

Marine Turtles Turkey

Status survey 1988 and recommendations
for conservation and management



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Prepared by
World Wide Fund for Nature



Cover picture: Akyatan beach, one of the major sea turtle nesting beaches
Photograph: Max Kasperek

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1. Summary and Recommendations

In 1988, 2,456 km of Turkish coastline between Kuşadası in the Aegean region and Samandağı close to the Syrian border was surveyed for sea turtle nesting activity. No nesting, or only irregular nesting, is thought to occur in Turkey outside this area. The survey was carried out by repeated ground patrols and track counts. Almost 100% of beaches were covered including those which looked less favourable for turtle nesting.

Turtle nesting occurs on almost all physically suitable beaches from the Dalyan region in the west to the Syrian border in the east. However, the number of nesting turtles and nesting densities varies greatly, and only a small number of beaches hold significant numbers and are most important for the survival of sea turtles in the Mediterranean.

The fact that no significant turtle nesting occurs west of the Dalyan region is not solely for climatic reasons. The lack of suitable nesting beaches is the primary limiting factor.

In Turkey, two species of sea turtles occur: The loggerhead turtle *Caretta caretta* and the green turtle *Chelonia mydas*. Green turtle nesting is more or less confined to a few eastern beaches (Kazanlı, Akyatan, Samandağı). Almost all other turtle nests were made by loggerhead turtles.

13 major nesting beaches have been identified, together with 4 beaches which are of vital importance although they hold smaller numbers of nesting turtles. These are:

The major nesting beaches

Dalyan (no. 416)

This beach has a relatively high number of nesting loggerhead turtles and plays an important role as an outpost at the western edge of the nesting grounds of this species. The Dalyan beach has been protected as a "Mediterranean specially protected area", but the final regulations for protection have not been issued yet. Increasing tourism is still an imminent threat to the turtles there. The Dalyan beach (4.0 km) forms a unit with the nearby beaches of Dalyanağızı (0.2 km; no. 415) and Ekincik (0.4 km; no. 412).

Dalaman (no. 421 - 425)

The Dalaman beach holds even more sea turtles than the Dalyan area. It is completely unprotected. There is no tourist development on most of the beach, except the Sarigerme area which is at the northern end. A solution is urgently needed to the serious pollution of the sea caused by the SEKA papermill. It threatens both turtles and human health. The length of the Dalaman beach excluding the Sarigerme area is 7.2 km.

Fethiye (no. 435 - 437)

The northern side of the Fethiye - Çalış beach provides nesting habitat for an important number of loggerhead turtles. The area was designated a "Mediterranean specially protected area" in 1988. One tourist establishment is already operating. It is not known whether it has affected turtle nesting activity and whether protection measures (light screening etc.) are necessary. The length of the beach is some 4.8 km.

Patara beach (no. 510 - 512)

The beach on both sides of Eşen Çayı is relatively undisturbed and holds important numbers of nesting loggerhead turtles. It is close to tourist centres and there is a threat from tourist development at Gelemiş village. The length of the beach is 11.8 km and no tourist facilities are planned on the beach by the Ministry of Tourism.

Kumluca beach (no. 530 - 536)

This is on the eastern side of the bay of Finike and holds outstanding numbers of loggerhead turtles. Problems are caused mainly by beach huts belonging to local people. The nesting zone of the turtles comprises about half of the bay which is 20.5 km long.

Belek region (no. 630-651)

Between Antalya and Side, there are important sea turtle nesting areas which should be treated as a unit. For the purpose of this report they have been called the "Belek region". There are already many tourist facilities on the beach. The operation of these establishments is not regulated, no envi-

ronmental impact assessment (EIA) has been made and further tourist developments are planned. According to the masterplan for the development of tourism, they will cover the whole beach. At present, beach huts belonging to local people cover an area of considerable size. The total length of the beach is some 30 km.

Kızılot region (no. 666 - 672)

This beach holds extremely high numbers and high nesting densities mainly of *Caretta*, but also of *Chelonia*. Similar to the Belek region, there is no management plan and no EIA has been carried out. Several tourist facilities are either being constructed or already operating. However, no tourist facilities are planned by the Ministry of Tourism. There are no beach huts at present on the beach. The beach is 16.6 km long.

Demirtaş beach (no. 705 - 706)

This beach has become of even greater importance for nesting sea turtles since the loss of nesting grounds near Alanya. The beach lacks any protection. No tourist development is planned by the masterplan. There is evidence that the lights from a camp site and hotel are disorienting mature turtles and hatchlings. The length of the beach is 7.4 km.

Gazipaşa Çiftlik beach (no. 717)

This is a very small beach with an extraordinarily high number of nesting turtles. At present the habitat is not threatened. Some turtle hunting occurs. The length is 2.4 km.

Göksu delta (no. 760 - 763)

Important numbers of sea turtles nest on the western side of the delta. The site is threatened by the growth of a holiday village for local people, by pollution and by sand extraction. The area used for turtle nesting is some 10.5 km long.

Kazanlı (no. 804 - 805)

This is one of the two most important nesting grounds for green turtles. Kazanlı has an extraordinarily high nesting density which is unique to the Mediterranean. A number of factors threaten the turtles there, e.g. pollution of the sea from two factories, photopollution and the diminishing size of the nesting dune. The length of the beach is less than 1 km.

Akyatan (no. 817 - 821)

Together with Kazanlı, this is the most important nesting ground for the green turtle in the Mediterranean. It is completely remote and unaffected by human influences. The National Parks Division at the Ministry of Agriculture, Forestry and Rural Affairs has decided to establish a strict nature reserve. The beach is over 20 km long and turtle nesting occurs on a specific stretch of some 10 km.

Samandağı (no. 910 - 912)

For green turtles, this site is the third most important in Turkey. The area is threatened by tourist development and pollution. The nesting beach is 5.0 km long. As there were great fluctuations in turtle numbers in 1988, it was impossible to determine the exact importance of the beach.

Other important nesting beaches

Apart from these main nesting beaches, there are others which do not hold such large numbers as the main nesting beaches, but which are still of vital importance for sea turtles. These are:

Ekincik (no. 412)

A small bay with a similar nesting density as the nearby Dalyan beach, with which it forms a unit. The beach length is 0.9 km.

Kale beach (no. 521 - 523)

A nesting beach at the lagoon of Kale (near Finike) has significant turtle numbers, although its degree of importance cannot be estimated exactly as the numbers fluctuated greatly in 1988. Its length is 2.2 km.

Tekirova (no. 605)

The beach has extremely high nesting densities. However, the beach length (3.7 km) means that the total number of nesting turtles is not exceptionally high. Turtle nesting has probably already suffered a lot from tourist activities, and it will probably be completely ruined by the "South Antalya tourism development project".

Sea turtles are well distributed over the 12 km long beach with concentrations on both edges (Anamuryum and Pullu). Tourist activities and sand excavations are the main threat to the turtle population.

Turkey has a total coast length of 8,333 km. Turtle nesting occurs in the Aegean and Mediterranean region over a coast length of 2,577 km. Of this, 606 km are beaches. Less than 25% of these beaches provide sea turtle nesting of significance. The main nesting beaches cover 20% of the 606 km. A further 3% has fewer turtles but is still of vital importance. The recommendations show that tourist development does not necessarily have to be prohibited in all areas. However, careful planning is necessary whether and if, where and how to develop these areas.

Recommendations

In addition to revealing that Turkey holds the largest known numbers of *Caretta caretta* and *Chelonia mydas* in the Mediterranean and has 17 particularly important nesting beaches, the survey found that sea turtles in Turkey are under serious threat from tourism, marine pollution, sand and shingle extraction, incidental catch by fishermen, killing, predation of nests, etc. Urgent action needs to be taken to counteract these threats.

WWF recognises that implementation of the recommendations below will be neither easy nor cheap. However, it is essential for the future survival of the sea turtles in Turkey that they will be carried out. WWF is ready and willing to assist the Turkish authorities in this task and to encourage international aid agencies to provide the necessary financial support.

General recommendations

1. To prepare a Coastal Zone Management Plan for the Turkish Aegean and Mediterranean region. With the increasing human pressure on Turkey's coastline, a comprehensive Coastal Zone Management Plan is necessary to ensure that the conservation requirements of sea turtles (and other wildlife) are fully integrated into, and not damaged by, the development of tourism and other activities. This would go considerably beyond the scope of the Master Plan for the Development of Tourism, already in place in Muğla and Antalya provinces, which is limited to tourism and does not require compatibility of tourist development and conservation.
2. To establish a network of nature reserves along the coast to protect the 17 most important sea turtle nesting beaches. Where possible, strict nature reserves should be designated. Where this is not possible because of development already in place, Mediterranean Specially Protected Areas should be designated and, where possible, combined with strict nature reserves to protect the core zones of the nesting beaches.
3. To initiate a programme for long-term monitoring of sea turtle populations and threats to their survival.
4. To avoid artificial lights on nesting beaches since they disorientate turtles, especially hatchlings.
5. To carry out the specific recommendations made for each of the beaches surveyed. These are contained in the individual beach reports in the Annex to this report. First priority should be to implement the recommendations for the 17 most important beaches as soon as possible. In particular:
 - to prepare management plans for the Mediterranean Specially Protected Areas Dalyan and Fethiye.
 - to restore nesting areas at Kazanlı and Kızılot;
 - to establish sewage treatment plants for the paper mills of Dalaman and Taşucu and for the soda and chrome factories at Kazanlı.

Tourism and other development activities

1. To carry out environmental impact assessments for all development projects likely to have a significant adverse impact on sea turtles.
2. To establish guidelines for environmental impact assessments for development projects in the coastal region.
3. To ensure tourism is only developed in accordance with the Master Plan and that illegal

development is penalised.

4. To develop high quality tourism within the "Specially Protected Areas", making turtles and other wildlife a feature to be enjoyed but not disturbed.
5. To prohibit extraction of sand and shingle from important sea turtle nesting areas and to develop concepts for each coastal province how to satisfy the demand for sand and shingle.

Marine pollution

1. To control and limit the discharge of sewage into the sea from industry (e.g. factories) and human settlements along the coast.
2. To control and limit the flow of agrochemicals into the sea through rivers and drainage canals.

Exploitation of turtles

1. To prohibit the killing of sea turtles everywhere in Turkey. The best method may be an addition to the law on water products (Su Ürünleri Kanunu).
2. To prohibit the sale, purchase, offer for sale or purchase, or display for commercial purposes of sea turtles or sea turtle parts or products. This would bring Turkish law into line with current legislation in the European Community.

Fishing

1. To extend the four mile zone in which shrimp trawling is prohibited to the coast to the east of the Göksu delta.
2. To introduce the "Sea Turtle Excluder Device", used by shrimp trawlers in the United States, on an experimental basis.

2. Introduction

2.1 Origin of the study

The Aegean and Mediterranean coastline of Turkey is of outstanding beauty and inhabited by a unique fauna and flora and holds archeological sites of high national and international reputation. This combination of various natural and cultural resources provides the basis for a prosperous regional economy. The coastline is used for recreation and tourism, suitable lands are exploited for agriculture, flat coastal plains are occupied by industry and the sea and some lagoons support a local fishery. Uncontrolled developments are increasingly threatening the sustainable use of these resources. Expanding tourist, industrial and urban developments destroy unique natural sites and pollute marine and terrestrial water resources on which the local economy and the well-being of people depends. Rare and endangered species are disappearing or are threatened such as marine turtles or monk seals. This conflict between development and conservation/rational use of natural resources calls for re-consideration of the current development process and for integrating ecological considerations into all development plans.

Scientists, conservationists and conservation organisations, in particular the Society for the Protection of Wildlife and the World Wide Fund for Nature, expressed their concern about these developments. A major national, public awareness campaign highlighted the degradation of the country's coastal resources and called for action. The Turkish Government realized the need for new land-use strategies and took several initiatives in 1987 and 1988 to achieve better conservation of coastal resources. A major tourism project was cancelled in the Dalyan area. To safe-guard a nesting beach for marine turtles and an adjacent wetlands, several coastal areas including Dalyan, were proclaimed specially protected areas.

A survey of nesting beaches for marine turtles was considered as another essential requirement to avoid conflicts between conservation and development. It is obvious that such a survey cannot replace a comprehensive coastal management plan which is urgently required for the Turkish coastline. However, the results of such a survey can be considered as an essential first step to prevent destruction and help protect important natural habitats along the coast and re-direct harmful development.

2.2 Objectives of the study

- survey marine turtle nesting beaches along the Mediterranean coast of Turkey and collect information on:
distribution of nesting sites, status and trends of marine turtle populations and their nesting habitats, threats to nesting areas and marine turtle populations, in particular, in relation to existing and planned coastal developments.
- identify priorities for marine turtle conservation and formulate recommendations for their implementation.

2.3 Methods

The greatest problem was the size of the study area: it extends over 2,456 km coastline, 64% of it in the Mediterranean region, 36% in the Aegean region. It was not known before the survey how much of this coast provides possible turtle nesting habitats and due to the lack of modern large-scale maps (which either do not exist or are forbidden for military reasons), neither the location of many beaches was known, nor the access to them. Considerable efforts had to be made to identify possible nesting beaches and to find ways to them. This often took much more time and much more effort than counting sea turtles or their tracks. Altogether, beaches with a total length of 606 kilometer were surveyed. They include almost all the beaches between Kuşadası and the Syrian border. Only a very few small beaches in small bays were not visited. These contribute less than 5% to the total beach length. Results from other small bays surveyed show that no important nesting is likely there. Thus, one can speak of almost 100% coverage.

The field work extended over three months: A first survey was carried out in June 1988 in order to identify all possible nesting beaches and to count the tracks of sea turtles there. In a second survey in July, all beaches which had already been identified as important nesting grounds were visited again and the turtle tracks were counted once more. A third count in August covered all beaches where any sea turtle tracks had been found before. The primary task of this survey was to collect information on hatchlings. In addition to this general pattern, some important nesting beaches were

visited more than three times. Some areas were visited very frequently, especially the Kazanlı beach where a team stayed for a total of 51 days. The direct observation of sea turtles was not an important task for the project executives. However, some night observations were made to create a databank of measurements of sea turtle tracks. Such data were used for the development of a method to identify sea turtles by means of their tracks. In the course of these night observations, 23 green turtles and 19 loggerhead turtles were observed and tagged. Monel tags of the U.S. National Band and Tag Co. with the inscription "Ege University, Izmir, Turkey" and a number consisting of 4 digits were used.

The survey method was simply to walk along the beach and count turtle tracks. For each track, information on the type of track (false crawl? successful egg-laying?), size (species identification!), form, distance from the sea etc. was registered. These counts were made in day time. Exact numbers of sea turtles cannot be calculated from this method, but this was not the aim of the present study anyway. The method used was the only way of covering such a large study area and identifying all nesting beaches (see also below). During the field survey 3-4 groups worked simultaneously. Each group consisted of about 4 people and was equipped with a vehicle and a rubber boat with outboard motor.

Population censusing is a valuable tool for conservationists: The knowledge of population size and population development is essential for conservation measurements. Sea turtles are particularly difficult to census. After they have hatched from the eggs and left for the sea, they remain there for their whole life. During the first year, they are virtually out of human sight, a phenomenon that has been called the lost year (cf. Erhart 1982). After that, the possibility for counting them does not improve greatly. At present, we do not have a method available which would enable us to estimate the number of sea turtles at sea. Therefore, the only way for a population census is through censusing the females which come ashore to lay their eggs.

Regular ground patrols with 1-day intervals are the best way to estimate the population size of the arriving females. Additional night observations combined with a tagging programme can determine the proportion of sea turtles which emerge from the sea more than once per season (multiple nesting, false crawls). This method, however, needs considerable efforts even if the beach is only a few kilometers long and is not suitable for larger areas.

Counting the tracks of adult female sea turtles coming ashore for egg-laying at longer intervals seem to be the only possibility for surveying a large area. This method even has many advantages over aerial surveys, which have sometimes been applied to turtle population estimates.

Nevertheless, we have to consider that

- the visibility of a track greatly depends on the texture of the beach. A track is easily visible in wet sand but hardly visible in dry coarse gravel.
- the visibility of a turtle track depends on the time of day. This is especially important for partly obliterated, older tracks. The morning and evening sun makes shadows which makes the tracks easier to see even from greater distances. At noon, a careful close examination is often required.
- the longevity of the turtle track depends greatly on the type of beach, e.g. on its substrate, width, human (and other) use, and even on the climate of the region. Loose sand does not preserve a turtle track for a long time, even a light breeze will obliterate the tracks here. In contrast to that, gravel preserves the track for a long time. Turtles usually walk on a wide beach for a longer way than on a narrow one and a long track has a better chance to be seen (and not to be obliterated) than a short one. A beach which is heavily used during daytime, for example, by tourists will hardly have any tracks visible in the evening, whereas a remote beach still has. Also, wind obliterates turtle tracks and the longevity of a track thus depends on the climate. In regions with a lot of wind (sea winds, evening winds, afternoon breeze, etc.) tracks will be obliterated more rapidly than in others without regular winds.
- the number of tracks does not necessarily reflect the number of turtles. It might even happen that a great number of tracks means a low number of turtles: If there is disturbance on the beach, sea turtles will make more attempts to find a nesting site than under favourable conditions.
- it cannot be decided with any certainty from a turtle track whether the emergence has resulted in successful clutch laying or not, assuming that one does not make excavations at the likely nest site. In our survey, we therefore used three types of classification: no nest (no signs that the turtle has dug, i.e. U-turn, false crawl), perhaps with nest and probably with nest.

One problem still cannot be solved: In natural populations the number of female turtles emerging from the sea for egg-laying varies greatly from year to year. These oscillations can be responsible for the fact that the number of nests are e.g. 5- or 6-fold in a certain year compared to the preceding year or the numbers drop in the following year. Meylan (1982) in an overview of census

methods therefore concludes that "...whatever the censusing method employed, estimation of seasonal nesting totals should be based on data from more than one season" (Meylan 1982: 136).

For all these reasons, the data obtained in the 1988 survey cannot be used for a population estimate. We do not know whether 1988 was a "typical" turtle year, a year with modest numbers or a peak year. Neither can the results of the 1988 survey be used for an estimate of the number of nests in the 1988 season or the number of females which laid eggs in 1988. The results we obtained in our survey allow, to a certain degree, a comparison of the beaches with each other. But even here, the inaccuracy is rather high and one should not overstress slight differences in nesting densities etc. between any beaches. It was the aim of the study to identify the nesting grounds of sea turtles along the Turkish coasts and to select those rookeries which are essential for the conservation of sea turtles in Turkey. For *this* aim, the methods applied were powerful and adequate and we can be sure that no rookery of importance was overlooked. Our results give the basis for further study on the population size and conservation measures required for Turkish sea turtles.

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3. Marine Turtles in Turkey

3.1 General considerations

3.1.1 The biology of marine turtles

In Turkey, two out of the world's seven species of sea turtle occur: the loggerhead turtle *Caretta caretta* and the green turtle *Chelonia mydas*. Their biology is relatively similar so the review of their natural history below refers to both species. Non-nesting leatherback turtles *Dermochelys coriacea* apparently occur irregularly. There is only one record of a specimen which was caught by fishermen and brought to the harbour of Antalya in 1985 (Atatür, pers. comm.).

Sea turtles are marine animals which, under normal circumstances, do not leave the sea. They do not enter freshwater e.g. by river mouths or brackish water lagoons. Apart from a very few sightings of sea turtles emerging from the sea to sunbathe, the only occasion when turtles leave the sea is the egg-laying period. The females usually emerge for less than 1-2 hours at night to lay their eggs in the sand at a favourable nesting ground. Males stay at sea.

Sea turtles mate in coastal waters during the day, sometimes in some distance to the nesting beach. The eggs develop within a few days of mating (Geldiay 1978-1987 and own observations). For example, the bay of Yurmurtalık on the Turkish Çukurova coast is frequently used for mating. The animals seem to belong to a population which has its breeding grounds some 50 kilometers away. Or, the population of Dalyan apparently also use the bay where the beach is situated as a mating ground.

When the females emerge from the sea, they are looking for a favourable site on which to lay their eggs. They frequently start digging a nest, but give up without depositing their eggs. This may be because the site is not favourable. However, it seems that there are more reasons for the high proportion of false crawls. It may be that digging is needed as stimulation for egg-laying.

Thus not every emergence from the sea ends in successful egg-laying. The percentage of "false crawls" ("U-turns") is dependent on the beaches: Our observations show that beaches with many unfavourable zones and with a high human pressure generally have a high proportion of false crawls.

Sea turtles prefer sandy beaches and avoid muddy, slimy ones. The sand may be intermixed with pebbles, but very coarse grained gravel is avoided. Thus turtles are not very selective with regard to the texture of the substrate. However, the slope of the beach from the sea should not be too steep, and neither should it be too flat. Flat beaches consist of compact sand as they are frequently flooded during winter and they do not provide a proper micro-climate below the surface: Humidity, where the eggs are deposited 40-50 cm deep, is too high.

Adult female sea turtles are, in general, very sensitive to light. Our own observations confirm that moving lights (such as the headlights of a car or torches) disturb turtles more than non-moving ones (from houses etc.). Turtles react against lights either by returning to the sea or by approaching the light. The latter is mostly observed when the light is strong and the turtle has been dazzled (also flashes!). Only during the egg-laying process does the turtle not show reactions to light or any other modest disturbance.

In the tropics, the egg-laying season extends over the whole year (cf. e.g. Mortimer 1984 for the Seychelles). In the Mediterranean, however, it is confined from the end of May to mid August (Geldiay 1978-1987 and own observations). Some females lay up to three clutches a year.

The females lay about 100 round ping-pong ball-size eggs in a pit which is about 0.5 m beneath the surface of the sand. The nest hole is filled in by the turtle after egg-laying. The temperature of the clutch is essential both for survival and for determining the sex of the young turtles (cf. Mrosovsky & Yntema 1982). Temperature fluctuations, e.g. by the time of day, are much reduced below the surface of the sand and do not vary greatly. Opening up a turtle nest can have disastrous effects, even if it does not damage the eggs. A change in the sex ratio of baby turtles can affect a population almost as much as, for example, killing them.

A reasonably high portion of nests are preyed upon by foxes, jackals, wild boars etc. Mankind has added feral dogs to the list of predators. These predators have a considerable effect on turtle populations in some areas and exceed the level which can be compensated for under natural conditions (own observations). Ghost Crabs *Ocypode cursor* are frequently found at previously destroyed nests. They cannot open or devour eggs, but they can consume already damaged eggs and they frequently burrow into nests (Stancyk 1982).

The period of incubation by the sun lasts 55-65 days (Erhart 1982). After then, the young hatch

more or less simultaneously, generally within 2-3 days (own observations). The young wait underground until night and then dig their way to the surface. Under the sun, they would quickly die because the freshly hatched young would desiccate on the extremely hot temperatures of the sand (temperatures of 50°C are not unusual). After the hatchlings have reached the surface, they immediately head towards the sea. They use the wavy line of the sea for orientation. In a natural environment, this is the brightest point in the night where the moonlight is reflected. If there is anything which is brighter than the waves, that is taken as a target - whatever it is, whether it is the headlights of a car, the lights of a house, a restaurant or, as our observations at Kazanlı have shown, even glimmering limestones. This fact gives rise to the requirements of an environment which is not "photopolluted", that means an environment which is not disturbed by artificial lights.

When heading from the nest to the sea, the turtle hatchlings are imprinted by the beach, i.e. they "learn" their place of birth. This process is essential for turtles, as they thus "learn" to find their future nesting beaches after reaching maturity. It is not desirable, therefore, to carry turtle hatchlings from the beach to the sea. They should be allowed to find their way alone, without human assistance.

There are no reliable results on maturity and the maximum age of sea turtles. It is assumed, however, that the earliest maturity reached is after 6-8 years, mostly after 15-20 years, and that fertility lasts 25-35 years. Thus sea turtles presumably reach an age of 30-50 years.

Female sea turtles do not lay eggs every year. The internesting period of Mediterranean sea turtles is not known. In general, an interval of 2 to 3 years is accepted (Ehrhart 1982). These intervals are the reason for the number of egg-laying sea turtles varying considerably in a certain area from year to year. They are why a one-year survey cannot be used to calculate the population size: One cannot understand whether the year of the survey was a "good" or a "bad" turtle year. The number of laying females may be exceeded in the following year several times, or it can also be several times smaller.

Within a season, a female nests a few times. Up to 11 clutches per year have been observed, but a frequency of 1-3 clutches per year is more likely. Nesting intervals in a season vary from 9 to 15 days.

3.1.2 Marine turtles in the Mediterranean

Both loggerhead turtles and green turtles are threatened on a global basis. The IUCN Red Data Book recognizes the green turtle as "endangered" and the loggerhead turtle as "vulnerable". Both suffer a lot from the loss of breeding grounds, killing for food, curios, horn etc., incidental capture in fishing trawls, and other reasons. In the Mediterranean, the Turkish population of both species is by far the largest.

The following review of distribution in the Mediterranean is based mainly on Groombridge (1982, 1987) and Honegger (1981) and refers to nesting grounds rather than to inter-nesting distribution.

Albania: No nesting is known.

Algeria: No nesting is known.

Cyprus: A recent survey of Northern Cyprus in 1988 (Groombridge, see WWF 1989) showed that turtle nesting occurred on 43 out of a total of 60 beaches, but the numbers were low to moderate. Both species occur, *Caretta* exceeding *Chelonia* somewhat in number. For southern Cyprus, a population of around 300 mature loggerheads and around 100 mature green turtles is estimated. A hatchery exists on the Lara beach.

Egypt: No nesting is known.

France: No nesting is known.

Gibraltar: No nesting is known.

Greece: Six main areas are known: on Cephalonia, Zakynthos, the western and south-eastern Peloponnes, on southern Crete and on Rhodes. Population sizes are uncertain. However, in 1983 2460 nests were recorded on Zakynthos, suggesting some 900 females. On Cephalonia, around 150 nests were recorded in 1984. All nesting refers to *Caretta*. Numbers are decreasing because of the loss of nesting habitats. Kinzelbach (pers. comm.) estimates the population on the south-eastern Peloponnes to be at least 100 mature individuals.

Israel: Very few *Chelonia* are left from a population which was once very large.

Italy: *Caretta* nesting is known, or suspected, on the southern part of the mainland, Sardinia, Sicily, and on Lampedusa. However, nesting is not regular and numbers are insignificant.

Lebanon: No nesting is known.

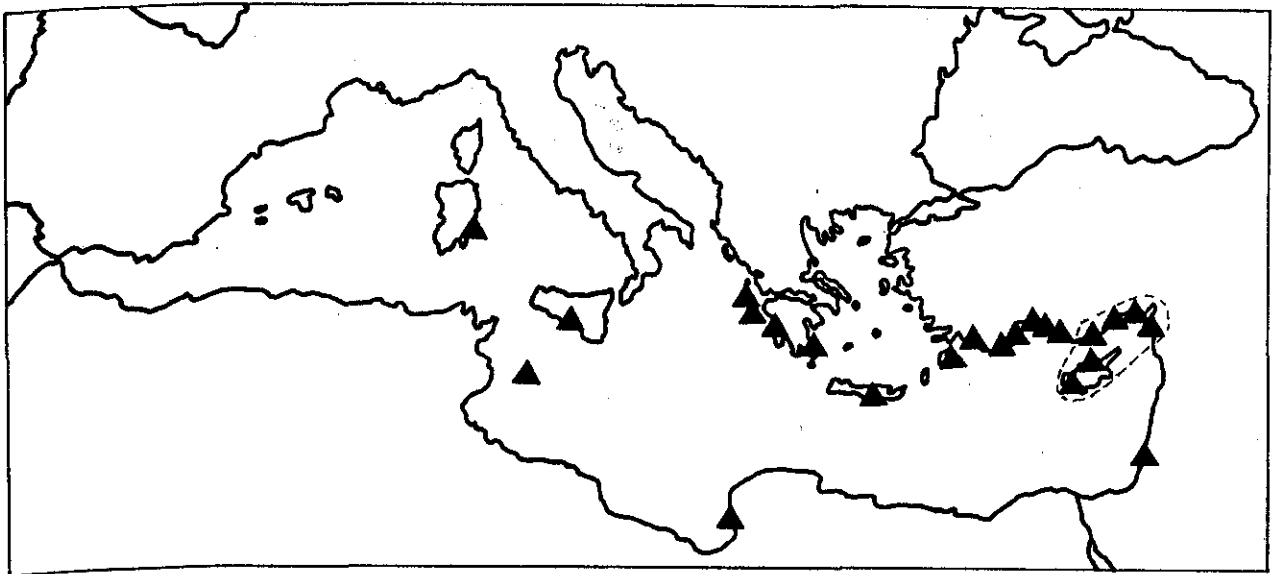


Fig. Distribution of the sea turtle nesting areas in the Mediterranean. The main nesting grounds of the green turtles are indicated by a broken line, all other nesting sites belong predominantly to the loggerhead turtle. The triangles show all nesting sites irrespective of how many individuals use the site. Turkey holds by far the largest populations of both species in the Mediterranean.

Libya: Nesting is known only from one site (Kouf national park in Cyrenaika), where 60-65 nests are recorded per season (cf. Schleich 1987).

Malta: No nesting is known.

Marocco: No nesting is known.

Spain: No nesting is known.

Syria: No nesting is known.

Tunisia: No nesting is known.

Yugoslavia: No nesting is known.

Our knowledge on turtle distribution and numbers is thus still very poor. For example, only a few points on the coastline of North Africa have been surveyed. Much has still to be done and "new" populations might still be discovered. According to present knowledge, however, Turkey holds by far the largest populations of both *Caretta* and *Chelonia* in the Mediterranean, and therefore a great responsibility for the conservation of these species.

3.2 Previous studies

Some basic information was collected by Geldiay and co-workers in the years 1978-1982 with the support of the World Wide Fund for Nature (WWF), the International Union for the Conservation of Nature (IUCN) and the Turkish Scientific Research Council (TÜBİTAK). Geldiay had surveyed a few beaches but it was not clear before the 1988 survey, whether these beaches were still used by nesting sea turtles or whether they had been obstructed by buildings. It was also not clear, whether these beaches represented a small sample of the Turkish population or were the most important nesting beaches. A figure of "2,000 km of sandy beaches" on the Turkish Mediterranean coast has been frequently cited in the literature (in reality the total length of the Turkish Mediterranean coast is only 1,577 km and the length of the "sandy beaches" is only 481 km!) opened the door for many speculations. Unfortunately, Geldiay's working methods are not documented. Therefore, the nesting densities recorded by him have only a limited value and cannot be used for comparison with the results of this survey. A new survey was therefore essential for any further conservation work.

The 1988 survey was the first and, so far, the only comprehensive coastal survey in Turkey. Hence, no data are available for comparison with former figures. No estimation can be given of trends in Turkish sea turtle populations, only some fragmentary data.

