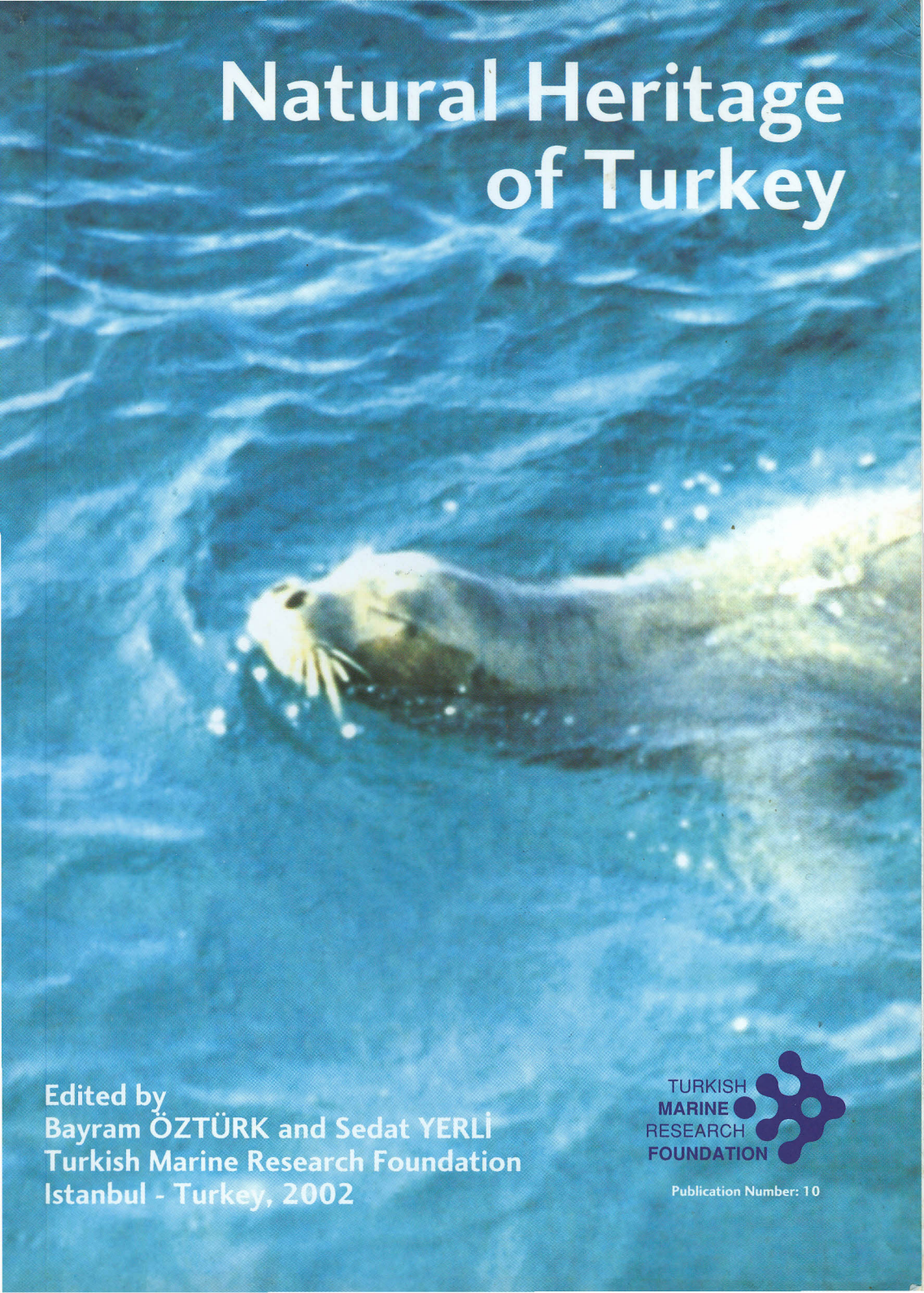
Natural Heritage of Turkey



Edited by
Bayram ÖZTÜRK and Sedat YERLİ
Turkish Marine Research Foundation
Istanbul - Turkey, 2002

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Front cover photo: The Mediteerranean monk seal, *Monachus monachus*.
Back cover photo: Oriental spruce, *Picea orientalis*.

CONTENTS

INTRODUCTION

Turkey has a total area of 777,971km² and extends from Europe to Asia. The European part is called Thrace, and the Asian part, Anatolia, is a long peninsula bounded by the Black Sea in the north and the Mediterranean Sea in the south. The Asian part of Turkey represents 97% of the total area of the country.

The Çanakkale (Dardanelles) and Istanbul (Bosphorus) Straits are a link between the Mediterranean and the Black seas. The total length of the Turkish coastline amounts to 8,353km, excluding islands but including the shores of the Sea of Marmara, which is entirely surrounded by Turkish territory.

The country is an undulating high plateau extending from West to East. The Southern Taurus ranges, the transverse mountains on the Aegean coast, and the upheavals scattered throughout Anatolia are outstanding features of the landscape. The average altitude is 1,250m, and only 10% of the territory lies below 250m above sea level.

The country is divided into seven natural units with different characteristics. According to relief, climate, and soil, it can be regrouped into two large natural areas.

The coastal regions bear the names of the bordering seas: The Black Sea, the Sea of Marmara, the Aegean Sea, and the Mediterranean Sea. The climate is relatively humid with an annual rainfall exceeding 600mm. The vegetation cover is mainly forest. The relief is contrasted with high mountain ranges and narrow coastal plains.

The inland regions are sheltered by coastal ranges. Their climate is continental and dry, allowing only steppe grasslands in the plains. The temperatures are contrasted with long and severe winters and relatively warm summers. Mountains are everywhere in varying proportion from one region to another. Among these regions: Central Anatolia is at a lower altitude and dry with large basin sseparated by isolated mountains; Eastern Anatolia is higher and very hilly with a more severe climate; South Eastern Anatolia, the extreme northward extension of the Syrian plateaus (along the Karacadağ mountain and the Mardin range) is overheated and dry during summer.

Turkey is a country that connects Europe, Asia, and Africa; hence, it has been a passage between various types of geographical generations. As a result of the differentiation of the topographic structure and climatic varieties, the settling of many different species in the region has resulted in an increase in the number of subspecies. During the glacier periods that spread throughout different geologic times, species escaped from the adverse conditions and also between the glacier times; many species which come from south and east settled down in Anatolia. Therefore, species of flora and fauna are mostly European, West Asian, North African, and Mediterranean. Turkey is a center for terrestrial biodiversity, and there are many endemic species in the region.

