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## Review

# Wetland management in Turkey: Problems, achievements and perspectives

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**Due to the extremely variable topography and diverse climate, Turkey has a great biodiversity in the term of flora and fauna. One of the main features that compose the rich biodiversity in Turkey is wetlands. Although the ecological and economical worth of the wetlands have been valued recently and considerable initiatives have been carried out in Turkey for the last decade, there are still significant threats and problems concerning the conservation and management of the wetlands. It is aimed in this paper to inquire into the issues experienced to date about wetlands and to discuss the steps that have been taken for solution of these issues in order to evolve suggestions that will provide guidance over and support to the road maps developed to ensure consistency of the wetlands in Turkey.**

**Key words:** Wetlands, wetland management, Turkey.

## INTRODUCTION

Turkey is a transcontinental Eurasian country located in the northern hemisphere on the peninsulas of Anatolia and Thrace, stretching from the southeast of Europe towards the Caucasus and the Middle East. The peninsula of Thrace, the European extension to Turkey and the peninsula of Anatolia, the Asian extension are separated by the Bosphorus, also known as Istanbul Strait, the Dardanelles and the Marmara Sea, a small mediterranean, which connect the Black Sea to the Aegean Sea, and thereby to the Mediterranean Sea. The country is surrounded by the Black Sea in the north, the Aegean Sea in the west and the Mediterranean Sea in the south (Figure 1).

Turkey has an area of 814.578 km<sup>2</sup> (Özey, 2009) and is on the 35°51' - 42°06' north parallel and 25°40' - 44°48' east meridian geographic coordinates. As a country of transition between the continents of Europe, Asia and Africa, Turkey demonstrates great differences in the topographical aspect. These topographical differences, which are one of the main factors to the rich biodiversity in the country, have also diversified the climate zones. It is possible to say that there is no other land anywhere in the

world with the size of Turkey that covers such various climate zones (Demirsoy, 2002). The country, which has an extremely variable topography and diverse climate, sustains very assorted habitats and different species correlated to these habitats.

One of the main elements that compose the rich biodiversity in Turkey is wetlands. While wetlands of different qualifications increase the ecosystem diversity on one hand, the species using these wetlands raise the species' and genetic diversity on the other hand. The wetlands in Turkey are one of the most important ecosystems as well as one of the most important ecologic assets. After Russia, Turkey is the richest country in Europe and in the Middle East in terms of the existing wetlands. It is estimated as the conclusion of the inventory work carried out by the Ministry of Environment and Forests (MoEF) and the Nature Association that the total wetland area of Turkey are about 3,000,000 ha (Ceran, 2005). Although the ecological and economical worth of the wetlands have been valued recently and considerable initiatives have been carried out in Turkey for the last decade, there are still significant threats and problems concerning the conservation and management of the wetlands.

It is aimed in this paper to inquire into the issues experienced to date about wetlands and to discuss the steps that have been taken for solution of these issues in

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**Figure 1.** Turkey's position on earth (<http://www.bmtrans.com/images/tu-map.jpg>).

order to evolve suggestions that will provide guidance over and support to the road maps developed to ensure consistency of the wetlands in Turkey.

## GENERAL BIO-GEOGRAPHICAL FEATURES AND WETLANDS OF TURKEY

Thanks to its bio-geographical features, Turkey has become one of the most important areas in the world in terms of biological diversity. Today, while approximately 2,600 species of flowering plants exist in Germany, 4,500 in France, 4,900 in Greece and 5,500 in Italy (Demirsoy, 2002), around 9,200 species of flowering plants have been identified in Turkey. Identified number of the species and subspecies is approaching to 11,000 with recent additions. 34% of the species possessed are endemic (Ministry of Environment and Forestry, 2007).

Turkey has very different kinds of wetlands such as

flood plains and rivers, estuaries and deltas, lakes, marshes, peat bogs, coastal wetlands and human-made wetlands (Karadeniz, 1995). Besides being important resources which compose the coastal wetlands, the rivers of Turkey also form unique wetlands such as river beds and riparian coasts, flood plains and mud islands (Tırıl, 2005).

In Turkey, the number of wetlands in the category "Wetland of International Importance" according to Ramsar criteria is 135 (Table 1). The total area of these wetlands is 2,206,835 ha. (<http://www.milliparklar.gov.tr/bolumler/dkoruma/kbab/pylsm/transfer/arsiv/sulakalan.htm>, 2009).

Sustaining many types of species, especially those of birds, the wetlands of Turkey increase the diversity of species in the country. Birds maintain an important place among these species, not only in terms of number of species but also the sizes of population.