- In the Çukurova region, up to 10-15,000 sea turtles were captured per year in the 1950s and 1960s (Hathaway 1972, Sella 1982). As the 1988 track counts show, the total population of adults is much

smaller now than these figures.

- In 1980, Geldiay tagged 15 sea turtles at Kazanlı in two nights (Geldiay & Koray 1982). Although this is now one of the best turtle areas in Turkey, only 1-5 sea turtles were seen and tagged there per night in 1988.
- Geldiay worked in 1979-82 on the beach to the east of Alanya. Although the beach is still physically suitable for sea turtle nesting, hardly any turtles lay their eggs on the beach nowadays, probably because of tourist development.
- the area to the south of Antalya was reported by many local people as a turtle nesting area (and also by Geldiay). Nowadays, turtle nesting is virtually confined to the Tekirova beach.

These data give some indication of the decline of the Turkish turtle population.

3.3 The distribution area

Sea turtle nesting was known to occur in several localities on the Turkish Mediterranean and Aegean coast long before this survey. As a result of the climate (hot, rainy summers) and the absence of nesting habitats (mostly steep coast, with only few sandy bays and longer sandy beaches only in the deltas of the rivers Kızılırmak and Yeşilirmak) sea turtle nesting does not occur in the Black Sea region. Nesting in the sea of Marmara cannot be ruled out, but has never been proved. Only in the Koca Çay delta (Bursa prov.) is there a reliable report from a local fisherman (Kasparek). However, even if nesting occurs, it seems to be irregular and in small numbers. The same is true for the greater part of the Aegean region. Regular nesting is confined to the Dalyan/Ekincik beaches. 75 beaches or sections of beaches were surveyed in the Aegean region in 1988. Most proved to be unsuitable for turtle nesting: Small, narrow beaches with a hard foundation (gravel). The few sandy beaches are not very long and are mostly covered with tourist facilities (Kuşadası, Altınkum). Even the large delta of the Büyük Menderes River does not provide favourable nesting grounds, either: its shores are generally too muddy. In the Aegean region, only the beaches of Datça, Ekincik and Dalyan provide nesting beaches of sufficient length. Whereas nesting in Dalyan and Ekincik is well-known and well-documented, the beach to the east of Datça is not used by nesting turtles or only very irregularly and in small numbers (in 1988, some false crawls were found).

Dalyan - Ekincik is the westernmost outpost of the distribution range. The area has a strong population of loggerhead turtles and it is particularly important to protect this population at the edge of its range. It may serve as a "bridge" to the populations in Greece.

In the Mediterranean region to the east of Dalyan - Ekincik, sea turtle nesting occurs on almost all beaches with suitable texture, sufficient width and low (or no) human pressure. Nesting densities, however, vary greatly. Several beaches hold significant numbers of sea turtles and are most important for the species' survival.

Three main nesting grounds are used by green turtles: Kazanlı, Akyatan and Samandağı. All other nesting beaches are used primarily by loggerhead turtles.

3.4 Processes affecting status and distribution of marine turtles in Turkey

3.4.1 Climate

The Turkish Mediterranean and Aegean coasts are dominated by pure Mediterranean climate: The summers are hot and have hardly any precipitation. The winters are warm, but with high precipitation. That means that almost all the precipitation is concentrated in the winter months. Heavy winter rainfalls characterize the coastal zone. In summer, temperatures rise often to 30-35°C and sometimes even above 40°C. The warmest months are July to August. The temperatures are still high in the first half of September, but decrease quickly after then.

Geldiay, Koray & Balık (1982) and Geldiay (1987) have claimed that the unequal distribution of the loggerhead turtle and the green turtle in Turkey is dependent on the temperature: The green turtle occurs only in the warmer eastern parts of the Turkish Mediterranean sea, whereas the loggerhead turtle is more tolerant to colder sea-water and therefore extends further west.

However, the temperature of the sea-water is probably not the limiting factor. It varies greatly during the season and is rather low during winter anyhow, without any visible effect on green turtles. What seems to be more crucial is the temperature of the air. The level of the temperature and the duration of high temperatures are directly responsible for the success of the eggs which are incubated by the sun. A high temperature during the nesting season is of vital importance for the

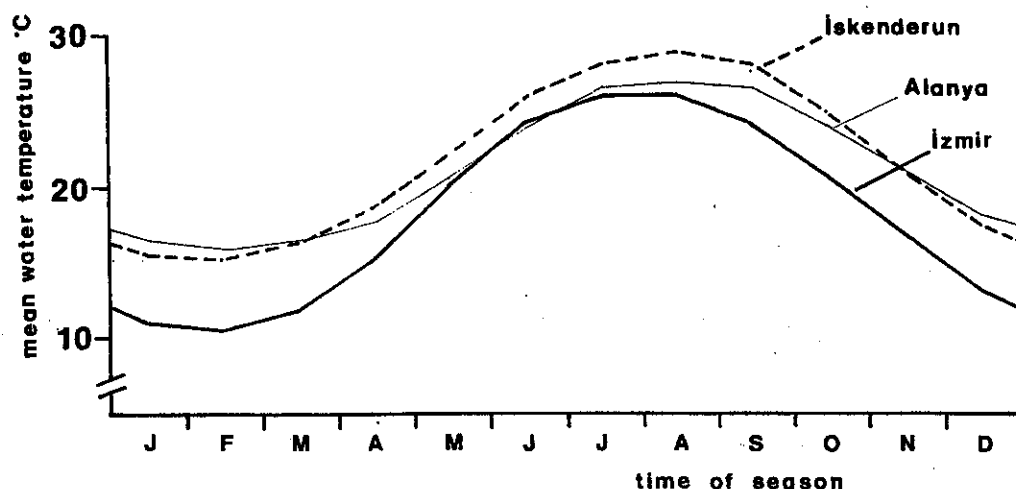


Fig. Seasonal change of the mean temperature of the sea at three stations along the Turkish Mediterranean and Aegean coast.

	mean July temp.	annual mean temp.	duration of mean temp. above 20°C in months	annual precipitation
Izmir	27.6	17.6	4.6	700.2
Kuşadası	26.0	16.6	4.1	673.0
Bodrum	28.0	19.0	5.1	772.9
Fethiye	27.9	18.8	5.2	993.5
Antalya	28.2	18.7	5.1	1068.2
Anamur	27.0	19.5	5.7	1001.0
Silifke	27.8	19.0	5.3	636.4
Adana	27.6	18.7	5.6	646.8
Iskenderun	28.0	20.2	6.1	785.4

Tab.: Some climatic parameters of nine locations along the coast between İzmir and Iskenderun.

survival of the clutches.

The mean temperature in July does not show a gradient on an east - west axis, e.g. in İzmir it is 27.6°C, in Iskenderun it is 28.0°C. All other values are in the same range (cf. table). The annual mean temperature is more or less the same, although it is considerably (almost 2°C) lower at İzmir and Kuşadası. Two of the reasons for this are lower temperatures in winter and a shorter hot season: The time, when the monthly mean temperature exceeds 20°C is almost one month shorter in İzmir and Kuşadası than at the other locations. Bodrum's climate is similar to that of the Mediterranean sites, for example Antalya. The northern Aegean region (İzmir, Kuşadası) has equal summer temperatures, but the summer is considerably shorter. There is thus a leap in the climatic parameters somewhere on the way from Bodrum to Kuşadası. The climate does not change gradually from east to west.

The climate thus does not explain the different distribution patterns of the loggerhead and the green turtle in Turkey. Neither does it explain the western boundary of the nesting range of the loggerhead turtle: The climatic leap is further west than the edge of the nesting range.

3.4.2 Tourist development

Beach tourism has a long tradition in Turkey. Turks living in the inner parts of the country prefer to stay at the somewhat cooler seaside during the hot summer months. The simplest and oldest type of beach constructions are huts put together with wood, reed mats and plastic. They are often used by people who live not far away from the beach in a nearby village or town. Real communities

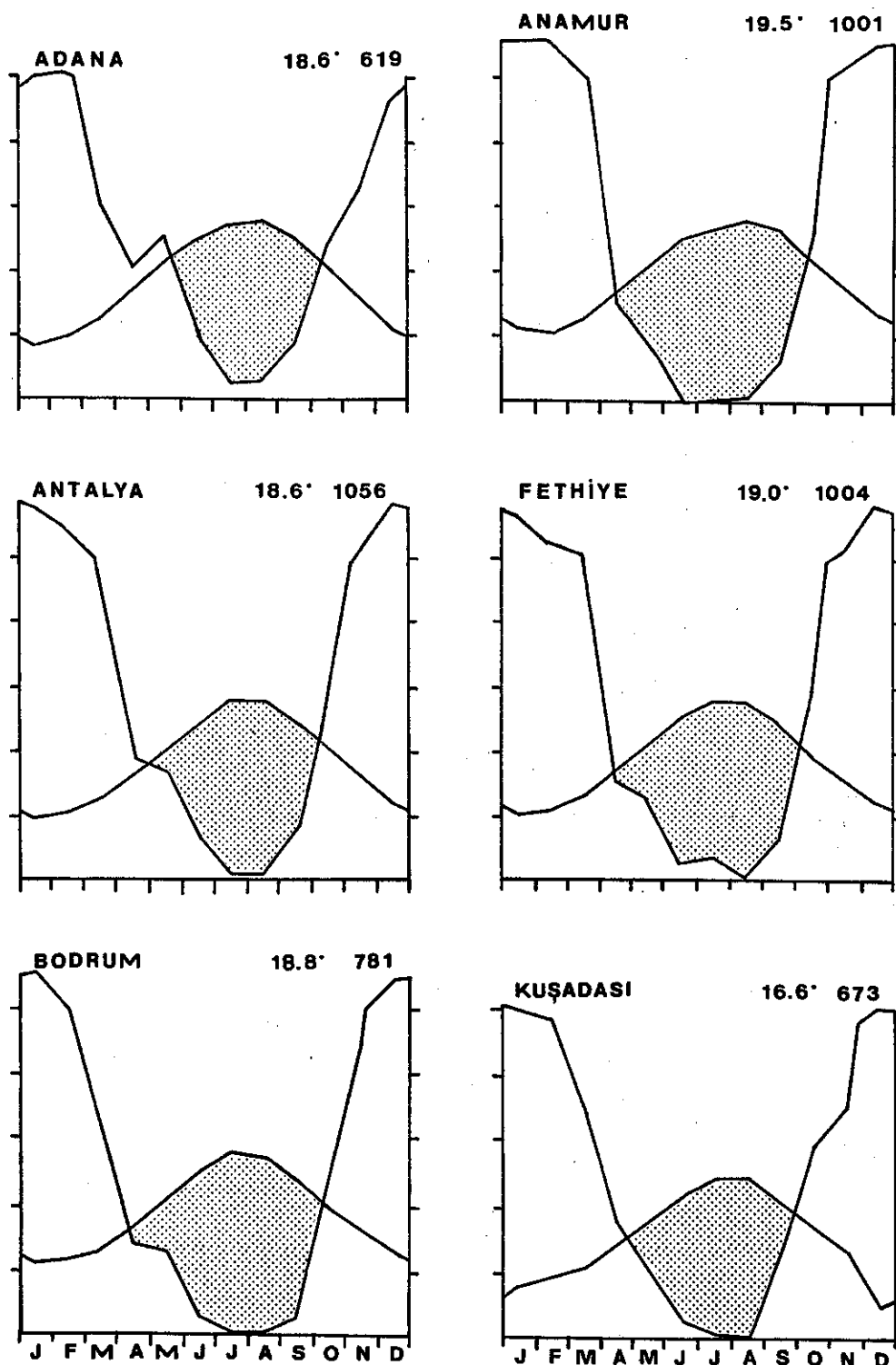


Fig. Climate diagrams of six stations along the Turkish Mediterranean and Aegean coast. The left ordinate shows the mean temperature, the right ordinate the mean precipitation. The annual mean temperature and the annual mean precipitation are added after each station name.

have thus often developed on the beach, sometimes well-equipped with electricity etc. Most of the inhabitants come in the second half of July and leave again in early September.

One step up from the system of beach huts are the cooperatives where people join together to buy ground at the seaside and construct summer houses, all in the same style. The people living there for the summer months usually come from further afield, e.g. from big towns like Istanbul, Ankara or İzmir. The houses are stable constructions, and the ground belongs to owners of the houses.

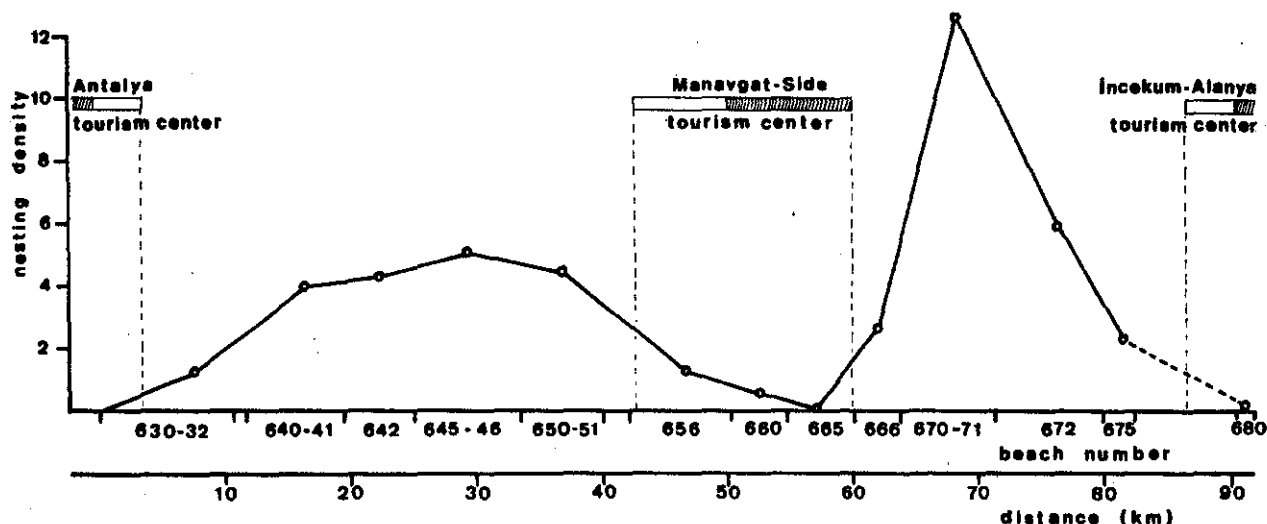


Fig. Nesting density of sea turtles between Antalya and Alanya, based on counts between 18-26.7.1988. The upper abscissa shows the beach ID-numbers (cf. the beach inventory), the lower abscissa the beach length expressed as distance from Antalya. For the calculation of the nesting density, all turtle tracks were used which were not definitively false crawls. The figure shows also the position of the main tourist centres.

As the beach huts of local people are built on public ground, they can be removed when necessary, for example when the place is needed for hotel construction. Dalyan is an example of the successful-removal of wooden beach huts, first for a hotel, then for turtle protection.

The cooperative houses take up much more land. The houses of relatively few people cover a relatively large area. The cooperative villages are common especially in the Aegean (and Marmara) region and are also found, but less commonly, in the Mediterranean region. In the Aegean, this type of housing covers most of the bays and beaches, or at least the ground has been sold to cooperatives. Tourism planners complain that they often cannot find proper land for hotels and tourist holiday villages, because the whole area is covered by cooperative housing.

The destruction of nesting habitats through tourist development has become the main threat to the sea turtle populations of Turkey. A tourist boom began in Turkey in 1983 and is still under-way. The number of foreign visitors to Turkey is increasing at up to 32% per year and has reached 4.2 millions of people in 1988 (see table*). This is however still only 2.1% of all the visitors to the Mediterranean. As a consequence of the tourist boom, the bed capacity was enlarged considerably, even to a greater degree than the number of tourists. Many efforts are being made to further increase the tourism which has become an important factor in the national income of Turkey. For 1988, the income from tourism was estimated to be 1,700 million U.S. dollars. Another source estimates 2,600 million U.S. dollars (cf. table). Over 450 foreign tour operators had Turkey in their brochures in 1985.

The state-owned tourism bank, founded in the 1950s, plays a key position in the development of tourism. In 1984, it gave credits of over 18.5 billions TL, in 1985 18.1 billions TL and in 1986 about 75 billions TL. With the selection of certain investment areas (divided into three categories) which influence the level and type of a possible credit, the tourism bank directly influences the regional distribution of tourist establishments. In 1986, 43.9% of all credits were given to the Mediterranean region, 38.6% to the Aegean region and 11.8% to the Marmara region.

In its efforts to increase and guide tourism in Turkey, the tourism bank has prepared and published maps in 1986 which show the tourist investment areas of southwest Turkey, i.e. the provinces of Muğla and Antalya. These maps are usually known as the "masterplans for the development of tourism". This plan simply designates almost all beaches between Bodrum and Gazipaşa as investment areas which are suitable for the construction of tourist facilities and which are not protected, e.g. as archeological sites. For example, almost every bay of the Aegean region and the 70 km long sandy beach between Antalya and Manavgat has been designated as a tourist investment area. It seems that the planners have tried to show the physical possibilities, i.e. how much tourism can be

*) All figures on tourism in this chapter were extracted from the Statistical Yearbook of Turkey and newspaper archives, mainly the newspapers "Cumhuriyet" and "Newspot". Different sources often yielded different figures. We tried to select the most reliable to demonstrate the general tendencies rather than to analyze tourism.

established in the landscape physically, rather than taking the social, ecological and nature conservation aspects into account, on which well planned modern tourism depends. It is obvious, that implementation of these plans would lead to the destruction of outstanding natural resources which constitute the main tourist attraction in Turkey. A masterplan for the development of tourism for the provinces İçel (Mersin), Adana and Hatay (Antakya) is not available.

It should be emphasized that the masterplan covers only those tourist facilities which are installed under the auspices of the Ministry of Tourism and which use credits from the tourism bank. Many small projects are working outside this framework. There are many private plots where pensions and small hotels are constructed without public funds. Illegal constructions are also frequent. All this leads to uncoordinated development and destruction of important ecological and economic assets.

year	foreigners visiting Turkey	increase in % according to the preceding year
1980	1,057	
1981	1,158	+ 9.5
1982	1,148	- 0.8
1983	1,506	+31.2
1984	1,855	+23.2
1985	2,190	+18.1
1986	2,388	+ 9.0
1987	2,865	+19.9
1988	4,200	+46.5

year	bed number	increase in %	income from tourism (in Mio. U.S. dollar)
1983	65,934		411
1984	68,266	+ 3.5	548
1985	85,995	+ 25.9	1094
1986	95,055	+ 10.5	954
1987	152,549	+ 60.5	1,259
1988	218,925	+ 43.5	1,700

Foreign investment in the tourism sector of Turkey has played a significant role since the 1950s, when the first project was carried out (Hilton hotel in Istanbul). Turkish-foreign joint ventures (regulated by law no. 6224) have become increasingly important in recent years, but are still relatively rare. 26 joint venture projects costing 529,000 millions TL were licensed in 1987. The bulk of the foreign investors are German and British. In 1988, German companies were involved in 10 projects in Alanya and İncekum near Alanya, in Side, Tekirova, Fethiye, Bodrum, Çeşme and in three places in İzmir. 45,000 new beds are planned with foreign capital by 1990.

Four areas are regarded as main investment areas: Dalyan-Köyceğiz, Antalya-South, Side-Mağnavat and Alanya-İncekum.

Dalyan - Köyceğiz investment area

The master plan for the development of tourism had foreseen a tourist development of the Köyceğiz Lake including the beaches of İztuzu and Ekincik. A rough overview revealed the following tourist projects:

- İztuzu project with approx. 2,000 beds (hotel with 640 beds, bungalows with 400 beds and holiday village with 1,000 beds).
- Dalyan Ağzı Project with 550 beds
- Ekincik Project with 3,400 beds
- Marina hotel at Sülüngür Lake with 5,000 beds
- Hotel at Küçük Karaağaç with 500 beds
- thermal springs' hotel at Sultaniye with 1,500 beds.

These plans which comprise almost 13,000 beds were supplemented by a number of smaller projects mainly within Köyceğiz and Dalyan itself.

After the long-lasting discussions on the tourist development of the region and its ecological impact including the sea turtles of Dalyan - İztuzu beach, any further development was stopped for

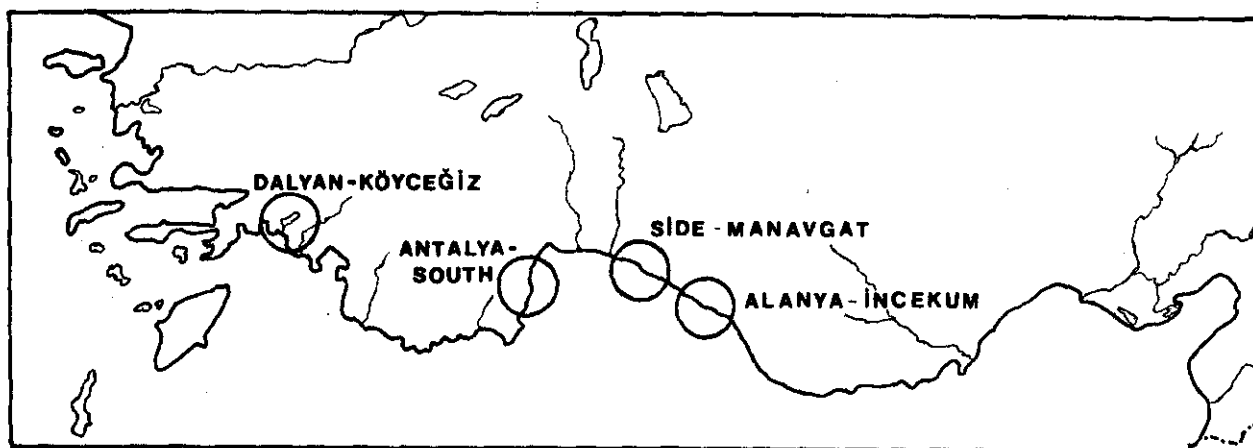


Fig. The four main investment areas which have been selected by the Ministry for Tourism.

the time being. Construction work is only going on at Sultaniye and within Dalyan. The area has become protected as a "Mediterranean specially protected area". A final decision on the tourist projects seems not to have been made yet.

South Antalya investment area

This area extends over 75 km coastline from Antalya harbour (which is somewhat to the south of Antalya) to the southern tip of Chelidonia (Gelidonya) peninsula. Most of the area is also a national park. The infrastructure for tourism is being financed with the aid of credit from the World Bank.

The centre of tourism is Kemer where a marina with a capacity for 200 yachts was opened in October 1986. In 1987, 3,373 beds were available there and 6,803 beds were scheduled for the end of 1988.

At present, 9,420 beds are available in the South-Antalya tourism investment area. 7,608 of these are in hotels and similar establishments, 812 on camping sites. Facilities with a capacity for a further 8,309 beds are under construction and the plots have been selected for hotels and holiday villages with a capacity for 8,922 beds. In its final version, 45,930 beds should be available (84.5% in hotels etc., 15.5% on camping sites). These are planned for distribution over the following villages:

Beldibi	10,079
Tekirova	9,352
Kemer	8,630
Camyuva	5,268
Göynük	5,042
Kızıltepe and Tekerlektepe	4,859
others	2,700

Sea turtles were probably once well-distributed over the whole area. Now, the Tekirova beach is the only important nesting beach. All other nesting beaches have been lost due to tourist developments.

Side - Manavgat investment area

The tourism part of Side covers roughly 17 km of the coast on both sides of Side. The area had a capacity of 1,817 beds in 1986, which increased to 3,931 beds in the following year. A total of 35 tourist establishments with 16,883 beds are planned.

Apart from the area around ancient Side, the surroundings of the Titreyen Lake will become another centre of tourism within this investment area. Permission has already been given to 9 tourist facilities with a capacity of 4,700 beds. A 750 m long quay with 9 landing places and space for a total of 150 boats is being constructed. The shores of the lake will be covered by restaurants, cafes, playgrounds for children, picnic facilities etc.

The Side - Manavgat investment area divides two of the most important turtle nesting grounds in Turkey: the Belek region to the west and the Kızılot region to the east. The lack of nesting or low nesting densities are without doubt due to the tourist development.

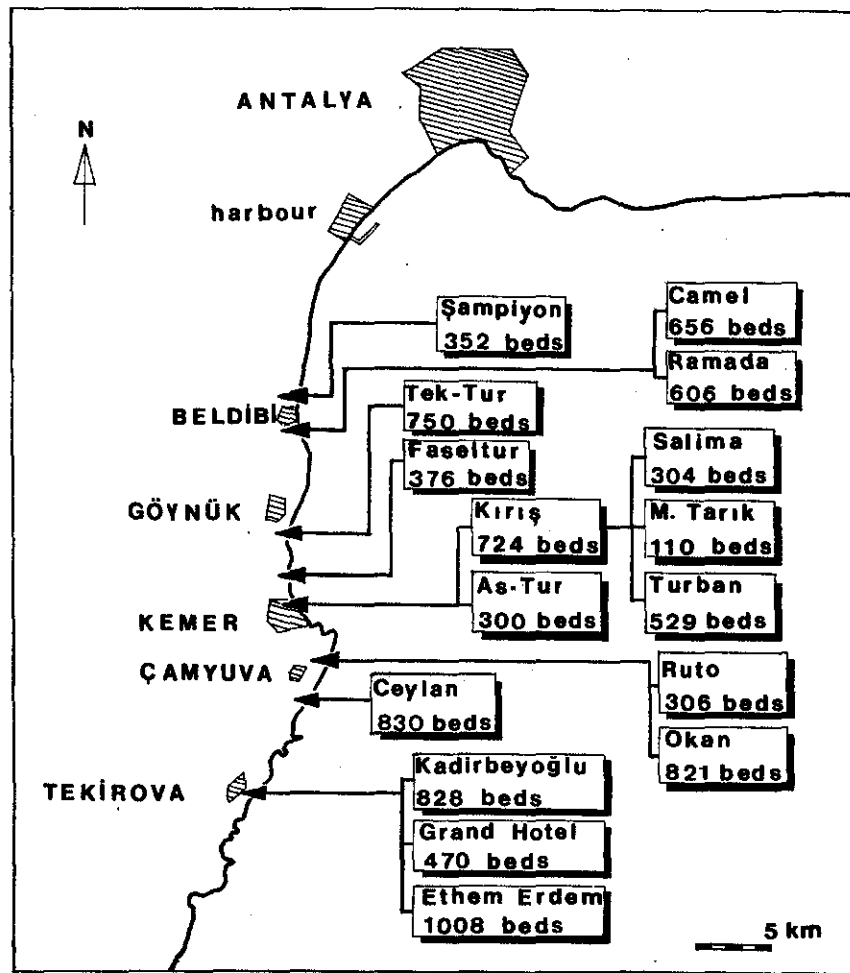


Fig. Tourist development within the "South Antalya project" of the Ministry of Tourism. Although the whole project area lies within the boundaries of the "Olimpos-Beydağları National Park", the whole coast is developed and no marine habitats are set apart for nature conservation. National parks have not proved to be an adequate means for the protection of nature in Turkey.

Alanya - Incekum investment area

This investment area extends from Alanya city along the coast to Incekum. A large number of hotels in the city and along that coastal strip are already available. The capacity was 6,556 beds in 1987. New investments are planned or are being constructed at Türkler Köyü, Avsallar and at Incekum.

The beach to the east of Alanya still held important numbers of nesting sea turtles in 1978-82, when Geldiay worked there. Apparently because of tourist development, the beach has now completely lost its importance and only occasional nesting occurs there. The development to the west of Alanya in the Incekum area prevents sea turtles from nesting there and thus limits the nesting grounds of the Kızılot region.

3.4.3 Pollution

Pollution is regulated in Turkey by the "Environmental Law" *) which came into force in 1983. The regulations implementing the law on water pollution came into force in 1988. **) This means, lawers and conservationists have only very recently obtained a tool with which to fight against water pollution.

The coastal waters of the Aegean and Mediterranean region of Turkey are far from "clean". Although large areas do not have any visible pollution, pollutants are found in high concentrations in

*) Law no. 2872, see Resmi Gazete no. 18132 of 11.8.1983.

**) Resmi Gazete no. 19919 of 4.9.1988.

many areas. An unpublished report by the Institute of Marine Sciences of the Middle East Technical University of 1988 says, that every year 2,072 tons of the heavy metals: mercury, chromium, cadmium, and lead enter the Turkish eastern Mediterranean sea in different ways. *) For example, out of a total of 12 tons of mercury per year, 5 tons come from the atmosphere and 7 tons from the rivers. The total lead amount is 1,900 tons/year with 1,720 tons from the atmosphere and 180 tons from the rivers. The annual amount of chromium is 145 tons, that of cadmium 15 tons. Pollution of the sea has thus reached a critical level.

At the sea turtle nesting beaches, extreme pollution was found at three sites:

- Dalaman: The paper factory SEKA discharges its sewage through the Dalaman River directly to the sea without purification. There are almost no living organisms in the river, and the sea in front of the coast has a brownish colour and an oilish consistency. The whole area smells awful. Dead Nile soft-shelled turtles *Trionyx triunguis* and stripe-necked terrapins *Mauremys caspica* were found there in considerable numbers (see inventory).
- Göksu delta: A paper mill of the state-owned SEKA is working there. Situated at Taşucu, the factory discharges its sewage through an underground pipeline several kilometres long to the sea.
- Kazanlı: At this single most important nesting beach for green turtles in Turkey, several factories discharge their sewage into the sea: A chromium factory where sodium bichromate, sodium sulphate and basic chromium sulphate are produced (cf. Altan & Sirel 1987) has a sewage channel which flows into the sea. Pure chromium is less poisonous to plants and animals, but soluble chromium compounds are highly poisonous. Chromates and dichromates cause abscesses and eczemas on the skin. Allergies are frequent (cf. e.g. Borgmann et al. 1987). Most of the Cr(III) compounds are green. The sea in front of the mouth of the sewage channel is greenish with a milky tinge. Next to the chromium factory, there is a soda factory. Soda (Na_2CO_3) is produced there using limestone. The sewage from this factory probably causes the milky tinge in the sea. The amount of suspended particles in the sea is 1278 mg/l in front of the chromium factory, although 30 mg/l is treated as a general standard and 3 mg/l as a standard for recreation areas by the General Directorate for Environment (Altan & Sirel 1987). The director of both factories informed us that a sewage plant (for both factories?) would be ready for operation in October 1988.

Furthermore, pollution of the sea and beaches from crude oil is considerable in some parts. The bay of Iskenderun is particularly worth mentioning. In May/June 1988, the beaches around Karataş and Yumurtalık were so heavily polluted that it was feared that young turtles would not be able to reach the sea because of oil covering their flippers. However, fortunately the tar had disappeared by the time of the hatching season. The amount of crude oil entering the eastern Mediterranean sea of Turkey was calculated to be 27,000 tons a year, by the above mentioned study of the Middle East Technical University.

