European Environment Agency

Europe's biodiversity

— biogeographical regions and seas

Biogeographical regions in Europe

The Anatolian region

— the biogeographical transition to Asia

Original contributions from ETC/NPB:

Sophie Condé, Dominique Richard (coordinators)
Nathalie Liamine (editor)
Anne-Sophie Leclère
(data collection and processing)
Barbara Sotolargo (drafting)
Ulla Pinborg (final co-editor)

Map production:

UNEP/GRID Warsaw (final production)

Project manager: Tor-Björn Larsson, EEA

ZooBoTech HB, Sweden, Linus Svensson
(final edition)

Summary

- Covers the interior and eastern part of Anatolia (Turkey) which is a biogeographical transition to Asia.
- Large differences between summer and winter temperatures, low levels of precipitation in most of the area.
- Xerophytic and salt steppes dominate, the flora has a high level of endemisms.
- Several of the mammal species found are of Asian or North African origin.
- Agriculture and drainage, as well as the introduction of alien species, construction of dams and over-grazing are threats to biodiversity.

1. What are the main characteristics and trends of the Anatolian biogeographical region?

1.1 General characteristics

1.1.1 Extent and boundaries

The region corresponds to the interior and eastern part of the Anatolian peninsula, having no contact with the Black Sea or the Mediterranean. The region extends over three different geographical areas: the central Anatolian Plateau, the east Anatolian mountain range and the northern Mesopotamia.

1.1.2 Geomorphology and topography

Structurally, the region is located within the geologically recently-folded mountain zone of Eurasia. The geology of the region is complex, with sedimentary rocks ranging from Paleozoic to Quaternary, numerous intrusions, and extensive areas of volcanic material. Although there are no active volcanoes, the geological structure of most of the region is unstable. Faulting and folding are widespread and mountain-building is still in progress. This is particularly conducive to earthquakes.

The central massif is often referred to as the Anatolian Plateau, although its relief is much more varied than this term suggests. Nevertheless, there are large areas of flat or gently sloping land. Elevations are of about 900 m. Further to the east, the Pontic and Taurus mountains converge to produce an extensive area of mostly mountainous terrain with pockets of relatively level land in valleys and enclosed basins. A noteworthy feature is the extensive area with geologically recent volcanic activity. That complex group of mountain ranges contains the highest mountain in the region, Mount Ararat, reaching 5 137 m. The southeast is characterised by a relatively gentle relief, with broad plateau surfaces resting on a stable massif, the Arabian platform. At the center of this zone, the volcanic Mount Karaca reaches 1 920 m.

The four major rivers in the region are the Euphrates, the Tigris, the Kizilirmak and the Sakarya. The first two drain through Mesopotamia to the Gulf of Iran and the latter two flows into the Black Sea through the neighbouring Black Sea region. Arms of the Euphrates River form extensive areas of natural floodplains at high altitudes in the north and the river has not been regulated. The rivers forming the Konya Basin, the Akarcay Basin and the Van Basin dry out before they reach the sea.

Table 1. Statistics for the Anatolian biogeographical region

Surface area (km^2)	Number of countries in region	National composition by area	Population (inhabitants/km^2)
450 000	1	Turkey 100 %	77

Sources: *various sources by ETC/NPB and EEA. Note that the region covers only 57 % of Turkey.*

1.1.3 Soils

Red and grey-brown podzolic soils, along with brown forest soils, represent the most extensive group of soils. These occur mainly in mountainous areas as a broad belt around the northern, western, and southern sides of the Anatolian interior and are associated with the more humid climatic zones. The red and grey-brown podzolic soils are moderately leached and somewhat acidic, the red type occurring in the wetter and warmer areas. Brown forest soils are generally developed on calcareous rocks and are less acidic than the red and gray-brown podzolic soils.

