultivation.

WATERMANAGEMENT PLAN

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

References

Erdoğan, S. 2003. *Karst: Yeni Ramsar Sulak Alan Kriteri ve Türkiye'den Bir Örnek. Mağara Ekosisteminin Türkiye'de Korunması ve Değerlendirilmesi Sempozyumu (Ed.İrfan Albayrak)*, Türkiye Tabiatını Koruma Derneği – TÜBİTAK. Ankara.

Taban, Ş.D., Dıvrak, B.B., Ayas, C., İş, G., Beton, D., Çakıroğlu, İ. 2008. *Türkiye'deki Ramsar Alanları Değerlendirme Raporu*. Doğal Hayatı Koruma Vakfı (WWF-Türkiye).

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 is 37 km to the city center.

SITE IDENTITY

Name of the Ramsar Site	Lake Kuyucuk
Location and Boundaries	Located within the boundaries of Kuyucuk and Duraklı Villages, Akyaka and Arpaçay districts of Kars province.
Area	416 ha
Coordinates	40° 45'N 43° 27'E
Elevation	1.627 m
Conservation status	Ramsar Site Wildlife Improvement Site
Population	302 (Kuyucuk Village)
Climate	Continental
National and International Significance	Turkey's wetland of international importance Key Biodiversity Area Important Bird Area
Site significance	The shallow lake supports a broad variety of bird species for being situated on African-Eurasian migration route.
Site symbols	Ruddy shelduck (*Tadorna ferruginea*), white-headed duck (*Oxyura leucocephala*), red-breasted goose (*Branta ruficollis*), ferruginous duck (*Aythya nyroca*)
Management Plan	The wetland management plan of the site is expected to be completed by early 2011.
Facilities in the site	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 also was 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**
Criteria 1	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 that millions of birds migrate through in Falls and Springs.
Criteria 2	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 (*Pelecanus crispus*), red-breasted goose (*Branta ruficolis*), ferruginous duck (*Aythya nyroca*), white-headed duck (*Oxyura leucocephala*), red kite *(Milvus milvus)*, Egyptian vulture (*Neophron percnopterus*), cinereous vulture (*Aegypius monachus*), pallid harrier (*Circus macrourus*), imperial eagle (*Aquila heliaca*), lesser kestrel (*Falco naumanni*), red-footed falcon (*Falco vespertinus*), black-tailed godwit (*Limosa limosa*), great spine (*Gallinago media*), great bustard (*Otis tarda*), black-winged pranticole (*Glareola nordmanni*), European roller (*Coracias garrulous)* are the threatened or near threatened bird species recorded in Lake Kuyucuk.
Criteria 3	Lake Kuyucuk bears a significant value for the long-term existence of the region's genetic and ecological richness with respect to its flora and fauna characteristics.	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.
Criteria 4	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 (*Oxyura leucocephala*) 14 species breed in the site.
Criteria 5	More than 20.000 waterbirds are observed regularly in Lake Kuyucuk.	Lake Kuyucuk supports thousands of ruddy shelduck, grayleg goose and Eurasian coot during migration in falls. According to 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.
Criteria 6	Over 10.000 ruddy shelducks are observed regularly in the site in falls.	This number corresponds to almost 5-12 percent of the 170.000-220.000 estimated world population of ruddy shelduck. In 2004, 2006 and 2007 20.000, 13.000 and 10.000 ruddy shelducks were recorded in the lake.

MANAGEMENT STRUCTURE

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

The management plan of the site is expected to be completed by early 2011. The management plan will be executed by the Kars province 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. Waters carrying nitrate, phosphate and other chemicals from the surrounding agriculture lands may leak into the lake. Chemical measurements conducted in springs of 2006 and 2007 for the first time revealed that the lake water is relatively clean and the lake is an ideal candidate for ecological restoration.

GEOLOGICAL ASPECTS

The Kalkankale formation in Lake Kuyucuk and surrounds 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, pearlite, pumice, obsidian) form the elevations in southwest.

Lake Kuyucuk and its immediates 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 Cadalı Heights (1.772 m) in the southwest; Büyükalamet Heights (1.676 m), Küçükalamet 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 used for cereals and fodder plants cultivation and 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. The unwooded steppes surrounding the lake are used for cereals and fodder plants cultivation and livestock production.

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 and sand lizard (*Lacerta agilis*) is the reptile species recorded in the site.

Birds

The site supports a high variety of bird species due to being situated on the African-Eurasian migration route. The site is very important for rich bird communities of the greatest 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 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 bilind 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 the 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-story building. Having been damaged and torn down in time there remained only one story. A church bell of three tons at the top story 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 RESOURCE USE

The most important human activities in the environment of the lake are agriculture and livestock production. Mostly fodder plants are cultivated and cattle farming is also one of the most important means of living.

Bird ringing and wetland restoration works are conducted in Lake Kuyucuk. Birdwatchers and nature tourists visit the site from the first moths 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, Birdwatching Day in the site.

Agriculture

Dry agriculture activities are widespread 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 area following harvest. Grass growing in the meadow areas are hayed for winter by the villagers in the same period.

Livestock

Cattle farming in the region is intense. There are 5000 cattle grazing by the lake and drinking lake water in Kuyucuk, Carcıoğlu and Duraklı villages. Despite the prohibition of animal entranceinto the site, over-grazing during Aprils, when the grass is just starting to grow, leads to serious degradation of the grass and reeds around the lake.

WETLAND MANAGEMENT PLAN

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

References

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