Other pollutants in the Aegean and Mediterranean Sea are

- industrial sewage which enters the sea through rivers and in the Çukurova region, also through drainage channels (own observations).
- in Mersin, 100,000 m³ sewage with phosphate acid poured into the sea after an accident in January 1988 (newspaper news).
- fertilizers and pesticides (such as DDT which is not forbidden in Turkey) are washed into the sea through rivers and drainage channels. For example, 2,169,533 kg of insecticides were sold in the province Adana and 1,697,617 kg in the province İçel (Mersin) in 1987 and the concentration of pollutants is significantly higher in the vicinity of river mouths (Ünsal 1989).
- sewage from many holiday villages, towns and tourist facilities flows into the sea without purification. Sewage plants are rare along the Turkish coasts. According to newspaper news, an accident in the sewage system of Alanya in April 1988 gave rise to an extremely polluted, awful smelling sea and to many complaints by local people and tourists. This problem is well-known to Turkish politicians and a recent declaration of the Minister of State M. Yazar (Febr. 1989) says that canalisation systems will be established in all coastal settlements within the next two years.
- many beaches are polluted bacteriologically with concentrations of *Escherichia coli* above the tolerable limit. A control system has been installed and samples are taken at many bathing beaches at regular intervals but action at critical times is still rare (fear of a negative publicity).
- garbage, excessive especially on the Samandağı beach in springtime, which is exposed to the mainly western wind. Huge amounts of plastic devices are swept ashore and may be obstacles to turtles (cf. inventory).

*) Cumhuriyet of 27.1.1988

Pollution is a problem for turtles since long-term effects on fertility and longevity through accumulations in the food chain will threaten sea turtle populations.

3.4.4 Trawling

Trawling is a common means of shrimp fishing throughout the world. However, the ground nets are a great threat to sea turtles, especially to young ones. Many turtles die every year because they are caught in trawling nets and not released.

In August 1988 we observed several trawlers in Kazanlı coming from Mersin harbour. They trawled the bottom of the sea in front of the beach which is the most important Turkish nesting ground for green turtles. The trawlers came up to almost 20 m from the shore and were often among people swimming. We estimated that many young sea turtles died in the nets of the trawlers, as this happened in the main hatching season. It seems that sea turtles also suffer at other places from trawling such as the sea around Yumurtalık. In a scientific survey on the marine fish life in front of the Çukurova coast, in which trawlers were also used, sea turtles were caught regularly (Bingel 1981, 1987).

Turkish law forbids trawling inside a 4 mile-zone along the coast*). However, there is one exception: Shrimp trawling is allowed everywhere "to the north of a line from the mouth of the Göksu River to the coastal point of the border of Turkey with Syria". **). That means, there is no protection for the shallow coastal waters of the Çukurova from trawling.

The shrimp fishery has expanded rapidly in Turkey in recent years. For example, Turkey's total shrimp production was 588 t in 1980 (383 of these in the Mediterranean). In 1982 it increased to 1,211 t (676 t in the Mediterranean), and in 1986 it rose to 4,252 t, 811 t of which was in the Mediterranean (Su Ürünleri 1980-1986).

Thus the Turkish government has protected the bottom fauna along all coasts by law, except for one place which is under intensive economic use. At that place, trawling causes damage to the turtle populations.

In the United States, a "Sea Turtle Excluder Device" has been developed to exclude sea turtles from shrimp trawls (Seidel & McVea 1982). It has not yet been tried in Turkey.

The International Union for Conservation of Nature and Natural Resources (IUCN) considered the problem of turtle mortality through shrimp trawlers at their 17. General Assembly in Costa Rica (1988). IUCN recommended (IUCN 1988):

"recalling the effectiveness of the turtle excluder device (TED) in the prevention of sea turtle incidental catch by shrimp trawlers, the General Assembly (...) urges the member governments to enact and enforce national legislation to increase the conservation of sea turtles: (...) Whereas turtles are present, require use of TED by shrimp trawlers, and control all other fishing methods as needed to minimize incidental catch, particularly off the nesting beaches during the breeding season."

3.4.5 Sand extraction

All along the Turkish coast, there are enormous construction activities: hotels and other tourist facilities, private houses, roads, bridges etc. For all of these, there is a demand for sand and shingle. The beaches and sand dunes themselves are a source of sand and shingle. However, this exploitation has reached a stage which far exceeds the tolerable limit. Often the dunes behind the beach have been flattened completely and the beaches often resemble construction sites. This not only destroys turtle nesting grounds, but damages unspoilt beaches with a high scenic value which are the basis for tourism.

Heavy vehicle tracks cause further damage: turtle babies often cannot pass over the deep tracks which compact the sand and pose a further threat to the nests.

Excavation activities are often permitted by the local authorities and are sometimes carried out by them. There is also a lot of illegal excavation. In some places people even come at night to the beach with tractors to collect sand and shingle.

*) Su Ürünleri Tüzüğü, 7. Bölüm (Resmi Gazete no. 14607 of 27.7.1973).

**) Ek fıkra no. 88/7377 of 10.11.1983.

These activities have caused a lot of damage to some turtle populations, in particular at Kızılot, Anamur and in the Göksu delta, and regulations restricting and controlling the amount of exploitation of beaches and sand dunes are urgently required.

Sand dunes are important for beach protection. The dunes and vegetation on dunes trap the marine sands, help to prevent erosion of beaches and the covering of inland areas (houses, roads, farmland) by wind-blown sand.

3.4.6 Hunting of marine turtles

Turtle fishing was once common in the eastern part of the Turkish Mediterranean. A fishing company, located at İskenderun, collected and purchased sea turtles from local people in the 1950s and 1960s. The destination of these turtles was Central Europe.

Between 1952 and 1965, up to 15,000 specimens were taken from the shores of Mersin. By the mid-1960s, a considerable decline in this population had been noted. After then, the area around Karataş (Akyatan shore?) became the main harvesting area and 100 specimens or more were caught there each day in 1965. In this single area, apparently more than 10,000 turtles were captured in May 1965 (Sella 1982). Even now people in Kazanlı can remember their turtle job. They went to the beach at night, female turtles coming ashore to lay their eggs were turned on their backs, and in the morning a lorry from the fishing company came to collect the animals.

Hathaway (1972) brought it to our attention that the official fishing statistics give 286,505 kg of sea turtles for the whole of Turkey in 1968 and 52,355 kg in 1969. This refers to approximately 2,300 and 400 sea turtles, respectively. In 1972, approximately 1,200 turtles are said to have been caught (Sella 1982). More recently, the official fishing statistics report 4,000 kg sea turtles for 1980, 44,000 kg for 1981, and 173,528 kg for 1984. None were reported in 1982, 1983 and 1986 (Su Ürünleri 1980-1986). That means that in 1984 about 1,400 sea turtles were still being killed. Even if the exact number of sea turtles might not be reflected by the official statistics which are based on a questionnaire of fisheries and fishermen, it clearly shows that hunting constituted a major threat to turtle populations.

In Turkey itself, turtle meat or turtle eggs are not eaten. A case of turtle eggs which were excavated and brought away by people near Belek in 1987 (Kinzelbach, pers. comm.) is extraordinary. However, there are a number of other reasons for killing sea turtles. According to Geldiay & Koray (1982),

- turtle shells are used as cradles. Frequently used as wedding presents, people believe that a turtle cradle strengthens the marriage and the expected babies.
- the application of turtle blood is good against hemorrhoids.
- turtle blood strengthens the human sexual capacity.
- turtle shells are used as decorations and souvenirs for tourists.

Almost all of these points were confirmed during the survey in 1987-88: Turtle shells were offered to tourists in Bodrum and Taşucu, a turtle killing was observed in Dalyan and the tracks of another turtle killing on the beach was found by a survey team at Gazipaşa. Shells used as decorations were seen at Dalyan (guest-house), Silifke (restaurant), and at Yumurtalık (shop and private houses). Many fishermen in Yumurtalık had some shells at their homes (observation by Altan, Kasperek & Kılıç 1987).

There is probably nobody in Turkey whose business is exclusively turtle hunting and/or the trade of sea turtles or their products. There is probably no international trade of any importance.

Turkish laws forbid turtle killing only in the areas belonging to the General Directorate of Forestry*) (i.e. e.g. in the marine national park of Olimpos - Beydağları), but apparently not everywhere.

3.5. Marine turtle nesting beaches

As mentioned above, sea turtles nest almost everywhere between Dalyan/Ekincik and the Syrian border where favourable nesting habitat is available and human pressure is not excessive. Nesting densities, however, vary greatly, and only some beaches hold significant numbers of sea turtles and are most important for the species' survival. Sometimes a sea turtle emerges from the

*) Orman Genel Müdürlüğü, Milli Parklar Dairesi Başkanlığı, 1988-1989 avlama döneminde hakkında getirilen yasak, tahdit ve mükellefiyetlerin uygulama esasları (Tamin no. 4245, Tasnif no. IV/653. Ankara).

sea at night for egg-laying in front of a hotel or on a beach which is over-crowded with tourists during the day-time. We found tracks of one sea turtle which successfully deposited its eggs between the deck-chairs of a beach hotel. However, one should be careful with any interpretation of these events, as the nesting density on beaches with human pressure is always very low and the breeding success on such beaches is very low, too. Therefore, the protection of sea turtles must concentrate on beaches where the total number of successful nestings is high.

Turkey has a total coast length of 8,333 km. Turtle nesting can be expected in the Aegean and Mediterranean region over a coast length of 2,577 km which is also the length of the study area of this survey. Out of these, 606 km are beaches. About one fourth of these represent sea turtle nesting areas of significant importance: 20% are main nesting beaches and 3% beaches with fewer turtles, but which are still of vital importance. The recommendations will show that this does not necessarily mean prohibiting tourism in all areas. However, careful planning is necessary whether and if, where and how to develop tourist facilities within these sensitive areas.

3.5.1 The major nesting beaches

In Turkey, there are 13 main nesting beaches for sea turtles which are listed here from the west to the east. Detailed descriptions of the beaches including numbers of turtles and proposed conservation measures are found in the inventory of nesting habitats in the annex of the report. The numbers refer to the ID-numbers of the beaches in the inventory.

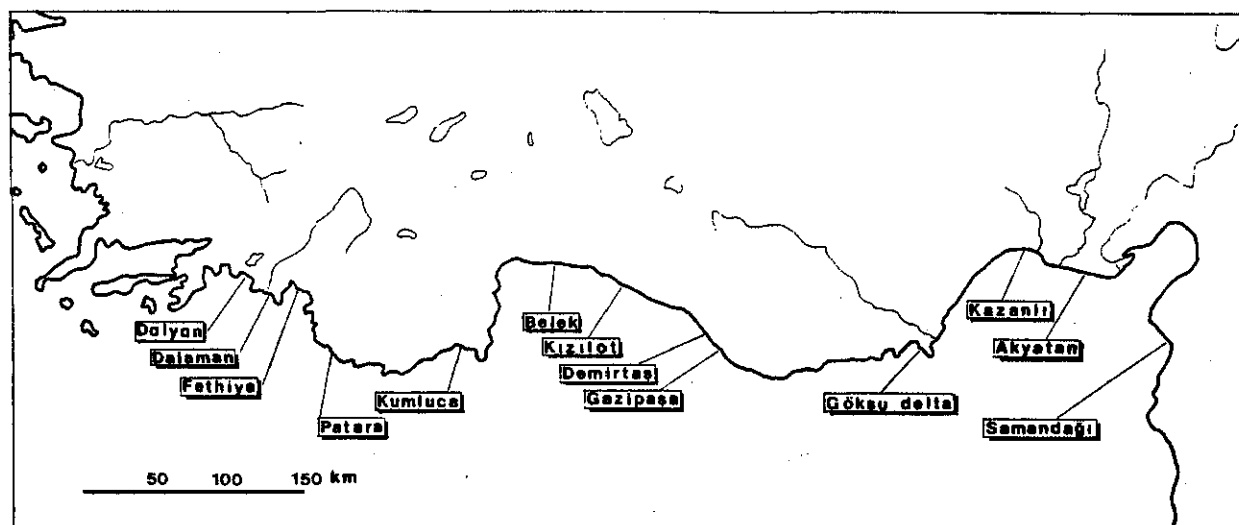


Fig. The 13 major nesting grounds of sea turtles in Turkey.

Dalyan (no. 416)

The beach has a relatively high number of nesting loggerhead turtles and plays an important role as an outpost at the western edge of the nesting grounds of this species. The Dalyan beach has been protected as a "Mediterranean specially protected area", but the final regulations for protection have not been issued yet. Increasing tourism is still an imminent threat to the turtles there. The Dalyan beach (4.0 km) forms a unit with the nearby beaches of Dalyanağı (0.2 km; no. 415) and Ekincik (0.4 km; no. 412).

Dalaman (no. 421 - 425)

The Dalaman beach holds even more sea turtles than the Dalyan area. It is completely unprotected. There is no tourist development on most of the beach, except the Sarigerme area which is at the northern end. A solution is urgently needed to the serious pollution of the sea caused by the SEKA papermill. It threatens both turtles and human health. The length of the Dalaman beach excluding the Sarigerme area is 7.2 km.

Fethiye (no. 435 - 437)

The northern side of the Fethiye - Çalış beach provides nesting habitat for an important number of loggerhead turtles. The area was designated a "Mediterranean specially protected area" in 1988. One tourist establishment is already operating. It is not known whether it has affected turtle nesting

major nesting beaches	ID-numbers	length in km
Dalyan	416	4.0
Dalaman	421-425	7.2
Fethiye - Çalış	435-437	4.8
Patara	510-512	11.8
Kumluca	530-536	10.0
Belek region	630-651	30.0
Kızılot region	666-672	16.6
Demirtaş	705-706	7.4
Gazipaşa Çiftlik	717	2.4
Göksu delta (westside)	760-763	10.5
Kazanlı	804-805	1.0
Akyatan	817-821	10.0
Samandağı	910-912	5.0
total		120.7
beaches still of vital importance		
Ekincik	412	0.9
Kale (nr. Finike)	521-523	2.2
Tekirova	605	3.7
Anamur	730-735	12.0
total		18.8

activity and whether protection measures (light screening etc.) are necessary. The length of the beach is some 4.8 km.

Patara beach (no. 510 - 512)

The beach on both sides of Eşen Çayı is relatively undisturbed and holds important numbers of nesting loggerhead turtles. It is close to tourist centres and there is a threat from tourist development at Gelemiş village. The length of the beach is 11.8 km and no tourist facilities are planned on the beach by the Ministry of Tourism.

Kumluca beach (no. 530 - 536)

This is on the eastern side of the bay of Finike and holds outstanding numbers of loggerhead turtles. Problems are caused mainly by beach huts belonging to local people. The nesting zone of the turtles comprises about half of the bay which is 20.5 km long.

Belek region (no. 630-651)

Between Antalya and Side, there are important sea turtle nesting areas which should be treated as a unit. For the purpose of this report they have been called the "Belek region". There are already many tourist facilities on the beach. The operation of these establishments is not regulated, no environmental impact assessment (EIA) has been made and further tourist developments are planned. According to the masterplan for the development of tourism, they will cover the whole beach. At present, beach huts belonging to local people cover a considerable part of the area. The total length of the beach is some 30 km.

Kızılot region (no. 666 - 672)

This beach holds extremely high numbers and high nesting densities mainly of *Caretta*, but also of *Chelonia*. Similar to the Belek region, there is no management plan and no EIA has been carried out. Several tourist facilities are either being constructed or already operating. However, no tourist facilities are planned by the Ministry of Tourism. There are no beach huts at present on the beach. The beach is 16.6 km long.

Demirtaş beach (no. 705 - 706)

This beach has become of even greater importance for nesting sea turtles since the loss of nesting grounds near Alanya. The beach lacks any protection. No tourist development is planned by the masterplan. There is evidence that lights from a camp site and hotel are disorienting mature turtles and hatchlings. The length of the beach is 7.4 km.

Gazipaşa Çiftlik beach (no. 717)

This is a very small beach with an extraordinarily high number of nesting turtles. At present the habitat is not threatened. Some turtle hunting occurs. The length is 2.4 km.

Göksu delta (no. 760 - 763)

Important numbers of sea turtles nest on the western side of the delta. The site is threatened by the growth of a holiday village for local people, by pollution and by sand extraction. The area used for turtle nesting is some 10.5 km long.

Kazanlı (no. 804 - 805)

This is one of the two most important nesting grounds for green turtles. Kazanlı has an extraordinarily high nesting density which is unique to the Mediterranean. A number of factors threaten the turtles there, e.g. pollution of the sea from two factories, photopollution and the diminishing size of the nesting dune. The length of the beach is less than 1 km.

Akyatan (no. 817 - 821)

Together with Kazanlı, this is the most important nesting ground for the green turtle in the Mediterranean. It is completely remote and unaffected by human influences. The National Parks Division at the Ministry of Agriculture, Forestry and Rural Affairs has decided to establish a strict nature reserve. The beach is over 20 km long and turtle nesting occurs on a specific stretch of some 10 km.

Samandağı (no. 910 - 912)

For green turtles, this site is the third most important in Turkey. The area is threatened by tourist development and pollution. The nesting beach is 5.0 km long. As there were great fluctuations in turtle numbers in 1988, it was impossible to determine the exact importance of the beach.

3.5.2 Other important nesting beaches

Apart from these main nesting beaches, there are others which do not hold such large numbers as the main nesting beaches, but which are still of vital importance for sea turtles. These are:

Ekincik (no. 412)

A small bay with a similar nesting density as the nearby Dalyan beach, with which it forms a unit. The beach length is 0.9 km.

Kale beach (no. 521 - 523)

A nesting beach at the lagoon of Kale (near Finike) has significant turtle numbers, although its degree of importance cannot be estimated exactly as the numbers fluctuated greatly in 1988. Its length is 2.2 km.

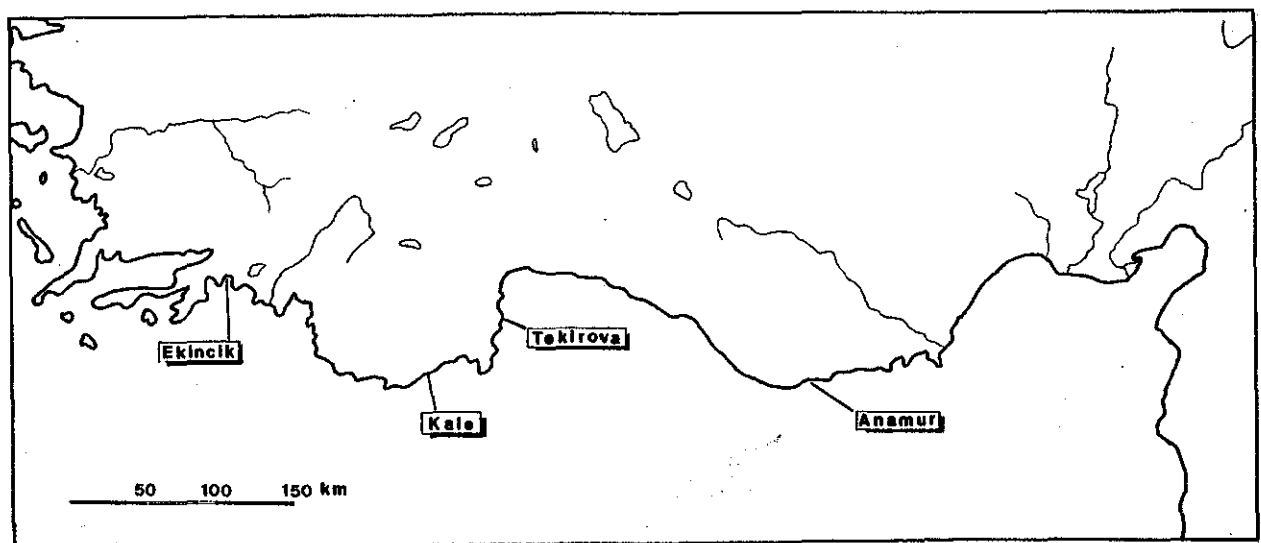


Fig. The four nesting beaches which do not hold such large numbers of sea turtles as the major nesting beaches, but which are still of vital importance for sea turtles.

Tekirova (no. 605)

The beach has extremely high nesting densities. However, the beach length (3.7 km) means that the total number of nesting sea turtles is not exceptionally high. Turtle nesting has probably already suffered a lot from tourist activities, and it will probably be completely ruined by the "South Antalya tourism development project".

Anamur (no. 730 - 735)

Sea turtles are well distributed over the 12 km long beach with concentrations on both edges (Anamuryum and Pullu). Tourist activities and sand excavations are the main threat to the turtle population.

4. Conservation of Marine Turtles

4.1. Conservation tools

4.1.1 National Parks and Strict Nature Reserves

The concept of the protected area was introduced into Turkish jurisdiction in 1949. The legal establishment of the national parks coming into being in 1956, under Forest Law no. 6831*). Being under forest law, only forests or areas belonging to the Ministry of Forestry could be protected, and the concept was to "protect nature . . . to fulfil the needs of the society for sport and recreation facilities and to make tourist development possible." Recreation and tourism thus were the reasons for establishing national parks. When a separate "National Park Law" came into force in 1983**), the term "forest" was replaced by "pieces of nature" ("tabiat parçası") and the type of protected area thus became much wider. Apart from national park, the terms "nature park", "nature monument", and "strict nature reserve" have been introduced and defined. Whereas national parks are designated for "nature protection, recreation and tourism", the "strict nature reserve" excludes every use apart from "educational and scientific purposes".

The major national parks have master plans which were drawn up with the assistance of the US National Park Service in the 1960s and early 1970s. They tend to be biased towards recreation management and lack sufficient information on fauna and flora or habitat conservation and management. They do not fulfil the IUCN national parks criteria. At present, Turkey has 17 national parks comprising a total of 245,591 ha. Two of the parks, Dilek Yarımadası National Park and Olimpos Beydağları National Park, are coastal parks, or at least they include a coastal zone of considerable size. Whereas Dilek Yarımadası National Park does not hold any sea turtle nesting beaches, Olimpos Beydağları National Park does. It includes 138 km of coastline south of Antalya and extends offshore for one nautical mile (1.85 km). Since the 1980s there has been a tremendous change in the use of the land within the borders of the park: The rural settlement Kemer has become a main tourist centre with a marina, a complex of numerous hotels, restaurants and water-sport facilities. Hotels are situated all along the coast inside the park. Increasing pressure from tourism is a great threat to the park for which 45,930 beds are scheduled in the next few years. A maximum of 10,000 beds was designated in the masterplan for the national park. The park thus does not fulfil its purpose to protect nature which includes the protection of sea turtle nesting beaches. Beaches where sea turtles had been present 10-15 years ago have been abandoned and are now covered with tourist facilities.

Other national parks in Turkey have similar problems and one can conclude that this kind of protection is not a sufficient means to protect sea turtles.

"Strict Nature Reserves" ("Tabiati Koruma Alanları") are relatively recent in Turkish jurisdiction. Although the law has existed since 1983, the first area was protected in 1987. The law is thus too young to judge whether this type of protection will be a powerful tool for conservation. At present, no turtle nesting beach has been made a "strict nature reserve" under this regulation, but as a result of the present study, the green turtle nesting beach south of Akyatan Gölü has been included in the list of areas which will be made strict nature reserves. The formal process is in an advanced state, and it is hoped that strict nature reserves will become more widely applied to important turtle nesting beaches.

*) Orman Kanunu (madde 25), Resmi Gazete no. 9402 of 8.9.1956.

**) Milli Parklar Kanunu, Resmi Gazete no. 18132 of 11.8.1983.

4.1.2. The Barcelona Convention

The Turkish Government recently introduced a new conservation statute into the legal mechanism which is called a "specially protected area". Dalyan was among the first three areas to be protected by this new statute.

The "specially protected areas" are implemented in the framework of an action plan for the protection of the Mediterranean under the guidance of the United Nations Environmental Programme

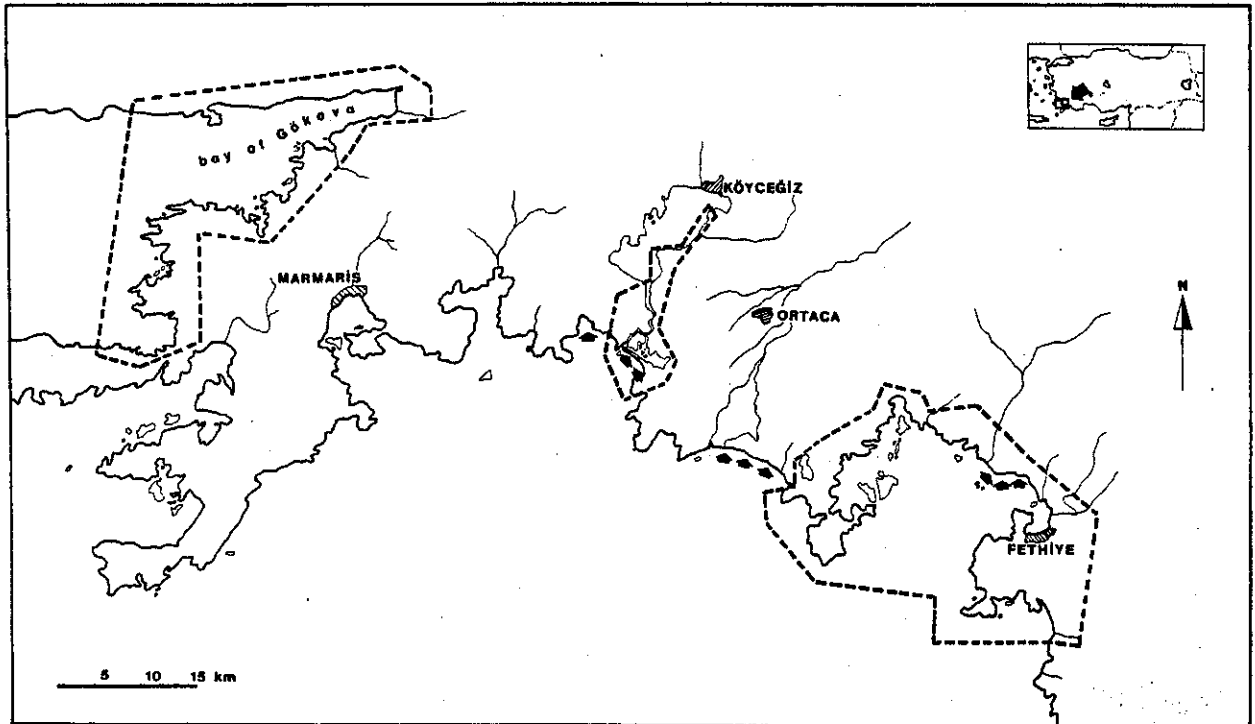


Fig. Map of the three "specially protected areas" in Turkey. These areas have been protected under the Barcelona Convention in 1988. The Turkish Government has not yet issued the regulations and protection measures for these areas. Management plans for all areas are recommended in this report. The arrows show the nesting beaches of sea turtles.

(UNEP). In 1975, 16 Mediterranean governments approved a Mediterranean Action Plan (MAP) and one year later the same governments and the European Community met again in Barcelona to sign a convention committing them to "take all appropriate measures . . . to prevent, abate and combat pollution . . . and to protect the marine environment". The Barcelona Convention was to become the legal framework for the Action Plan adopted a year earlier. The underlying philosophy of the governments was, among other things, to identify the main environmental problems and their causes and to harmonize national legislation with the spirit and goals of the Barcelona Convention. In 1982, the governments signed a protocol providing special protection to endangered Mediterranean animals and plants as well as to whole areas considered vital for their survival. The aim of the protocol is to protect the breeding grounds of some 500 species, of which considerable numbers are unique to the Mediterranean. The parties to the protocol "shall, as far as possible, establish protected areas and endeavour to undertake the action necessary in order to protect these areas and, as appropriate, restore them, as rapidly as possible" (article 3).

The protocol establishes a system through which Mediterranean coastal states establish and manage marine coastal areas, through regular consultations among states party to the protocol and through a cooperative programme toward a system of coastal and marine protected areas in the Mediterranean region. This protocol is the first international mechanism for establishing marine protected areas, although it has limitations. The protocol has been limited, first, to the territorial seas of the party states, where states can already establish protected areas without restriction. A second limitation was the absence of detailed criteria and guidance for selecting, establishing, and managing marine protected areas, although it was foreseen that these might be adopted by parties at a later date.

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The beach has extremely high nesting densities. However, the beach length (3.7 km) means that the total number of nesting sea turtles is not exceptionally high. Turtle nesting has probably already suffered a lot from tourist activities, and it will probably be completely ruined by the "South Antalya tourism development project".

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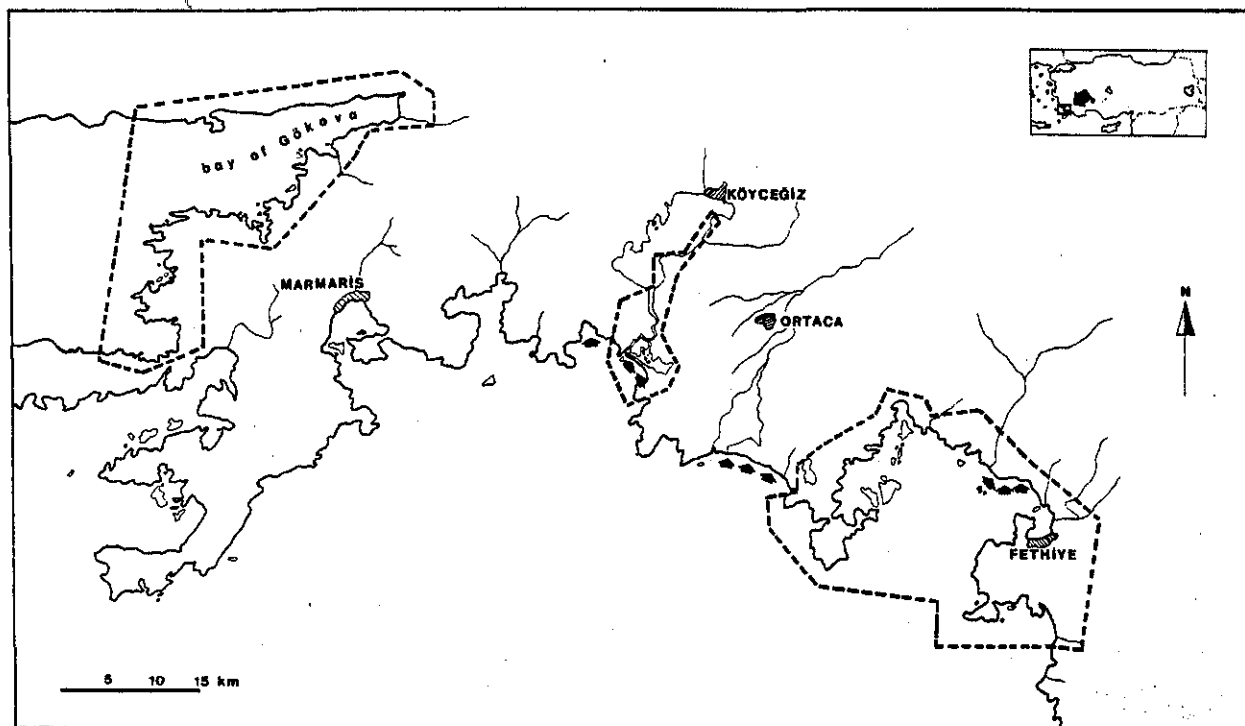


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The protocol came into force in Turkey in 1988 *) "to protect the natural beauties of the protected areas and their surroundings, the archeological sites, the ecological balances and the living and non-living goods above and under water and to create the basis for passing these goods to future generations" **) For the implementation of these aims, an "Environmental Protection Commission" ("Çevre Koruma Kurulu") was founded, where the Secretary of State of the Ministry of Tourism, the General Director for Environment, the General Director for Forestry and the local head of a "specially protected area" are represented.