Brown and reddish brown soils are characteristic of the driest parts of the region, mainly in the semiarid zones of central Anatolia and in the southeast; they support extensive dryland grain production. Chestnut soils are found on a smaller scale in the same regions as the brown and reddish brown group but under slightly more humid conditions where the parent materials are calcareous.

Serozems — highly alkaline semi desert grey soils — are found in the driest areas, notably in the Konya basin and the Aras valley.

Alluvial soils are found in the basins of central and eastern Anatolia. They support the most intensive agriculture.

Map 1. Physiography of the Anatolian biogeographical region

1.1.4 Climate

In general, the climate of the region is characterised by relatively large differences between the average summer and winter temperatures. Annual precipitation is very low in the central Anatolian Plateau and northern Mesopotamia ranging between 280 and 400 mm annually. In the East Anatolian mountain range, precipitation is slightly higher reaching up to 550 mm per year. However, annual precipitation might reach up to 2 000 mm locally in mountainous areas south of the Van Lake. Northern Mesopotamia is warmer than other areas of the region, both in summer and winter. The area is characterised by extremely high summer temperatures (above 30 ºC in July). The East Anatolian mountain range has extremely cold winters with an average temperature of – 15/– 5 ºC in January whereas the average summer temperatures are between 16 and 23 ºC. The Central Anatolian Plateau is warmer than in the east having an average of 20/25 ºC in summer and 1/– 5 ºC in winter.

1.2 Present biodiversity status and trends: habitats, fauna and flora

1.2.1 Habitats

The Anatolian biogeographic region is the westernmost part of the Irano-Turanian phytogeographical region and western Asian elements constitute a major proportion of its species diversity. However, elements from the Mediterranean, Euro-Siberia (including the Black Sea) and North Africa are also present where topographical and climatic conditions provide suitable habitats.

Table 2. Main habitat types in the Anatolian biogeographical region, as defined by EUNIS (European Nature Information System) habitat classification

Habitat type	Proportion
Regularly or recently cultivated habitats and gardens	49 %
Heathland and scrub habitats	42 %
Woodland and forest habitats and other wooded lands	4 %
Freshwater aquatic habitats	3 %
Grassland habitats	2 %
Bare soil	< 1 %
Constructed industrial and other artificail habitats	< 1 %

***Sources**: ETC/NPB, estimation based on 68 % of the region.*

1.2.1.1 Steppes

Steppic habitats represent the major natural vegetation in the region. Much of the steppes has, however, been converted into arable land or is under considerable pressure from over-grazing. Two different types of primary steppes can be distinguished: steppes dominated by xerophytic species and salt steppes in saline soils around salt-lakes.

The characteristic plant species of dry, deep-soiled plain steppe of the Konya Basin in the west is wormwood (*Artemisia santonicum*). General coverage of the herbaceous plant layer can reach up to 90 %. *Artemisia santonicum* has a dominance of 50–60 % and it may grow up to 20–40 cm. However, biomass of the existing *Artemisia* steppes is generally very low due to excessive grazing which also has the effect of decreasing the

diversity of species. Many of the species that form associations with *A. santonicum* are endemic, for example the thyme *Thymus sipyleus* and drooping brome *Bromus tectorum.* The steppes in the southeast are of a semi-desert character with some typical plants such as *Artemisia herba-alba*, *Eryngium noerium* and *Salvia spinosa*.

Bromus tectorum, *a grass species forming associations with* Artemisia *in the steppes of the Anatolian region.* ***Photo****: Keir Morse.*

The vegetation of mountainous steppes differs from that of the plain in terms of species diversity and composition. At shallow-soiled places of mountains that suffer from over-grazing and erosion, thorny shrub habitats are dominated by sea-lavander species (*Astracantha* spp*.* and *Acantholimon* spp*.*). The sainfoin *Onobrychis cornuta* is a characteristic species of mountainous steppe at the northern slopes of the Taurus Mountains facing the Konya Basin. Some examples of the most important plant species used for grazing in the mountainous steppe are *Thymus sipyleus*, *Bromus tomentellus*, *Hedysarum pestalozzae* and *Globularia orientalis*.