A large part of the bird species observed in Turkey is

**Table 1.** Wetlands of Turkey

No	Wetland Name	No	Wetland Name	No	Wetland Name
001	Uluabat Lake	046	Karataş Lake	091	Meke Maar
002	Kuş Lake	047	Salda Lake	092	Meyil Obruk
003	Göksu Delta	048	Yarıklı Lake	093	Samsam Lake
004	Akyatan Lake	049	İznik Lake	094	Tersakan Lake
005	Gediz Delta	050	Kocaçay Delta	095	Uyuz Lake
006	Burdur Lake	051	Gökçeada Lagoon	096	Ereğli Reedbeds
007	Sultansazlığı Marshes	052	Saroz Bay	097	Marmara Lake
008	Seyfe Lake	053	Işıkli Lake	098	Dalaman Wetlands
009	Kızılırmak Delta	054	Pamukkale	099	Gölköy
010	Kesik Lake	055	Meriç Delta	100	Dalyan Wetlands
011	Ağyatan Lagoon	056	Hazar Lake	101	Girdev Lake
012	Karagöl and Çinili Lakes	057	Ekşisu Reedbeds	102	Güllük Delta
013	Tuzla Lake	058	Gölova Lake	103	Köyceğiz Lake
014	Yumurtalık Lagoon	059	Tortum Lake	104	Metruk Saline
015	Gölbaşı Lakes	060	Balıkdımı Lake	105	Akdoğan Lake
016	Karamık Reedbeds	061	Yüksekova Reedbeds	106	Bulanık Plain Wetlands
017	Eber Lake	062	Aras-Karasu Floodplains	107	Haçlı Lake
018	Karakuyu Reedbeds	063	Gölcük Lake	108	Iron Reedbed
019	Acıgöl Lake	064	Kovada Lake	109	Fırtına Stream
020	Balık Lake	065	Eğirdir Lake	110	Karadere Stream
021	Çiçekli Lake	066	Beyşehir Lake	111	Sakarca Delta
022	Doğubeyazıt Reedbeds	067	Büyükçekmece Lake	112	Sapanca Lake
023	Sarısu Wetlands	068	Küçükçekmece Lake	113	Yeşilirmak Delta
024	Tuz Lake	069	Terkos Lake	114	Sarıkum Lake
025	Çöl Lake and Çalıklüzü	070	Alaçatı Estuar	115	Hafik Lake
026	Mogan Lake	071	Gölcük Lake	116	Tödürge Lake
027	Aksu Delta	072	Küçük Menderes Deltası	117	Ulaş Lakes
028	Avlan Lake	073	Gökdere Stream	118	Cizre Wetlands
029	Olukköprü Watersources	074	Aygır Lake	119	Bendimahi Delta
030	Patara Coast	075	Çalı Lake	120	Çaldıran Plain Wetlands
031	Aktaş Lake	076	Kuyucuk Lake	121	Çelebibağı Reedbeds
032	Çıldır Lake	077	Hürmetçi Reedbeds	122	Çimenova Lakes
033	Putka Lake	078	Palas Lake	123	Dönemeç Delta
034	Büyük Menderes Delta	079	Kapuzbaşı Watersources	124	Edremit Reedbeds
035	Bafa Lake	080	Zamantı River	125	Erçek Lake
036	Ayvalık Coast	081	İğneada Longozu	126	Kaz Lake
037	Yüzenada Wetland	082	Dupnisa Cave	127	Turna Lake
038	Batmış Lake	083	Akşehir Lake	128	Van Lake
039	Nemrut Lake	084	Bolluk Lake	129	Yedikır Dam
040	Sodalı Lake	085	Çavuşçu Lake	130	Hirfanlı Dam's Lake
041	Nazik Lake	086	Çıralı Obruk	131	Sarıyer Dam
042	Abant Lake	087	Kızören Obruk	132	Southern Keban Dam
043	Yeniçağa Lake	088	Konya Acıgöl Lake	133	Karakaya Dam
044	Çorak Lake	089	Kozanlı Gököl Lake	134	Atatürk Dam
045	Göhlisar Lake	090	Kulu Lake	135	Karkamış Floodplain

Source: <http://www.milliparklar.gov.tr/bolumler/dkoruma/kbab/pylsm/transfer/arsiv/sulakalan.htm>, 2009.

**Table 2.** Mid-winter waterfowl count results in Turkey between years 1986-2006 (Onmuş, 2007).)

Year	The number of the wetlands	Number of the waterfowls
1986	32	1.323.007
1987	38	637.796
1988	46	303.389
1989	34	578.379
1990	47	368.859
1992	38	702.425
1993	33	559.094
1996	67	1.879.068
1999	81	1.655.390
2002	82	865.209
2005	86	1.323.007
2006	79	1.410.895
2007	94	1.653.284

dependent on wetland habitats. At the mid-winter waterfowl count held in the wetlands of Turkey in 2006, 1,410,895 waterfowls were counted while 1,653,284 were counted in 2007 (Onmuş, 2007). Mid-winter waterfowl count results for the years 1986 to 2009 are shown in Table 2.

Turkey's wetlands are very important breeding areas for some bird species. For example, Dalmatian Pelican (*Pelecanus crispus*), which is under the threat of extinction worldwide is breeding in the wetlands such as Kuş (Manyas) Lake, Great Menderes Delta, Gediz Delta in Turkey. It is known that approximately 70% of the world population of the white-headed duck (*Oxyura leucocephala*) which is under the threat of extinction worldwide was wintering in the wetlands in Turkey until recently. However, this number decreased in the recent years (Kılıç and Eken, 2004).

## BRIEF HISTORY

Having acted as a bridge between the old world continents, Turkey has been experiencing anthropogenic influences since the ancient times. As for its wetlands, the damages caused to them have increased especially during the 20th century. As in many countries, the wetlands in Turkey have also been dried out for an extended period of time with the purpose of acquiring agricultural fields as well as preventing diseases, such as malaria, for

the spread of which the wetlands were blamed. Besides, for reasons like urban development, flood control and irrigation, most of the wetlands in Turkey have been dried out totally or partly. Negative outlook of public opinion regarding the wetlands also has a part in the damages caused to them (Tırıl, 2005; KAD, 2006).

Draining out of the wetlands in Turkey has been going on since the Ottoman period. While the wetlands were being dried out with the purpose of fight against malaria in general until 1950's, development-oriented practices starting from 1950's have increased the damages caused to the wetlands. Draining of the wetlands has accelerated with the capability to cultivate vast areas due to mechanized agriculture and the increase in the construction of dams and roads in these years. A law was enacted in 1950 setting forth that those to dry out the government-owned marsh areas would possess such areas free of charge and then in 1960, the "Act for Termination of Malaria" was put in force which also included draining of the wetlands spreading out malaria. In 1953, DSI (State Hydraulic Works), the functions of which also included draining of the marsh areas has been founded. DSI, a leader of the public organizations of Turkey causing damage to the wetlands, has drained or attempted to drain many wetlands totally or partly in Turkey (Tırıl 2005, KAD 2006).