Flora

Anatolia has features that have provided life for various kinds of organisms in every period. Consequently, many different kinds of organisms have moved into the regions of Anatolia. The differences in the topographic structure played an important role in forming macro and microclimates and provided environments for many types of microclimate species. For instance, a humid and rainy climate prevails in the Black Sea region of Turkey; in the southeast, hot and dry weather, prevails, and in the south and west, the Mediterranean climate prevails. Harsh climates are experienced in many regions, areas, and in different altitudes, with climate variations. Thus, environments proper to different groups of organisms are formed.

▲ In addition to, cultured wheat (*Triticum*) and wild wheat (*Aegilops)* populations are distributed throughout Turkey. Anatolia is the gen center for *Triticum* species. *(1)*

▸ Snowdrop, *Galanthus elwesii.* Under protection. *(2)*

Mountains, straits, and other barriers may have limited the lives of organisms, and increasing isolation conditions have also formed subspecies and even species. Mountains, one of the most important of these barriers, have been a hindrance to many groups of organisms. Moreover, mountains play an important role in determining climate. For example, the Taurus Mountains in the south of Turkey prevent the Mediterranean climate from reaching inland areas. The mountain range on the coast of the Black Sea functions in the same way by preventing humidity from moving inland.

With regards to the flora of Turkey, there are a total of 9,222 species, yet 8,988 of these are native.

▲ Soapwort, *Saponaria mesogitana.* Distributed in western and southern Turkey. *(3)*

▲ Saffron crocus, *Crocus abantensis.* An endemic species.*(4)*

To understand Turkey's richness in flora, it would be useful to compare it with other countries' flora.

The number of endemic species in Turkey is 2991. This is more than the total number of species in England, which is 2000. The reasons for this high level of diversity are:

- The topography of Turkey shows an irregular structure from east to west and north to south,
- Due to its topographic structure, several macro and micro climates have been formed,
- Turkey connects two continents, functioning as a bridge,
- Turkey is located in the middle of three different geographic regions (Europe-Siberia, Iran-Turan, the Mediterranean),
- A variety of soil structure,
- Turkey is a gene center for many species,
- Some types of domesticated plants originate in and the environs of Anatolia.

The richness of flora in Turkey can be explained in five families and genera as illustrated below:

Families	Number of Genera	Number of Species	Endemism Rate (%)
Asteraceae	133	1156	38
Fabaceae	69	974	39
Lamiaceae	45	546	44
Brassicaceae	85	515	38
Poaceae	142	512	10

Genera	Number of Species	Endemism Rate (%)
Astragalus	391	59
Verbascum	232	79
Centaurea	177	62
Allium	142	35
Silene	129	40

▲ Cornflower, *Centaurea iconiensis.* An endemic species under protection. *(5)*

The most significant and interesting factor concerning the flora of Turkey is the rate of endemism: 33% of its flora are paleo-endemic types and all of them can survive in old and suitable microclimate areas. These are *Helleborus vesicalius, Graelsia davisiana, Podocytisus caramanicus, Cronanthus orientalis, Linum aretioides, Ferula drudeana, Echinops onopordon, Globularia davisiana, Asyneuma pulvinatum, Dorystoechas hastata,* and *Rhodothamnus sessilifolius.* The other species are neo-endemic, and have appeared by speciation mechanisms. The number of endemic species of this kind in central Anatolia is 926, in East Anatolia 724, Southern Anatolia 1030, Southeast Anatolia 236, North Anatolia 480, and West Anatolia 260.

The recent information about flora of Turkey is shown below:

TAXA	Number of Species
FERNS	90
GYMNOSPERMS	22
DICOTYLEDONES	7593
MONOCOTYLEDONES	1517

▲ Lily, *Lilium monadelphum.* Distributed in northeastern Turkey. It is under protection. *(6)*

◀ Mandrake, *Mandragora autumnalis.* Lives in the Mediterranean area of Turkey. Used for medicinal purposes. *(7)*

▲ Cherry laurel, *Laurocerasus officinalis.* Used for medicinal purposes. *(8)*

▲ Arum, *Arum euxinum.* An endemic species. Under protection. *(9)*

▲ Three-lobed sage, *Salvia fruticosa.* Used for medicinal purposes. *(10)*

▲ Corn poppy, *Papaver rhoeas.* Used for medicinal purposes. *(11)*

◀ Muscari, *Muscari azureum.* An endemic species scattered in Anatolia. Under protection. *(12)*

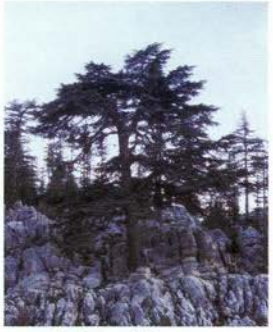
◀ Cyclamen, *Cyclamen mirabile.* An endemic species. Under protection. *(13)*

▲ Austrian pine, *Pinus nigra. (1)*

Forests and Mountains

Turkey is a very rich country with respect to its forests. 18% of Turkey is covered by forests and these forests have a mixed structure. Natural forests constitute 95% of all forests. Turkey is a centre of genetic sources for oak, pine, oriental spruce, *Picea orientalis*. For example, very old Austrian pines, *Pinus nigra*, can be found especially in the eastern Black Sea region. They are approximetly about 35m in height, which are slowly becoming extinct in other countries.

Abies bornmülleriana: Reaching a height of 40m, it can still be found in the southern Marmara region and in the western Black Sea.



▲ Cedar of Taurus, *Cedrus libani. (2)*

Cedar of Taurus, *Cedrus libani:* In south Anatolia and the Taurus Mountains, the biggest cedar population is found. Some trees are more than 2000 years old and they are under protection as a monument tree.

Liquidambar orientalis: Found in southwest Anatolia in small populations.

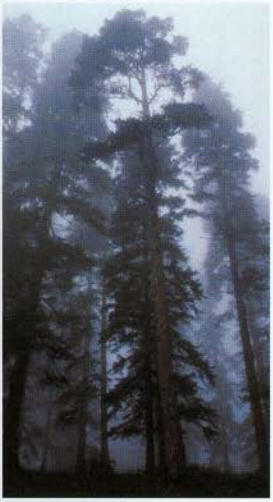
Scots pine, *Pinus sylvestris:* In the Cura Mountains, south of the Black Sea, the scots pine can be found. They have a great economic value in their timber industry. Some trees are more than 500 years old.

▲ *Liquidambar orientalis. (3)*

▲ Uludağ fir, *Abies bornmülleriana. (4)*

Sweet chestnut, *Castanea sativa:* In Turkey, sweet chestnuts reaching the age of 1000 years and a height of 25m can be found.