Extensive areas of salt steppe exist in Central Anatolia and in the Igdir Plain. These areas are dominated by species in the goosefoot family, Chenopodiaceae, and the family Plumbaginaceae. Salt steppes and marshes of the Konya Basin, particularly those of the Lake Tuz area, have a very high proportion of plant endemism. *Gladiolus halophilus* and *Acantholimon halophilum* are species of a monotypic endemic genus, and *Hypericum salsugineum* and *Taraxacum mirabile* are examples of endemic species. In general, at least one salt lake lies at the centre of each salt steppic area. Although salt steppes are originally not suitable for agriculture, drainage and irrigation schemes set up in recent years have leached these areas and converted them to arable land. In several places where ground water is pumped for irrigation, the salt-tolerant sugar beet has become the most widespread crop. Salt steppes are also used for grazing, though not as intensively as *Artemisia* steppes. However, there are still vast areas of pristine salt steppe in the Konya Basin.

Secondary steppes formed by clearing and/or grazing of former scrub or forest areas cover the rest of Central Anatolia and large parts of the Eastern Anatolia interspersed with remnants of *Quercus*, *Pinus* and *Juniperus* species.

1.2.1.2 Forests

Only 4 % of the region is covered by forests, which are found mainly in the east on the lower slopes of the mountains. In north Anatolia the relatively humid climate is reflected by in the predominantly mesophytic vegetation, characterized by deciduous forest, mainly dominated by Quercus spp. The largest unfragmented stands are confined to the range of mountains between the Lake Van and the border to Iraq.

Pallas's pine (*Pinus nigra* ssp. *pallasiana)* and Scots pine dominated forests extend mainly in the transition zone to the Black Sea region and stands of the former occur also locally in the south of Central Anatolia. Pallas's pine grows between 1 200 and 1 800 m. Although it forms some pure stands where climate is more continental, it tends to form mixed consortia: e.g. in western Anatolia it is found mixed with *P. brutia*, *Quercus spp*., *Juniperus* spp. and Kazdağı fir (*Abies equi trojana*). On higher mountain slopes around the tree line, Pallas's pine forms sparse mixed forests with *Juniperus* spp. These forests also contain many species characteristic to steppe vegetation (e.g. *Pyrus eleagnifolia*, *Prunus spinosa*, *Crateagus* spp.) and many herbaceous species in the understorey.

Forests composed of pines of the *Pinus sylvestris* group, mostly included in *Pinus sylvestris* ssp. *hamata*, are found in the Pontic range in northern Anatolia. Forests with Mediterranean elements such as *Cedrus libani* and *Abies cilicica* are present in the area surrounding Lake Beysehir, in western Anatolia.

Cyclamen hederifolium, *a frequently encountered geophyte in pine forests in the Anatolian region.*
***Photo**: Linus Svensson, ZooBoTech.*

1.2.1.3 The alpine zone

The alpine zone is confined to the high peaks of mountains. It extends above 2 000 m in the west while the tree line reaches 2 750 m in the northeast of the region.

1.2.1.4 Wetlands

Wetlands are numerous and range from soda lakes to volcanic lakes. Lakes are usually closed basin systems surrounded by extensive reeds and marshes and are generally fed by small streams. The properties of the water of these lakes vary significantly depending on the nature of their underlying soil. The largest lake in the region is the Lake Van, a soda lake of 390 000 ha.