Wetlands, the natural composition of which has either been disturbed or irreversibly destroyed in Turkey throughout the last century as the result of various inter-

**Table 3.** Wetlands drained in Turkey (Magnin and Yazar, 1997).

Name of the wetland	Province	Area (ha.)
Amik Lake	Hatay	27.000
Asvan flood plain	Malatya	200
Emen Lake	Kahramanmaraş	2.750
Aynaz Marshes	İçel	1.000
Regma Marshes	İçel	1.000
Avlan Lake	Antalya	800
Kara Lake	Antalya	3.280
Gökçeli Lake	Burdur	740
Güvenç Lake	Konya	200
Yarma Marshes	Konya	10.000
Hamam Lake	Afyon	500
Alparslan Lake	Isparta	500
Gencali Lake	Burdur	317
Pınarbaşı Lake	Burdur	1.000
Söğüt Lakes	Burdur-Antalya	6.500
Ovagelmiş Lake	Antalya	1.350
Kestel Lake	Antalya	2.300
Arapçayırı, Çumra Plain	Konya	20.000
Sakarya River Flood Plains	Through the river	Many tens of thousands of hectares
Gökçeören Lake	Adapazarı	2.500
Simav Lake	Kütahya	2.065
Cellat Lake	İzmir	1.200
Efteni Lake	Düzce	480

interferences, mainly draining and agricultural irrigation projects, are 1.3 million hectares (Özesmi and Özesmi, 2001). Draining of the wetlands is in the first place among the practices that cause damage to the wetlands in Turkey. Turkey Also involved in draining of the wetlands with the purpose of acquiring agricultural fields is a political intention of winning the local village people's votes through issue of such fields to them.

In line with the increase in urban development in Turkey following 1950, degradation of the wetlands near settlements, primarily the big cities, has begun for urban/industrial utilization purposes. Factors such as failure to aware of the ecologic significance of the wetlands and being straight and easy to reach have added to the damages caused to the wetlands near settlements. By means of an amendment to the Housing Law enacted in 1970, wetlands were included in the lands, which can be allocated, assigned and transferred. This and other similar legal provisions have encouraged opening of the wetlands for housing activities. Utilization of fresh water in Turkey has increased due to expansion of agricultural fields and increase of irrigated areas as well as urban and

industrial growth. While water from the sources feeding the wetlands has been used for irrigation, drinking, utility, power generation and similar purposes on one hand, dams and similar facilities of irrigation and/or power generation plants have been built directly on the wetlands on the other hand. Such practices are being carried out today as well. Large wetlands drained in Turkey in the 20th century are listed in Table 3.

## MAIN PROBLEMS AND THREATS

Today, the wetlands in Turkey are being threatened mainly by the following activities:

- Draining of wetlands (for agricultural utilization, etc.).
- Prevention of natural water flows to wetlands by dam constructions.
- Urban development on wetlands and/or surroundings (urban/industrial utilization).
- Chemical contamination due to the industrial and household wastes.

- Invasion of foreign/exotic species.
- Unsustainable hunting/fishing/plant picking.

Central Anatolian wetlands are among those that have been affected most by the water resource policies, plans and implementations of Turkey. For this reason, many lakes, ponds and reedbeds in the Central Anatolia have been either destroyed completely or are about to. Many examples can be given on this issue.

Ereğli Reedbeds, draining of which started in 1960's is one of the wetlands that have given in to dams too. Dams and discharge canals built on the resources feeding the area as well as extreme use of the underground water for agricultural irrigation have caused the wetland dry to a very large extent. The wetland is completely dry in summer (WWF-Turkey, 2006). Akşehir Lake, the surface area of which was reduced approximately by 50% between the years 1969-1993, has come to a point of total drainage in 2000's. Akşehir and Eber Lakes, which were declared protected area in 1992, are now dry to a great extent. Water resources feeding the lakes are removed for drinking and irrigation purposes both from surface and underground waters. Waste waters of industrial facilities in Afyon and surroundings are being carried to these wetlands. Decrease of water level and burden of extreme pollution have had destructive effects on fishing in the lake (WWF-Turkey, 2006).

Today, the water level of Eber Lake has decreased to 5%. A management plan prepared by the MoEF to put an end to such course of events was completed in 2007. The plan vision has been determined as the "reinstating the identity of wetland ecosystem which created by the region's microclimatic and biologic characteristics" (Ministry of Environment and Forestry, 2007).

DSI has prepared and tried to put into practice an agricultural project under the name "Ecologic Preservation Project" which would disturb the wetland ecosystem of Seyfe Lake which, besides being declared as a "natural site" by the Ministry of Culture and Tourism and "nature protection area" by the Ministry of Environment and Forestry, has been taken under protection in the scope of Ramsar Convention as well. Even though this project that would open almost 8,000 hectares of natural steppe area to agriculture and destroy the wet meadows near the lake was changed in 1998 because of reactions, activities carried on by DSI at the lake are causing damage to the wetland ecosystem (Eken, 2001).

Another wetland damaged by dam construction is Eşmekaya Reedbeds, which is a "natural site" and "wildlife protection area". Though Eşmekaya Reedbeds located at the Tuz (Salt) Lake basin in Central Anatolia was a wetland fed with fresh water from the springs in the region, which provided a living environment to many kinds of birds and was used as a pasture for the cattle, a project was set off under political pressure in 1995 to turn the reedbeds into a dam lake. Project aimed to collect the

water from the four springs that fed Eşmekaya Reedbeds in the dam lake to be built and to turn the wetlands remaining out of the dam lake area into agricultural fields. However, the area considered for irrigation under this project had already been irrigated naturally by means of underground waters. The Society for the Protection of Nature (DHKD) filed a lawsuit at the stage of dam designing while the Ministry of Culture filed a lawsuit upon beginning of the construction work on the grounds that the wetland was a "natural site". Construction work was carried on during progress of the lawsuits. An interesting aspect of the matter is that the springs, which were planned to feed the dam, dried during the construction work. So, the dam which was being built would be of no use. Even though the Ministry of Culture won the case, DSI completed the dam. While Eşmekaya Dam was built, reedbeds dried completely. But now, dams and reedbeds are not in place and the area has lost its "natural site" status in 2005 (WWF-Turkey, 2006).

Hotamış Reedbeds, which is the most important wetlands of Turkey, was approximately 16,000 hectares in 1985 but the area decreased to 8,000 hectares in 1990 (Eken, 2001). Upon withdrawal of water in 1998, several hundreds of hectares of reedbeds to the south of the area have been turned into agricultural fields and are completely dry today (WWF-Turkey, 2006).