At present, three "Mediterranean specially protected areas" have been proclaimed in Turkey: The Dalyan beach including the eastern shore of Köyceğiz Gölü, the whole bay of Fethiye including e.g. Göcek and Ölü Deniz and the bay of Gökova (see map). Unfortunately, the Köyceğiz - Dalyan protection area does not include the whole of lake Köyceğiz.

In Dalyan - Iztuzu, the status "specially protected area" was helpful in order to avoid tourist development on the beach and it is hoped that it will be so in the future. However, the regulations regarding the protected areas are very vague and thus greatly dependent on the decisions of the "Environmental Protection Commission". A considerable uncertainty as to how these areas will work is found not only among conservationists, but also among investors and local people.

4.1.3 The Bern Convention

The Convention on the Conservation of European Wildlife and Natural Habitats, usually called the "Bern Convention" was opened for signatures in September 1979 and came into force in June 1982. Nineteen States and the European Economic Community are Parties to the Convention. With the publication of an English and a Turkish version of the text in the official gazette, the convention came into force in Turkey in 1984***).

Contracting Parties are required to maintain populations of wild flora and fauna and to give particular emphasis to endangered and vulnerable species, including endangered and vulnerable migratory species. Each Contracting Party specifically undertakes to:

"take appropriate and necessary legislative and administrative measures to ensure the conservation of the habitats of the wild flora and fauna species especially those specified in the Appendices I and II and the conservation of endangered natural habitats" (Article 4,1)

and to

"give special attention to the protection of areas that are of importance for the migratory species specified in Appendix II and III and which are appropriately situated in relation to migratory routes, as wintering, staging, feeding, breeding or moulting areas" (Article 4,3)

and to prohibit the

"deliberate damage to or destruction of breeding or nesting sites" of Appendix II species (Article 6,b)

Article 6,b is very specific and strict; however, the explanatory report of the Convention states that it should apply only to important breeding and nesting sites. As Lyster (1985) has pointed out, implementation of article 6,b necessitates the identification of important breeding and nesting sites for species of Appendix II. Appendix I is a list of plants. Appendix II is a long list of strictly protected fauna species which includes the loggerhead turtle *Caretta caretta* and the green turtle *Chelonia mydas*.

Turkey is a full member of the Bern Convention. The Turkish Government thus has an obligation to protect sea turtles as well as their nesting beaches along the Turkish coasts. The "Standing Committee" of the Bern Convention has taken a number of actions with respect to sea turtles and recommended protection of the nesting beach of Dalyan. The Turkish Government has fulfilled its obligation by cancelling a large tourist project which would have destroyed that nesting ground. A survey for other possible nesting grounds along the Turkish coast which was recommended by a group of turtle experts of the "Standing Committee" of the Bern Convention was also supported by the Tur-

*) Karar no. 88/13019 of 12.6.1988, published in Resmi Gazete no. 19863 of 5.7.1988, implementation in Resmi Gazete no. 19931 of 16.9.1988. The protocol of the Convention has been published in Resmi Gazete no. 19968 of 23.10.1988.

**) from paragraph 1 of "Özel Çevre Koruma Bölgesine İlişkin Esaslar", Resmi Gazete no. 19931.

***) Resmi Gazete no. 18318 of 20.2.1984, Karar no. 84/7601.

kish Government. This report is the result of that survey. The Turkish Government has more than once demonstrated its readiness to adhere to conservation and set examples for others to follow.

4.2 Recommendations

The coastal areas of Turkey are under increasing human pressure which require the development of specific management policies. Earlier sections of the report describe different human activities which have direct or indirect impacts on coastal resources. There is a need to establish an overall coastal zone management plan which should lead to the establishment of a system of protecting different ecosystems and directing developments based on ecological principles to avoid destruction of natural resources on which long-term development for benefits of people depends. Protection of marine turtles is only one aspect of such a management plan. The recommendations which follow below should be integrated into a more comprehensive programme.

4.2.1 General recommendations

One fourth of the beaches in the study area in the Turkish Aegean and Mediterranean region holds significant number of nesting marine turtles. This implies that Turkey holds the largest known numbers of both *Caretta caretta* and *Chelonia mydas* in the Mediterranean. It is recommended:

- to elaborate a coastal zone management plan for the Turkish Aegean and Mediterranean region
- to establish a network of nature reserves along the coast. Strict nature reserves are the best means for legal protection. Mediterranean specially protected areas are useful in regions where tourism and/or other developments are taking place. Existing national parks do **not** provide adequate protection, their status should be upgraded to meet international standards.
- to initiate a long-term monitoring programme for the populations of sea turtles and their threats.
- to investigate the distribution of Mediterranean sea turtles in the inter-nesting season and the distribution of immature turtles and threats to them.
- to integrate environmental impact assessments (EIAs) into all coastal development projects.

Tourist development has been identified as the most serious threat to conservation of marine turtles. Regarding the development of tourism, it is recommended that:

- the masterplan for the development of tourism in the provinces Muğla and Antalya which designates the investment areas is revised and takes the ecological and nature conservation aspects into consideration.
- a masterplan for the development of the Mediterranean coast east of Gazipaşa (provinces İçel, Adana and Hatay) is prepared. Tourism and industrial development should be guided by ecological considerations.
- environmental impact assessment studies are carried out for all large-scale development on the coast.
- measures are taken to control tourist developments for areas not covered by the masterplan.
- measures are taken to prevent illegal coastal development.

Many beaches and nesting habitats are affected by the extraction of sand and shingle. It is recommended:

- to develop ecologically sound concepts for each coastal province how to satisfy the demand for sand and shingle.
- to establish plots where sand and shingle extraction is less harmful to the environment.
- to control illegal extraction.

Turtle hunting has decreased considerably in Turkey, but still threatens the populations. We therefore recommend:

- that turtle killing is forbidden everywhere in Turkey. This should be done by an addition to the law on water products (Su Ürünleri Kanunu).
- that the possession of sea turtles and turtle derivatives also becomes prohibited.
- that all turtle products available in private or public possession are collected and given e.g. to Turkish universities for their scientific collections.

Pollution of the Mediterranean coastal waters has reached a critical stage and long-term effects on the sea turtle populations are inevitable. It is recommended:

- to prohibit the discharge of industrial sewage to the sea.
- to establish canalisation systems for all human settlements along the coast.
- to control and limit the input of agrochemicals into the sea through rivers and drainage canals.

Many sea turtles including hatchlings and immatures are caught incidentally by trawlers. It is recommended:

- to investigate whether the "sea turtle excluder device" can achieve sufficient results in Turkey
- to extend the 4-miles zone where shrimp trawling is prohibited to the coast to the east of the Göksu delta.

A control of predators should be considered in certain circumstances, i.e. when the loss of nests is extremely high, when one can be sure that no endangered predators (jackals!) or non-target organisms are affected, and when the method applied for the control will affect only individuals and not populations.

Artificial lights must be avoided on sea turtle nesting beaches, as they attract freshly hatched young turtles which then cannot find the sea and dry up on the hot sand in day time.

4.2.2 Specific recommendations

The inventory of sea turtle nesting habitats in the annex describes the conservation problems of each beach and makes recommendations for conservation. Reference should be made to those chapters. Here, only a few outstanding problems are repeated:

- prepare management plans for the "specially protected areas" Dalyan (including whole Köyceğiz Gölü) and Fethiye.
- implement recommendations for major nesting beaches (see 3.5.1) as a first priority within the next two years.
- implement recommendations for remaining sites over a period of five years.
- restore nesting habitats where necessary (Kızılot, Kazanlı).
- establish sewage plants for the papermills of Dalaman and Taşucu.
- establish sewage plants for the soda and chromium factories at Kazanlı (Mersin).

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Annex:

Inventory of sea turtle nesting habitats

The inventory is a central part of the study: Its lists all beaches, describes them including their use by human beings and by sea turtles as well and makes recommendations for conservation, so far as the beach is of importance to turtles. The rapid change of the coastal environment in Turkey will make this document a historical one in due course. This emphasises the necessity of this document, but also the necessity of up-dating it at regular intervals.

Even if one or the other description still might be improved by a more detailed study, the present inventory might serve as an over-view of the situation on the Aegean and Mediterranean coasts of Turkey in general. It is documenting the geomorphological situation and the human use of the landscape. The document is thus not only useful in the hand of the turtle student and turtle conservationist now and in the future, but it might also be useful for many other studies on the ecological and socio-economic value of the Turkish coast.

The coastal inventory covers almost all beaches on the coast between Kuşadası and the Syrian border. All flat coastal strips which consist of loose material have been treated as beaches. This definition includes all coasts which do not consist of rocks. From the beginning, there was no confinement to sandy beaches. One thus now has the guarantee that no turtle site has been over-looked because the spectrum of habitats was not known. All beaches, even if they looked like less favourable or unfavourable turtle nesting habitats, were surveyed. In fact, some examples confirmed that the decision to survey all "flat coastal strips consisting of loose material" was right.

For several reasons, especially for the unequivocal identification, the beaches have been numbered. The numbers consist of three digits of which the first identifies the geographic region. For this purpose, the Turkish Aegean and Mediterranean coast was divided into nine regions:

- 100 Kuşadası - Güllük region
- 200 Bodrum peninsula
- 300 Datça peninsula
- 400 Dalyan - Fethiye region
- 500 Patara - Kumluca region
- 600 Antalya - Alanya region
- 700 Alanya - Mersin region
- 800 Çukurova region
- 900 Iskenderun - Samandağı region

The first three regions belong to the Turkish Aegean coast, the others to the Mediterranean coast. The same system of ID-numbers has been applied also to the computerized data processing. An outline map and detailed maps which show the positions of all beaches are found at the end of this inventory.

Glossary

Some common Turkish words which have been repeatedly used in the inventory are explained below:

ada: island.

ağız: mouth (also: river mouth).

burun: nose, also (e.g. a rocky) spur into the sea.

çay: creek

kaya: rock.

körfez: bay

kum: sand. This word is found in many village names, e.g. Kum Köyü (Sandvillage), Kumlu köy (sandy village), Kumlu Ova (sandy plain), Kumtepe Köyü (sandy hill village), etc.

liman: harbour, also in the meaning of small bay.

nehir: river.

plaj: beach.

su: water, but also streamlet.

tepe: hill.

yarımada: peninsula.

Arrangement of the inventory

Name: For most of the beaches, no standard names were available. Therefore they have been named after nearby villages or geographic landmarks.

ID-number: For each beach, an identification number was given, of which the first digit indicates the region (e.g. no. 639 is situated in region 600 Antalya - Alanya). Long beaches were subdivided into sections. Depending on the specific situation (differences between certain sections), these were treated under one headline or one by one. When possible, natural landmarks like river mouths, rock formations, and also roads, buildings etc. were used for dividing the beaches into sections. As these often had to be created during the first survey without knowing the beach in total, some borders could now, with a much wider knowledge, be better defined. The ID-numbers vary between 100 and 999 and are ascending from the west to the east. The numbers are not continuous so that one has the possibility to use a finer screen without creating a new system of ID-numbers.

Co-ordinates: The co-ordinates of each beach have been given in order to allow an unequivocal identification. For short beaches, the co-ordinates of the centre of the beach were given, for longer ones the co-ordinates of both edges.

Length: In most of the cases, the length of the beach was determined from the 1 : 100,000 nautical map. In some cases, estimations in the field were necessary.

Description: This chapter contains some basic information on the beach structure, like width, texture, incline etc. The width of the beach refers to the width of the naked sand, it does not include any sand dunes. A classical coast thus consists of sea - splash zone - beach - dune - inland landscape. Often one can see from the descriptions at once, whether the beach is favourable for turtle nesting or not.

Land use: The human influence on the beach is described here. Continuous influences (through buildings etc.) are treated here and also the temporary effects from people bathing, boats, fishermen etc. If available, this chapter includes information on the proposed future use of the beach. Information obtained from the masterplan for the development of tourism has been used here.

Turtle situation: All data available on the occurrence of sea turtles at each coastal section are presented in this chapter in detail. This should give future sea turtle students the figures for comparisons, even if they use other methods. If any information outside the 1988 survey (from literature or from unpublished sources) is available, this has been included, too.

Other fauna: When available, some data on endangered animal species other than sea turtles have been included here. This chapter includes information published by Ertan, Kılıç & Kasperek (1989).

Recommendations: Recommendations are made for the nesting beaches of sea turtles regarding the protection of the nesting sites. In some cases, however, when outstanding ecological deficiencies have been recognized, other recommendations are also given.

Pollution: Information on water pollution was available only for a few beaches, as the bulk of pollutants are not visible to the human eye. Those beaches mentioned here are thus only some very drastic cases of pollution.

Protection: All kinds of protection by national laws are listed here, no matter whether the status of protection gives an area a de facto protection or not. Therefore also compare the chapters on protected areas in the general part of the study.

Various: Room is available here for different subjects, e.g. the presence of seaweed on the shore etc.

Kuşadası - Güllük region

This region comprises the Samsun Dağı peninsula which is one of the oldest Turkish national parks, the delta of the Büyük Menderes River which is one of Turkey's largest river deltas and the bays between Akbük and Güllük. In general, the beaches of this region are rather small and stony, those of the Menderes delta are rather muddy. The only sandy beach of considerable length is situated to the north of the national park, but it is almost completely covered with tourist developments. Although there are contradictory statements in the literature, the area of Samsun Dağı national park does not provide nesting habitats for sea turtles. Nevertheless, occasional nesting in the region in insignificant numbers cannot be ruled out.

Kuşadası at the northern edge of the region is an old tourist centre of Turkey which is still growing fast. Akbük is becoming another centre at present.

The survey covered 22 beaches or beach units with a total length of 46.8 km.

Kuşadası South

ID-number:	105 and 106
Explanation:	105 is the northern half, no. 106 the southern half
Co-ordinates:	37.43/27.14 – 37.48/27.17
Length:	about 12 km
Description:	Fine sand, interspersed with small pebbles in places; inclination slight, however, in about 20% of the southern half of the beach (i.e. in no. 106), the incline from the sea is steep for a few metres, but then becomes slight again.
Land use:	95% of the shore is covered by tourist developments. Hotels, wind-surfing schools, rent-a-boat facilities, holiday villages etc. cover a large area. Holiday villages for local people cover most of the area and many are still under construction. Agricultural land and a wood make up the remaining 5% of the shore line not covered by tourist constructions. Many tourists were on the northern side of the beach on 7.6.88, but almost none (<30) on the southern side. Some tractor tracks were seen on the southern side.
Pollution:	Much tourist litter on the northern half of the beach (no. 105), but only a little on the southern side (no. 106). A small lake close to the shore is heavily polluted with organic pollutants and its bottom consists of rotting mud.
Protection:	None.
Turtle situation:	Although there was a favourable nesting habitat (but with strong human pressure), there was no indication that sea turtles occur there.
Various:	The holiday villages in no. 106 have been built on a former wetland. Some reeds along the ditches between the houses, a 1-2 ha reed bed and a small (<5 ha), heavily polluted lake is all that remain. Much seaweed is found, especially on the southern side of the beach.

Small beaches on Dilek Peninsula

ID-number:	107, 108, 110 - 113
Co-ordinates:	37.41/27.07 - 37.42/27.11
Length:	approx. 0.5 km each, only 113 is 0.75 km
Description:	Narrow beaches, consistently about 5 m wide. Stony pebbles which become larger on the landward side. The incline of the beach from the sea is gradual. At the back of the beaches are forest covered hillsides. The gravel of the northernmost beach (close to the entrance to the national park, i.e. Güzelçamli beach)

and that at the top of the peninsula (Dipburnu) is somewhat finer grained than the others.

- Land use:** Only no. 107 (Güzelçamli beach), 108 (to the east of Kalamaki beach) and 110 (to the west of Kalamaki beach) were visited. Very few people and no tourist facilities on the beaches. The other beaches are probably not used anyway due to limited access because of road deficiencies and military restrictions.
- Turtle situation:** The national park is said to hold nesting beaches for sea turtles and their protection was one of the reasons for the establishment of the park (cf. PADU 1988). However, the three beaches visited and Kalamaki beach (see below) are too stony (large pebbles) for any turtle nesting. Unfortunately, some beaches could not be visited because of military restrictions (border to Greece!), but they are also stony according to Altan (1971). Thus turtle nesting within the park can be ruled out. There is one anecdotal report, which could perhaps explain the stories on turtle nesting within the national park: Geldiay (1981) reported that "we ... transferred eggs [of sea turtles] to the national park closest to Izmir (120 km) where no nests were made previously (National Park of Dilek Peninsula)". We do not know whether this was an attempt to introduce sea turtles.
- Protection:** The bays lie within Dilek Yarımadası (Samsun Dağı) National Park.

Kalamaki beach (Dilek Yarımadası National Park)

- ID-number:** 109
Co-ordinates: 37.41/27.09
Length: approx. 2.0 km
Description: Gravel beach with a constant width of about 5 m. Beyond 5 m the pebbles are larger and covered with a layer of humus. The incline of the beach is slight. Tree-covered hillsides are behind the beach.
- Land use:** Since 1985 there has been an increase in the promotion of tourism to the national park. Tourist buses directly connect the resort of Kuşadası with the park. Simple facilities such as a small cafe, water taps and picnic tables are provided along the shore. There is a large number of hotels etc. to the north of the national park (cf. beaches no. 105-106), but none in the park itself.
- Turtle situation:** Beach not favourable for turtle nesting. Cf. the remarks in previous section (small beaches of Dilek Peninsula).
- Protection:** The beach lies within the 10,985 ha Dilek Yarımadası (= Samsun Dağı) National Park, established in 1966.

Karine

- ID-number:** 115
Explanation: Other spellings available, e.g. Karina
Co-ordinates: 37.38/27.07
Length: 0.2 km
Description: Beach a few metres wide with large pebbles.
Land use: Road along the shore, ruins of houses in the background. Fishermen's tents have been built inside the ruins. There is a military post, continuously occupied by a few soldiers.
Protection: None, but Dilek Yarımadası National Park starts immediately behind the road.

Büyük Menderes Delta

ID-number:	116 - 121
Explanation:	116 narrow island on the northern edge of the delta 117 island to the north of Pale Boğazi 118 dune between Pale Boğazi and Atacak Boğazi 119 coast to both sides of the mouth of B. Menderes River 120 coast to the west of Mavi Göl 121 coast to the west of Karagöl
Co-ordinates:	37.38/27.07 - 37.28/27.10
Length:	16.6 km (116: 1.0 km, 117: 2.1 km, 118: 4.1 km, 119: 2.2 km, 120: 2.4 km, 121: 4.8 km)
Description:	The Menderes delta which was formed in historical times (the shore line has been pushed about 15 km forward within the last 1500 years, cf. Kasperek 1988) has a large area of shallow water in front of the shore. A depth of 10 m is reached after 1-2.5 km in the sea. In general, the shores are rather muddy with only a few sandy parts. All the land is rather flat and does not stand much over sea level. The northermost section is an extremely flat island with a width of 100-200 m. It is a dune consisting of compact sand and mud and is sparsely covered with halophyte vegetation. A very flat sandy island which is completely bare is situated to the south of this section and belongs to it. Section 117 also consists of a mixture of mud and very fine sand. The width of the beach is some 10 m after which a zone of halophyte vegetation follows. Steep edges have been formed in the splash zone as a result of the waves' actions. Section 118 is very similar, the edge in the wave wash zone reaches here some 40 cm in height and the width of the beach is more variable. It extends from 2 m minimum to over 20 m. The vegetated zone has sandy parts intermixed. Section 119 includes the mouth of the Büyük Menderes River (which is joined by the lower Menderes channel before the mouth; that is much bigger than the Menderes River). It does not provide any beach in the classical definition: All the shores are covered with reeds and rushes, which means that turtle nesting on this section can be ruled out. In section 120, the incline from the sea is very gradual for the first 5 metres, but then rises quickly to 1 m above sea level. To the south (in section 121), the beach becomes wider, but does not exceed 20-30 m. At the southern tip of the delta, the width of the beach is reduced again to a few metres. As in other parts of the delta, the beach here also consists of a rather compact mixture of sand and mud. A submersed sand bank is found all along the shoreline of the delta.
Land use:	The only human use of the delta is by fishermen. The fishery here is of national importance for Turkey. However, it is mainly confined to the inner lagoons and there is only modest disturbance on the seaside. A few huts are spread over the coast. Anglers are regularly present at the mouth of Menderes River. Some cattle graze regularly in section 120.
Turtle situation:	One dead green turtle washed ashore was found in section 117 on 4.7.1987 and another was reported by fishermen to be washed ashore some days before (Kasperek). Local fishermen report regular occurrences of sea turtles (live in the sea and dead washed ashore) in the delta (Kasperek).
Other fauna:	The delta is of international importance for wildlife, especially for breeding and resting/wintering waterfowl. Dalmatian Pelicans, <i>Pelecanus crispus</i>, breed in the delta. Other noteworthy breeding species include Little Bittern, <i>Ixobrychus minutus</i>, Night Heron, <i>Nycticorax nycticorax</i>, Squacco Heron, <i>Ardeola ralloides</i>, White-tailed Eagle, <i>Haliaeetus albicilla</i>, Avocet, <i>Recurvirostra avosetta</i>, Collared Pratincole, <i>Glareola pratincola</i>, Mediterranean Gull, <i>Larus melanocephalus</i>, Caspian Tern, <i>Sterna caspia</i>, and White-breasted Kingfisher, <i>Halcyon smyrnensis</i>. During winter, the area holds large numbers of waterfowl, i.e. ducks and waders.

Protection: None.
Various: The shallow sea is very turbid because of the presence of suspended particles. Many of the sandbanks and dunes are probably flooded in winter during storms.

Tavşan Burnu / Didim Orman Kampı

ID-number: 125
Co-ordinates: 37.26/27.14
Length: about 1 km
Description: Fine sand, width of the beach usually less than 10 m. The incline of the beach is slight, but steep slopes (sand hills) are behind the beach. These are covered with scrub.
Land use: There is a public camp site on the beach, belonging to the General Directorate for Forestry. Trees hide most of the tourist buildings. Nevertheless, some can be seen from the shore. Other houses (holiday villages etc.) are situated behind the beach. Seaweed is cleaned regularly from most of the shore for the guests of the camp site. The beach was crowded during several visits from spring to autumn 1988.
Various: The shores are covered by seaweed, sometimes almost one metre in height.
Protection: None.

Kovala Limanı / Türk Burnu

ID-number: 126
Explanation: several small bays close to each other
Co-ordinates: 37.23/27.13
Length: total length 1-2 km
Description: The area consists of rocky shores with some small bays, where agglomerations of alluvial mud are found. These are, however, not favourable for turtle nesting, because of the hard consistency of the ground and their narrowness. Some of the small bays also have gravel and slope steeply within 2-3 m from the sea.
Land use: Several holiday villages have either been built or are under construction in the surrounding area.
Turtle situation: Local inhabitants informed us that they observe sea turtles regularly in the sea, but they were unable to nominate any nesting site.
Protection: None.

Altinkum

ID-number: 127
Co-ordinates: 37.21/27.17
Length: approx. 1 km
Description: Fine sand for about one kilometre, bordered by rocks on both sides. Width approx. 200 metres. Together with beach no. 128, this is one of the few sandy beaches in the area. The meaning of its Turkish name is "Golden Sand Beach".
Land use: Behind the beach, and covering its total length, is a row of hotels, restaurants etc. The hotels belong to the settlement Yenihisar. On 9.6.88, the beach was

Protection: almost completely covered by sun-bathing tourists.
None.

Kuruerik Bükü

ID-number: 128
Explanation: The only shore is situated in the south of the bay
Co-ordinates: 37.21/27.19
Length: 0.5 km
Description: Sandy beach, which becomes muddy towards the shore line. This restricts its value for tourists and turtles as well. Width varying from 20 to 30 m.
Land use: Private houses belonging to Yenihisar are situated around the shore. Only a few people swimming were on the beach on 9.6.88.
Protection: None.

Akbük

ID-number: 129
Co-ordinates: 37.25/27.25
Length: 2.5 km
Description: Beach consisting of hard material, mostly of mud with some wet sand intermixed. An island close to the shore (Saplı Ada) consists of the same material. The beach slopes rather steeply from the sea.
Land use: The beach will be completely covered by tourist facilities.
Turtle situation: In 1987, Kasperek was told by fishermen that sea turtles occur there.
Protection: None.

Beach at Kazıklı Limanı

ID-number: 130
Explanation: The beach is situated at the place where the road from Gürçanılar meets the sea.
Co-ordinates: 37.20/27.29
Length: approx. 200 m
Description: A narrow shore consisting of mud and gravel.
Land use: Agricultural fields come up almost to the shore, and there are also some houses as well. The land has already been sold to a co-operative, which will construct a holiday village for local people. The preparations for this have not started yet.
Protection: None.

Beach at Güllük Körfezi

ID-number: 140
Explanation: Small bay west of Kiyıkışlacık
Co-ordinates: 37.16/27.33
Length: 100 m
Description: Small bay with a muddy and stony shore. A road runs parallel to the shore a few metres from it.
Land use: A camp site, not frequently used, is situated on the shore.
Protection: None.

lasos beach

ID-number: 141
Co-ordinates: 37.17/27.36
Explanation: Situated to the north-east of the village Kiyıkışlacık
Length: approx. 1 km
Description: Bay of alluvial origin. Shores muddy, with gravel in parts. At the back of the beach is a small wetland, which has been partly drained.
Land use: Some houses and a holiday village are being built in the direction of the village Kiyıkışlacık. With the development of tourism there (the village is the place of the ancient lasos), further construction can be expected.
Land use: The land at the back of the beach is grazed by cattle.
Protection: None.

Sarıçay mouth

ID-number: 142 - 143
Explanation: 142 is the area between the mouth of the two arms of Sarıçay and 143 is the area south of the southern arm towards Güllük.
Co-ordinates: 37.15/27.36
Length: 0.5 km (142) and 1.0 km (143)
Description: About 5 m wide beach consisting of fine sand. An extensive wetland is situated behind the coast. At some places rushes reach the shore line (no. 142). The beach becomes narrower to the south (143), generally only 2 m wide, and its material more coarse (gravel). Agricultural land, trees and scrub form the hinterland at those places.
Land use: The beach is intensively used by a fishery at both mouths of the wetland. Nets are situated at the outflows which can be closed.

Bodrum peninsula

The shore of the Bodrum peninsula is characterized by many small bays. None of them exceeds a length of 3 km. Narrow beaches with many pebbles are typical. Bodrum itself, the ancient Halikarnassos, is one of the oldest tourist centres of Turkey. However, other parts of the peninsula have only recently been developed for tourism or are still being developed. Access to the northern side of the bay of Gökova (Gökova Körfezi) is still difficult.

The survey covered 19 beaches or beach units with a total length of 26.2 km.

Torbalı (= Torba)

ID-number: 210
Co-ordinates: 37.05/27.28
Length: 0.5 km
Description: Integrated into the village of Torbalı (= Torba). A fine sandy beach which is only 5 m in width. A wall separates the shore from the streets of the village.
Land use: Tourist developments are on and behind the shore. Many tourists including surfers were there on 11.6.88.
Protection: None.

Demirler

ID-number: 211
Co-ordinates: 37.06/27.27
Length: 1.0 km
Description: Narrow (approx. 5 m) muddy beach. Wave activity has broken up the beach and formed a 30 cm high ridge. Vegetation behind the ridge. The sea in front of the beach is shallow and a few sandbanks are found.
Protection: None.

Aşağıgölköy

ID-number: 216
Co-ordinates: 37.07/27.24
Length: 1.0 km
Description: Beach completely covered with tourists and tourist developments. Road close to the beach, buildings behind the road.
Protection: None.

Gündoğan

ID-number: 219
Explanation: Beach 1.5 km to the north of Gündoğan
Co-ordinates: 37.08/27.21
Length: 1.3 km
Description: Beach consists mostly of gravel, fine sand only in a few places. Width approx. 2 m.
Land use: A road runs along the shore and buildings are situated immediately behind the road. A small harbour is situated in the bay.
Protection: None.

Yalıkavak

ID-number: 221
Explanation: Yalıkavak is situated in Ortakent Limanı. Ortakent is the old name for Yalıkavak.
Co-ordinates: 37.07/27.13
Length: 2.0 km
Description: Fine sand, width usually 5-10 m, but narrower to the southwest (towards Yalıkavak approx. 2 m). Some small bays on the northern side of the bay have gravel in between rocks. Sand, when present, is confined to a very narrow (1-2 m) band.
Land use: The area behind the beach is used for agriculture, but more frequently buildings are found there. From Yalıkavak to the south-west, the road runs parallel and close to the shore line.
Various: Seaweed covers some of the small bays on the northern side of the bay.
Protection: Part of the area is protected as a historical site.

Ortakent

ID-number: 224
Explanation: The beach is to the south of Ortakent
Co-ordinates: 37.01/27.21
Length: 3.0 km
Description: The beach consists of gravel and sand. Narrow (< 5 m) and with gravel in its easternmost part, the beach becomes 10-15 m wide at its centre. The widest section (15-25 m) is found on the southern end of the beach which is separated from the other parts by an approx. 100 m long rocky spur.
Land use: The central part is completely covered by tourist developments (road, restaurants, bars, etc.). At present, there is only minor tourist use of the eastern and south-western edges of the beach, but the construction sites for hotels and holiday villages have already been defined. The beach is cleaned every morning. Tracks of heavy vehicles were seen on the shore.
Protection: None.