Lake Van, Turkey. Its brackish water does not allow a high level of biodiversity. ***Source****: www.gust.st.*

The lake is at 1 719 m a.s.l. located in an enclosed basin bordered by high mountains to the south, by plateau's and mountains to the east, and by a complex of volcanic cones to the west. It has no outlets and drains an area of about 15 250 km^2. Its brackish water allows for almost no animal life. However, the Darekh *Alburnus tarichi*, a freshwater fish related to the European bleak *Alburnus alburnus*, has adapted to the saline environment and spawns near the mouths of streams feeding the lake. It is the sole fish that can survive Lake Van's brackish waters. The second largest is the Lake Tuz in the Konya Basin, a salt lake covering 260 000 ha. The lake is at 900 m a.s.l. and has no outlets. It is very shallow, expanding and contracting with the seasons. Other major lakes are freshwater wetlands: Keban Reservoir, Hirfanli Reservoir, Atatürk Reservoir and Beysehir Lake. Only the latter is of natural origin, the largest freshwater lake in Turkey covering 73 000 ha in the western Konya Basin. Keban and Atatürk reservoirs have been constructed on the main body of the river Euphrates and have had a negative impact on biodiversity. The lakes Balik, Nemrut, Cildir and Aktas situated at high altitudes in eastern Anatolia are of particular importance for biodiversity. They benefit from cool microclimatic conditions and are characterised by relict populations of a number of species generally occurring much further north.

The Euphrates and Tigris rivers form important riparian habitats in eastern and south-eastern Anatolia with extensive floodplains. *Tamarix* scrub, stands of *Populus*, sand-banks and barren gravel islands are typical features. Several species of afro-tropical and oriental origin came to the Anatolian region following the course of these rivers. Both inland wetlands and riverine habitats in the region are critically threatened: current trends to drain wetlands and construct large scale reservoirs on Euphrates and Tigris may result in the extinction of many species and habitats confined only to this part of the region. Anatolian wetlands are of international importance because of their populations of birds and endemic fishes.

1.2.2 Fauna

Information on the fauna of the region is very limited, especially concerning invertebrates. The diversity of invertebrates (mainly insects) is very high due to the exceptional richness in plants. No reliable estimate is available for the number of invertebrates, although it is assumed to be not less than 30 000 species.

There are approximately 95 mammal species recorded in the region. Of these, 31 are of Asian or North African origin and do not occur in other parts of Europe. A number of species of particular importance to this biogeographic region are Persian mole *Talpa streeti*, striped hyaena *Hyaena hyaena*, Arabian sand gazella *Gazella subgutturosa* and the red sheep *Ovis aries*. Jungle cat *Felis chaus*, leopard *Panthera pardus*, Egyptian mongoose *Herpestes ichneumon* occur only in this region and in the adjacent part of the Mediterranean region. The Woolly Dormouse *Dryomys laniger* is a small mammal species endemic to Anatolia occurring above 2 000 m in the Taurus mountain. Many of these species have become very scarce since the 1970s. They are threatened with extinction and will probably disappear in one or two decades unless conservation action is urgently taken. The Anatolian leopard *Panthera pardus tulliana* is categorized as critically endangered, and the last known record of this subspecies in Turkey was in 1992 (Baskaya and Bilgili, 2004). The tiger *Panthera tigris* became extinct in the region in the late 1970s.

Marmaronetta angustirostris, *listed as vulnerable by IUCN.*
***Photo**: Arthur Grosset.*

As regards birds, 360 species regularly occur in the Anatolian region. They include many globally threatened species and species of European concern. Examples of globally threatened species breeding in the region are Dalmatian pelican *Pelecanus crispus*, marbled teal *Marmaronetta angustirostris*, imperial eagle *Aquila heliaca*, lesser kestrel *Falco naumanni*, corncrake *Crex crex* and great bustard *Otis tarda.* Some bird species' range in Europe is confined to this region. These include see-see *Ammoperdix griseogularis*, greater sand-pluver *Charadrius leschеaultii* and mongolian trumpeter finch *Bucanetes mongolicus.* Populations of a large number of species, especially of those associated with riparian habitats, are decreasing at an alarming rate due to the constructions of large-scale reservoirs on Euphrates and Tigris. Flood plains in the region provide breeding grounds to many rare bird species including crane *Grus* and demoiselle crane *Anthropoides virgo*. Other important species of European concern are mainly confined to higher parts of mountains: caspian snowcock *Tetraogallus caspius* and radde's accentor *Prunella ocularis*.