Sultansazlığı, which has been under protection as a "natural site", national park and Ramsar site, is about to be destroyed completely because the waters feeding it are kept in dams and attempts are being made to have agricultural fields and is in a position to decrease by 90% (WWF-Turkey, 2006). In the framework of the GEF Program, a project titled "Protected Areas, Sustainable Management of Natural Resources and Conservation of Biological Diversity" is carried on for Sultansazlığı as one of the case studies of four different ecosystems in Turkey with the cooperation of the MoEF and World Bank (Karadeniz, 2000). The project is highly important for reasons of actively involving for the first time the local administrations in the management of the protected area and aiming to achieve participation of all stakeholders in the preparation process of management plans.

It is a widespread practice in Turkey to excavate for sand from river beds and shores, which causes harm to wetland ecosystems. Meke Maar, which was declared in 2005 a Ramsar site and had already been taken under protection as a national monument is an example of the wetlands at which excavation is made for sand. Wetland in the Karapınar provincial town of Konya, which also has a geologic significance besides its biologic value, is being caused damage to with illegal sand excavations in spite of these qualities (Atlas, 2004).

Extinction of the Central Anatolian lakes and reedbeds has not only caused hydrologic and biologic adversities, but also has put an end to the economic benefits gained from these wetlands. Activities like fishing and reed har-

vesting which contributed to the economy of the local people as well as potential opportunities of ecotourism, which could have been put into practice through rational planning, have been lost.

Together with draining the lakes, many plant and animal species that used to live at these lakes or used to make use of these areas for purposes like feeding and breeding are under threat of extinction. For example, in 1967, a population of 162,100 water birds was counted at Amik Lake, which was drained in 1960's and 1970's. Amik Lake used to meet the Ramsar criteria like some of the lakes that were drained. It is only a small lake of 250 hectares that is left today from Amik Lake, approximately a 27,000 hectare-part of which has been drained (Yarar and Magnin, 1997).

Factors such as dams, excessive use of underground waters and drainage with the purpose of gaining new agricultural fields, which cause damages to the Central Anatolian wetlands, also affect the wetlands at the coasts of the country. In addition to these unfavorable factors, there are other factors like urban development, tourism and secondary residences, which threaten the coastal wetlands in Turkey highly effectively. Especially the Aegean and Mediterranean coasts of Turkey are the areas where coastal ecosystems have been caused damage to because of touristic attraction. Many wetlands especially on the Aegean coasts have been destroyed by touristic facilities.

Kızılırmak Delta, on the Black Sea coast in Turkey is facing similar threats by environmental and human induced disturbances, like most of the other wetlands in the country. Kızılırmak Delta is the largest and most significant wetland area of Turkey which has been able to protect most of its natural beauties on the Black Sea Coasts to date. However, the Delta is modified by human activities. Currently, the most destructive of these activities and land-use decisions is the Samsun-Sinop highway construction along the Black-Sea Coast (Acar et al., 2004).

Chemical substances constitute another factor that causes damage to the natural life in Turkey's wetlands. Use of pesticides is very widespread in Turkey and farmers are not conscious regarding the matter. In addition to the pesticide contamination, domestic and industrial liquid wastes are also discharged to wetlands generally without treatment. According to Ministry of Environment and Forestry (2004), a serious problem of pollution is being experienced at all large rivers in Turkey due to the high contamination levels.

Another factor that threatens the wetlands of Turkey is introduction of exotic species of plants and animals into these areas. Eucalyptus (*Eucalyptus* spp.) also known as "malaria tree" in Turkey is one of these species often used to drain wetlands in Turkey, either small or large.

The invasive species are another factor that threatens the natural aquatic fauna of the wetlands. Pike perch

(*Stizosteidon lucioperca*) introduced to Egirdir Lake in 1950's has brought an end to the existence of seven out of ten kinds of the native fish that used to live in the lake naturally (Environmental Foundation of Turkey, 1993).

Hunting and collecting bird eggs are other activities which cause damage to the biologic diversity of wetlands in Turkey.

## LEGAL and LEGISLATIVE REGULATIONS FOR CONSERVATION

### National development plans

National Development Plans (NDP's) are the top-scale instruments effective for determination of the basic policies regarding the wetlands. In the NDP prepared by the State Planning Organization (SPO) for five-year periods in the term of 1963 - 2006 and for seven-year periods from 2007 on, overall aims regarding the environment and natural resources identified in line with the developments in the world and Turkey resources have been stated. Even though water resources were frequently cited in the "National Environment Strategy and Action Plan (NESAP)" prepared with the purpose of integration with the 7th Five-Year Development Plan covering the years 1996 - 2001 and purpose of accomplishment of the sustainability objectives, wetlands were mentioned very little. The term "wetlands" was included only under the heading of "biodiversity" and was mentioned as one of the four sensitive habitats at the biomes in Turkey (Anonymous, 1998; Tırıl, 2005; Guclu and Karahan, 2004). The 8th Five-Year Development Plan covering the period of years 2002 - 2006 and the 9th Five-Year Development Plan covering the period of years 2007 - 2013 did not only omit any provisions directly related with the wetlands but also left out any reference to the term wetlands. Instead, water resources were mentioned and the requirement for protection of the water resources from pollution, integrated management of basins, and efficient use of water resources and development of urban and rural infrastructure were dwelled on (Official Gazettee, 2006).

### Conservation statuses

Ministry of Environment and Forestry (MoEF) is directly responsible for the wetlands in Turkey. A large part of the wetlands is being protected by means of the national and/or international statuses determined by the MoEF. Other authority is the Ministry of Culture and Tourism. National and international protection statuses of the wetlands in Turkey, legal bases and responsible ministry are listed in Table 4.