◂ Oriental spruce, *Picea orientalis. (7)*



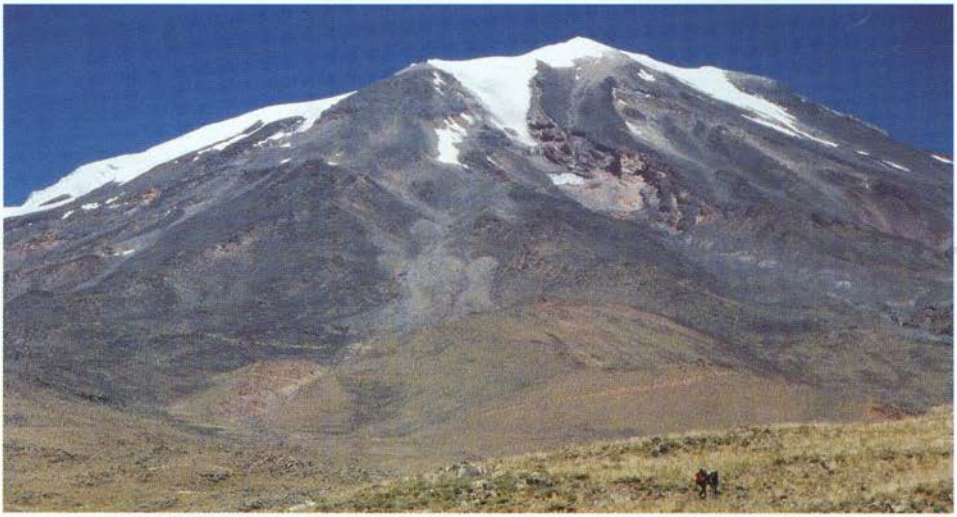
▲ Scots pine, *Pinus sylvestris. (5)*

▲ Sweet chestnut, *Castanea sativa. (6)*

▸ Oriental plane tree, *Platanus orientalis. (8)*

Oriental spruce, *Picea orientalis:* Reaching a height of 50m and up to a meter in diameter, it is the principal tree found in northeast Anatolian mountain forests and is under protection.

Oriental plane tree, *Platanus orientalis:* The oriental plane tree is known as a monument tree and most are older than 1000 years.



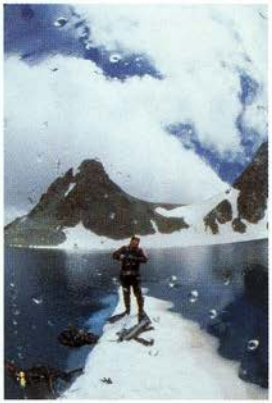
▲ Mount Ağrı (Ararat), 5,151 m. *(9)*

Turkey's forests are so abundant that birds, mammals, insects, and lizards can frequently be seen.

Turkey is located in the Alpine-Himalayan Mountain Belt and has many beautiful mountains, such as Mount Ağrı and Mount Süphan.

Mount Ağrı is the highest mountain in Turkey at a height of 5,151 meters. Wild sheep live around the foot of the mountain. Mount Süphan is the second highest mountain in Turkey where wild goats live around its foot.

Turkey's mountains could be discovered by individuals interested in activities such as trekking, altitude diving, climbing, and observing wild life.



▲ Kaçkar Mountains. Turkish scientists are researching the glacier lakes to examine the ecological changes. *(10)*

▲ Mount Süphan, 4,157 m. *(11)*

A Case of Ecotourism in Turkey

Butterfly Valley is close to Fethiye on Turkey's southwest coast. Most visitors make day trips to the valley by boat from the Ölüdeniz Lagoon. A trip takes approximately 25 minutes.

The valley is a kind of open natural history museum of butterflies. It is possible to observe 40 nocturnal and 35 diurnal butterfly species in the valley.

Some of the most spectacular species of butterflies and moths in the world are widely distributed in the Ölüdeniz and Butterfly Valley. A very rare butterfly, *Alexanor* sp., is not found in Europe at all, is often observed in the central, Mediterranean, and east parts of Turkey.

Upon arrival to the valley, it is possible to see many plant species that provide food for butterflies. In the valley, all kinds of butterflies of the Mediterranean coastal region live during eight months of the year. The tiger moth, *Euplagia quandripunctaria,* is the species responsible for the name of the valley. Between June and October, colonies consisting of many hundreds of these lovely, colorful species prefer the valley as their habitat. Although there is no electricity, telephones, hotels, or even roads in the valley, many nature lovers visit the valley simply to observe and experience this butterfly paradise.

▸ Butterfly Valley, Fethiye. *(12)*

◂ Tiger moth, *Euplagia quadripunctaria. (13)*

◂ Golden yellow, *Gonepteryx farinosa. (14)*

Another beautiful butterfly in the valley is the golden yellow, *Gonepteryx farinosa*, which is golden yellow in color as defined in its name.

◂ *Papilio machaon. (15)*

This species *Papilio machaon* also commonly observed in the valley after March.

Lakes, Rivers and Wetlands

Turkey is also very rich in internal waters. Statistically, Turkey has 906,118 ha natural lakes; 200,000ha dams and ponds; and 145,715km of rivers in length.

In Turkey 56 wetlands are defined as Ramsar Status. Below are some our wetlands that have international importance according to the Ramsar criteria:

Sultan Sazlığı: This region, which is in Develi Plain, Kayseri, is one of the wetlands of Turkey that has a maximum protection status. An area of 45,000 ha is allocated as a Wild Life Protection Area and an area of 17,200ha as a Nature Protection Area. In 1993, this wetland was declared as a Natural SIT Area. It is also a reproduction area for many species: cormorant, heron, mallard, common tern (*Sterna hirundo*), marbled teal (*Mermaronetta angustrostris*), white headed duck (*Oxyura leucocephala*), red-crested pochard (*Netta rufina*), glossy ibis (*Plegadis falcinellus*), white spoonbill (*Platalea leucorodia*), gad wall (*Anas strepera*), ferruginous duck (*Aythya nyroca*), coot (*Fulica atra*), and squacco heron (*Ardeola ralloides*).

▲ Lake Van. *(1)*

While ruddy shelduck (*Tadorna ferruginea*) lives in this region during the summer, flamingo (*Phoenicopterus ruber*), crane (*Grus grus*) and avocet (*Recurvirostra avosetta*) prefer the region in the spring. In addition, many water birds can be seen in this wetland during the winter.

Lake Van: With a surface area of 3,547km², this lake is one of the most important habitats for birds. Lake Van is one of the most interesting brackish lakes of the world. Pearl mullet, *Chalcalburnus tarichi,* is the only endemic fish living in Lake Van. They reach maturity at approximately three years and live for seven years. Marbled teal and white-headed duck use this region as a reproduction area. Great bustard, *Otis tarda,* can often be seen in this lake.

Tuz Lake: Located in Aksaray, Konya, it is Turkey's second largest lake and the saltiest. The lake's area shows great changes throghout the year. In 1992, the lake was declared as a SIT area. The biggest flamingo colony in Turkey lives in this lake. Lesser kestrel (*Falco naumanni*), avocet, and greater sand plover (*Charadrius leschenaultii*) are also seen in this region. In winter, white fronted goose (*Anser albifrons*) is seen.