The mongolian trumpeter finch Bucanetes mongolicus*, which distribution in Europe (including Turkey) is confined to the Anatolian region.* ***Photo****: Mike Prince.*

Ninetyfive species of herpetofauna — 14 amphibians and 81 reptiles — occur in the region. About 30 of these are of Asian origin, including three lizards which are endemic to the Anatolian region: *Eremias suphani*, *Lacerta bedimahiensis* and *Lacerta sapphirina*. Coastal viper *Vipera xanthina* is an endemic species to Turkey occurring in this region and in the adjacent part of the Mediterranean region. Ranges of many rare species are confined to Northern Mesopotamia and Igdir/Van area. The world population of the Euphrates softshell turtle, *Refetus euphraticus*, one of the most endangered species in the region, is confined to Euphrates and Tigris rivers, which are subject to large-scale dam constructions.

Vipera (Montivipera) xantina *is endemic to Turkey.* ***Photo****: Anders Selmer.*

There are 85 species of fish, 40 of which occur nowhere else in Europe (including Turkey). Sixteen out of these 40 species are endemic to the Anatolian wetlands and many of them are critically endangered by the introduction of alien species such as pike-perch *Sander lucioperca*. Two examples of the most endangered endemic fish species in the region are *Alburnus akili* in Lake Beysehir and *Alburnus heckeli* in Lake Hazar. Among the non-endemics, ranges of 21 fish species are confined to Euphrates and Tigris basins and their survival in the region is seriously threatened because of proposed reservoirs in south-eastern Turkey.

2. Main issues of biodiversity in relation to human activities

2.1 Main pressure on biodiversity

2.1.1 Agriculture, reed harvesting and fisheries

The meadows in the floodplains of east Anatolian rivers are harvested once a year, mainly in July, the driest period. Grass covering several thousands of hectares is cut mainly by hand, though mechanised techniques have started to be in use in recent decades. This is a sustainable use of wet meadows, which provides breeding grounds for many rare bird species during the rest of the year.

Cutting of reed *Phragmites australis* is the principal activity of several villages adjacent to wetlands in the region. Reeds are cut and exported from extensive marshes in Eregli, Konya Basin. Some 80 families depend on reed-cutting. During the harvesting period from November 1995 to March 1996, 250 000 stacks — representing 50 ha — were cut, of which 170 000 were exported. The harvest of reedbeds can be maintained sustainable provided that appropriate management plans are in operation.

Drainage of wetlands for agriculture, constitute one of the most important threats to biodiversity in the region. Many wetlands have either been reduced in size or completely disappeared. It has been estimated that at least 1 300 000 ha of wetland habitats have been irreversibly lost in Turkey during the twentieth century, mainly since 1960. A major part of these losses are within the Anatolian biogeographical region. The most important current reclamation scheme concerns the Konya Basin where the State Water Works of Turkey intends to leach several thousands of hectares of wetland habitats.

There is a thriving fishing industry in Lake Van based on the species Darekh *Alburnus tarichi*, a freshwater fish adapted to the brackish waters of this lake.