By means of an amendment made to the Forest Law in 1956, the actuality of national parks has been included in



**Table 4.** Nature conservation statuses covering the wetlands in Turkey and responsible organizations (Tiril, 2005).

Conservation statuses	Level	Responsible organization	Legal basis
National Park	National	General Directorate of Nature Conservation and National Parks / Ministry of Environment and Forestry	National Parks Law Date: 1983 Law Number: 2873
Nature Protected Area	National	General Directorate of Nature Conservation and National Parks / Ministry of Environment and Forestry	National Parks Law Date: 1983 Law Number: 2873
Nature Park	National	General Directorate of Nature Conservation and National Parks / Ministry of Environment and Forestry	National Parks Law Date: 1983 Law Number: 2873
Game and Wildlife Conservation Area	National	General Directorate of Nature Conservation and National Parks / Ministry of Environment and Forestry	Land Hunting Law Date: 2003 Law Number: 4915
Specially Protected Area	National	Environmental Protection Agency for Special Areas / Ministry of Environment and Forestry	Environment Law Date: 1983 Law Number: 2872
Natural Site	National	Ministry of Culture and Tourism General Directorate of Cultural Assets and Museums	Conservation of Cultural and Natural Assets Law Date: 1983 Law Number: 2863
Ramsar Site	International	General Directorate of Nature Conservation and National Parks / Ministry of Environment and Forestry	Ramsar Convention Ratified Date: 1994

legal provisions for the first time in Turkey. Kus (Manyas) Lake in Balıkesir is the first conservation area as a wetland from among the national parks declared under these provisions (1959). With the National Parks Law enacted in 1983, definitions of national park, Nature Park, natural monument and nature protected area have been made, the basics of protected areas included in the scope have been set and many wetlands in Turkey have been taken under protection in the scope of these protection statuses.

#### **International regulations, conventions and agreements signed by Turkey**

Turkey is a party to several international conventions which have been formulated to contribute to the conservation and management of wetlands at different scales. Turkey's becoming a party to the environment-related international agreements, especially during the period following 1980, has constituted the infrastructure of many legal provisions enacted after this year. Turkey approved the International Agreement for Protection of Birds in 1966, Barcelona Agreement being the basis of the Decree in Effect of Law no. 383 related to the Specially Protected Areas in 1981, Paris Agreement being the basis of the Law for Preservation of Cultural and Natural Assets no. 2863 in 1983, Bern Agreement in 1984, Ramsar Convention being the basis of the Wetlands Regulation in 1994, Biologic Diversity Agreement in 1996, and the European Landscape Convention in 2003.

Among these conventions, the "Convention on the Conservation of European Wildlife and Natural Habitats", called "Bern Convention" in short, is an important legal regulation on conservation of natural areas also including wetlands. Turkey, as obligated to protect the species - Annex List 1 for plant species and Annex List 2 for animal species- together with their natural habitats by the required legal and administrative measures has not prepared the national legislation for implementation of Bern Convention yet. Although supposed to be efficient in the conservation of wetlands, especially considering the bird species in the Annex List 2 of the Convention, lack of required national legislation is an important deficiency.

As the European Landscape Convention came into force in 2003, the studies for determination of landscape types in the country have been started. The first project conducted under the coordination of the MoEF in the scope of the Convention is carried on a wetland-Sugla Lake and surroundings - to identify the landscape character types.

Among the international conventions Turkey is a party to, Ramsar Convention comes to the forefront with its direct relation with the wetlands and effective implementations in Turkey.

#### **Ramsar convention**

The Convention on Wetlands (Ramsar, Iran, 1971)- called the 'Ramsar Convention'- is an intergovernmental treaty that embodies the commitments of its member

**Table 5.** Ramsar sites in Turkey ([http://www.ramsar.org/profile/profiles\\_turkey.htm](http://www.ramsar.org/profile/profiles_turkey.htm), 2009).

Ramsar No	Ramsar Site	Year	Province	Area (ha)
657	Göksu Deltası	1994	Mersin	15.000
658	Burdur Lake	1994	Burdur	24.800
659	Seyfe Lake	1994	Kırşehir	10.700
660	Manyas Kuş Lake	1994	Balıkesir	20.400
661	Sultan Sazlığı	1994	Kayseri	17.200
942	Kızılırmak Deltası	1998	Samsun	21.700
943	Akyatan Dalyanı	1998	Adana	14.700
944	Uluabat Lake	1998	Bursa	19.900
945	Gediz Deltası	1998	İzmir	14.900
1618	Meke Maar	2005	Konya	202
1619	Yumurtalık Dalyanı	2005	Adana	19.853
1620	Kızören Obruk	2005	Konya	127
.....	Kuyucuk Lake	2009	Kars	416
				Total = 179.898

countries to maintain the ecological character of their wetlands of International Importance and to plan for the 'wise use', or sustainable use, of all of the wetlands in their territories (<http://www.ramsar.org>, 2009).

In 1994 when it became a party to the Ramsar Convention, Turkey included five wetlands in the scope of the convention, and four wetlands in 1998. National Wetland Commission, decided to include 20 more wetlands in Turkey under provisions of the Ramsar Convention on 12 October, 2004. However, only three of them have been declared as "Ramsar site" and thus, number of the sites included in the Ramsar List has risen to 12. In 2009, with inclusion of Kuyucuk Lake (Kars) -though it was not in the candidates list declared in 2004, number of the Ramsar sites in Turkey has become 13. Total surface area of Turkey's Ramsar sites is 179,898 ha (Table 5). Kuyucuk Lake was declared in the Official Gazette no. 27264 dated 20 June, 2009 to be included in the Ramsar List. However, the name of this site is still not included in the official website of the Ramsar Convention. ([http://www.ramsar.org/profile/profiles\\_turkey.htm](http://www.ramsar.org/profile/profiles_turkey.htm), 2009).

Locations of the Ramsar sites in Turkey are shown in Figure 2.