◂ Pearl mullet, *Chalcalburnus tarichi. (2)*

▲ Lake Beyşehir. *(3)*

Beyşehir Lake: Having a surface area of 73,000 ha, this lake is the Turkey's largest freshwater lake and also has a great importance as a bird habitat. The red-crested pochard, *Netta rufina,* spends winter seasons in this region.

Doctor Fish: Striker, *Cyprinion macrostomus,* and licker, *Garra rufa,* fish living in the hot spring pools in Kangal, Sivas, attack patients' skin, remove crusts, and thus cause a direct water contact. These fish give positive results in psoriasis and rheumatical disease treatments. The water temperature of the hot spring pools, approximately 35° C, has an important role in this treatment. These are among the world's rarest fish used in medical treatment. Although they are under protection, smuggling to other countries is common.

▸ Doctor Fish. *(4)*

Turkey has 26 river basins with a total water flow of 186 billion m^3. Over half of the surface flow originates from six main basins: Dicle, Fırat, East and West Black Sea, Antalya, and West Mediterranean. There are nine rivers longer than 500 km: Kızılırmak, Fırat, Sakarya, Murat, Aras, Seyhan, Dicle, Yeşilırmak, and Ceyhan.

▲ The Kızılırmak River. It discharges into the Black Sea. *(5)*

◀ The Dicle River (Tigris). *(6)*

The annual total discharge of rivers in Turkey is 41 billion m^3 into the Black Sea and 36 billion m^3 into the Mediterranean Sea. The Dicle and Fırat Rivers run through Iraq and Syria, respectively.

Deltas are very important for biodiversity, especially regarding waterfowls. The deltas formed by the Meriç, Gediz, Büyük Menderes, and Küçük Menderes rivers that flow to the Aegean Sea and the Göksu, Seyhan, Ceyhan Deltas are suitable habitats for a large number of different species of waterfowl because the Anatolian plain freezes during winter.

▲ A Fish caught in the Fırat River (Euprate). Turkey is trying to protect the river and the fish stocks. *(7)*

Birds

Turkey, a host country to birds during their seasonal intercontinental migration, is on the three big migration routes between Asia, Europe, and Africa. A total of 430 species of birds can be seen in Turkey.

In East Anatolia, on the North-South migration route, birds of prey can mostly be observed. In the West, especially in the Istanbul Strait (Bosphorus), the migration of storks and birds of prey is worth watching. A part of the Siberia-Africa migrants can be observed in the widest part of the country on the North-South direction. In the Black Sea coast, Kızılırmak Delta shelters 320 species of birds, and in the Mediterranean coast, Göksu Delta hosts 332 species of birds.

Turkey is one of the most important regions for bird migration in the world. Every year, depending on the season, millions of migrants fly through the country and while choosing their direction, they say "hello" or "goodbye" to Asia, Europe, and Africa.

Turkey is on the migration route of birds; thus, species diversity is high. These species are classified in 18 orders and 65 families. All of these species are protected by national laws and international agreements. The largest threat for Turkey's bird population is the cultivation of drugs.

The night heron, *Nycticorax nycticorax*, is now very rare in some regions. They use wetlands, especially at night.

◂ Night heron,
Nycticorax nycticorax. (1)

▲ Cattle egret, *Bubulcus ibis. (2)*

Cattle egret, *Bubulcus ibis*, colonies use the islands of Lake Van as nesting areas. They are rarely found in wetlands.

The grifton vulture, *Gyps fulvus*, lives in the Taurus Mountains and in Middle Anatolia. Their number has now decreased significantly.

The Egyptian vulture, *Neophron percnopterus*, lived throughout Anatolia and were high in number in the past, but their numbers have since then decreased.

The black vulture, *Aigrupus monachus*, is rarely seen in Anatolia. It is quite a sight to watch this bird gliding with its wings stretched out.

▼ Grifton vulture, *Gyps fulvus. (3)*

▲ Egyptian vulture, *Neophron percnopterus. (4)*

▲ Black vulture, *Aegypius monachus. (5)*

▲ Imperial eagle, *Aquila heliaca. (6)*

The imperial eagle, *Aquila heliaca*, is found in mid-Anatolia as a native species throughout the year. It is also a rare species.

The white stork, *Ciconia ciconia*, migrates through Turkey, and they can be seen in numbers in the hundreds of thousands while they use the Istanbul Strait as a migration route. They are seen very rarely in Europe nowadays.

▲ White stork, *Ciconia ciconia. (7)*

The slender billed gull, *Larus genei*, is a very rare species. It can only be seen in west Anatolia.

▲ Slender billed gull, *Larus genei. (8)*

The dalmatian pelican, *Pelacanus crispus*, has survive in numbers and can be seen in Turkey's wetlands throughout the year.

▲ Dalmatian pelican, *Pelacanus crispus* and *Pelacanus onocrotalus. (9)*

The bald ibis that is almost extinct, is found only in Turkey and Morocco. These birds lay eggs in the town of Birecik in southeastern Turkey close to the Fırat River.

▲ Bald ibis, *Geronticus eremita. (10)*

Turkey is an ideal country for bird watching. It is possible to observe birds in forests, wetlands, and in steppes in all seasons of the year.

Amphibians and Reptiles

Amphibians and reptiles are important groups in Turkey. Amphibians are an evolutionary class between fish and reptiles and can survive in water and partly on land. In Turkey, there are seven species belonging to Urodela (frog with a tail) group and family of the salamanders, and also 11 species of five families from Anura (frog without a tail) group. However, within these species, there are many subspecies. For instance, it is known that there are eight subspecies of terrestrial salamander, recognized as *Mertensiella luschani.*

Taurus Frog, *Rana holtzi*: The taurus frog is a mountain frog and its length is 7.5cm. Its skin is usually soft, slim, and flat. The color of its back is different shades of brown, with spots (that run along its left and right sides) usually surrounded by a slender light stripe. Its stomach is spotless yellowish, pinkish, or whitish. It is an endemic species that only lives in Turkey, Karagöl, which is 2,550m in altitude on the top of the Bolkar Mountains and surrounded with pasture grasses. It is a protected species.

▾ Taurus frog, *Rana holtzi. (1)*

There is also a quite rich diversity of reptiles in Turkey. From the group of turtles (Testudinata): four species of two families live in fresh water, two species of one family in the sea, two species of one family on the ground. There are two subgroups of Squamous (Squamata) group, as lizards (Lacertilia) and snakes (Ophidia). 49 species of eight different families of lizards and 36 species of five different families of snakes live throughout the country.

The two types of snakes that inhabit the regions of the Black Sea and southeast Anatolia are found only in Turkey. They are under threat because of pesticides, but they are protected species.