2.1.2 Introduction of alien species

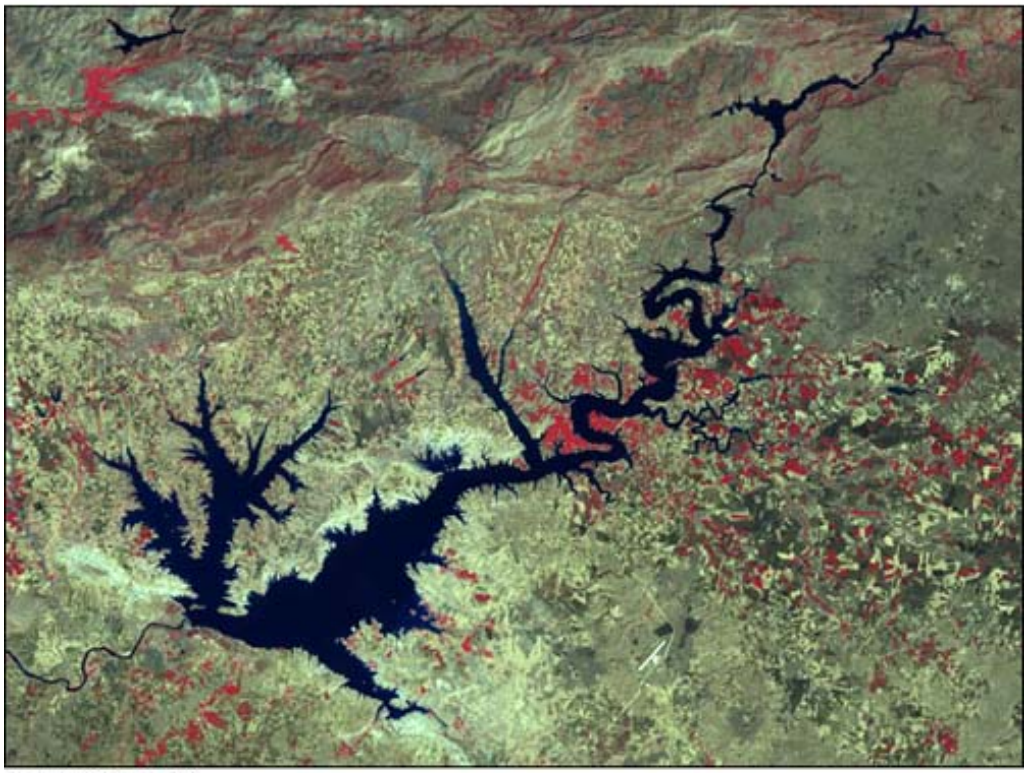
The introduction of alien fish species into closed basin lakes is another major pressure to biodiversity of wetlands in the region. In particular, the introduction of the pike perch *Sander lucioperca* has resulted in the extinction of several endemic fish species. There is no precise information on the damage done to other taxa, although water bird populations are known to have drastically decreased in several closed basin lakes after the introduction of alien species. The biodiversity of Lake Beysehir in the west of the region has been particularly damaged.

The pike perch, Sander lucioperca*, is introduced into several Anatolian waters and is regarded as a threat to endemic species.* ***Source****: <www.ittiofauna.org>.*

2.1.3 Construction of large scale reservoirs

The Atatürk Dam is the largest in a series of 22 dams and 19 hydroelectric stations built on the Euphrates and Tigris rivers in the 1980s and 1990s in order to provide irrigation water and hydroelectricity to arid south-eastern Turkey. These rivers form extensive riparian habitats with a rich biodiversity. Many hundreds of rare species are to be lost unless urgent conservation action is taken. The southern course of the Euphrates is already converted into an extensive chain of dams to produce electricity. The Tigris River is less exploited, but projects under consideration are likely to threaten the biodiversity also of this unique river.

August 20, 1983



August 24, 2002

In 1983 the Euphrates River was in a natural state. The building of the Atatürk Dam dramatically changed the flow regime.

Courtesy of NASA Earth Observatory.

2.1.4 Over-grazing and clear-cutting of forests

Over-grazing is a major threat to biodiversity in the steppes. It can be particularly serious on less productive grasslands in central and south-east Anatolia. Indeed, the demand for more and better grazing areas is so intense that often nearby scrub and forest are seriously damaged as well. The issue is further complicated by various forms of inappropriate grazing, for example in early spring, during the seed formation period or in

late autumn, which is a critical period in the plant cycle of annuals. As a result, over-grazing reduces the productivity and plant cover of grasslands. It inevitably affects the species composition and richness of flora and fauna, impacting the climax species and favouring less palatable ones. Clear-cutting of forests, which still occurs in some parts of eastern Anatolia, is an important threat to dry oak (*Quercus*) communities.