Bodrum

ID-number: 225
Explanation: Beach in Kümbet bay to the south-west of Bodrum
Co-ordinates: 37.02/27.24
Length: 1.0 km
Description: Sandy beach used by tourists, the shore line is totally covered by tourist developments. The master plan for the development of tourism has designated the bay as a tourist zone.
Protection: None.

Tekerek Limanı

ID-number: 230
Explanation: Ildır Limanı is another name
Co-ordinates: 37.00/27.41
Length: 0.8 km
Description: Sandy to gravel beach with a mean width of 10-20 m. The beach slopes gently from the sea. The sea bed shelves quickly. A small creek has its mouth on the beach during high water level (spring), but after May - June, there is only a small pond behind the beach. Rich vegetation around this pond.
Land use: No buildings. A herdsman with about 100 goats was seen on the beach on 13.6.88.
Protection: None.

Beaches to the west of Hurma Burnu

ID-number: 231 - 233
Explanation: 231 is the westernmost, 233 the easternmost section
Co-ordinates: 37.00/27.43
Length: approx. 1.5 km (total length)
Description: Three small beaches (each 400-600 m in length) which are separated from each other by rocky spurs. Coarse grained gravel with some larger pebbles in between. The sea bed shelves quickly. Some cliffs in front of the shore.
Land use: One house in 231 and three or four including a coffee house in 233. The master-plan for the development of tourism assigns the total beach for tourist development.
Protection: None.

Beach to the east of Hurma Burnu

ID-number: 234
Co-ordinates: 37.00/27.45
Length: 0.7 km
Description: Coarse grained gravel with larger stones in between.

Land use: Some houses, fishermen on the beach, no tourists. According to the masterplan for the development of tourism, the beach will be covered by tourist facilities.

Protection: None.

Ilgın Limanı

ID-number: 235

Co-ordinates: 37.00/27.45

Length: 0.5 km

Description: Coarse grained gravel with larger stones in between (similar to 234).

Land use: No buildings, only two fishing boats laying on the beach. The beach is assigned as a tourist investment area together with no. 234 by the masterplan for the development of tourism.

Protection: None.

Kayaönü

ID-number: 237 - 239

Explanation: Beach with three sections which are separated from each other by rocks.

Co-ordinates: 37.01/27.50

Length: 3.6 km (237: 1.5 km; 238: 1.3 km; 239: 0.8 km)

Description: Narrow beaches (max. 6 m wide), whose material consists mostly of coarse grained gravel. In 238, some finer gravel is found and the beach is also somewhat wider (approx. 10 m) than the others. The beaches inclines gently from the sea, and vegetation with trees and scrub, are behind the beach. Underwater, the beach shelves rapidly.

Land use: A road, infrequently used, is just behind the beach in 239. No houses or other buildings are close to the beach and only a few local people swim in the sea here. The masterplan for the development of tourism foresees the installation of tourist facilities in the westernmost section of the beach (no. 237).

Protection: None.

Ören

ID-number: 241 - 243

Co-ordinates: 37.01/27.57

Length: 9.3 km (241: 1.5 km; 242: 6.3 km; 243: 1.5 km)

Description: The beach of Türkevleri (241) and the section to the south of Ören (242) are narrow (< 5 m), stony beaches. The east (243) becomes somewhat wider (5-10 m) and somewhat more sandy. The sea bed shelves quickly. The bottom consists of large pebbles. Some cliffs are in front of the beach (242). In 242, the wave activity has broken up the beach in places and formed a ridge up to 60 cm high.

Land use: A road runs just behind the beach parallel to the shore in the easternmost part (241). A large area in the west of 242 is covered by the construction site of a thermal power plant. A light-house is situated at the border from 242 to 243. Behind 242 there is farmland, in 243 some houses belonging to Ören village extend onto the beach. The masterplan for the development of tourism assigns

two areas for tourism: One in the eastern edge of the beach, and one at the mouth of Kemer Deresi.

Various: A small wetland is situated at the mouth of Kemer Deresi. This is a place, where a hotel will be constructed. Seaweed washed ashore formed a wall up to 60 cm high in 242 on 14.6.88.

Protection: The surroundings of Ören which is the ancient Keramos are protected as an archeological site. The protection area, however, does not extend onto the beach.

Datça peninsula

The Datça peninsula stretches far into the sea. It is the top of a submerged mountain. Only 1 km wide at its narrowest point, the coast is very rugged. The peninsula consists of two units: the Reşadiye peninsula and the Daracya peninsula (Bozburun). Apart from one almost 10 km long sandy beach to the east of Datça town, the peninsula does not provide much nesting habitat for sea turtles, as most of the bays have stony beaches. Marmaris is a major tourist centre, Datça is becoming another one, and many other places are being developed, for tourism at the moment. The survey covered 26 beaches or beach units with a total length of 51.6 km.

Gökova beach

ID-number: 301
Co-ordinates: 37.02/28.20
Length: 2.7 km
Description: Very gently sloping muddy shore. Most of it is covered by a freshwater wetland (mouth of İgriazmak Çayı). The shore is partly overgrown by vegetation.
Land use: Some tourist facilities on the northern edge of the shore.
Turtle situation: Kinzelbach (pers. comm.) found one old track of a sea turtle on 18.6.1987. No survey in 1988.
Protection: A "specially protected area" under the Barcelona Convention.

Kızılan beach

ID-number: 330
Co-ordinates: 37.47/27.42
Length: 9.0 km
Description: Very narrow (3-5 m) beach, with a steep incline from the sea. Large rocks are at the back of the beach. Stony.
Land use: None.
Pollution: Slightly polluted with litter which has been washed ashore.
Protection: None.

Beach south of İnce Burnu

ID-number: 331
Co-ordinates: 37.48/27.38
Length: 0.7 km
Description: A steeply sloping beach, narrow (3-5 m wide), gravelly (with pebbles up to 10 cm in diameter).
Land use: A light-house is situated to the east of the beach.
Pollution: Heavily polluted with litter washed ashore.
Protection: None.

Körmen Limanı

ID-number: 332
Co-ordinates: 37.46/27.37
Length: 3.0 km
Description: Beach consists mainly of coarse grained gravel, almost no sand. Width 5 m, sometimes even less. Immediately behind the beach, the ground consists of solid earth (farmland, gardens). A small creek (Güzne Deresi) has its mouth at the northern end of the beach.
Land use: A road coming from Datça leads directly to the beach. A primitive harbour is situated in the south-western section. There are plans to enlarge this harbour as a marina (masterplan for the development of tourism). Only a few houses elsewhere on the beach.
Protection: None.

Datça beach

ID-number: 351 - 355
Explanation: The beach is subdivided from the southwest (351) to the east (355) into five sections.
Co-ordinates: 37.46/27.44
Length: 9.7 km (351: 2.0 km; 352: 1.5 km; 353: 2.7 km; 354: 1.5 km; 355: 2.0 km)
Description: This beach is the only one of considerable size on Datça peninsula, and it is sandy as well. The southwestern edge of the beach is formed by the town of Datça, which is a tourist centre, and some large hotels are found on the beach near the town. The beach itself is narrow (< 5 m) and stony there. Wave activity has broken up the beach in several places, forming steep walls several metres high. The sea in front of a spur which projects into the sea (in 351) is shallow and many cliffs are found there. This is also the site of an ancient town. The narrow beach with steep cliffs behind extends up to 352, where the land behind becomes farmland. In 353, the beach becomes wider, extending 10-15 m from the shore line. It consists of fine grained sand with only some intermixed larger pebbles. The slope is gentle, and low dunes (usually lower than 1 m, but a few metres in places) back onto the beach. The dunes are covered with vegetation. A relatively high proportion of the land here is not cultivated, although some is under agricultural use. 354 and 355 are very similar to 353, thus also providing a sandy beach, although there are often coastal rocks in the wave wash zone.
Land use: 351 is more or less completely developed for tourism (hotels, public beach,

boats on the sea etc.). One wind surfing school has been established within the dunes (at the border of 353/354). There is much camping along the shore, most of the people arriving late in the evening and leaving in the early morning. Sand from the dunes is used for constructions (legal?), which causes serious damage to the landscape. The masterplan for the development of tourism intends to totally cover 353, 354 and 355 with tourist facilities.

Turtle situation: A local diver told us that he had seen sea turtles underwater several times and once he killed one by accident (!) with a harpoon. According to his description, they may have been immatures. Questionnaires regarding nesting resulted in contradictory statements. On 17.6.1988, no tracks were found. Another survey on 10.8.1988 resulted in two tracks, although neither led to a nest. The tracks were not at sites favourable for turtle nesting. In one case, the beach was only 1 m wide with a cliff behind, which hindered the turtle coming further up the land.

Protection: The ancient town to the northeast of Datça is protected as an archeological site.

Karaincır

ID-number: 358
Co-ordinates: 36.46/27.47
Length: 0.4 km
Description: Narrow gravel beach. Site of the ancient Bybassos.
Land use: A large tourist village is under construction.
Protection: The area is protected as an archeological site.
Various: Although being an archeological site, the masterplan for the development of tourism dedicates the area for tourist developments.

San Limanı

ID-number: 359
Co-ordinates: 37.46/27.48
Length: 0.7 km
Description: Stony beach with low dunes (height 1 m) behind. These are covered by vegetation. Agricultural fields are behind the dunes. The sea in front of the beach is shallow.
Land use: During a visit on 19.6.88, only a few children swimming and one yacht on the sea were seen.
Protection: The area is listed as a "natural site". It is not known whether this gives the area legal protection.

Emecik

ID-number: 360
Co-ordinates: 37.46/27.49
Length: 2.3 km
Description: Sandy and gravel beach with a width of 10-15 m in the west, declining to 5-10 m in the east. The sand is somewhat more coarse grained and intermixed with gravel in the west than in the east. Rocks, trees, scrub and rural areas behind

the beach.
Land use: A herd of sheep on the beach on 19.6.1988.
Protection: None.

Beach east of Kalemlik Burnu

ID-number: 361
Co-ordinates: 36.44/27.51
Length: 1.2 km
Description: Fine grained sand with some gravel intermixed. Width 10-15 m, sloping gently, natural vegetation behind.
Land use: A herd of sheep on the beach on 19.6.1988.
Protection: None;

Çiftlik Limanı

ID-number: 362
Co-ordinates: 36.46/27.53
Length: 2.5 km
Description: Fine sand; the width of the beach does not usually exceed 10-15 m. The beach slopes gently, under the sea as well. Some rocks stand out of the water.
Land use: The whole beach is used by tourists from a holiday village immediately behind the shore. This has been planned by the masterplan for the development of tourism.
Protection: None.

Kuruca

ID-number: 363
Co-ordinates: 36.45/27.55
Length: 2.5 km
Description: 5-10 m wide beach. Sandy in the eastern half, but becoming more gravelly to the west and south. Earth and some rocks behind the shore.
Land use: A small settlement in the middle of the beach, a camp site and restaurants in the southwestern corner. Fishermen with boats are active there. People swimming in the sea all along the shore.
Turtle situation: Fishermen said that they saw sea turtles several times swimming in the sea in earlier years. Once, they also saw one on the beach (egg laying?). However, none were recorded in 1988.
Protection: The hinterland is listed as a "natural site". It is not known whether this is a legal tool.
Various: Within the natural site and to the east of it, some specimens of the endemic palm *Phoenix theophrasti* are found (Boydak 1985).

Gönlücek Bükü

ID-number: 364
Co-ordinates: 36.46/27.28
Length: 1.5 km
Description: 2-3 m wide, stony beach with many cliffs in the sea. Rocky background.
Land use: None.
Various: Around the bay is one of the richest populations of the endemic and extremely rare palm *Phoenix theophrasti* (Boydak 1985).
Protection: None;

Lindos Limanı

ID-number: 366
Explanation: Situated to the northwest of Lindos Burnu
Co-ordinates: 36.46/28.01
Length: 0.7 km
Description: Stony beach with a width of 5-15 m, wider in the east than in the west. Many cliffs jut out of the sea. Rocky formations form the background to the beach.
Protection: None.

Erine beach

ID-number: 370
Co-ordinates: 35.48/28.08
Length: 2.5 km
Description: Narrow, 5-10 m wide beach. The shores are sandy to muddy. The mouth of a creek is covered with reeds. Vegetation (rushes etc.) often go right up to the water's edge. The zone of shallow water is relatively broad, some rocks jut out of the sea.
Land use: Tourists use part of the beach: bars, restaurants, boats, surfboards etc. However, the beach is not over-crowded. A herd of sheep was also on the beach on 16.6.1988.
Protection: The site of the ancient Erine has been allocated as an archeological site. This covers about half of the beach.

Selimiye beach

ID-number: 375
Co-ordinates: 36.42/28.06
Length: 2.5 km
Description: Stony beach of less than 5 m width.
Land use: Road close to the beach. Almost completely used for tourism.
Protection: None.

Turunç Beach

ID-number: 382
Co-ordinates: 35.46/28.15
Length: 1.2 km
Description: Width of the beach does not exceed 5 m. In the northern half, a wall runs along the shore. In general, a very stony beach with only a little sand in its southern half.
Land use: The whole beach is either developed for tourism or construction work for this aim is going on at present.
Protection: None. However, the ancient Amos which is located to the south of the beach is preserved as an archeological site.

İçmeler beach

ID-number: 383
Explanation: the beach is situated to the northwest of İçmeler (old name = Gölenye)
Co-ordinates: 36.48/28.14
Length: 1.0 km
Description: 10-15 m wide beach. Under a layer of fine sand, which seems to have been brought for the tourists. Hard earth and stones are found. The bottom of the sea is stony, too.
Land use: Almost completely developed for tourism. Some large hotels are being constructed.
Protection: None.

Marmaris beach

ID-number: 384
Co-ordinates: 36.51/28.16
Length: 4.5 km
Description: Sloping gently. Approx. 10-15 m wide beach. Only the upper layer consists of sand, deeper layers of hard earth and stones. The bottom of the sea is stony, too. The sand has been imported apparently from elsewhere to fulfil the needs of tourists.
Land use: The beach and the land at the back has been completely developed for tourism. It is the main beach of the nearby Marmaris tourist centre.
Protection: None.

Yıldız Adası

ID-number: 385 - 386
Co-ordinates: 36.49/28.17 (385); 36.49/28.18 (386)
Length: 1.0 km (385: 0.8 km; 386: 0.2 km)
Description: Two narrow, only 2-3 m wide beaches. Stony.

Land use: Completely used for tourism: yachts, swimmers and sun-bathers.
Protection: None.

Beach of Yalancı Bogazi

ID-number: 387 - 388
Explanation: 387 is the north side of the landbridge, 388 the south side.
Co-ordinates: 36.49/28.19
Length: 0.5 km (north) plus 1.5 km (south)
Description: This is a narrow (width 100 m) landbridge which connects Yıldız Island with the mainland. A sharply sloping beach. Gravel with rocks distributed over the beach.
Land use: As a road is being constructed, the greater part of the beach has been destroyed. The aim is to use the landbridge as a marina (masterplan for the development of tourism).
Protection: None.

Dalyan - Fethiye region

The Dalyan area is a transitional zone between the Aegean and the Mediterranean region. The Datça peninsula to the north of the area screens the Aegean region. The Dalyan - Fethiye region comprises three main beaches: Dalyan - İztuzu, Dalaman and Fethiye - Çalış. All three beaches are extremely important for nesting sea turtles and what happens to the region is of great interest for conservationists since it could set an example for turtle protection throughout Turkey. Fethiye is an old tourist centre, and Dalyan has undergone a tourist boom in the last 2-3 years; Before then it was a rather unknown village.

The survey covered 21 beaches or beach units with a total length of 26.4 km.

Ekincik main beach

ID-number: 412
Co-ordinates: 36.50/28.33
Length: 0.9 km
Description: This beach is situated on the west side of a rocky headland some 5 km (straight line) to the northwest of Dalyan beach. The beach consists of coarse-grained reddish sand with particles 3-5 cm in diameter, and pebbles up to 10 cm in diameter. The beach slopes fairly steeply from the sea over its whole length; its width varies from 40 to 50 m. Behind the beach there is dense vegetation and farmland; the bed of a dried creek is also situated there.
Land use: Three restaurants are situated on the western edge of the beach; the beach is almost inaccessible from the land side and the restaurants cater exclusively for yacht tourism. They are frequented by many yachts. On 22.6.1988, 24 large yachts and a higher number of smaller boats were counted. However, most of them seem to leave the area at night. Gravel is extracted from the beach, pro-

bably for road construction.

- Pollution:** Several plastic bags were seen in the sea around the yachts and a thin film of oil was present at the same locality and also further out to sea.
- Turtle situation:** In 1987, local people told us that many young sea turtles died in previous years near a restaurant, because they were attracted by its lights during the night (Kılıç and Kasperek). Nesting in the 1987 season was recorded by several people independently (Corbett, Groombridge, Kasperek, Kinzelbach et al.), but no figures on track and nest numbers etc. are available. The general impression was that the nesting density was about the same as on the Dalyan beach. On 22.6.1988, six tracks were counted. One of them was a false crawl, the other led to presumed nests. On 11.8.1988, eight tracks were seen. Nests were situated along all of them (up to 5 nests), but it remained unclear how many of the nests had eggs.
- Recommendations:** The beach has similar nesting densities as the nearby Dalyan - İztuzu beach. Both beaches should be treated as a unit and the "Mediterranean specially protected area", which comprises the whole Dalyan - İztuzu beach, should be enlarged to include the Ekincik beach. Further development on the beach should be avoided, and a solution to the yacht pollution problem should be found. It may be possible to screen the restaurants already operating with scrub, trees and perhaps fences and thus to avoid, or at least to minimise, the negative effect of the lights. The extraction of gravel should be stopped.

Ekincik small beaches

- ID-number:** 411, 413
- Explanation:** situated on the west (411) and east side (413) of the bay of Ekincik
- Co-ordinates:** 36.49/28.33
- Length:** 0.4 km (200 m each)
- Description:** Only 2-3 m wide beaches with pebbles up to 10 cm in diameter. Beach slopes rather steeply.
- Land use:** Above the beach on the eastern side of the bay (413), a large restaurant is situated and yachts anchor below it in the sea.
- Pollution:** Same as Ekincik main beach: Litter (plastic bags etc.) in the sea and an oil film on the surface of the sea.

Dalyan - İztuzu beach

- ID-number:** 415 - 416
- Explanation:** A small sandy beach to the west of Dalyanağzı is part of this site and has been allocated to no. 415
- Co-ordinates:** 36.48/28.36 - 36.47/28.38
- Length:** 4.2 km (415: 0.2 km; 416: 4.0 km)
- Description:** The Dalyan - İztuzu beach is a crescent-shaped sand dune. The western two thirds of it divide an extensive wetland (Dalyan estuary) with a labyrinth of reedy channels and rushy fields from the sea. Behind the eastern third is a small lake, İztuzu Gölü, which is separated from the Dalyan estuary by a mountain ridge. At the western edge of the beach, the wetland complex opens through a narrow channel (Dalyanağzı) to the sea. İztuzu Gölü does not have a natural surface connection with the sea, but one was created in the course of building a hotel in 1987, later cancelled. That has now silted up again. Over its total length, the slope of the sand dune to the sea is rather gentle, but

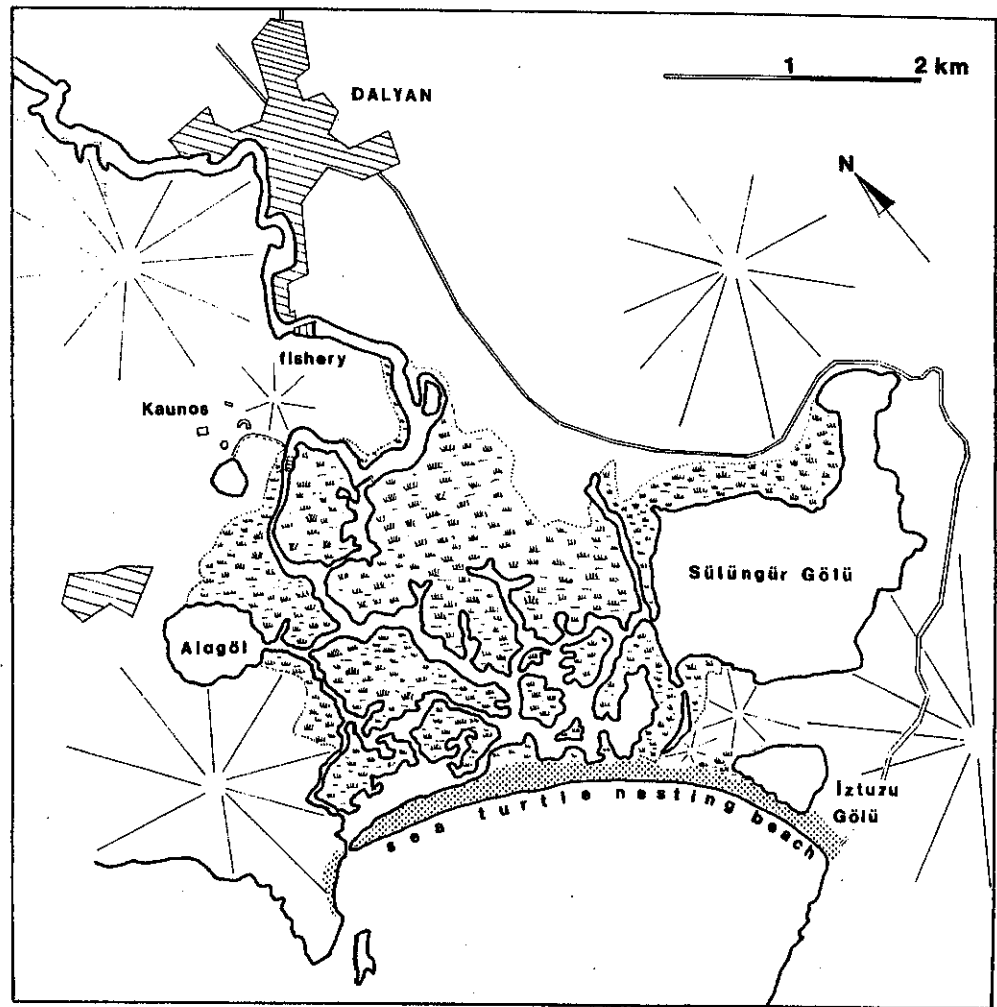


Fig. Map of the Dalyan sea turtle nesting beach and the Dalyan estuary.

towards the lagoon it is rather steep (cf. figure). The crown of the dune is sparsely vegetated. On both edges and near the rocky spur and around İztuzu Gölü, there are pines (*Pinus brutia*), most of them deformed under the continuous influence of wind. Other plants include e.g. oleander (*Nerium oleander*). The dune does not contain any pebbles, but consists of fine sand. The beach to the south of Dalyanağzı (no. 415) is up to 25 m wide and is surrounded by rocky formations.

Land use:

Until 1986, there were a number of beach huts on the beach. People from Dalyan village spent the summer there. The number of huts varied, but was mostly between 80 and 150. They were scattered all over the beach with concentrations on both edges. Following an order of the municipality of Dalyan, these huts were removed in 1986 and only some foundations are left. In 1988, only two primitive cafe-bars (built of wood) were situated on the beach. Even the research and recreation hut used by the Middle East Technical University had been removed.

On the hill to the east of İztuzu, a forestry camp with some 20-30 primitive wooden summer houses has existed for a long time. After a break in 1987 when the huts were taken over by a hotel builder, forestry people again started spending the summer months there in 1988.

In March and April 1987, some thousands of cubic metres of gravel were dumped on the southeastern corner of İztuzu Gölü in order to build a hotel (Kaunos beach hotel). The foundations were laid (the foundation laying ceremony was on 4.4.87), but after a few months construction stopped and in summer 1988 the project was cancelled. Thus, a large, hard, compact plain (about one hectare) of gravel and the concrete foundations are left. Although the hotel project has been cancelled, there are still rumours that some sort of building will go ahead:

for a turtle research station, for a congress centre, for a nature conservation academy, for a nature museum etc. These ideas mostly include lodging facilities.

Close to the foundations of the hotel, there is a long building parallel to the coast line. It was once the beginning of an illegal hotel construction which has been stopped. In 1987, it was restored and enlarged to provide lodging facilities for the engineers of the construction site of the Kaunos beach hotel. After completion of the hotel it was planned to remove the building.

The present tourist use of the beach is moderate. There are three ways onto the beach, by boat from the lagoon, by boat from the sea or by car from a road to Iztuzu. Most tourists choose the first route: They go by boat from Dalyan (and pass the kings' graves and the ancient Kaunos) to the beach in the morning and return in the late afternoon. Most tourists coming by boat from the sea side also stay only during the day (e.g. daily tours from Marmaris), but those coming to Iztuzu generally intend to stay the night here. In 1988, several tents and caravans were continuously present.

Following the publicity about Dalyan sea turtles, many photographers, TV-teams, tourists and even conservationists and researchers came to see the turtles. This caused much disturbance in 1987 and 1988.

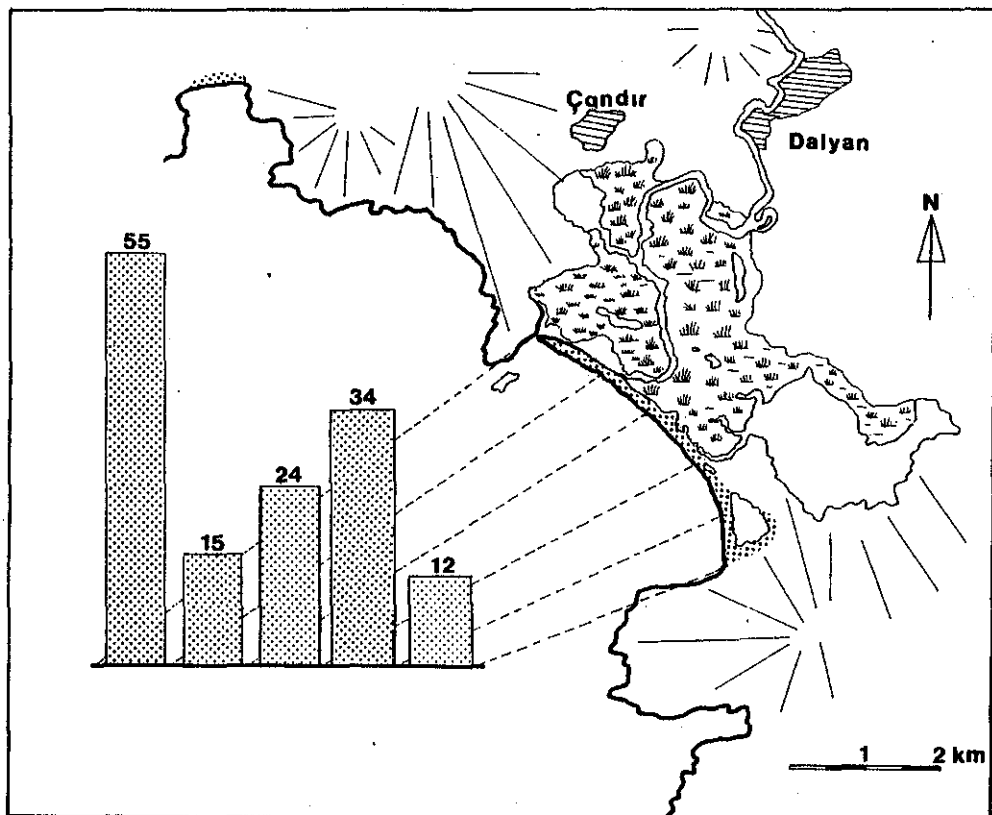


Fig. Distribution of nesting sea turtles on the Dalyan beach in 1987. The nesting densities vary greatly within the beach. The columns show the number of nests per season.

Turtle situation:

A carapace which was found at Dalyan in February 1973 is in the collection of the Aegean University (Başoğlu & Baran 1982). Geldiay (1987) found 47 nests/km or > 4 nests/km/day on the Dalyan beach in the years 1979-82. Although these numbers should be treated carefully since they are based on a wrong beach length and the counting method is not known, they confirm the importance of Dalyan beach for loggerhead turtles.

In 1987 and 1988, several observations of sea turtles were made. The most complete and long-lasting records were those made by R. Jesu (see table) on the main beach (no. 416) in 1987. Within 32 days, he counted 322 loggerhead tracks.

Tab. Turtle emergence and nesting data on the Dalyan beach in 1987. The data were kindly provided by R. Jesu.

date	nests	emergence only (no nest)	total emergences
June 4	4	5	9
5	2	8	10
6	1	10	11
7	4	5	9
8	4	7	11
9	12	9	21
10	5	5	10
11	2	0	2
12	2	1	3
13	2	1	3
14	2	1	3
15	2	0	2
16	1	2	3
17	7	0	7
18	3	5	8
19	4	3	7
20	5	4	9
21	8	12	20
22	16	13	29
23	8	5	13
24	4	19	23
25	3	2	5
26	3	1	4
27	5	2	7
28	3	1	4
29	5	2	7
30	5	4	9
July 1	8	18	26
2	5	4	9
3	8	3	11
4	6	6	12
5	5	10	15
-	total		
-	154	168	322
-	mean per night:		
-	4.8	5.2	10.0
-	mean per kilometre per night:		
-	1.2	1.3	2.5

168 of these (=52%) were false crawls, 154 resulted in clutch deposition. This means 10 emergences/night and a density of 2.5 tracks/km or 1.2 nests/km. On the small beach of Dalyanağı (no. 415), Kinzelbach (pers. comm.) counted 7-8 fresh turtle tracks on 3.7.1987.

In 1988, 17 tracks were counted on June 22th. At least 5 were successful in egg laying and at least 10 returned to the sea without laying. Two of the nests containing eggs were destroyed by predators (dogs?) in the same night. On August 11th, 4 tracks were still visible, two of these with nests and one false crawl. 9 nests which were destroyed by predators and three body pits were also seen.

Other fauna:

Lake Köyceğiz and the Dalyan estuary form one of the largest wetlands along the Turkish coast. They hold one of Turkey's most important population of Nile soft-shelled turtles, *Trionyx triunguis*, purple heron, *Ardea purpurea*, gull-billed tern, *Gelochelidon nilotica*, white-breasted kingfisher, *Halcyon smyrnensis*, and pied kingfisher, *Ceryle rudis*, are among the breeding birds. The total number of bird species recorded so far in the area is 176 (Kılıç & Kasperek 1987, 1989).

The otter, *Lutra lutra*, could still survive in the Dalyan estuary (Kılıç & Kasperek, unpubl.).

Pollution: No serious pollution on the beach itself. In the Dalyan delta however, the channels between Dalyan and the beach are polluted with oil from the boats transporting tourists. An oil film covers the water surface in some places.