### National wetland strategy

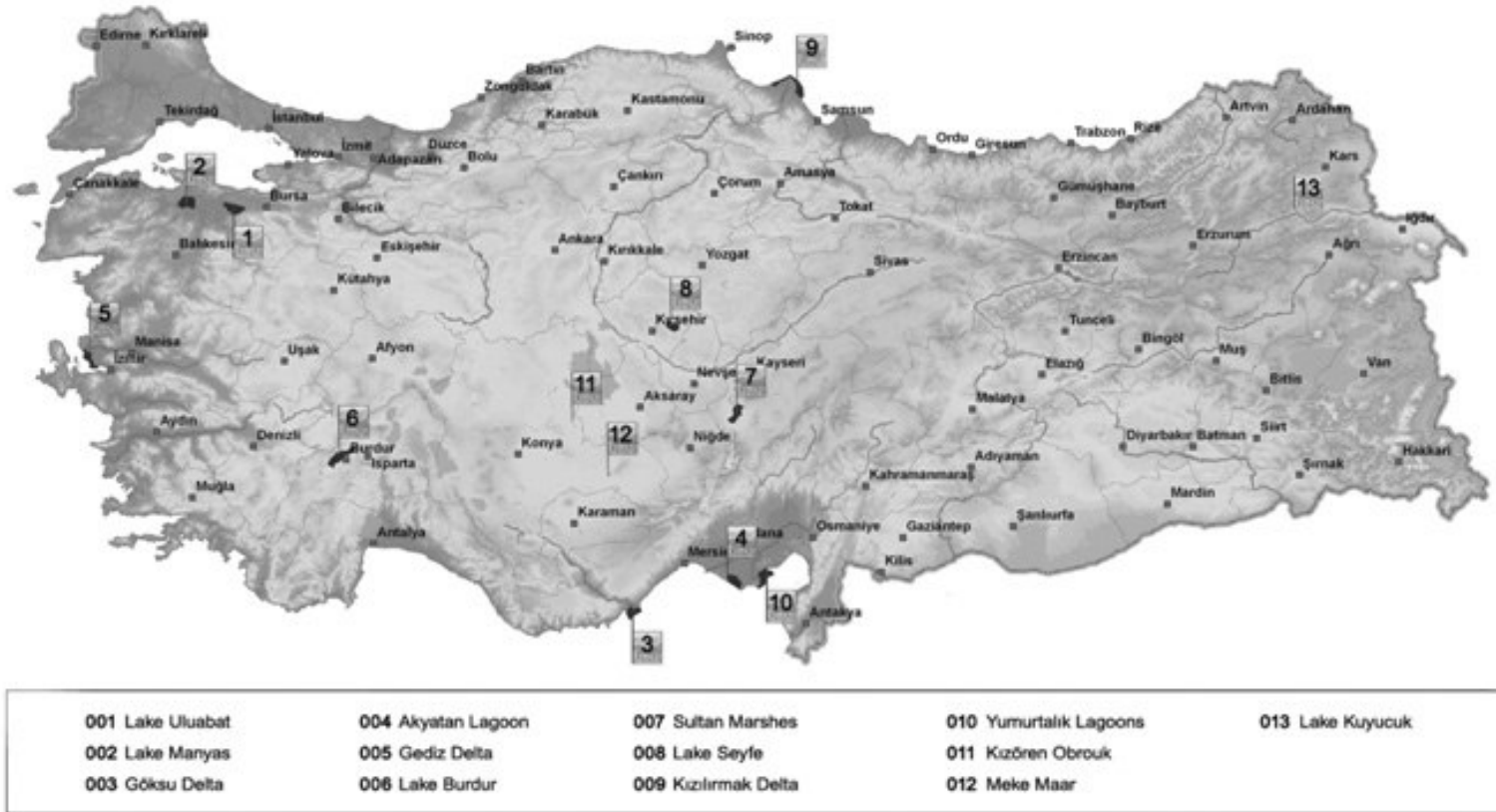
In line with execution of the Ramsar Convention, the Ministry of Environment issued in 2002 a "Regulation for Protection of the Wetlands" with the purpose of protection and development of the wetlands and determining the basics of cooperation and coordination between the organizations and institutions assigned for the matter (Official Gazette, 2002). Regulation, which covers protection, rational utilization and management of the wetlands as

well as the basics and methods related to the "National Wetlands Commission", has filled in a big gap in Turkey regarding protection and development of the wetlands.

The Regulation was revised on 17 May, 2005 in accordance with the Birds Directive (Official Gazette, 2005) in the scope of the arrangements that should be made by Turkey in the course of its membership to EU. The Regulation dated 2002 set forth that it was essential to rehabilitate the wetlands with degraded ecologic character and to reclaim the drained wetlands. The statement "It is essential to reclaim the drained wetlands" was changed in the new regulation as "Necessary measures shall be taken to reclaim the drained wetlands that are convenient in technical and economic terms". It has been banned with the Regulation to fill up and drain natural wetlands that are larger than eight hectares while it is subject to the permission of the MoEF to fill up and drain natural wetlands that are smaller than eight hectares.

The Regulation has classified the wetland protection areas into zones of "strict protection zone", "wetland zone", "ecological impact zone" and "buffer zone", which have been defined in the regulation as follows:

- **Strict Protection Zone:** Includes the protection areas where rare and endangered waterfowl and plant species exist.
- **Wetland Zone:** Area consisting of wetland habitats.
- **Ecological Impact Zone:** Area consisting of habitats related to the wetland ecosystem and habitats supporting the system.
- **Buffer Zone:** Area separated for the purpose of protecting the wetland ecosystem, with a border area of 2,500 meters as a minimum from the ecological impact zone if any, or from the wetland zone, provided that the water gathering basin borders are not exceeded.



**Figure 2.** Ramsar sites in Turkey (S. Çağırnkaya, Ministry of Environment and Forestry, Ankara, personal communication, 2009).

National Wetlands Commission (NWC) set up with a regulation has domination on many matters regarding the wetlands, principally determination of the national wetland policies and strategies. The commission is an organization consisting of representatives of the related parties. Regulation has set forth that "Local Wetlands Commissions" be set up in provinces where there are wetlands of international significance for which management plans have been prepared or are in the process of preparation.

Following the Regulation, a "National Wetlands Strategy" was prepared for the period of 2003-2008. Objective of the Strategy prepared by the Ministry of Environment was specified to be accomplishment of protection and wise use of wetlands (Ministry of Environment, 2003). Turkey is one of the leading countries which have made up a national strategy in order to preserve the wetlands (Ceran 2005). Evaluation of this strategy is expected to be made at the end of 2009. Furthermore, preparation of the Strategy is on the agenda for the period of 2010 - 2015 with the cooperation of non-governmental organizations (NGO's) and responsible government departments depending on the experiences gained from the first strategy and scientific work related to the matter (S. Çağırnkaya, Ministry of Environment and Forestry, Ankara, personal communication, 2009).