3. Some initiaves for biodiversity on nature conservation in the region

3.1 Nature conservation policies

There are many legal instruments that relate to nature conservation in general and directly or indirectly affect habitats and species. The following laws are of particular importance in relation to nature conservation:

- The Environment Law (1983) and the related Decree-Law concerning the establishment and functions of the Ministry of Environment (1991) are the major legal instruments regulating environmental conservation in Turkey. The first regulates the legislative and technical aspects of environmental conservation; the latter defines the terms of reference of the Ministry of Environment.
- The National Parks Law (1983) and Hunting Law (1937) are the major laws which provide protection of particular sites and species. These laws are the responsibility of the Ministry of Forestry, General Directorate of National Parks and Game-Wildlife. The National Parks Law sets up a network of protected areas, whilst the Hunting Law, through the annual Central Hunting Committee, decides on hunting regulations. Under the Hunting Law, sites can be permanently or temporarily closed to hunting.
- The Law on Protection of Cultural and Natural Assets (1983) regulates the protection and maintenance of movable and immovable assets, which are of particular historical, archaeological, cultural or natural importance. Areas protected under this law are known as 'SIT'. Natural areas are classified as 'Natural SIT'. The implementation of this law is the responsibility of the Ministry of Culture, general Directorate for the Protection of Cultural and Natural Assets.

The following legal instruments are indirectly associated with the conservation of natural areas in the region:

- The Salt Law (1936) regulates the salt (sodium chloride) mining activities (managed entirely by the State).
- The Forestry Law (1956) defines and regulates the use of forests. It divides forests into three categories according to their character: preservation forests, national parks and production forests. The first two seek the protection of forest areas. The status of national parks has been superseded by the National Parks Law of 1983.
- The Aqua-products Law (1971) regulates aquaculture and the use, control and preservation of aqua-products on inland wetlands (including reservoirs), lagoons and seas. A circular issued annually identifies areas where fishing is prohibited or restricted.
- The Decree-Law on the Establishment of the Authority for the Protection of Special Protected Areas (1989) organises the administrative aspects of the management of Specially Protected Areas. The Authority for the Protection of Special Areas (APSA) is part of the Ministry of Environment.
- The Environmental Impact Assessment (EIA) Regulation (1993) made EIA compulsory for planned developments at defined sensitive areas including wetlands and forests, and for any development in protected areas.

- The Pasture Land Law of 1998 regulates the use, protection and improvement of pasture land. The pasture land at high altitudes is owned and managed by the state and the law regulates the use for grazing but also with respect to the emerging tourism (including building).

Turkey is party to a number of international conventions on nature conservation. Treaties involving the Anatolian biogeographic region are:

- Convention for the Protection of Birds (Paris, 1950), ratified in 1966;
- Convention Concerning the Protection of the World Cultural and Natural Heritage (1975), ratified in 1982;
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1979), ratified in 1984;
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention, 1971), ratified in 1994;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1973), ratified in 1996;
- Convention on Biological Diversity (CBD, 1992), ratified in 1997. In response to CBD a 'National Biodiversity Strategy and Action Plan of Turkey' was presented in 1999;
- Convention on Combating Desertification (Paris, 1994), ratified in 1998.

The Turkish Constitution states that international treaties that have been ratified by Parliament automatically become law of the land. Therefore all Conventions mentioned above have become an act of Turkish domestic law after their ratification and they have superior ruling over the existing laws and they may not be challenged before the Constitutional Court.