Protection: Mediterranean specially protected area since 1988. In 1988, some wardens (employed by the municipality of Dalyan) were on the beach each night to prevent people from disturbing sea turtles. Tables were installed on the beach in order to inform people about the sea turtles and the necessary restrictions.

Various: The beach huts which existed until 1986 were said to have adversely affected sea turtles. This opinion was often heard especially from the hotel constructors. However, as the beach huts were not equipped with electricity, their influence would seem to have been less drastic than often described.

Recommendations: Dalyan has already become established as a "turtle paradise" in the public opinion and in the mind of politicians and decision makers. Protection measurements here will be held up as an example and will undoubtedly affect the conservation of other beaches.

The area is protected as a "Mediterranean specially protected area" in the framework of the Barcelona Convention initiated by the United Nations Environmental Programme. This legal status helps the protection of the area, but it does not ensure protection forever. It is therefore recommended that a core zone (which should include at least the whole beach and the whole estuary) be designated a "strict nature reserve". It is not recommended that Dalyan be made a national park, since national parks in Turkey do not ensure protection and are established for the promotion of tourism.

It is recommended that the authorities develop a plan for the development of tourism in Dalyan without damaging the ecosystem and threatening endangered species. Special emphasis should be given to the protection of the sea turtles and the management of the already damaged freshwater and brackish water ecosystems. Fishery experts and conservationists should work hand-in-hand to increase the fallen yield of the fishery in such a way that it is for the profit of the people there and for nature. A well-operating fishery ensures a certain independency from tourism.

The foundations of the cancelled hotel project, the gravel platform and the lodging house at İztuzu construction site should be removed immediately. Even if a complete restoration of the former beach is impossible, the platform and the foundations should be destroyed so that their later use is impossible. There is no need for any large scale conservation - information - congress centre (see above) on the İztuzu beach.

The wardening of the beach which began in 1987/88 should be continued and studies should be made into how to improve the wardening system and how to train the wardens. A station for the wardens and for any scientists as well should be established. This should be done not on the İztuzu construction site, but on the lee side in the centre of the sand dune near the already existing moorings. It should be a wooden construction like the traditional huts of local people and should be equipped with a boat.

Information and guidance is necessary for tourists. A nature information centre should be set-up within Dalyan, if possible in conjunction with the general tourist information centre. It is important to inform as many tourists as possible about nature conservation in the area and about any necessary restrictions. This would not happen if such a centre was in İztuzu.

The most important regulations for tourists will be the prohibition of access to the beach during the night. This will be controlled by the wardens.

Efforts are necessary to create zones free from disturbance in the Dalyan estuary. The boat traffic which is very heavy at the moment has to be limited in number and on certain routes. A plan has to be worked out which can be applied to boats carrying tourists and for fishing boats as well.

Beaches west of Sarigerme

ID-number: 419 - 420
Explanation: two beaches close to each other in one bay
Co-ordinates: 36.43/29.39
Length: 200 m each
Description: Sandy to fine gravel beaches up to 20 m wide, which are surrounded by rocky formations. Many rocks are scattered on the beach in 420; the slope from the sea is slight to medium.
Land use: One small restaurant on 419 was being constructed in June 1988.
Turtle situation: No turtle tracks counted. On 420, there were perhaps 3-5 very old tracks on 22.6.1988, which were, however, too blurred to allow a definitive identification.

Sarigerme - Dalaman beach

ID-number: 421 - 425
Explanation: 421 Sarigerme to Sarisu
 422 Sarisu to Dalaman Çayı
 423 Dalaman Çayı to SEKA main canal
 424 SEKA main canal to Acısu (= Taşlıçay)
 425 Acısu to south-eastern edge
Co-ordinates: 36.42/28.41 - 36.41/28.48
Length: 10.1 km (421: 1.3 km; 422: 1.6 km; 423: 3.8 km; 424: 1.9 km; 425: 1.5 km)
Description: The shape of the beach is like a crescent, not unlike the Dalyan-İztuzu beach. Rocky mountains form the edges on the eastern and the western side. These rise up to 370 m within a kilometre from the sea. The back of the beach is formed by the lowland of Dalaman River, one of the big streams on the Turkish coast and which has suffered a lot from its industrial use. The beach is intersected by the mouths of Sarisu, Dalaman River, SEKA sewage canal and Acısu. The general appearance of the landscape has changed considerably in recent years: A sewage canal has been opened to the sea and the bed of some smaller streams has been changed.
 Over its whole length, the beach is sandy to gravelly, but the pebbles hardly exceed 1 cm in diameter and long stretches consist of pure fine sand. Gravel banks are present especially in section no. 424. The width of the beach is 20-30 m in general, but increases to some 100 m in places, and it has sand dunes in the background. These are vegetated with pines in the western edge and with sparse low plants elsewhere. The beach inclines gradually from the sea, and only to the west of Dalaman River are there steep edges which make the beach unfavourable for turtle nesting. Around Acısu mouth, there are coastal cliffs in the splash zone, but here also, the substrate of the beach is sand. In many places, the bottom of the sea slopes steeply, reaching a depth of 10 m within a few hundred metres.
Land use: On the western edge of the beach (in 421), a large hotel complex with several hundred beds and two holiday villages are being constructed. This belongs to the Sarigerme tourism investment area which extends up to the mouth of the Dalaman River. The complete obstruction of the area with tourist facilities is planned. At the time being, workers live with their families on the beach in tents and huts.
 Near the eastern edge of the beach, another tourist installation, a holiday village with 659 units (Incebel holiday village) is being constructed. It is planned to be completed by the end of 1989. It is about 1.0 km away from the shore and is situated on a rocky spur above the plain.
 Dalaman airport which has been opened on 13.5.1982 for civil international

flights is very close to the beach. It is also used for military purposes, especially during the night. Starting and landing planes go low over the beach. During the night, there is additional light pollution from the airport, which is however, modest.

Some fishermen are seen every day at the mouth of Acisu and other streams. Close to Acisu mouth, there are also some tents and huts belonging to local people who spend the summer on the shore.

Apart from the new constructions at Sarigerme, there are no other buildings on the shore and access is often difficult. However, the masterplan for the development of tourism foresees the total obstruction of the beach with tourist establishments. Only an 1.5 km wide section which is flown over by planes from Dalaman airport while starting and landing is planned to be maintained undeveloped.

Turtle situation:

In 1987, Kinzelbach (pers. comm.) found on June 17th one nest in 421, 7 nests in 422, 17 tracks (including 2 false crawls) in 423 and 10 nests (including one false crawl) in 424. Groombridge (unpubl.) did not find any turtle track during a 2 km walk in 421/422 on 10.7.1987. On a 2 km stretch in segments 423/424 (exact locality unknown), he detected 7 nests of which 3 were opened by predators.

The results of the 1988 survey are presented in the table. Segment no. 423 holds by far the highest number of sea turtles: 69.7% of all tracks (or 67.3% of all nests) were found there. This number not only reflects the greater length of that section compared with the others, but the nesting density is also considerable higher than in the other sections (see figure).

Tab.: Results of the 1988 sea turtle survey on the Dalaman - Sarigerme beach.

date	beach no.	all tracks	apparently without with nest	nests ("U-turns")
23.6	421	0	0	0
	422	1	1	0
24.6	423	24	13	10
	424	5	4	0
	425	0	0	0
30.6	421	1	1	0
	422	3	2	1
	423	28	20	5
	424	20	11	6
	425	4	4	0
12.7	421	0	0	0
	422	8	4	2
	423	37	24	7
11.7	424	11	2	0
12.8	421	0	0	0
	422	7	2	0
	423	73	17	8
	424	4	3	0
	425	2	2	0

Other fauna:

The Dalaman delta was once a large wetland. Now only a small part remains. It is, however, still of vital importance for wildlife, and holds Nile soft-shelled turtles, *Trionyx triunguis*, and some endangered birds like the purple heron, *Ardea purpurea*, or ruddy shelduck, *Tadorna ferruginea*.

Recommendations:

Since it is one of the main nesting grounds of loggerhead turtles in Turkey, the Sarigerme - Dalaman beach needs special attention. The masterplan for the development of tourism has designated the area as an investment area: The whole beach is planned to be covered with hotels and other tourist developments except for a 1.5 km wide segment in front of the Dalaman airport. The

plan does not consider the ecological value of the area as a habitat for logger-head turtles and of Nile soft-shelled turtles. It has recommended the urgent installation of a sewage farm for the state-owned SEKA paper mill which is situated some 10 km in the inland. It is not tolerable to pollute the sea with enormous amounts of uncleared sewage which destroys any life near it.

A tourist development as has been outlined by the masterplan for the development of tourism is not realistic anyhow as the noise from the nearby airport cannot be screened. Such a development would be harmful to the sea turtle populations. A revision of the plans should take these aspects into consideration and should confine tourist developments to the western edge of the beach (Sarıgerme). The turtle population is lowest there.

The core zone of turtle nesting should be protected as a strict nature reserve which means a strict ban on construction work and the strict prohibition of any use of the area for reasons other than conservation and science.

In a detailed plan, the core zone, the buffer zone and the border of the tourist area should be defined. It should be investigated whether the lights from already existing (but not yet operating) hotels are harmful to sea turtles and if so, it should be studied how to minimize these effects.

It is of great importance to ensure that the holiday village on the rocky spur at the eastern edge of the beach does not dump its sewage into the freshwater ecosystem there, which is the habitat of the endangered Nile soft-shelled turtle. Disturbance e.g. by boat-traffic must also be avoided.

Protection:

About one third of the Sarıgerme investment area is protected as "SİT alanı", i.e. as a site of archeological importance. Nevertheless, hotels are being constructed within that protected area. This has led to protests in the Turkish press. However, they did not succeed in changing the situation.

Küçük Kargı

ID-number: 430

Co-ordinates: 36.44/29.01

Length: 0.6 km

Description: Gravelly beach with pebbles up to 2 cm in diameter. The beach slopes sharply close to the sea, but is rather flat further back. The width of the beach is about 30 m. Meadows behind.

Land use: Camp site belonging to the General Directorate for Forestry.

Protection: "Mediterranean specially protected area".

Fethiye - Çalış beach (northern side)

ID-number: 435 - 437

Explanation: this item refers to the beach to the north of Çalıştepe. No. 435 is the section from Uzun Burun to the mouth of Kargı Çayı.

Co-ordinates: 36.41/29.04

Length: 4.8 km (435: 1.0 km, 436: 1.5 km, 437: 2.3 km)

Description: The width of the beach is 50 m and more. Only the first few metres of the beach gently slope up from the sea. The shingle here consists of pebbles up to 2 cm in diameter. Behind this zone, the beach becomes much steeper and most pebbles are 5-10 cm in diameter. The crown of the beach which has a width of about 30 m still has large pebbles, but also fine sand. Sand is mixed with pebbles everywhere: sand is the dominant substrate at some places, shingle in others.

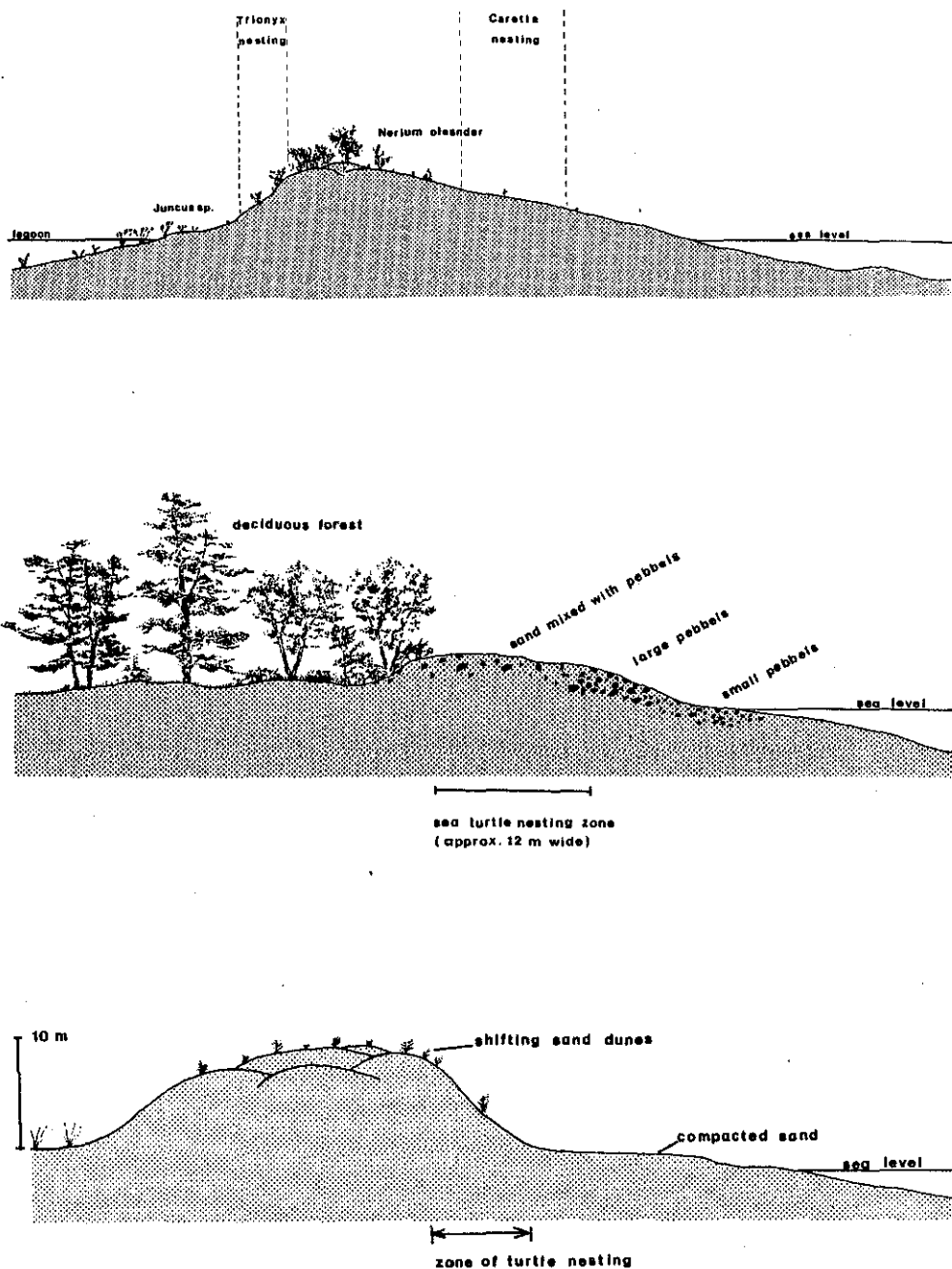


Fig. Cross sections of the beaches of Dalyan (top), Fethiye (middle) and Patara (bottom).

The back of the Dalyan beach is formed by a lagoon where Nile-soft shelled turtles, *Trionyx triunguis*, live. These use the back side of the sand dune for egg laying, whereas loggerhead turtles, *Caretta caretta*, use the front side. — The Fethiye beach consists of sand and shingle with pebbles of varying size. Beyond the dune, there is a forest. — In some parts of the Patara area (like in the example), the beach is rather flat and consists of compacted sand. Thus loggerhead turtles use the often rather steep slope of the shifting sand dunes for egg laying in those areas.

No. 435 is the beach from the northern headlands to the mouth of a creek (Çayboğazı Deresi or Kargı Çayı) which almost dries up in summer. In June, its depth at the mouth does not exceed 10 cm. No. 436 is the beach to the south of this creek. Its southern border is marked by a fence for cows. No. 437 is from here to some rocks (Çalıştepe) which give the beach a natural boundary.

Behind the southern section of the beach (437), a large wetland is situated. Large parts of it are covered by a forest which is partly inundated. Small creeks are situated within it. Open areas are covered with dense vegetation including reeds, others with rushes. One of the creeks has an outflow to the sea, however, there is a main drainage channel which runs to the south and opens to the sea towards Fethiye.

The forest continues to the north and forms the hinterland of section 436. The vegetation of the forest and the wetland extends up to the beach in 436 and the western half of 437, but is further away towards Çalıştepe.

Land use:

A large tourist club is situated to the south of the mouth of Çayboğazı Deresi. The beach in front of the buildings is under permanent use (umbrellas, beach-chairs etc. which are not collected during the night). A wooden pier was under construction in 1988 and the tracks of tractors on the beach may belong to that. The guests of the club also go fishing with rods especially at the mouth of Çayboğazı Deresi. The lights of the club are more or less hidden by trees and scrub. There are almost no other activities on the beach, apart from some swimming children, some cows sleeping on the edge of the beach and some fishing boats.

Geldiay (1978) has reported "many summer camp units" on the beach of Çalış. In 1988, only a very few huts were present on the southern part of the beach (437) which were, however, not inhabited.

During a visit on 24.6 and 7.7.1987, Kinzelbach (pers. comm.) noted many people swimming and also huts on the beach. This apparently refers to the southern edge of the beach.

The masterplan for the development of tourism plans to cover approx. the northern half of the beach with tourist developments. The southern half (no. 437 and a part of no. 436) should remain without buildings, as it is a "natural site" with an "archeological site" within its borders. Çalıştepe is designated for tourism, too. As the beach has been designated a "specially protected area" in the framework of the Barcelona Convention, these plans might be changed.

The northern edge of the beach (435) is subject to extraction of gravel for construction. Almost the whole beach is covered with tractor tracks.

Turtle situation:

Turtle nesting has been recorded by Geldiay (1978). Later publications put the beach into a class of nesting density with medium importance, that is a density with 1-4 nests/km/night. However, Kinzelbach (pers. comm.) did not find any turtle track on 24.6 and 7.7.1987. If there were any, they had been obliterated by the people on the beach, he says.

On 25.6.1988, three tracks of emergences which resulted in nests were found on 435, 23 tracks (at least 4 without nests) on 436 and 19 tracks (at least one without nest) on 437. This means 9.37 tracks/km with a maximum of 15.3 tracks/km in the central section of the beach (436).

On 13.8.1988, no tracks were found on 435, 52 on 436 (most of them were identified by the nests rather than by the females' tracks, only two of the tracks were false crawls) and 11 on 437 (including one false crawl). Three of the nests in 436 were destroyed probably by dogs. Most of the tracks found on 13.8 seemed to be rather old. The total track density was 13.1 tracks/km with a maximum of 34.6 tracks/km (or 33.3 nests/km) on 436.

The large pebbles make it extremely difficult to find and to trace the turtle tracks and therefore to assess their exact number. Taking this into account, the figures are minimum numbers rather than maximum numbers.

Protection:

The beach is among the first three areas which were designated as "specially protected areas" in the framework of the Barcelona Convention in 1988. However, it is too early to tell what the protection will be and how it will work in practice. A part of the beach is protected as "natural site". Within the boundaries of that site, an "archeological site" is situated.

Recommendations:

This beach is among the most important nesting sites of loggerhead turtles in Turkey and needs the strongest protection. The "specially protected area", the "natural site" and the "archeological site" are three different tools for conservation and all should be used for effective conservation.

Unfortunately, the club hotel on the beach has been finished and is operating.

However, its position is somewhat in the background and the existence of trees and scrub as well as the natural form of the beach hides the hotel to some degree. There is some hope of avoiding any illumination of the beach from the hotel. The exact photopollution, i.e. the illumination of the environment with artificial lights, on the beach should be assessed and efforts should be done together with the operator to minimize it. Any other buildings (hotels, restaurants etc.) including tents and huts should be completely prohibited.

The extraction of gravel from the beach for construction work (now ongoing in 435) should be forbidden (or illegal anyhow?) and effective controls should be established.

Any night time activities on the beach in front of the club hotel should be avoided, e.g. beach parties etc. Further studies should be made to see if it is necessary to collect the deck-chairs, umbrellas etc. in front of the hotel at night. Any buildings and further tourist development on the beach should be banned. This should include Çalıştepe, and a buffer zone should be established to the south (see below).

Protection of the beach should include the wetland behind the beach.

Fethiye - Çalış beach (southern part)

ID-number:	438 - 440
Co-ordinates:	36.40/29.06
Length:	3.5 km (438: 1.5 km, 439: 0.7 km, 440: 1.8 km)
Description:	438 is the beach between Çalıştepe and the beginning of the first houses of the settlement, 439 is the beach in front of the settlement up to the place where the main road approaches the beach at a right angle, and 440 is the remaining southern beach. 438 has a width of about 20 m and is very flat close to the sea, but steeper further away. The beach consists of shingle which is coarse grained in general, but fine grained in a few places. 439 is similar, but has no sandy parts. In contrast to both, 440 seems to be completely sandy, but an examination of the beach shows that this is only the upper layer which covers the pebbles. The fine sand apparently has been brought by man in order to fulfil tourist needs. Behind the beach are fields and dried up parts (summer!) of a wetland in 438, human settlement in 439-440. The southern tip of the beach is muddy (outflow of wetland drainage). Other than the beach itself, the bottom of the sea consists of rather fine grained sand.
Land use:	Only one hut and a rather primitive camp site are situated on 438. The other two sections (439-440) are covered with tourist developments (hotels, guest houses, camp sites, restaurants, bars etc.). In 440 a road divides the beach (which is artificially sandy) from the buildings (promenade). Whereas the southern sections are over-crowded, modest numbers of tourists are found in 438. There, a fishing boat also lay on the beach.
Turtle situation:	A loggerhead turtle which was caught at "Fethiye" in May 1975 by fishermen is in the collection of the Aegean University İzmir (Başoğlu & Baran 1982). Four turtle tracks ending at a nest were counted in 438 on 25.6.1988 and three tracks (one of them a false crawl) on 439. None in 440. During a second survey on 13.8.1988, no sea turtle tracks were found. However, local people told us that young turtles were seen on 439 on two nights. The freshly fledged turtle babies had been attracted by the lights of the houses, where they were collected and taken to the sea.
Various:	Hooded Crows (<i>Corvus corone cornix</i>) live around the beach and are possible predators of baby turtles which are still on the beach during the daytime.
Protection:	"Specially protected area" in the framework of the Barcelona Convention. An area to the south of Çalıştepe is protected as an "archeological site".
Recommendations:	Building on the beach has already reached an advanced state. Building should

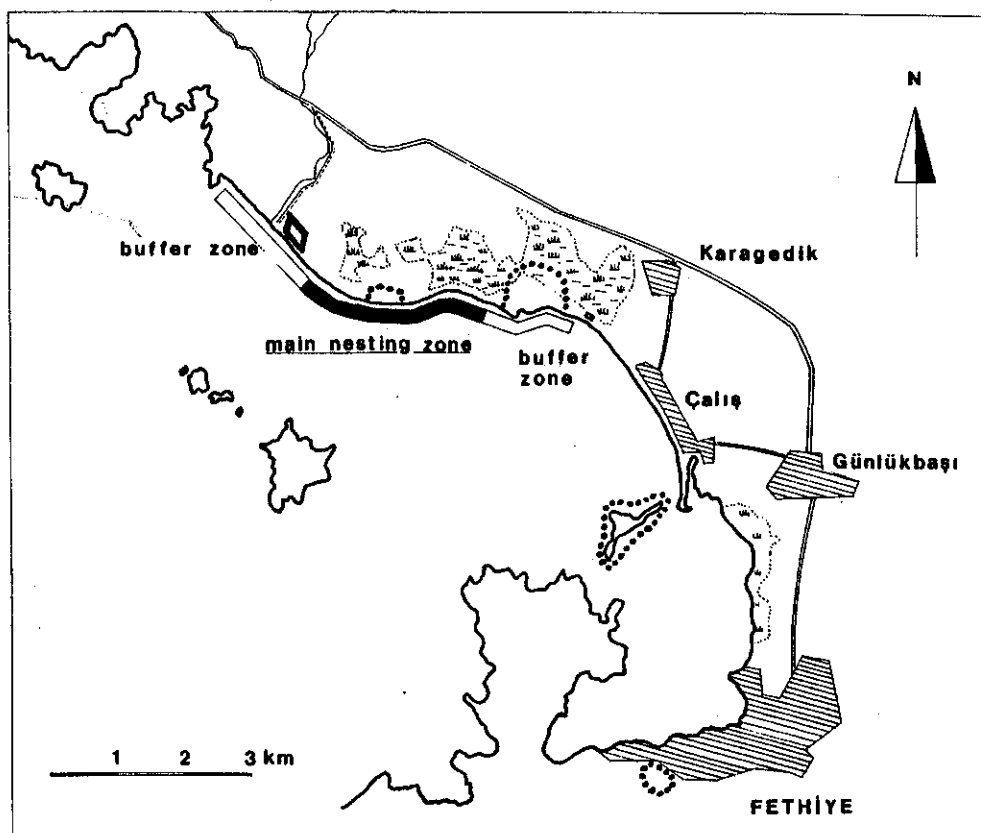


Fig. Map of the Fethiye beach. The map shows the main turtle nesting zone and buffer zones for a proposed turtle reserve. The dotted line shows the border of areas which are protected as "archeological sites". The square in the proposed northern buffer zone indicates an existing hotel complex.

be stopped at the southern border of the archeological site. Although the beach has apparently lost its importance for sea turtle nesting, it is important to establish a buffer zone here to the turtle beaches 435-437.

Ölü Deniz

ID-number: 445 - 446
Co-ordinates: 36.33/29.07
Length: 1.5 km
Description:

The western half of the beach (445) is a sand dune which separates a lagoon from the sea. Only a ten metres broad cut at the western edge connects the lagoon with the sea. The beach is gently sloping and is some 50 m wide. It consists of fine sand and pebbles up to 2 cm in diameter. Vegetation, mostly pine plantations, form the crown of the dune.

The southeastern half of the beach (446) consists of a strip of shingle about 20 m wide by the sea, behind which there is a 20 m wide strip of fine sand. Behind that, a road runs parallel to the shore.

Land use: Ölü Deniz ("Dead Sea") is one of the main tourist attractions in the Fethiye region. In tourism planning, Ölü Deniz has become a separate "tourist centre". The area behind the road in 446 is completely covered with tourist developments like restaurants, camp sites etc. Most of the tourists come for daily tours from Fethiye. Boats, surfboards etc. are available for rent on the beach.

The western half of the beach (445) belongs to the General Directorate of Forestry. A public recreation area has been established, although staying overnight is prohibited.

Protection:

The area has been designated a "natural site". In 1988, it became a "specially protected area" in the framework of the Barcelona Convention.

Patara - Kumluca region

This is a southern section of the Turkish Mediterranean coast, even further south than e.g. Adana. The Taurus mountains meet the coast at an almost vertical angle. The coast is steep and is full of rocky cliffs. Sand has only agglomerated in considerable amounts on both edges of the region: Near Patara, where the Eşen River opens to the sea and in the bay of Finike - Kumluca. Tourist development is concentrated mainly at Kaş (where no sandy beaches are available) and around Finike. The Patara beach has only recently been "discovered" for tourism and is undergoing a tourist boom, although the total number of tourists was still moderate in 1988.

The survey has covered 15 beaches or beach units with a total length of 42.6 km.

Patara beach

ID-number: 510 - 512

Explanation: 510: northwestern edge to Özlen Island
511: Özlen Island to mouth of Eşençay
512: Eşençay to the southeastern headlands

Length: 11.8 km (510: 2.1 km, 511: 3.7 km, 512: 6.0 km)

Description: The Patara beach lies south of the ancient Lycian towns of Patara, Xanthos, Letoon, and Pydnae and is bisected by the mouth of the ancient Xanthos River, which is now called Eşençay. The whole beach consists of fine sand.

The northwestern half has been divided into two sections (450-451). The first (450) extends from the northwestern edge of the shore to a place where a small rocky island (Özlen Adası) lies in front of the beach. It is an extremely flat and low-lying beach, and the activity of waves which apparently flush over the beach from time to time has made the sand compact and hard, and even heavy vehicles can drive on it. The sea in front of this section is very shallow. The 0.5 m isobathe is 50 m and the 5 m isobathe is about 1 km in front of the tide line. This very flat beach is 40-50 m wide, behind which a broad zone of shifting dunes is situated. They have been covered in vegetation and wicker-work in an attempt to stop them moving.

The following section is similar, although the flat, compact area in front of the dunes is much smaller, decreasing to a strip of only about 5 m in width. The sea in front of the beach also becomes deeper to the east, the distance of the 10 m isobathe from the tide line decreases from about 1.2 km to about 0.3 km in the middle. The latter figure remains constant for the rest of the beach.

In the part of the beach close to Eşençay River mouth, the flat zone in front of the dunes varies from 5-20 m in width. Many dead trees and drift wood are on the beach, indicating that the shifting dunes are changing the landscape considerably (wind erosion).

The southwestern part of the shore from the mouth of Eşençay River to the headlands near Gelemiş Köyü is a rather flat beach with dunes in the background. The distance from the shore line to the dunes varies from 50 to 250

metres, in mean about 100 m. The beach itself is often step-like, as the waves have broken up the sand and have formed edges. Along the shore, there are often zones of shallow water and there is a wet sand strip of up to 20 m. Vegetation has been planted on the dunes behind the beach in order to prohibit their movement. The dunes reach a height of 10 m.

Land use:

The beach can be entered either from the northwestern or from the southeastern corner. There are no roads to other parts and also not to the Eşençay River mouth. The approach from the northwest is not used by many foreigners, as it is not easy to find from the main road and the track is very bad for several kilometres. Nevertheless, many local people go to the beach to swim especially at weekends. In section 450 many vehicle tracks were found on the beach. At weekends, people even come by tractor and lorry onto the beach. During the week and at night, the number of tourists is low, but the headlights of vehicles were seen even from a great distance. In the northwestern corner, there are a few primitive restaurants made of reed and wood.

In front of Gelemişköy, a lot of tourist trappings are found, such as beach-chairs, umbrellas (over 100), tents against the sun, kiosks, etc. These are not collected at night. Tractors were said to drive up and down the beach in 1988, selling soft drinks to tourists (Groombridge 1988). The lights of Gelemişköy cannot be seen from the beach, but they give an indirect illumination at the horizon. Only one light (house?) on the headlands above Gelemiş shines directly onto the beach.

Gelemiş was almost unknown to tourists until recently. At present, it is undergoing a tourist boom with many new houses, guest houses, restaurants, camp sites, etc. However, the total number of visitors was still modest in 1988 compared with other tourist beaches.

In 1988, there was an attempt to carry out some research on turtles by a foreigner on a private basis. Some unqualified activities apparently led to the beach being disturbed and possibly to negative effects on sea turtles.

Pollution:

Plastic, tyres etc. were seen especially around the mouth of Eşençay, but in modest numbers.

Protection:

The area around Gelemiş (Patara) is protected as an "archeological site" which includes also the easternmost 1.9 km of the beach itself. For this reason, access to the beach at night is prohibited and there is a warden to enforce the prohibition.