## CURRENT MANAGEMENT EFFORTS

Management plans have been prepared for 15 wetlands in Turkey to date. These wetlands are Göksu Delta, Manyas Lake, Gediz Delta, Uluabat Lake, Kızılırmak Delta, Burdur Lake, Yumurtalık Lagoon, Akşehir-Eber Lakes, Acarlar Longoz, Mogan Lake and Eğirdir Lake. The wetlands for which management plans are in the process of preparation are Seyfe Lake, Isikli Lake, Karakuyu Reedbeds, Akyatan and Tuzla Lagoons (S. Çağırnkaya, Ministry of Environment and Forestry, Ankara, personal communication, 2009).

### Göksu delta management plan experience

Göksu Delta, which is located on the Mediterranean coast in the south of Turkey, is the first wetland in Turkey for which a management plan has been prepared (Ceran, 2005). It has been taken under protection by means of the Ramsar Convention and national protection statuses. Process of management plan that started in 1989 through the initiatives of DHKD was put into practice in 1998. The facts that the Delta has been under the pressure of construction efforts and that the shrimp plantations will

have an adverse effect on the fish population have been the motives for initiation of the management planning process (Buluş, 1998).

The project, which was the first experiment for the management of a wetland on ecologic basis in Turkey, was submitted to the government in 1990 and was supported in scientific and financial terms by the Ministry of Agriculture, Nature Management and Fishing of Holland, Utrecht and Nijmegen Universities in Holland and Tour du Valat Biology Institute in France (DHKD, 1997).

The "Feasibility Report" prepared in 1997 in the scope of the project initiated under the name "Environmental Development Project" has been a significant step of the management plan. Through the Feasibility Report, status of the wetland has been worked out in terms of biological and cultural features, the administrative and legal status has been determined, the past and planned utilizations have been evaluated, relations between sectors have been examined and the requirement for an integrated management plan for the entire basin has been dwelled on (DHKD, 1997).

Studies required as a baseline for the management plan have been carried out in the fields of hydrology, agriculture and socio-economy, the threats have been exhibited and three long-term goals have been set. Also, around 100 activities have been worked out to ensure accomplishment of the goals. A large part of the goals projected in the plan completed in 1998 could not be accomplished (Tiril, 2005).

Even though public involvement was foreseen in the project, the fact that the specialists from the Ministry of Environment did not care for and want public involvement has caused break-up of the concerned groups and while it has been stated in the conclusion report that participation was successfully obtained, it has been expressed that the management plan goals could not be achieved (Ari, 2001). The fact that the management plan activities were not applicably realistic was the failing part of the plan. It should also be considered as a deficiency that Environment Protection Agency for Special Areas who had no experience in this matter was solely responsible for the plan. Nevertheless, the management planning process has been an educating experience for all sectors for reasons such as international cooperation, NGO alliance and public involvement at particular steps.

### **Kus (Manyas) lake management plan experience**

Kuş (Manyas) Lake located in the Marmara Region has been the first wetland of Turkey taken under protection. This wetland, the significance of which was realized by Prof. Dr. Kurt Cosswig in 1938, was declared as a National Park in 1959. A part of the lake was included in the scope of the Ramsar Convention in 1994, and the entire lake in 1998.

Water was being used from the lake for irrigation in the past years due to insufficient resources of water and extensive agriculture carried out around the lake. The regulator set up for this purpose on the outlet footing of the lake raised the water level of the lake, therefore an area of 3,800 ha was transformed into agricultural fields.

Industrial and poultry activities in the surroundings of the lake discharge their wastes, without treatment, to the lake or the reserves that feed the lake. Besides this, a high rate of pollution has been detected due to discharge of waste waters from 10 out of 13 villages in the lake basin by means of brooks as well as effect of the chemical fertilizers and agricultural pesticides being used in the agricultural fields in the vicinity of the lake through surface flow and underground waters (Ministry of Environment, 2001). An "Emergency Action Committee" was established in 1996 with the participation of related organizations and institutions to restore the damaged ecological integrity of Kus (Manyas) Lake (Erdem, 1997). In the scope of the "Ecological Risk Analysis and Management Planning of Manyas Lake" prepared with the cooperation of the Ministry of Environment, Landscape Architecture Department of Ankara University and the Ministry of Forestry, natural and cultural data have been obtained from the planning area and ecological risk analysis has been made. The ideal objective of the Management Plan has been set as "development of mechanisms to accomplish the increase of the bird population and wise use of the area through restoration of the damaged ecological balance at Kus (Manyas) Lake (Ministry of Environment, 2001).

In the process of the management planning, public participation was achieved in the beginning; however, aimed participation could not be carried on during preparation and implementation of the plan. According to Ari (2001), it is a significant deficiency that sociologists and local people have not taken part in preparation of the plan. A large part of the activities worked out for accomplishment of the objectives set in the Kuş (Manyas) Lake management plan could not be carried out. Failures to continue people's participation, lack of NGO's co-operation and change of local staff of the Ministry of Environment have had an effect on this. According to the Bird Research Society (2006), it has been one of the most significant deficiencies of the management plan process that those who carried out the plan were not involved in preparation of the plan.

### **Gediz Delta management plan experience**

Located on the Aegean Sea coast in the west of Turkey, Gediz Delta is distinguished from the other wetlands in Turkey by one major important characteristic that the delta and the city of Izmir, a metropol with a population over 3 millions, are within each other. This situation keeps

the delta facing many threats and pressures from different sources and effects while the related parties are not aware of the importance of Gediz Delta, which whereas, provides a significant recreation and tourism potential with so many activities like bird-watching, nature hiking, cycling, canoeing, photography, agricultural tourism, horse-riding, fishing, etc. The socio-economic benefits that the city of Izmir can be provided with by means of such potentials originating from the wealthy functions and values of Gediz Delta are adding to the importance of the delta.

In this context, the urban recreational opportunities and the domestic and foreign tourism opportunities as well as the potential social and economic benefits of Gediz Delta make up the backbone of the guidelines which ensure protection of the delta. Although the attempts towards handling and management of the delta with an integrated perspective go back to past years, management plan studies commenced in January, 2005.