Vipera barani: The length of its body is 55cm and they are entirely black. There are white spots on the scales at the edges of the mouth. The back is grayish-brown, and there are thick marks towards the neck. Some of these marks form a zigzag pattern. The tip of the tail is yellow.

This species lives in shrubs and is endemic in Turkey. Research finding indicates that they live around Adapazarı, Silifke, Taurus, and Trabzon. It is under protection by the European Council. Their number is decreasing especially due to smuggling.

▾ *Vipera barani. (2)*

▲ *Vipera wagneri. (3)*

Vipera wagneri: The length is 90 cm. Its back is gray or brown-beige and with spots. The edges of the spots are thick, and the inside parts are reddish or yellowish-brown. Spots may be separated from each other or may be merged. The lower side is light to dark gray in color.

It lives among rocks with little vegetation, the rocky sides of mountains, and plateaus. It is assumed that this species also lives around the north of the cities of Ağrı and Van, although it has only been spotted around Kars. Outside Turkey, it is only known in Azerbaijan. It is protected species under all known international agreements.

▲ Suphan lizart, *Eremias suphani. (4)*

Suphan Lizard, *Eramias suphani*: Its body length is 20 cm. Its back color is greenish or brown-gray, and there are light and thick colors along the left and rihgt sides of the back. The lower part is whitish. In young animals, stripes and points are numerous.

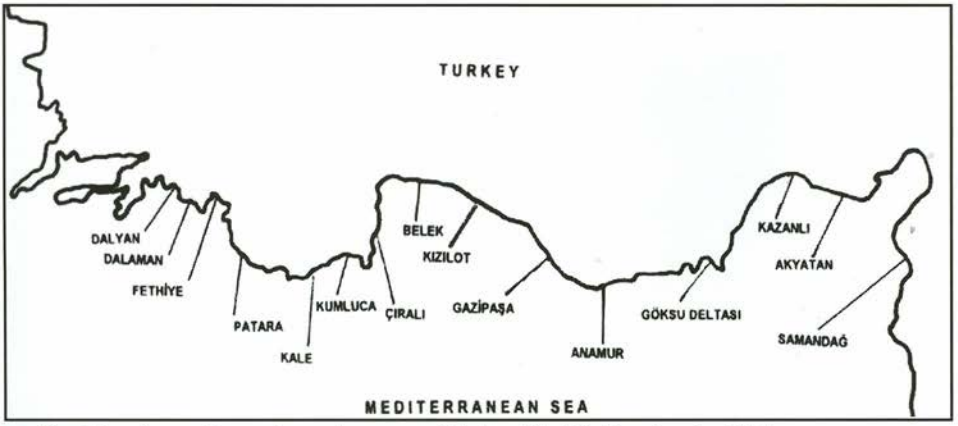
This lizard, which lives in sandy and stony places, is an endemic species. It is distrubuted only around the cities of Van and Bitlis.

▲ Loggerhead turtle, *Caretta caretta. (5)*

Protection of Sea Turtles

Two species of marine turtles can regularly be found along the Aegean and Mediterranean coast of Turkey. They are the loggerhead turtle, *Caretta caretta* and the green turtle, *Chelonia mydas*.

NGOs, government agencies, and local authorities have been working together for the protection of the loggerhead turtle and green turtle. These two species live on the coasts of the Aegean and Mediterranean and are under protection. The map below shows major nesting sites for these two species.



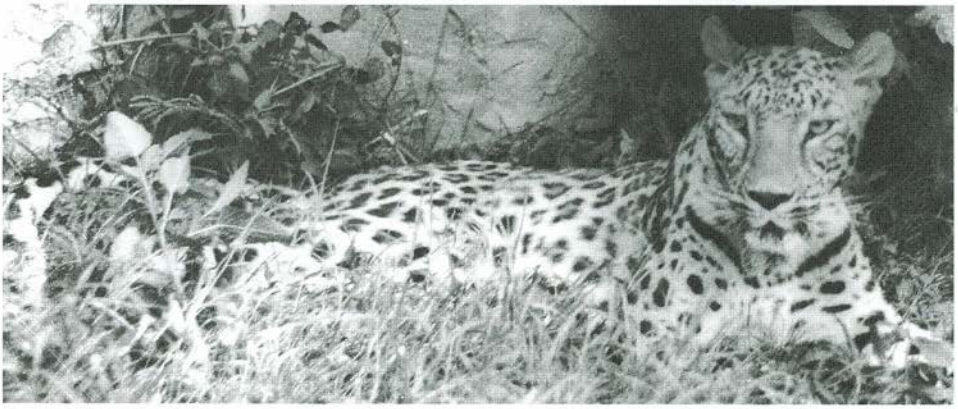
▲ The 17 major marine turtle nesting areas of Turkey (Yerli & Demirayak, 1996).

Terrestrial Mammals

In the past 50,000 years, many species of terrestrial mammals that originated in Europe, Asia, and Africa entered into Anatolia, which completed its own geologic formation 10 million years ago. Today, in Turkey, groups of mammals (Mammalia) are represented by 16 Insectivoras, 32 Chiropteras, 2 Lagomorphas, 55 Rodentias, 20 Carnivoras and 15 Artiodactylas. In ancient times, the Asian elephant (*Elaphus maximus*) lived in Anatolia. Wild cattle (*Bos primigenius*), cheetah (*Acinonyx jubutatus*), lion (*Panthera leo*), tiger (*Panthera tigris*), a kind of marten (*Martes zibellina*), and a type of carnivore (*Genetta genetta*) vanished. Anatolian leopard (*Panthera pardus*) and a kind of gazelle (*Gazella gazella*) are now on the verge of extinction in Anatolia due to hunting and deforestation.

While some species of insectivorous are located mostly in humid forest areas of Turkey, some others spread out in well-watered steppe lands. For that reason, the species such as mole (*Talpa europaea*) and caucasian shrew (*Sorex caucasicus*) are seen in some specific localities. However, species such as the white toothed shrew (*Crocidura leucodon*) can be seen everywhere.

▾ Anatolian leopard, *Panthera pardus. (1)*



Bats (*Chiroptera*) usually live in caves. Opening caves to tourism without scientific precautions may disturb bats. Thus, the protection of bats, which are the main components of a cave ecosystem, has become a priority issue in Turkey. Since the Egyptian fruit bat (*Rousettus aegyptiacus*) living on the Mediterranean coast damages fruit, these mammals are sometimes killed. Bechstein bat (*Myotis bechsteinii*) and Leisler bat (*Nyctalus leisleri*) are rare species that are disappearing because of forest fires. Although pipistrelle bat (*Pipistrellus pipistrellus*) and kuhl pipistrelle bat (*Pipistrellus kuhli*) which often can be found in settlement areas and in regions where pesticide is used, always give birth to twins, they are under threat.