Turtle situation:

Geldiay (1978) stayed three days on the northwestern half of the beach (which he called "Kumluova" after a nearby village) in July/August 1978. He noted many tracks and young turtles. In later publications (e.g. Geldiay 1982), he referred to this nesting site as "Kaş", although this settlement is some 45 km away. However, there is no other possible nesting site in the surroundings of Kaş. Geldiay (1982) has put the "Kaş" nesting site, i.e. the Patara beach into a class of medium importance for loggerhead nesting with estimated nesting densities of 1-4 km/km/day.

On 8.7.1987, Groombridge (1988) recorded four fresh *Caretta* nests plus two U-turns, on a 1.5 km walk on the eastern half of the beach and saw further tracks of emergences with binoculars further away. In the western half, he located one old track, with no nests located, probably of *Ch. mydas*; one of two further nests, by *Caretta*, had been opened and gulls had recently been eating the exposed eggs. However, no information on the length of Groombridge's walk in the western half of the beach is available.

In 1988, 124 emergences on the eastern half of the beach were counted between 7 June and 9 July (32 nights). All seemed to belong to *Caretta*. At least 14 nests were made and eight females were tagged (Groombridge 1988). If the number of nests in relation to the number of emergences (11%) is really so low (figure of nests is a minimum value), this might reflect a considerable disturbance, probably by the researcher himself.

On 10.6.1988, 17 tracks of emergences were counted on the eastern half of the beach. At least 15 of these did not succeed in clutch deposition (and the situation of the remaining two tracks was not clear). On the beach to the west of Eşençay, 12 tracks were counted, 11 of these being false crawls. The remaining track resulted in a nest which was destroyed by predators, probably by a dog. In

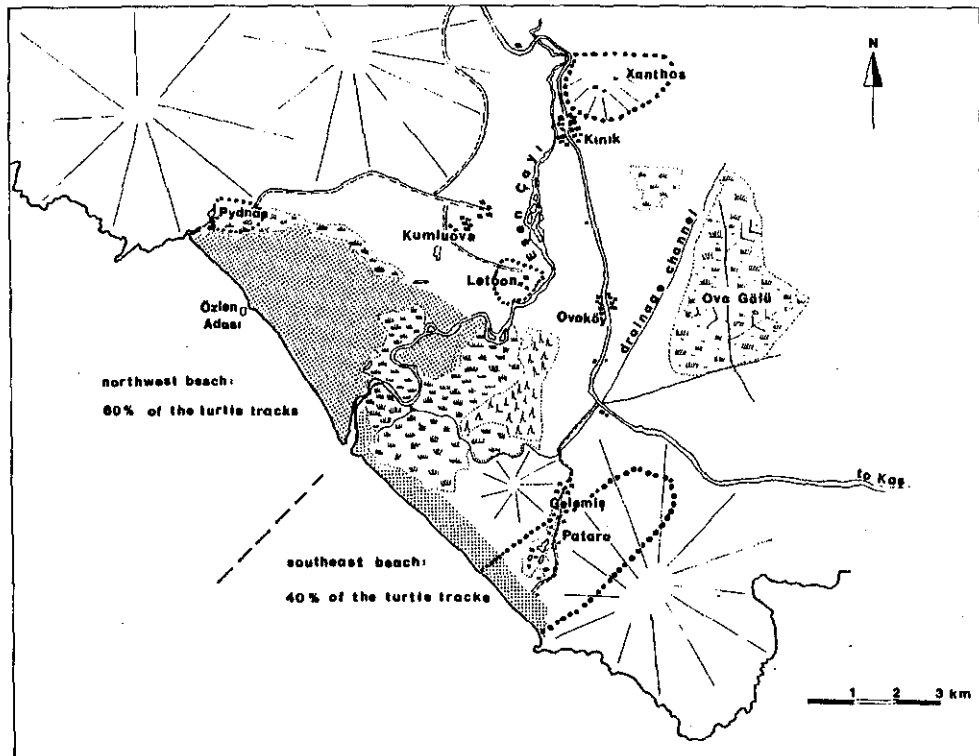


Fig. Map of the Patara beach. The dotted lines shows the borders of areas which have been protected as "archeological sites".

the following night (10-11.6) two *Caretta* were observed laying eggs on the eastern half of the beach close to Gelemişköy (no complete count of the beach that night!).

On 26-28.6.1988, the western half of the beach was patrolled again. No tracks were found in 510, but 14 in 511. 8 of these were U-turns, five apparently resulted in successful egg laying and the situation of one track was not clear. In the night of 27-28.6, four U-turns were recorded in 510, but all turtles returned after a few metres without reaching the nesting area in the dunes. They did not even cross the flat, low sand between the dunes and the sea. In 511, eight emergences were counted of which three apparently resulted in nests.

On 13.7.1988, 10 emergences of which only one resulted in a nest were counted on the eastern half of the beach. Among 38 emergences on the western half of the beach, there were at least 24 U-turns and at least 7 nests. Three of these were destroyed by predators, probably by foxes.

On 14.8.1988, three fresh tracks of emergences of the night before were recorded on the western side and two of them probably resulted in nests. In addition, one nest, destroyed by predators, was found and one nest from which at least five young had hatched. Judging from the tracks, however, none of the young reached the sea because of predation by crabs. On the eastern half of the beach, eight tracks were found, at least six of them were U-turns and even the remaining two probably did not lead to nests.

Summarizing the results, the extraordinary high proportion of false crawls is prominent. 71-76% of all emergences did not result in clutch deposition.

Recommendations: As one of the main nesting grounds of the loggerhead turtle in Turkey, the beach needs strong protection, e.g. as a "strict nature reserve". There are no plans for tourist development of the beach by the Ministry of Tourism, but the tourist boom at Gelemiş in 1988 might cause other people or institutions to bring up this idea. A nature reserve should be declared to prevent tourism even starting in the area.

The already existing restrictions for walking on the eastern section at night should be strictly enforced. The prohibition should also be extended to the

western shore. The warden of the archeological site should be trained to warden for turtles as well. There is no objection to tourists using the beach in front of Gelemiş during the day, but the umbrellas, deck chairs, sun shades etc. should be removed from the beach at night.

The reasons for the extraordinarily high proportion of false crawls should be investigated. It is significantly above the Turkish average.

Beach southwest of Kale

ID-number:	520
Co-ordinates:	36.13/29.28
Length:	0.8 km
Description:	The beach is situated between Güvercin Island (Güvercin Adası) and Taşdibi Burnu. It is sandy and slopes gradually from the sea. Its width is 20-50 m (40 m in the mean) and the landward side is sparsely covered with low dune vegetation. Rocks are found on the eastern one third. The sea in front of the beach is rather shallow.
Land use:	A restaurant which is frequented by local people is situated on the shore. Tractors and cars often drive on the beach, judging from the large number of tracks.
Pollution:	Litter and tar on the beach.
Protection:	None.

Kale beach

ID-number:	521 - 523
Co-ordinates:	36.13/29.29 - 36.16/30.04
Length:	8.5 km (521: 3.3 km, 522: 3.0 km, 523: 2.2 km)
Description:	The beach slopes gently from the sea. In some southern parts (521) the vegetation zone starts some 70 m behind the tide line. In other parts, the beach's width is 15-25 m. After that, it becomes rather steep for a few metres and vegetation (scrub etc.) begins behind that zone. The northeastern part of the beach is a spur-like dune which separates the sea from a lagoon. The lagoon opens through a small channel (Dalyan) to the sea at the edge of the beach. The whole beach consists of shingle with pebbles up to 15 cm in diameter. Some sandy parts are situated in the northern one third of the shore (523) and in some areas to the rear of the beach. Especially in some southern areas, the shingle turns gradually from coarse grained gravel into sand intermixed with pebbles.
Land use:	Huts (made of wood, reed and plastic) which are inhabited by local people during the summer months cover the greater part of the beach (not in 523). Also one or two restaurants are among the huts. There are tractor tracks everywhere. Gravel and sand is removed from the beach in 521 for construction works.
Pollution:	Some litter on the beach.
Turtle situation:	Kinzelbach (pers. comm.) did not find turtle tracks during a visit on 24.6.1987. Also no tracks on 12.6.1988, when 521 and 522 was surveyed. On 17.8.1988, again no turtle tracks were found in these sections, but surprisingly 34 tracks were counted in section 523. Some of these were rather old. 6 of them were false crawls, but at least 20 resulted in nests. At 3 nests, the tracks of young turtles were visible. On 17.8.1988, an adult turtle was observed during the day swimming in the sea close to the shore at Dalyan.

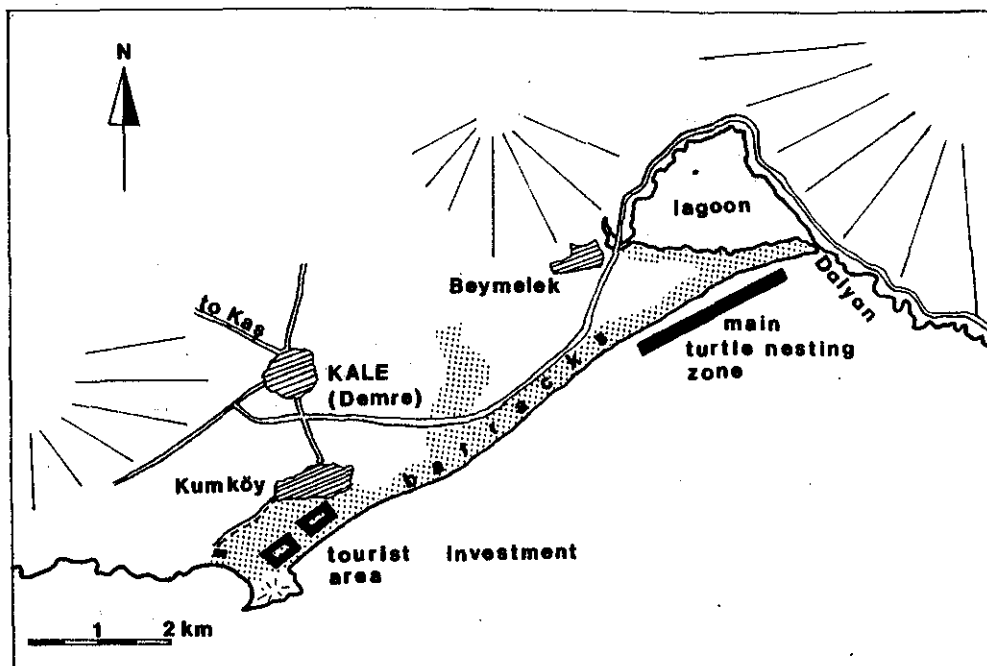


Fig. Map of the Kale beach. The grey area shows the sandy parts. The main turtle nesting zone is in the edge of the beach which is free of beach huts belonging to local people.

Information was obtained on turtle nesting in sections 521-522 from local people living in the huts on the beach. Young turtles were observed there at the beginning of August and in mid August 1988. They were seen under the huts. Thus, the western two thirds of the beach which are more or less completely covered with huts, are also used occasionally by turtles for nesting.

In the eastern one third where no huts are situated, 34 tracks were counted which is about 11.3 tracks/km and which puts the beach among the important nesting grounds of Turkey.

Pollution:

Some litter on the beach.

Recommendations:

Further study is needed for a full understanding of the beach as a nesting ground for sea turtles. The eastern one third of the beach should be protected. It should be screened from the hut lights and headlights of the cars on the road behind. Further study on the the importance of the beach for turtle protection and on necessary conservation measures is needed. Although not occurring at the moment, removal of sand and gravel from the beach is a possible forthcoming issue. The small wetland on the southwestern side of the lagoon and the lagoon itself should also be protected.

Protection:

None.

Finike - Kumluca

ID-number:

530 - 536

Co-ordinates:

36.18/30.09 - 36.16/30.22

Length:

20.5 km (530: 2.2 km, 531: 2.5 km, 532: 4.7 km, 533: 3.7 km, 534: 2.5 km, 535: 2.9 km, 536: 2.0 km)

Description:

The beach is situated in the bay of Finike and is crescent-shaped. Rocky headlands border the beach on the eastern and western edge. A plain which is under agricultural use is situated behind the beach. Whereas Finike, a tourist town, is situated by the sea (at the western edge of the shore), the larger town of Kumluca is some 5-6 km inland.

In general, the beach slopes gently from the sea and is at least 30-40 m wide. The crown of the dunes which occur behind the beach are sparsely covered with herbs and scrub. The substrate is fine sand in general, often with some coarser material in the wave wash zone.

At the eastern edge of the beach, the substrate consists of shingle with pebbles of 1-2 cm in diameter rather than of sand. The westernmost section of the beach (no. 530) is extremely flat and consists of compact, wet sand. Apparently it is flooded during storms. In section 531, the beach becomes very narrow, the width being reduced to a few metres. The beach is very steep, almost vertical in places because of ridges formed by wave action. Freshwater springs are found a little above the sea level.

Eucalyptus trees have been planted on the dunes to the east of Finike and to the south of Mavikent.

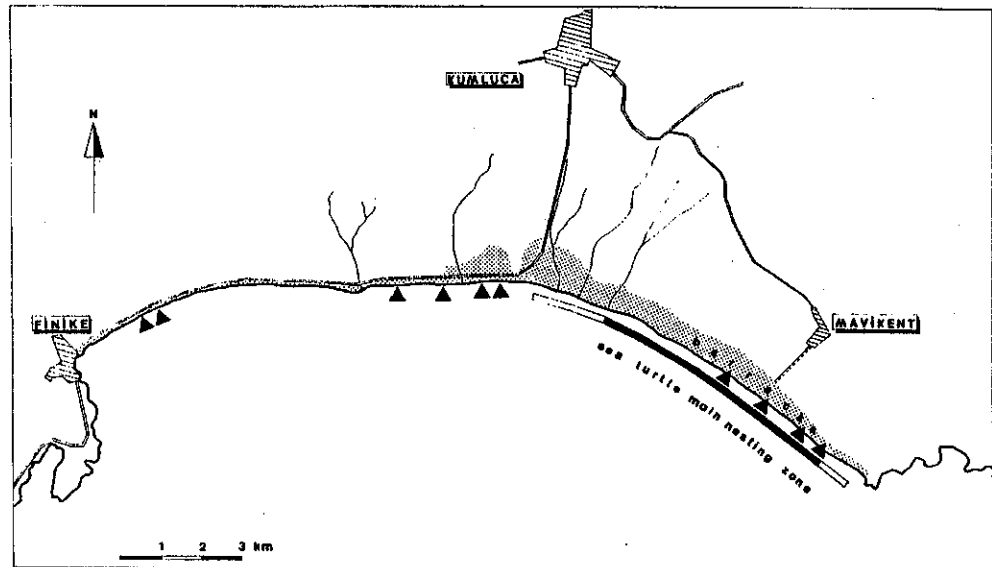


Fig. Map of the Kumluca beach. Sea turtle nesting is concentrated on the eastern half of the beach. The triangles indicate plots which are designated for tourist use by the Ministry of Tourism.

Land use:

The predominant human influence on the beach are the huts which have been built on the beach (usually 30-50 m from the sea) and are inhabited for several weeks in summer. This is a traditional way of escaping from the inland heat where there is no cooling wind. Only a few places have no huts. They are wooden pile-works and reedmats and plastic is frequently used for the construction. The people living there come from the surrounding villages and towns (like Finike, Kumluca or Mavikent). In general, the huts are rather primitive, but in Mavikent electricity is available to the huts.

Most of the people arrive around the end of July. They bring almost their complete household with them, including e.g. television, car and also their cats, dogs and hens. The huts are built on state-owned land and (at least) in Mavikent the inhabitants pay a fee to the Government.

There are only a few huts close to Finike (in section 530) because that beach is mostly used by day-time tourists from the town. The steep ridge in section 531 does not provide good sites for huts. Nevertheless, several huts are scattered over the beach even there. The edge of Yapraklı canal (which is the border of section 533 to 534) has no huts, nor does section 536 at the eastern edge of the beach. All the remaining coastline in the eastern half of the Finike - Kumluca beach is covered by huts. Thus, the huts cover more than 50% of the beach.

A public beach and some recreation facilities are planned near the mouth of Akmazsu. These will be installed and operated by the municipality of Beykonak. The huts already there belong to inhabitants of that town.

There is heavy extraction of sand and shingle from the beach. A large sand and gravel pit exists in beach no. 536.

Tracks of cars, tractors and other heavy vehicles are frequently seen on the beach. These are mostly related to the huts.

A few fishermen are working on the sea in the Finike - Kumluca bay. Finike has a harbour.

Turtle situation:

The beach has been recognized by Geldiay as an important nesting ground for loggerhead turtles. On a map, he indicated >4 nests/km/day for Finike and >1 nest/km/day for Kumluca. In another publication, he does not mention Finike, but gives 29.4 nests/km/season for Kumluca. Although there are some methodical doubts on these figures and 29.4 nests/km/season is much too small a value, if the daily number of nests is over 4 nests/km, the importance of the beach for loggerhead turtles has been established.

In 1988, the importance of the beach for sea turtles was confirmed. The results

Tab.: Results of the counts of sea turtle tracks in the bay of Finike - Kumluca in 1988.

beach no.	date	track number	with nest	U-turn
530	27.6	0	0	0
	15.8	0	0	0
531	15.8	0	0	0
532	13.6	14	7	5
	17.8	0	0	0
531-532	27.6	13	8	3
533	27.6	10	8	2
	16.7	39	12	25
	17.8	0	0	0
	19.8	0	0	0
534	27.6	25	22	1
	28.6	21	14	1
	16.7	91	38	47
	16.8	62	0	0
533-534	13.6	32	6	7
535	17.8	8	1	1
536	16.8	40	0	0
535-536	28.6	19	11	5
	16.7	51	21	29

are presented in the table. Section no. 534 proved to hold by far the largest numbers of nesting sea turtles: Up to 91 tracks with about 30 tracks/km (or at least 12 nests/km) were counted. Sections 535 and 536 are still of great importance for nesting turtles and also no. 533 where up to 39 tracks have been counted.

In addition to these results, a number of nests from which young had hatched were found: 7 in section 532 on 17.8, 4 in section 533 on 17.8 and 9 here on 19.8, 3 in section 534 on 16.8 and also 3 in section 535 on 17.8.

A total of 6 females have been tagged (27.6 - 1.7.1988). They all proved to be *Caretta*.

Recommendations: The eastern half of this beach is one of the most important nesting grounds for the loggerhead turtle in Turkey. Therefore, efforts are necessary to protect this site both legally and in practice. The map (cf. Fig.) gives a preliminary idea on the position and size of a protected area: The whole beach from the eastern edge to the place where the road meets the beach needs to be protected. A buffer zone should be established. Nevertheless, further study is needed to define exactly the boundaries of the core and buffer area. Study is also needed to determine the extent to which the western half of the crescent-shaped beach should be included in the buffer zone. The lights of any construction there (at present, there are no large constructions outside Finike) could harm sea turtles on the opposite side of the beach.

The creation of a protected area would involve the cancelling of some tourist projects planned by the Ministry of Tourism on the eastern edge of the beach (masterplan for the development of tourism).

At present, the greatest problem is local people's huts which cover many kilometres of the beach. At nesting time, the huts are not inhabited and are therefore not so harmful to sea turtles. Egg deposition has even been recorded under the pile-works. However, the huts are inhabited when the young hatch. The consequences are devastating: Many young turtles are disorientated by the lights of the huts and by the tracks of heavy vehicles in the sand, or they are destroyed by dogs, cats or hens. The available data are still too few to be precise, but breeding success seems to be very low for these reasons. Further investigations are necessary and should be carried out as a matter of urgency, since similar problems are present at many other places in Turkey. The settlement of huts elsewhere should be considered. A compromise would be not to allow any new huts and to concentrate the huts at one or two places. Now, they are usually built in 1-3 rows parallel to the sea. It should be possible to reduce the coverage of the beach by building the huts one behind another rather than side by side. The distance from the sea is not so important for the inhabitants as they do not use the sea for swimming.

Moving the huts elsewhere would also considerably reduce the number of vehicles being driven on the beach. However, the removal or the resettlement of the huts should be done in close cooperation with local people and local authorities, since their agreements is essential for the long-term protection of turtles. Two restaurants are also operating in the egg-laying season of the turtles. They are situated on the western end of section 536 and their lights shine over a large area at night. The lights could easily be screened, and this should be done by the owner of the restaurants in cooperation with conservationists.

Protection: None.

Adrasan (Çakmak)

ID-number: 540
Co-ordinates: 36.18/30.28
Length: approx. 1.0 km
Description: The beach is surrounded on three sides by rocky mountains. Its width is 100-200 m and it slopes gently from the sea. Mediterranean maquis is found behind the shore. The substrate is coarse grained sand with pebbles up to 2-3 cm. Large pebbles dominate. The depth of the sea falls rapidly within a few metres from the beach to 3.0 m, but then increases only slowly. A small creek, which has some water even in summer, has its mouth at the northern edge of the beach.
Land use: At present, the beach is used by only few foreign tourists, some local fishermen and some boat builders. A road runs for about 200 m parallel to the beach and three restaurants are situated there. A few huts are situated at the northern edge of the beach.
Pollution: Slightly polluted with waste and tar from the sea.
Protection: None. An "archeological site" borders the beach from the north.
Turtle situation: Six turtle tracks were observed on 13.6.1988 one of which led to a presumed nest. The situation of the other tracks remained unclear. On 19.8.1988, two sets of tracks of turtle babies were found. They consisted of about 20 young each and all were heading towards the sea. The hard consistency of the beach however did not allow the tracks to be traced right up to the sea.
Because of coarse grained sand and people walking on the beach, it is thought that none of the tracks on 13.6.1988 was older than one day.

Antalya - Alanya region

Antalya is *the* tourist centre of the Turkish "riviera". It has an airport and many tourists arrive here and leave again, even when they spend their holiday elsewhere. In 1988, some 200,000 tourists arrived at Antalya airport on some 2,500 charter flights. Many of the tourists spent their holiday within the town and in nearby tourist centres.

The coast to the south of Antalya is characterized by the steeply rising Beydağları mountains. Many sandy bays are situated at their foot. The "South Antalya tourism development project" is one of the largest development projects in Turkey. It has been described in the chapter on tourism. All beaches to the south of Antalya will be developed for tourism irrespective of whether the area is protected as a national park.

To the east of Antalya, a long sandy beach extends up to Alanya. Heavy tourist development is also proceeding there, especially around Manavgat - Side and around İncekum - Alanya, two of the main investment areas for tourism. Other beaches are still rather remote and provide good opportunities for conservationists.

The survey has covered 46 beaches or beach units with a total length of 141.9 km.

Olimpos beach (Çıralı)

ID-number:	601
Co-ordinates:	36.25/30.29
Length:	3.0 km
Description:	Rocks form the southern and northern edges of the beach. The width is 50-70 m with coarse grained gravel along the tide line. The pebbles become smaller about 10 m from the sea, and a fairly fine sand forms the landward side of the beach. Sparse, low vegetation lies behind the beach, also a meadow and several groups of trees. Two small and very cold creeks run into the sea at the southern edge of the beach where the ancient Olimpos is situated.
Land use:	The beach is difficult to reach for tourists, as only one track (partly through a dry river bed) leads to it. Nevertheless, tourists visit the area in modest numbers and even landrover tours are organized by one of the clubs in the vicinity. A few kiosks are on the beach for tourists and two camp sites in the hinterland.
Protection:	National park (Olimpos-Beydağları National Park). Completely protected as an "archeological site".
Turtle situation:	The tracks of freshly hatched turtle babies were seen by Kinzelbach (pers. comm.) on 2.8.1987 and a disabled <i>Caretta</i> young was found later in that nest. On 28.6.1988, four tracks of emergences were found. Two of these were rather fresh U-turns, the other two were too old to identify any possible nest. Local people told us that they observed an egg-laying female in 1988 before the survey.

Tekirova

ID-number:	605
Co-ordinates:	36.30/30.32
Length:	3.7 km
Description:	The width of the beach varies from 30 to 100 m, being about 60-70 m on average. The main substrate is shingle with pebbles of about 1 cm in diameter, but some pebbles at the back of the beach are very large (diameter up to 50 cm!). In general, the texture of the beach becomes finer towards both ends of the beach. The slope of the beach from the sea is average, with a rather steep rise at the

vegetation zone. Except for some buildings (see below) pine forests and scrub lie behind the beach. Some freshwater is found in the southern part of the beach, which however, dries before reaching the sea. The mouth of another small freshwater creek lies to the north of the large hotel.

Land use:

A large hotel (Phaselis Princess Hotel) is operating in the centre of the beach. Another large hotel (hundreds of beds) and a holiday village are being built in the forest behind the southern part of the beach. The beach in front of the already existing hotel (100-200 m) is intensively used by tourists. There are 100-200 deck-chairs and umbrellas, which are not removed at night, rent-a-boat and rent-a-surfboard facilities etc. Also a boat for parachute jumping over the sea is available. Camping occurs on the beach.

The masterplan for the development of tourism designates the whole beach as a tourist zone. All the lots have already been sold. See also the chapter on tourism for the "South Antalya tourism development project".

Pollution:

The beach is somewhat polluted with tar.

Turtle situation:

Kinzelbach (pers. comm.) found 13 nests plus 6 false crawls on 28.6.1987 and 10 nests on 2.8.1987.

On 18.6.1988, 11 tracks of emergences were counted, of which at least two led to nests and one was a false crawl. The texture of the beach (shingle) did not allow any nests to be identified along the other tracks. On 30.6.1988, 17 tracks were counted (8 with nests, 2 false crawls, the rest unclear), and on 17.7.1988 49 tracks. 28 of these were in the northern half of the beach (14 with nests, 14 false crawls), and 21 in the southern half (7 with nest, 12 false crawls, 2 unclear). On 19.8.1988, 15 tracks (all with nests) were in the north and 12 (11 with nests, one false crawl) in the south. Most of the tracks seemed to be rather old. In the latter part, in addition to the figures given, the tracks of turtles babies from four nests were found.

The turtle tracks are concentrated somewhat towards both edges of the beach, i.e. away from the illuminated hotel in the middle.

Recommendations:

The results clearly show the importance of the beach for sea turtles. However, the existence of one large hotel and the advanced stage of construction of two more are considerably harming the sea turtle population. Building on the beach should had been prohibited earlier. Now, in this advanced stage of development, we have to live with what is there. Nevertheless, as much as possible should be done for the sea turtles, so that they continue to nest on the beach. Hotels should be screened to avoid illuminating the beach at night. Umbrellas, deck-chairs etc. should be removed from the beach at night. A sepatate study should determine other protection measures.

Nevertheless, long-term adverse effects on the sea turtle population are almost inevitable and efforts should be made to compensate the negative effects.

Protection:

National park (Olimpos-Beydağları National Park).

Çamyuva

ID-number:

607

Co-ordinates:

36.34/30.35

Length:

5.2 km

Description:

About 60 m wide beach; slope from the sea is average; coarse grained gravel and fine sand alternate with each other in different zones.

Land use:

A road lies parallel to the southern half of the shore of approx. 400 m from the sea. A diving school is situated at the southern edge of the beach. In the southern half, the gravel has been covered with fine sand by man. At the northern edge of the beach, there is a large construction site for a hotel. See also the chapter on tourism for the "South Antalya tourism development project".

Turtle situation:

One track of an emergence which apparently resulted in a nest was found on

Protection: 14.6.1988.
National Park (Olimpos-Beydağları National Park).

Kemer

ID-number: 608 - 609
Explanation: 609 is the northern section south to Tekerlek Tepesi which is separated from the remaining coast by a rocky spur.
Co-ordinates: 36.37/30.34
Length: 4.8 km
Description: 60-70 m wide beach, sand to shingle mixed with rather large pebbles. Usually the zone closest to the sea consists of coarse grained shingle and the landward side of finer material with only a few large pebbles. The proportion of gravel increases to the south and around the town of Kemer, where almost no sand is found.
Land use: The northernmost part of the beach (609) is covered by a camp site (kiosk, deck-chairs, umbrellas, surfboards, lights at night, etc.). The beach near Kemer and its surroundings are also under intensive tourist development. In the central part of the beach, there are no tourist facilities and hence only a few tourists. The tourist plan (masterplan for the development of tourism) anticipates the use of about 70% of the beach length for tourist facilities. See also the chapter on tourism for the "South Antalya tourism development project".
Turtle situation: On 14.6.1988, two turtle tracks (one apparently leading to a nest, the other unclear) were seen and also about 15-20 pits which could have been old turtle nests. As no tracks were present, a positive identification was not possible. On 30.6.1988, two turtle tracks (one U-turn and one resulting in a nest) plus at least three old nests where the animals' tracks have been obliterated, were observed. On 20.8.1988 again two tracks, both with nests, were observed, plus one nest without any track, two rudimentary tracks (very old) and five nests from which young had hatched. All turtle tracks were concentrated in the middle of the beach which is the most remote section, away from the tourist facilities around the town of Kemer and at the northern edge of the shore.
Protection: National park (Olimpos-Beydağları National Park).

Göynük

ID-number: 610 - 611
Explanation: 610 is the southern, 611 the northern half of the beach
Co-ordinates: 36.41/30.34
Length: 5.3 km (610: 2.3 km, 611: 3.0 km)
Description: An approx. 50 m wide beach with rather steep slope close to the sea (about 50 cm high "step" at the splash zone of the waves), but only slightly sloping behind that zone. Gravelly with several zones changing from fine grained shingle to coarse grained shingle and vice-versa. Behind most of the southern part of the beach are pine forests.
Land use: A large holiday village (Palmiye Club) is situated at the southern end of the beach with waste sites in the forest and an excessive use of highly poisonous insecticides along the fence. A few hundred metres to the north is a similar development. The shingle on the beach there has been covered with fine sand and concrete structures help to stop the waves washing the sand away. Buoys

indicate the swimming area in the sea. Other facilities include wind surfing, rent-a-boat, water-skiing, diving school, beach bars, several hundred deck-chairs etc. Boarding houses etc. are in section 611, but further away from the beach. See also the chapter on tourism for the "South Antalya tourism development project".

- Turtle situation:** One track of an emerging sea turtle which probably also laid eggs was seen in 610 on 15.6.1988. No distinctive tracks on 611, but a few obliterated tracks which seemed to be turtle tracks. On 21.8.1988, three nests from which young had hatched were recorded on 611. All the turtle observations were made where no guesthouses or building work was in progress.
- Protection:** National park (Olimpos-Beydağları National Park).

Beldibi beach

- ID-number:** 612 - 613
- Explanation:** 612 is to the south of Beldibi, 613 to the north
- Co-ordinates:** 36.43/30.34
- Length:** 6.5 km (612: 3.5 km, 613: 3.0 km)
- Description:** A 40-50 m wide beach, narrowing to 20 m in some places. The zone close to the tide line is shingle with larger pebbles up to 30-40 cm in diameter among the smaller ones. The zone beyond this has a finer texture: generally fine sand is found at the back of the beach where sparse halophyt vegetation covers the ground. The beach lies at the foot of a headland which is covered with a pine forest.
- Land use:** Completely used for tourism: motels, camp sites, picnic facilities, boat clubs, guest-houses, holiday villages, private summer houses, beach umbrellas etc. A main road leads to the hillside above the beach and can be seen from most spots on the beach. See also the chapter on tourism for the "South Antalya tourism development project".
- Protection:** National park (Olimpos-Beydağları National Park).