The process of Gediz Delta management planning is a good example of co-operation between the government and NGO's. The plan has been prepared with the co-operation of the MoEF, Izmir Bird Paradise Conservation and Development Union, Aegean Association for Protection of Natural Life and Doga Dernegi. The process of planning commenced in 2004 through a protocol signed between these four parties.

The overall objective of the management plan has been set as "protection of the ecological functioning, biological diversity and landscape integrity of the Gediz Delta ecosystem and redirect of the economic inputs provided by the resource values of the area to the local people so as to increase their prosperity" (Erdoğan et al., 2007). The plan was completed in 2007; however, it is not possible to say that the objectives of the plan could be attained to the extent desired within the past two years.

## CONCLUSION AND DISCUSSION

Wetlands have been mentioned with negative expressions in so many countries of the world throughout the history. Considered to be harmful, they have been seen as areas that must be drained or changed into the different land uses. However, in line with the developments in the disciplines of biology and ecology nearly for the last half century, this understanding has been replaced by a protective perception. In spite of the effects of such protective approach in Turkey since 1994, when Turkey has become a party to the Ramsar Convention, wetlands are still facing very serious problems.

While initiatives to develop the nature protection laws and regulations in Turkey started in 1980's in the general sense, those particularly for protection of the wetlands started in 1990's.

The Constitution of the Republic of Turkey that was put

into force in 1982 has included an article related to protection of the environment for the first time, unlike former constitutions. Even though some laws related to protection of the environment were issued in the years following the new constitution, the first step directly related to wetlands was taken in 1994 by becoming a party to the Ramsar Convention. However, the legal provisions under the domestic law concurrent with this international agreement were enacted merely in 2002. It is witnessed through review of the past processes and practices that Turkey, with the aim of becoming a member of the European Union (EU), has changed its legal provisions related to protection of the nature as well as its law system for adaptation to the EU norms whereas failing to raise its human resources to the EU standards at the same level.

For instance, the managers of protected wetlands in Turkey are mainly forest engineers. They are specialists and obviously have great deal of experience in their own fields. However, as described by Hughes (2001), the management of protected wetlands requires a much broader perspective, coupled with a range of new management skills and concerns economics, multiple-land use, social processes, education and information dissemination, and participatory planning and management. On the other hand, although the Wetland Protection Division of the Ministry of Environment and Forestry is responsible organization for conservation and management of the wetlands in Turkey, only few staff takes over all related issues and problems. That's why there has been a serious need in the division to have more staff qualified in different disciplines.

Different approaches displayed by different government organizations cause adverse effects on protection of the wetlands. While legal provisions are set forth -though not fully practiced- for protection of the wetlands and becoming a party to international agreements on one hand, it is observed that works causing destruction of the wetlands are carried on at the same rate on the other hand. Destruction of wetlands of international importance according to the ecological criteria of the present day are being carried on by the governmental organizations on the basis of many different utilizations, principally for construction of dams for agricultural irrigation and power generation. Most of the responsibility regarding this issue lies with DSI, the organization that is still legally designated to drain wetlands among other duties.

Besides the irrigation and power generation policies of national scale, the destructive effects of urban-related local policies are observed on wetlands as well. Regarded as potential urban development areas, wetlands are among the natural areas abused by the politicians most. The people, being the only power to stop the national and local politicians' unfavorable policies on wetlands, are not conscious and influential regarding the matter.

For a majority of Turkish people, wetlands are unneces-

sary areas causing diseases, drainage of which is regarded positively. Even though a large part of the public has or shares this opinion, the leading activists for protection of the wetlands in Turkey have appeared in the non-governmental sector. NGO's have been the greatest force for changing the traditional outlook of the public opinion and growing the insight of the Turkish public administration towards wetlands. The studies initiated by the Association for Conservation of Nature of Turkey in 1960's and 1970's has been carried on with the work for adding to the awareness of the public opinion and government organizations towards wetlands led by DHKD in 1980's and 90's, and by Doga Dernegi, Turkish Bird Research Society (KAD) and WWF-Turkey in 2000's. The efforts of the mentioned NGOs, the influence of which have increased in the recent years, have accomplished development of a group among the Turkish public opinion who has a consciousness and sensitivity towards wetlands. However, this group is far at the present from becoming a majority in numbers to have the capability of affecting the public authority.

It is observed that NGOs are a force of motivation in the preparation process of the management plans for the wetlands in Turkey. In spite of this, the decisions of the management plans cannot be implemented entirely in many significant wetlands such as Kus (Manyas) Lake, Gediz Delta that are under threat. It is possible to indicate, as the main reason for this, both the public opinion and government organizations that have not adequately claimed the matter.

There is a strong, one-on-one relationship between the wetlands and the village people living in the vicinity of the wetlands in Turkey. Mainly through traditional preconceptions and for economic reasons, the village people living around the wetlands have been destroying the wetlands in the environs rapidly. Destruction of wetlands personally by those living around them and failure to develop a non-governmental initiative against government organizations that cause a greater destruction are the biggest threats for the wetlands in Turkey. Government organizations and politicians will carry on destruction of wetlands fearlessly unless there comes to stand against them a conscious, resolute and most important of all, a strong public opinion.

It is possible to say that there is an advanced body of legal provisions for protection of the wetlands in Turkey. The problem is failure to fulfill these legal provisions as well as actions by the government organizations themselves against these legal provisions. The public opinion which is supposed to conclude this dilemma is still far from becoming a critical pressure group; however, initiatives led by some NGOs tend to change the traditional outlook and practices.

According to the Utrecht Declaration (Anonymous, 2006), protection of the wetlands is possible only through understanding of the wetland ecosystems in ecological

terms in a complete, definite and correct manner. For this reason, government organizations are recommended to set up necessary cooperation with the research institutes, universities and NGOs to establish related centers. A "Wetlands Research Center" to be founded in Turkey under the responsibility of the MoEF should be regarded as a unit which can undertake such a function.

Addition to paying attention to the issue at scientific institutions and related governmental organizations, it is necessary to increase the awareness on wetlands through the all levels of formal education and adult training.

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