Although the wild rabbit (*Lepus europaeus*) of rabbit group (*Lagomorpha*) of Turkey is the most hunted type, they live in all vegetated regions of Turkey.

The most fundamental elements in the food chain are rodents (Rodentia). Caucasian pine vole (*Microtus majori*), one of the Turkish rodents, forest dormice (*Dryomys laniger*), and spiny mouse (*Acomys cilicicus*) are endemic species.

The population of all species are greatly declining because of hunting, except for the fox (*Vulpes vulpes*) and beech marten (*Martes foina*) that have characteristic opportunistic of feeding among carnivores (*Carnivora*) in Turkey. There is no accurate information about the situation of pine marten (*Martes martes*). Brown bear (*Ursus arctos*), lynx (*Felis lynx*), caracal (*Felis caracal*), and wildcat (*Felis silvestris*) are always being hunted for their fur. Wolf (*Canis lupus*), hyena (*Hyaena hyaena*), badger (*Meles meles*), jackal (*Canis aureus*), big poppy (*Mustela erminea*), and small poppy (*Mustela nivalis*) are species killed wherever they are seen since they harm vegetables, fruit, and domesticated animals.

The otter (*Lutra lutra*) a half aquatic species, is hunted for its fur and damages fish farms. A conservation project has been implemented for this species. As a result, some carnivores are vanishing because of unconscious hunting, habitat destruction and pollution.

All wild species except for wild boar have decreased in number because the species of even-toed (*Artiodactyla*) are the main target of hunters. Thus, they are now categorized as rare species. The domesticated races of Asian camel (*Camelus ferus*) and African camel (*Camelus dromedaries*) are surviving symbolically in some places. A type of gazelle (*Gazella subgutturosa*) and chamois (*Rupicapra rupicapra*) are also disappearing because of hunting. A type of wild sheep (*Ovis gmelinii anatolica)* is under protection in Central Anatolia. This species is a typical member of steppe ecosystems.

▾ Wild sheep, *Ovis gmelinii anatolica. (2)*

Thus far, Turkish and international scientists have researched mammals of Turkey taxonomically, ecologically, as well as biogeographically. However, some species vanished before their taxonomic identity was defined. Research into a species of badger (*Meles meles*) whose number was reduced, as well as some other species, has become almost impossible.

143 mammal species are under the protection of international agreements such as the Bern Convention and CITES (Washington Convention) that Turkey has signed.

▲ Bear, *Ursus arctos (3)*

The bear is one of the carnivores still living in Anatolia. The largest population lives in the East and the Northeast. In addition, those that used to be tamed for public attraction are protected in special areas to be released into nature again. The preservation of bears in Anatolia depends on the success in the protection of woodlands, pine groves, and maquis ecosystems.

▲ Wolf, *Canis lupus.* (4)

Wolves, particularly living in the region of Middle Anatolia and the Black Sea, are also under protection. The survival of these animals, which are one of the oldest indigenous species of Anatolia, depends on the protection of forest ecosystems. The number of wolves have declined throughout Europe and although they are still common in many areas in Turkey, they need to be protected in order to conserve the species.

▲ Gökçeada Sheep. (5)

Genetic Conservation of Some Domesticated Mammals

Gökçeada sheep is an isolated race of sheep. This species is also under protection to maintain genetic diversity.

▲ The dog of Kangal. *(6)*

The cat of Van which has blue and green eyes is unique only to the Van region and is under protection. It has been studied so that its genetic characteristics will not be lost.

The dog of Kangal, which is popular all around the world, originates in Anatolia's coldest and hardest climates. Researchers have been continuing their efforts to protect their genetic characteristics.

▲ The cat of Van. *(7)*

▲ The Black Sea.

Marine Life

Turkey is surrounded by four different seas. These are the Black Sea, the Marmara Sea, the Aegean Sea, and the Mediteranean Sea. These seas also contain numerous islands and islets.

▲ Fish market in the İstanbul Strait, rich in diversity. *(1)*

Turkish seas are rich in the diversity of fish species: the Black Sea has 300 fish species, the Marmara Sea 200, the Aegean Sea 300, and the Mediterranean Sea 400 species.

▲ The turbot, *Psetta maxima* released to the sea. *(2)*

The turbot, is one of the vulnerable species in the Black Sea, and various state institutions and NGOs work together for the restoration and recovery of the stocks. The release of cultured young fish started three years ago in Trabzon (Eastern Black Sea) as a protection measure for this species. The fishing season and methods are regulated.

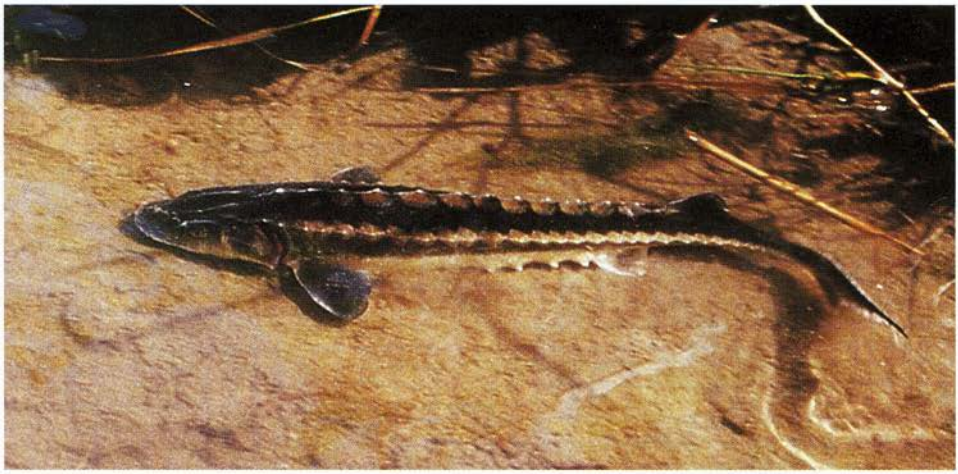
Sturgeons are among the most endangered species in the Black Sea and these species is under protection along all of Turkey's coasts. The main threats for sturgeons are overfishing and pollution. There has been some effort to further enhance the protection of sturgeons in the Black Sea.

▲ *Salmo troutta labrax* is endemic in the Black Sea. (3)

Salmo trutta labrax is an endemic species in the Black Sea. Overfishing and river pollution are the main threats for this species. It is also under protection, and studies aimed at restoring its stocks continue.

▲ The Black Sea coast. *(4)*

Marine biodiversity is under threat in the Black Sea due to eutrophication mainly caused by the Danube River, ship-originated pollution, over fishing and invasive exotic species. Turkey plays an important role in the implementation of the Bucharest Convention for the protection of the Black Sea.