3.2 Ramsar Convention

Sultansazligi and Seyfe 'Lake, two wetlands of the Anatolian biogeographic region, were declared 'Wetlands of International Importance', after Turkey had ratified the Ramsar Convention in 1994. Currently the Wetlands Department of the Ministry of Environment is developing management plans for the five Ramsar sites. In addition, drafts of a Wetland Regulation were prepared in 1995. This regulation will define different wetland zones and set limitations to the land and resource uses within these zones. It also envisages the establishment of a National Ramsar Committee. The designation of the Seyfe Lake in 1994 as a Ramsar Site has resulted in a major change in a project of the State Water Works of Turkey (DSI). In 1997, DSI developed a project aiming to reduce the lake to its size by diverting the flow from the drainage channels. As a result, 15 792 ha north and east of the lake was aimed to be reclaimed for agriculture. The Ramsar status of this wetland has helped to significantly revise the project and save the lake as a whole.

3.3 Integration of biodiversity in socioeconomic practices

The Turkish Society for the Protection of Turkey (DHKD) has forwarded a project proposal to the south-eastern Turkey Authority and UNDP for the conservation of the biodiversity in northern Mesopotamia particularly associated with riverine habitats and primary steppes. This is to be realised through identification of biodiversity hot-spots and promotion of nature friendly socio-economic practices within these areas.

3.4 Research and monitoring programmes

The Turkish Society for the Protection of Turkey (DHKD) and the Turkish Foundation for Combating Soil Erosion, for Reforestation and for the Protection of Nature (TEMA) are the main organisations promoting nature conservation. DHKD operates a number of projects in order to identify the biodiversity hotspots and to monitor selected Important Bird Areas in the region. TEMA effectively promotes the implementation of the Pasture Land

Law and implements reforestation projects in several localities. The Scientific and Technical Research Council of Turkey (TUBITAK) is the main governmental body in Turkey facilitating the research on biodiversity and natural resources.

4. Bibliography

Atalay, I. 1994. Türkiye Vejetasyon Cografyasi. Ege Üniversitesi Basimevi, Izmir.

Baran, I. and Atatür, M. K. 1998. Türkiye Herpetofaunasi. Cevre Bakanligi, Ankara.

Baris, Y. S. 1989. Turkey's bird habitats and ornithological importance. Sandgrouse 11: 42–52.

Baris, Y. S. 1991. Conservaiton problems of steppic avifauna in Turkey. Proc. Conservation of Lowland, Dry Grasslands in Europe Seminar. Joint Nature Conservation Committee, Newbury, pp. 93–97.

Baskaya, S. and Bilgili, E., 2004. Does the leopard Panthera pardus still exist in the Eastern Karadeniz Mountains of Turkey? Oryx 38: 228–232.

Britannica.com. Encyclopædia Britannica, United Kingdom. <http://www.britannica.com/>.

Eken, G.; Aydemir G.; Kurt, B.; Yalcin, G., Basak, E. and Can, E. 2000. Türkiye'nin biyolojik çeşitilik atlasi. Yesil Atlas 3: 22–33.

Eken, G. and Magnin, G. 1999. A Preliminary Biodiversity Atlas of the Konya Basin, Central Turkey. Biodiversity Programme Report No 13. Dogal Hayati Koruma Dernegi, Istanbul.

Geldiay, R. and Balik, S. 1988. Türkiye Tatlisu Baliklari. Ege Universitesi Basimevi, Izmir.

Kence, A. and Bilgin, C. C. (eds) 1996. Türkiye Omurgalilar Tür Listesi. DPT/TUBITAK, Ankara.

Kirwan, G. M., Martins, R. P., Eken, G. and Davidson, P. 1998. A checklist of the birds of Turkey. Sandgrouse Supplement I, Sandy.

Magnin, G. and Yarar, M. 1997. Important Bird Areas in Turkey. Doğal Hayatı Koruma Derneği, Istanbul.

Mayer, H. and Aksoy, H. 1986. Waelder der Türkei. Gustav Fischer Verlag, Stuttgart

Roselaar, C. S. 1995. Songbirds of Turkey: an Atlas of Biodiversity of Turkish Passerine Birds. GMB, Haarlem.