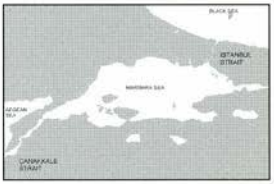


▲ Russian sturgeon, *Acipenser guldenstaedti*, one of the endangered sturgeon species in the Black Sea. *(5)*

The Sea of Marmara is a small inland sea of Turkey. It has two important straits, namely the İstanbul (Bosphorus) and Çanakkale (Dardanelles) Straits. These two straits play a vital role for the marine biodiversity of the Black Sea and Mediterranean Sea due to its characteristic as a biological corridor. The two straits are called the Turkish Straits System.

The Marmara Sea is under the threat of a heavy pollution load from the Black Sea. Moreover, ship-originated pollution is the most important pollution source for this sea, and many bays and gulfs are affected by previous ship accidents in the Istanbul Strait. Species diversity is also high in the Straits, and 52 marine species are in the Red Data Book, including the Mediterranean monk seal, *Monachus monachus*.

The Marmara Sea is a spawning area for many pelagic migratory fish. However, in recent years, overfishing caused a decline in the stocks of some species, such for sturgeon, turbot, swordfish, tuna, and mackeral. Currently, the draft Marmara Sea Action Plan considers the problem holistically.



▲ The Marmara Sea (Turkish Straits System).

▲ Black coral, *Gerardia savaglia* colonies. *(6)*

Mitigation of land-based, ship-originated, and industrial pollution are the priorities for the action plan.

Black coral, *Gerardia savaglia*, still survives below a depth of 30m in the Marmara Sea. This species is under protection in all Turkish waters.

The small spotted shark has an Atlantic origin but also lives in the Marmara Sea below a depth of 50m. This species can reach a length of 100cm.

The Aegean and Mediterranean coast of Turkey is under heavy tourism pressure, and its habitat diversity is severely threatened. The Turkish government realizes that tourism can only develop when the maintenance of water quality of the seas is properly managed. Soft tourism, like diving, has also been encouraged in some areas. Exotic species from other seas, land-based pollution, and overfishing are major threats to the marine biodiversity of Aegean and Mediterranean Seas. In the Aegean Sea, a total number of 35 marine species are under threat.

▲ Small spotted shark, *Scyliorhinus canicula*. *(7)*

The Aegean and Mediterranean seas have an endemic marine phaneograme. This species is Neptune grass, *Posidonia oceanica,* which is under protection by law in Turkish waters. The *Posidonia* meadow has a very important role in the entire Mediterranean Sea, where it constitutes a habitat for many species. Thus, *Posidonia* meadows are considered as the most important ecosystems along Turkish coasts.

▲ The Aegean Sea.

However, Neptune grass meadows are declining due to coastal infrastrucure, trawling, beach set nets, gill nets, anchoring, and pollution.

▲ Diving tourism is a new fashion in Turkish riviera. *(8)*

Sponges are one of the commercial products from deep water, traditonally fished in the Aegean Sea and exported throughout the world. Sponges entitled Turkish cup and elephant ear are known all around the world. Sponges are generally black in the natural environment, and they are bleached after harvesting for the market.

▲ *Posidonia* meadows. *(9)*

▲ Sponge sold in Bodrum. *(10)*

▲ A diseased sponge, *Ircinia* sp. in Neptune grass. *(11)*

▲ Knobbed triton, *Charonia lampas. (12)*

Sponges are habitats for many organisms and kinds of shelters for small sea stars, molluscs, and even nudibranches. But, in recent years, the sponge population in the Mediterranean Sea has declined due to an epidemic. Sponge fishing is banned in Turkey for the recovery of natural stocks.

Knobbed triton, *Charonia lampas,* is distributed in the Aegean and Mediteranean coasts of Turkey. This mollusc species is rare and under protection by law.

Shamefaced crab, *Calappa granulata,* is widely distributed along the Turkish Aegean coast.

Nudibranch, gastropod molluscs, are found on rocky beds from 2m down to 40m deep. Twelve nudibranch species are known in Turkish waters so far.

Red starfish, *Echinaster sepositus,* is under protection by law in Turkish waters due to its vulnerability. This species can live up to a depth of 250m.

▲ Shamefaced crab, *Calappa granulata. (13)*

▲ Red starfish, *Echinaster sepositus. (14)*

▲ *Hypselodoris valenciennesi. (15)*

▲ Golden grouper, *Epinephelus alexandrinus. (16)*

Golden grouper, *Epinephelus alexandrinus,* is still found in Turkish waters and has a stable population in the eastern Mediterranean. This fish is a flag species for divers and the diving business.

◀ Dusky grouper, *Epinephelus guaza. (17)*

Dusky grouper, *Epinephelus guaza,* is one of the fish species whose population is declining due to overfishing, illegal fishing, and spearfishing. Its status is vulnerable, and effective protection measures should be implemented.

Moray eels, *Muraena helena,* are silent inhabitants of the caves and rocky areas in Turkish coastal waters.

◀ Moray eel, *Muraena helena. (18)*

▲ Barracuda, *Sphyraena sphyraena. (19)*

▲ Sea horse, *Hippocampus ramulosus.* (20)

▲ Sperm whale, *Physeter catodon,* in Antalya, the Mediterranean. *(21)*

Barracuda, *Sphyraena sphyraena,* can be observed all year round along the Turkish Aegean and Mediterranean coasts. These fish are the favorites of divers, and big schools can be seen from the surface down to a depth of 50m.

Sea horse, *Hippocampus ramulosus,* can be found among Neptune grass from 1-10m to 25m deep. This species is one of the rare species and under protection by law in Turkey.

Marine mammals are top predators of the Black Sea and Mediterranean ecosystems. There are nine odontoceti and one mysticeti species living along the Turkish coasts, and all are under protection by law. Among them, sperm whale, *Physeter catodon,* is often seen in the Mediterranean and Aegean coasts. Fin whale, *Balaenoptera physalus,* is also observed in these seas. The main threat for cetaceans in Turkish waters are bycatch and pollution. For bycatch and strandings, a national stranding network was established five years ago.

A female sperm whale was rescued from swordfish nets in the Aegean Sea in mid 2002. Turkey has drafted and started to implement its own national plan for the conservation of cetaceans.

The Mediteranean monk seal, *Monachus monachus,* is one of the rarest animals in the world and a critically endangered species. This species still survives along Turkish coasts, and effective protection measures have been implemented successfully by local authorities, NGOs, and government agecies.

This species has been protected by law since 1977 in Turkey, and after many years the mortality rate has decreased, while the birth rate has increased. However, the population is still not stable. Therefore, a concerted action plan and its proper implementation is needed for the last monk seals of Europe.

▲ Two new born pups in the Cilician basin. The Monk seal is also a flag species in the Mediterranean Sea. *(22)*

Cetacean Species in Turkey

	Black Sea	Marmara Sea	Aegean Sea	Mediterranean Sea
Phocoena phocoena	+	+	-	-
Tursiops truncatus	+	+	+	+
Delphinus delphis	+	+	+	+
Grampus griseus	-	-	+	+
Ziphius cavirostris	-	-	+	+
Pseudorca crassidens	-	-	+	+
Stenella coeruleoalba	-	-	+	+
Globicephala melas	-	-	+	+
Physeter catodon	-	-	+	+
Balaenoptera physalus	-	-	+	+

◀ Bottlenose dolphin, *Tursiops truncatus,* while jumping *(23)*

▲ Monk seals swim freely in the Bodrum Peninsula in the Central Aegean Sea after effective protection measures. *(24)*

Turkey has also many islands and islets. Insular ecosystems are unique, due to high endemism and fragile habitats.

▲ Spiny lobster, *Palinurus elephas*, in the cave. *(25)*

Gökçeada in the North Aegean Sea is the biggest island of Turkey, and around the island spiny lobster, *Palinurus elephas,* is commonly seen.

Islands around the Bodrum Peninsula play an important role in species diversity and should be strictly protected due to its isolation from the mainland. Many sea weed species live in the unspoiled, crystal clear waters.

The Mediterranean islands and islets are also important for marine biodiversity. These islands have special algae which is strongly calcified and generally common in mediolittoral zones where it forms encrusted corniches up to 1m wide, namely trottoirs. These trottoirs prevent coastal erosion.

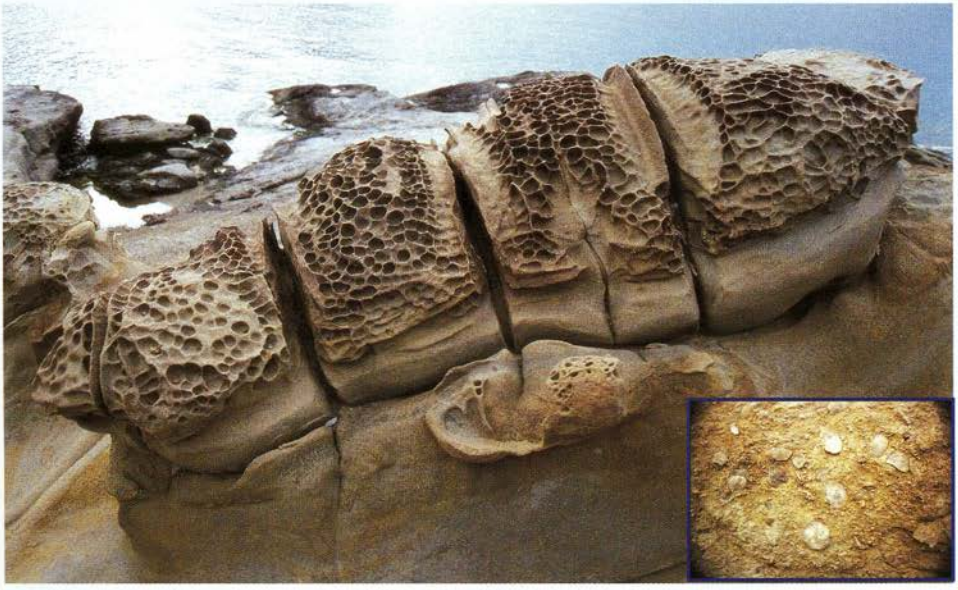
▲ Gökçeada Island. *(26)*

Protection of marine biodiversity is absolutely necessary for the sake of future generations. We know that marine biodiversity is under threat along Turkish coasts. We are aware that our seas, lakes, rivers, gulfs, and bays are very valuable for species, habitat, and ecosystem diversity.

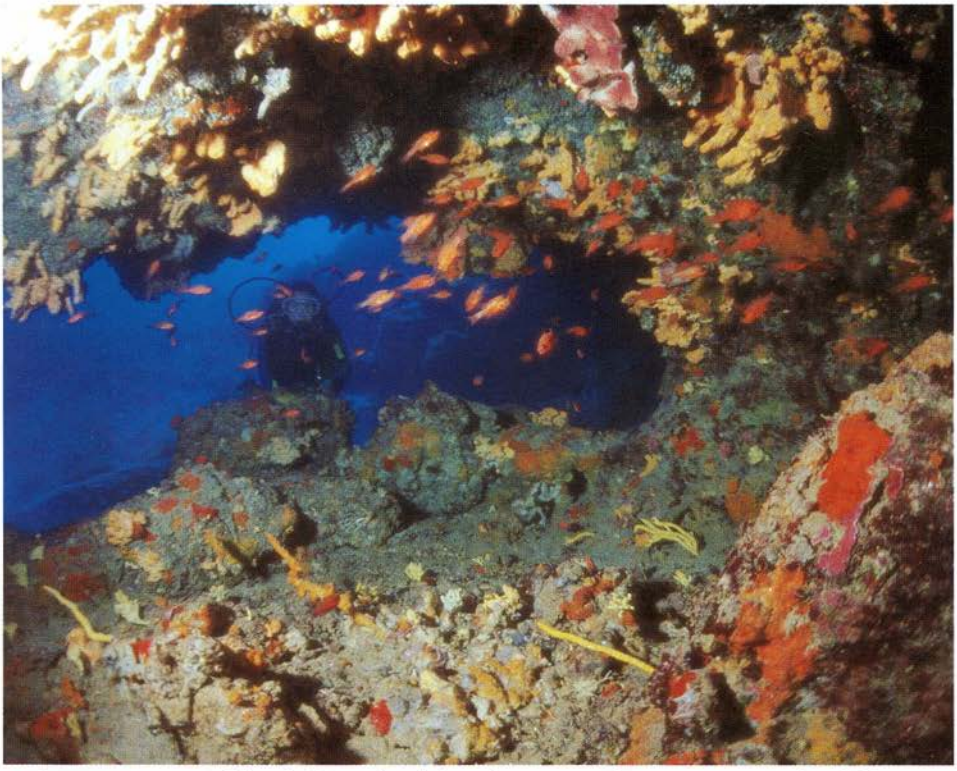
Turkey has already designated certain marine areas for habitat protection and some areas have been declared as special protected areas. All our efforts must be united for marine conservation. Thus, we work in close cooperation with local, national, and international communities.

▲ *Cystoseira* sp. is one of the key species in the Mediterranean ecosystem. *(27)*

▲ Stone weed, *Lithophyllum lichenoides*, found in the Mediterranean islands of Turkey. *(28)*



▲ These same small islands also have mollusc fossils and marvellous stone shapes caused by storms and the influence of waves. *(29)*



▲ Sea caves are suitable a habitats for fish and sponges. These ecosystems should be protected. More than hundred sea caves have been studied recently. *(30)*

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