Yumrucak beaches

- ID-number:** 615 - 619
- Explanation:** Some small beaches to the north and to the south of Yumrucak Tepesi
- Co-ordinates:** 36.47/30.34
- Length:** Approx. 2.0 km (total length)
- Description:** There are some small beaches, varying from a few hundred metres long to approx. one kilometre. High rocky mountain slopes partly covered with pines lie behind the beaches whose width seldom exceeds a few metres. The beach texture frequently changes from sand to coarse grained shingle.
- Land use:** These small bays are generally used by people from Antalya for picnics. See also the chapter on tourism for the "South Antalya tourism development project".
- Turtle situation:** Kinzelbach (pers. comm.) saw one track of a sea turtle on the small beach to the north of Sıçan Adası (no. 519) on 24 and 27.6.1987. One track was seen on the same beach on 30.6.1988. One track of an emergence with a nest was seen on the small beach of Çaltıcak forest recreation camp on 16.6.1988.
- Protection:** National Park (Olimpos-Beydağları National Park).

Antalya - Konyaaltı beach

ID-number:	620 - 621
Co-ordinates:	36.49/30.35 - 36.53/30.41
Length:	8.8 km (620: 1.0 km, 621: 7.8 km)
Description:	The beach is bisected by the harbour of Antalya (Hurmaköy), the southern part being much smaller than the northern one. A slightly sloping beach with a width of 20-50 m. There is a gradual change from coarse-grained shingle at the tide line to fine shingle on the landward side of the beach. Sandy patches are scattered over the beach. A wetland is situated to the south of Hurma harbour (no. 620).
Land use:	A main road runs parallel to the shore and many parking areas are situated along the road. Several restaurants, dressing huts, toilets, etc. are found along the beach. Fences divide the beach into several sections. The whole beach is over-crowded, especially during summer weekends.
Pollution:	The sea seems to be clear, but the beach is polluted with tar and litter.
Protection:	The wetland in 620 (mouth of a small stream) is designated a "natural site", but it is not known whether this gives the area legal protection.
Turtle situation:	None found in 1988, and also none by Kinzelbach (pers. comm.) on 24.6.1987.
Various:	Although the wetland at the southern end of the beach (in 620) is shown as a "natural site" in the masterplan for the development of tourism, its size is decreasing from year to year as it is filled with waste and shingle.

Lara - Aksu beach

ID-number:	630 - 632
Co-ordinates:	36.51/30.48 - 36.51/30.55
Length:	10.8 km (630: 3.9 km, 631: 2.7 km, 632: 4.2 km)
Description:	Lara beach which is on the western edge of this coastal section is one of the main tourist attractions for visitors to Antalya, 10-15 km away from here. Many people come from there, mostly for daily visits. They stay on the beach for swimming and recreation. The beach is 30-50 m wide, sometimes even wider. It has fine sand running the whole length of it with gravel only along the tide line. The beach slopes slowly from the sea, but the slope is steeper behind the beach, i.e. in the sand dunes. These dunes are 20-100 m wide and are sparsely covered with low vegetation. The beach is bisected by the mouth of Acisu River whose course runs some hundred metres parallel to the shore and whose bed is covered with reeds.
Land use:	Generally speaking, most of the tourists are in the west which is under intense tourist pressure. The number of tourists lessens towards the east. The development of the beach has reached about 50% (estimate). The easternmost 2-3 km (632) are intensively used by fishermen who fish in the sea near the Aksu mouth. Many boats are found there and tracks of vehicles (mostly tractors) cover the whole beach (e.g. about 40 fishermen on 17.6.1988). Beach huts are also situated here. Another summer settlement consisting of beach huts is situated some 4 km to the west of the Aksu mouth. Some hotels and holiday villages and several construction sites for new hotels are found in the central part of the beach (no. 631). The use of the beach here by tourists is intensive and includes e.g. a lot of umbrellas in the sand. Also the western one third of the beach (no. 630) accomodates many beach huts where local people spend the summer months. Other developments here are sport facilities, a children's park, restaurants, private recreation centres, holiday villages etc. Only a relatively small area of the western beach is not developed but people come to swim even in those open areas. Many boats, yachts, etc. are

found in front of this beach section and the western edge is used as a kind of harbour. Parascending occurs over the sea.

The beach has been completely designated as a tourist investment area by the masterplan for the development of tourism.

Pollution: Some waste on the beach especially on the western parts where there is intensive tourism.

Turtle situation: On 17.6.1988, 23 tracks of turtle emergences were counted, among them 3 U-turns and 17 apparently with nests. There were probably 6-7 further tracks and body pits which were, however, too old to allow positive identification. On 18.7.1988, 24 tracks of which at least 11 were U-turns had been counted. At least 13 of the tracks seemed to have resulted in successful egg-laying. On both days, the observers noted that the tracks were concentrated on the eastern side and only a few tracks were scattered over the western sections which have a stronger human influence.

On 22.8.1988, 7 tracks plus 9 body pits where the tracks have been obliterated were found on the eastern section (no. 632) and none on the two western sections. Four of the nine old nests have been destroyed by predators and in another, two newly hatched young were still present in the morning hours. Two of the seven tracks were false crawls.

Thus the proportion of U-turns is 29.6%. The density of tracks over the beach is up to 2.2 tracks/km for the whole beach, but as most of the emergences occur on the eastern edge, 5 tracks/km seems to be an adequate estimation.

Recommendations: Further study is needed on the spatial distribution of turtle nesting sites. See also the recommendations for beaches 645-646.

Aksu east beach

ID-number: 635

Co-ordinates: 36.51/30.55

Length: 1.2 km

Description: This is the beach between the Aksu River mouth and the mouth of the Acisu, a small stream to the east of Aksu. The beach consists of fine sand. Beach width is 30-70 m. Pine forest is in the background. Many stranded items (driftwood etc.) on the beach.

Land use: On the beach, there are huts which are inhabited during the summer months by local people. Fishermen are active at both river mouths. Many vehicle tracks in the sand. This is the only area between Antalya and Side which has not been designated an investment area by the masterplan for the development of tourism.

Turtle situation: Nine tracks (one being a U-turn) were counted on 17.6.1988. All were rather old.

Belek - Çakallık beach

ID-number: 640 - 642

Explanation: 640 is from Acisu mouth to İncekum Tepesi

641 from İncekum Tepesi to Taşburnu

642 from Taşburnu to İleri Burnu

Co-ordinates: 36.51/30.55 - 36.51/31.05

Length: 13.3 km (640: 4.5 km, 641: 3.0 km, 642: 5.5 km)

Description: The width of the beach is usually 30-50 m, sometimes only 15 m. On the fine sandy beach, there are sometimes areas of gravel. The size of the pebbles here

is up to 30 cm in diameter, but usually much less. Slightly sloping from sea level, with only a rather steep edge at the foot of the dunes which form the background. High scrub behind the dunes. The dunes slope here 0.5-1.5 m within a length of 1-4 m.

Acisu River flows parallel to the shore for about 130 m before it joins the sea. Scrub lies on the sand dunes in the back at a distance of about 100 m from the sea.

Land use:

Huts for local people who live here in the summer months. At least two kilometres of the shore line near Belek (i.e. in 642) is covered by huts and some huts extend some 5-10 m to the tide line. Several rows of huts lie parallel to the sea. Other huts are found close to the Acisu mouth and two smaller "settlements" are found about half-way. Fishermen around the Acisu mouth. Tracks of tractors seen several times on the beach.

It is anticipated by the masterplan for the development of tourism that the whole beach will be developed for tourism.

Turtle situation:

This is the beach called by Geldiay "Belek beach" in various publications. The co-ordinates have been given by Geldiay & Koray (1982) [The beach to the east of Belek was called "Serik beach" by them].

Geldiay (1982, 1984, cf. also Geldiay & Koray 1982) called Belek beach one of the most important Turkish loggerhead nesting beaches with about 15 nests/km/season. In a later publication Geldiay (1987) gives 10 nests/km/season. From those publications one understands that *Chelonia* nesting also occurs here in low numbers. The methods for determining nesting densities and species identification remain unclear.

42 tracks were counted on 18.6.1988, of which 25 were probably with nests and 7 were false crawls. Two of the nests were destroyed by predators. On the night of 24-25.6.1988, two loggerheads were observed and tagged in 642. One of these deposited eggs and the other returned to the sea without laying. On 25.6.1988, 31 tracks were counted (7 false crawls, 20 apparently with eggs, 6 of these were destroyed by predators).

On 18.7.1988, 45 tracks were seen in 640/641 (15 of these false crawls) and 26 in 642 (2 of these were U-turns). In both sections, at least 45 resulted in nests. 32 (= 45%) of the tracks seemed to be 1-2 days old, the others seemed to be older. 9 of the nests were destroyed by predators. There were no tracks in front of the huts near Belek, but all were on the unused, rather remote beach sections.

On 24.8.1988, 11 tracks and 25 body pits were counted on beach no. 640 and 6 tracks and 17 body pits in 641/642. 15 out of a total of 17 tracks resulted in nests, the other two were U-turns. 15 of the 42 nests were destroyed by predators and from 12 body pits, young had hatched as was deduced from their tracks.

The density of the tracks was 3.2 tracks/km on 18.6, 2.3 tracks/km on 25.6 and 5.3 tracks/km on 18.7. Until 24th August, this value has decreased to 0.8 tracks/km. As local concentrations occur, the density of tracks (nests) was often much higher on certain sections of the beach.

On 18.6.1988, one dead *Caretta* (curved carapace length about 50 cm) was found on the beach and on 25.6.1988, one dead *Chelonia*.

Recommendations:

This beach holds important numbers of sea turtles which have to be treated as a unit with those of the neighbouring beaches (no. 645-651). Compare therefore the recommendations under beach no. 645-646. Legal protection is urgently required which must include the regulation of the tourist development. The masterplan for the development of tourism has anticipated that the area is to be completely covered by tourist developments. A solution is also required for the huts of local people which are harmful to sea turtles in the hatching season and apparently reduce their breeding success considerably.

Belek - Köprü Çayı beach

- ID-number:** 645 - 646
- Explanation:** 645: from İleri Burnu to Acısu mouth
646: from Acısu mouth to Köprü Çayı mouth
- Co-ordinates:** 36.50/31.05 - 36.50/31.10
- Length:** 8.5 km (645: 1.8 km, 646: 6.7 km)
- Description:** The beach is bisected by the mouth of the Acısu, a small stream whose shores have reed beds in its lower course. The beach is slightly sloping from the sea and has a very fine sand. Only at the tide line are there some areas of coarse sand and shingle, especially on the eastern side of the beach. The width of the beach varies between 20 and some 120 m, usually between 60 and 80 m. The depth of the sea slightly increases in front of the beach and coastal cliffs are found in some places. Relatively flat dunes are situated behind the beach. Low dune vegetation (scrub) are found there. Loose pine woods behind the dunes in some parts.
- Land use:** The western part (no. 645) is almost completely used by tourists. Hotels are situated there with deck-chairs and umbrellas on the beach.
On the eastern side of the beach (no. 646) there are huts of local people who live there during summer. Electricity is present. A holiday village (Palmiye Club and another by Sosyal Sigorta Kurumu) are also being built there. The first houses have already been completed.
Some tractor and lorry tracks are found everywhere on the beach. At many places, the beach is used as an (illegal?) sand pit, e.g. for the construction of the holiday village. The natural structure of the beach has been destroyed completely especially in the west of Köprü Çayı mouth. Fishermen are all along the beach, especially around the mouth of Köprü Çayı. A road in the easternmost section approaches 6 m from the shore in some places.
- Pollution:** Much litter on the beach near the mouth of Köprü Çayı which has been washed ashore by the river and the waves of the sea. The sea smells awful there probably because of sewage which is passed to the sea through a small canal.
- Turtle situation:** On 22.6.1988, Kinzelbach (pers. comm.) walked between Acısu mouth and the construction site of the holiday village and counted 36 sea turtle nests on 2 km. 11 of these had been excavated by man.
On 18.6.1988, 18 tracks of emergencies were counted (11 with nests, 4 U-turns) and 65 tracks (34 with nests, two of them destroyed by predators and 22 U-turns) on 19.7.1988. On 26.8.1988, 10 tracks of adult turtles were found. Five of these were with nest, one was a U-turn. In addition, 6 body pits of sea turtles were found from which young had hatched. In one of these pits, a baby turtle was found.
Only very few tracks were found on the intensively used western section of the beach. On 19.7.1988, the observers noted a certain concentration of the tracks around the mouth of the Acısu, no tracks in front of the huts and again a small concentration near the Köprü Çayı mouth. Here, in the easternmost two kilometres, none were seen on 26.8.1988.
The density of the tracks is thus up to 7.64 tracks/km (on 19.7). Taking the low density in the western beach section (no. 645) into account, a density of about 9-10 tracks/km is realistic.
- Other fauna:** The area around the Acısu mouth is rich in mussels. The Blue Crab (*Callinectes sapidus*) was also found there.
- Recommendations:** The nesting density in the area between Antalya and Side reaches its maximum on beach no. 646 (cf. the graphs in the chapter on tourism). The whole population of sea turtles in the Antalya - Side area has to be treated as a unit. It comprises the beaches no. 640 to 651 which cover a length of 28.4 km. The necessity for protection is beyond any doubt, but due to the existing tourist facilities, the new developments planned and due to the great pressure created by the demand for new tourist facilities, it is unrealistic to get an almost 30 km long sandy beach reserved for sea turtles. On the other hand, the area is large

enough to provide facilities for both, tourism and turtle nesting. However, this is only possible with very careful planning and a careful selection of the type of tourism and the type of development. As the tourist development is progressing, such a plan showing, where and how tourist facilities can best be established in this area, are urgently required. This kind of planning should also regulate other activities on the beach, e.g. the huts, sand and shingle extractions, driving on the beach etc.

Niğit and Perakende beaches

ID-number:	650 - 651
Co-ordinates:	36.49/31.12
Length:	6.6 km (650: 4.2 km, 651: 2.4 km)
Description:	Beach no. 650 extends from the mouth of Köprü Çayı to a spur jutting into the sea in the east. 651 is from there to the mouth of the Acısu. The beaches are about 50 m wide on average with 20 and 100 m being the lowest and highest widths. Mostly fine shingle along the tide line (but some large pebbles with a diameter of up to 15-20 cm in between) and fine sand in the back parts. Sand dunes behind the beach lead on to agricultural fields and a pine forest around the promontary. The promontary is rather rocky and coastal cliffs are found in the sea. On the eastern side there are also coastal cliffs which can only be seen from the sea.
Land use:	The beach was full of tractor tracks. Many dog tracks were also seen. Apart from a few huts 500 m to the east of the Köprü Çayı mouth, there are no buildings on the shore and no tourist facilities. The promontary is used by people from the surrounding villages as a "harbour" for their fishing boats. The masterplan for the development of tourism sees the whole area as a possible investment area for tourist development.
Turtle situation:	On 25.6.1987, Kinzelbach (pers. comm.) saw turtle tracks on the beach (no count). On 21.6.1988, 18 tracks were noted on 650 and 4 on 651 (3 U-turns, 13 with nests, two of them destroyed by predators). On 19.7.1988, 38 tracks were found (6 U-turns, 32 with nest, 4 of these destroyed by predators). On 26.8.1988, 12 tracks (5 with nests, 4 U-turns) plus 63 body pits were identified. From 11 of the body pits, young had hatched and 24 were destroyed by dogs and/or foxes. The track density rose from 3.3 tracks/km on 21.6 (with 4.3 tracks/km in the western section 650) to 5.8 tracks/km on 19.7 and fell to 1.8 tracks/km on 26.8. The nesting density as indicated by body pits and presumed nests on 26.8 was 10.3 nests/km.
Other fauna:	A dead fox was found on the beach on 19.7.1988. The eastern side (no. 651) is rich in mussels.
Various:	Seaweed on the shore of no. 650. Many dog and fox tracks on the beach.
Recommendations:	This is one of Turkey's important nesting beaches. Further studies should be carried out on the exact spatial and seasonal use of the beach by sea turtles, on nest predation (which is extremely high) etc. A tourist development on the beach should be undertaken within the framework which has to be defined by a new plan for the conservation and development of the Belek region (see the recommendations for the beaches no. 645-646).

Gündoğdu beach

ID-number: 655
Co-ordinates: 36.49/31.15
Length: 2.0 km
Description: Segment of the beach which lies in between the mouths of two creeks: Acısu in the west and Karaöz Çayı in the east. Almost the whole shore consists of coastal cliffs (sandstone) which stand out a little above the sea and cover the tide line. About 30 m wide fine sandy beach lies behind the cliffs, after which a zone of high sand dunes follows. Only about 10% of the beach provides free access to the sea, i.e. without coastal cliffs. Only here can sea turtles come onto the beach.
Land use: None.
Turtle situation: None found on 21.6.1988, 26.7.1988 and on 26.8.1988.
Recommendations: The coastal cliffs not only prohibit turtles from egg-laying here, but also prevent tourists from swimming. Herewith, an ideal natural buffer zone for the western beaches which are proposed as turtle reserves.

Tilkiler beach

ID-number: 656
Co-ordinates: 36.49/31.16 - 36.48/31.21
Length: 8.0 km
Description: The width of the beach varies from 20 to 60 m. Fine sand embedded with banks of fine and coarse shingle. In the middle of the beach, flat topped cliffs rise along the coastline which cover about 1.5 km (total length). The western edge of the beach has similar cliffs. High sand dunes (> 10 m) lie behind the beach.
Land use: Six large hotels are situated along the shore including one near Kumköy most of which have bars, wind-surfing facilities, deck-chairs and umbrellas on the beach, pontoons, etc. Glaring lights shine from the hotels during the night. One recreation camp for military personnel. The construction of another hotel has been halted because archeological findings were made. Further hotels are being constructed at the moment. The dunes have been flattened by man in front of the existing hotels.
 About 60% of the beach length is used by tourists. The hotels are concentrated on the easternmost two thirds of the beach. Vehicle tracks are found on the whole beach. Huts belonging to local people are scattered over the beach. Fishermen are active especially around the mouths of some small rivers. The construction sites are brightly illuminated at night and make the area less attractive for turtles.
Pollution: Beach slightly polluted with oil, a dead horse on the beach, litter washed ashore. One of the creeks seems to be polluted by sewage.
Turtle situation: Kinzelbach (pers. comm.) found about 2 turtle tracks (nests?) per kilometre in the western section (from Süral hotel to the west) on 25.6.1987. On a 300 m section in front of Süral hotel, no tracks, nests etc. were detected on 9-11.9.1988. 13 tracks were counted each on 21.6.1988 (1 false crawl, 6 with nest) and on 26.7.1988 (4 false crawls, 9 with nests). On 26.8.1988, two nests which were destroyed by predators (dogs?) and four nests from which young had hatched were observed.
Recommendations: Although any turtle nesting in the Mediterranean is important, this beach apparently has suffered greatly from the existing tourist developments and the nesting density has fallen to a relatively low level. Efforts should therefore be concentrated on the more western beaches (Belek region) which hold much more important turtle populations.

Side west beach

ID-number:	660
Co-ordinates:	36.48/31.21 - 36.46/31.23
Length:	4.8 km
Description:	Beach slightly sloping above sea level. Fine sand. Dunes begin at a distance of about 45 m from the sea. Towards the tip of Selimiye (Side), the beach becomes narrower and finally ends in a steep coast. Some coastal rocks (cliffs) are situated in front of the shore.
Land use:	Used 100% for tourism. Many hotels and construction sites for hotels with lights during the night, umbrellas and deck-chairs on the beach, etc. Holiday villages, camp sites, motor boats, surfboards, catamarans etc. Some huts on the western side of the beach. Local people spend the summer months there.
Pollution:	Many tracks (human and vehicles) on the beach; also dog tracks.
Turtle situation:	A lot of litter on some parts of the beach. 3 tracks on 22.6.1988, all resulted in nests. On 25.8.1988, two body pits were found on the beach. Young have hatched from one of them.

Side east beach

ID-number:	665 - 666
Explanation:	665: from Selimiye to Titreyen Gölü 666: from there to the Manavgat Irmağı mouth
Co-ordinates:	36.46/31.23 - 36.44/31.29
Length:	9.0 km (665: 5.5 km, 666: 3.5 km)
Description:	The width of the beach is some 10 m in the northwest, but increases to 50-60 m towards the mouth of the Manavgat Irmağı. Fine sand. High (> 10 m) sand dunes behind the beach and behind that is a pine forest.
Land use:	Beach no. 665 is completely under tourist use. In 666, there is a large hotel and a luxury camp site on the Titreyen Gölü side. After an area of undeveloped beach, a beach hut village begins, where local people spend the summer months. Another clear beach area runs towards the mouth of Manavgat Irmağı. According to the masterplan for the development of tourism no further development is planned on the beach between the existing developments to the mouth of Manavgat Irmağı.
Pollution:	A great deal of litter on the shore near Manavgat mouth, washed ashore by the river and the sea.
Turtle situation:	Geldiay & Koray (1982) and Geldiay (1984) reported turtle nesting on "Side beach". They probably referred to this beach and they reported 15 nests/km/season and > 1 nest/km/day. Although being mainly <i>Caretta</i> , some <i>Chelonia</i> nesting also occurs, they said. On 21.6.1988, no turtle tracks were found in 665 and 20 in 666. 10 were with a nest, 6 were false crawls. With one exception, all tracks were situated either in the open area in between the buildings or (13 tracks!) in the 400 m long undeveloped section near the river mouth (= 32.5 tracks/km!). On 24.7.1988, 11 tracks were counted in 666 (no. 665 was not surveyed) plus two body pits. One of the pits had been destroyed by predators. From the 11 tracks, 6 were with a nest, 2 were false crawls. Again, all tracks were between the hotels and the beach huts (5 tracks) or near the river mouth (6 tracks and 2 body pits).
Recommendations:	The eastern half of beach no. 666 shows high local concentrations which are more or less unique for Turkish loggerhead populations. This provides an excellent example of the negative influence of tourism including the summer movements of local people. This area which surrounds the mouth of the

Manavgat River should be included in a conservation-oriented landscape plan, which is proposed for the Kızılot region (see recommendation to beach no. 670-671).

Kızılot west beach

- ID-number:** 670 - 671
- Explanation:** 670: Manavgat River mouth to Karpuz Çayı mouth
671: Karpuz Çayı mouth to Cactus beach
- Co-ordinates:** 36.44/31.29 - 36.42/31.34
- Length:** 7.7 km (670: 5.2 km, 671: 2.5 km)
- Description:** The beach is bisected by Karpuz Çayı mouth. Cactus beach is a small part of the beach called after the Cactus Beach Hotel which is situated 1 km to the east of Kızılot village. The beach consists of fine sand, however banks of fine shingle lie along the shore line in particular. The width of the beach varies from some 15 m to 70 m in the southeast. The shore is rather steep near the Manavgat River mouth, but then the slope increases only slightly from the sea.
- Land use:** The beach to the east of the mouth of the Manavgat River is used as a shingle and sand pit. For about 1 km, the whole natural structure of the beach has been destroyed: Only a strip of 4-6 m along the shore is in its natural state, all backward parts having been excavated. Thus a steep slope has been formed. A large hotel a few hundred metres to the west of the Karpuz Çayı mouth was under construction in 1988. The construction site was illuminated during the night. Some local people use the beach for sleeping ("beach parties") under the open air. They also use tractors for coming there. The guests of the Cactus Hotel use the beach during the daytime. At night, the umbrellas are collected, but not the deck-chairs. The construction of another (illegal?) hotel on Cactus beach began in 1988.
- Turtle situation:** Kinzelbach (pers. comm.) found about 8 nests/km to the east of the shingle pit on 25.6.1987. Further tracks and nests were present, but a positive identification of turtle tracks was impossible due to their obliteration. 54 tracks were counted on 22.6.1988 (38 with nests, 3 false crawls). On 21.7.1988, 23 tracks (16 with nests, 6 false crawls) were counted on a 2 km long stretch of the Cactus beach. On 24.7.1988, 143 tracks were counted: 75 with nests and 45 false crawls. Two young were found on the beach. On 11.8.1988, 20 tracks were still present plus 79 body pits. From 29 of these young had hatched, 3 of the nests were destroyed by predators. 20% of the nests and tracks were counted in the western sand and shingle pit. During the daytime check, two young turtles were found: one was *Caretta*, the other *Chelonia*. Between 23 and 26.7.1988 a total of 4 sea turtle females were observed and tagged. All proved to be *Caretta*. On 23.8.1988, 5 tracks of emergences were counted plus 28 nests from which young had hatched plus one nest which was destroyed by predators. 6 young of at least 4 different nests (3 dead, 3 still alive) were seen and all proved to be *Caretta*. On 26.8.1988, 15 tracks of adults were found plus 14 nests from which young had hatched plus 7 nests which were destroyed by predators plus one body pit. One young proved to be *Chelonia*. With 18.5 tracks/km or 9.7 nests/km (on 24.7) the beach between the Manavgat River mouth and Kızılot is one of the most important Turkish nesting sites for sea turtles. It holds both species, *Caretta* as well as *Chelonia*.
- Recommendations:** The beach needs the strongest protection. A large hotel which is under construction on the beach at the moment is already at an advanced stage. Its construction and operation will have strong negative effects on the turtle population. Nevertheless, as a very urgent matter, measures to minimize the negative

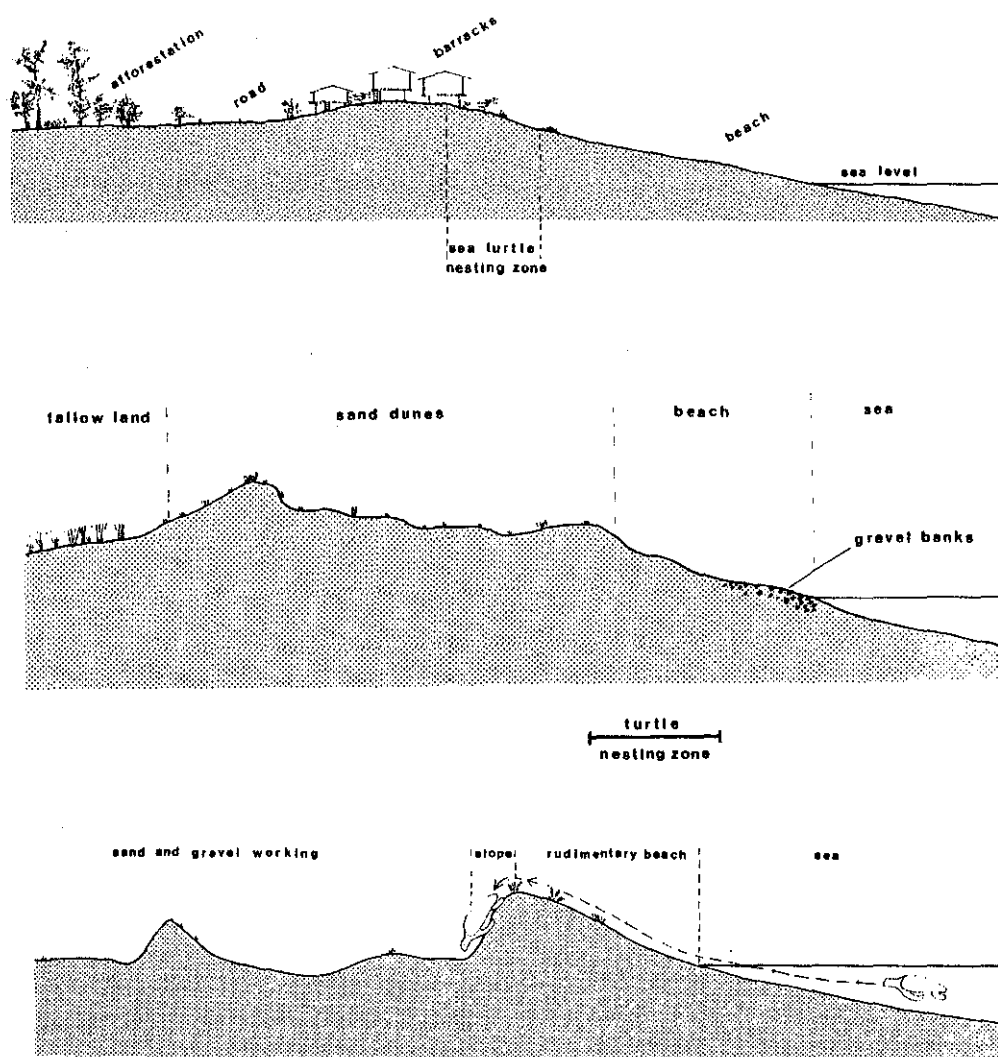


Fig. Cross sections of the beaches of Kumluca (top) and Kızılot (middle and bottom).

The Kumluca beach slopes rather gently from the sea. A large area is covered by wooden beach huts which belong to local people who spend the summer months there. The turtle nesting zone overlaps with the zone of the beach huts, so that egg laying even between and under the huts occurs occasionally (the huts are not inhabited in the egg laying period!). — The Kızılot beach near the Manavgat River mouth has been completely destroyed by sand and shingle extraction. It was observed that female turtles fall down a steep slope into the sand and shingle pit and hardly ever found their way back to the sea. A restoration of the sand dunes is recommended. — The Kızılot beach to the south of the village Kızılot is bordered by wide sand dunes. Shingle banks are often found in the splash zone.

influence should be worked out. The measures must include screening of the hotel (lights) and banning access to the beach at night.

At least one other hotel is being constructed without permission. Similar effects to those of the larger hotel are expected here and similar measurements have to be applied.

A great problem is the sand and shingle pit at the Manavgat River mouth where adult and young turtles fall down a slope which acts as a turtle trap. Judging from the tracks, adult turtles find their way out of the gravel pit but only after wandering around for several hundred metres. The exploitation of sand and shingle therefore should be confined to the back of the beach and the beach itself should be restored.

Together with Kızılot east beach (no. 672) and the land surrounding the

Manavgat River mouth in section no. 665, this beach should be protected as a turtle reserve. The masterplan for the development of tourism does not foresee tourist development in the area and there are no huts belonging to local people on the beach. This provides an excellent basis for conservation work. The protection as a "Mediterranean specially protected area" has to be considered. More important than the legal status however is a strict management plan for the area which regulates any developments on the beach and behind it, the excavation of sand, the operation of existing hotels etc. For such a plan, more information on the turtles and their exact spatial distribution is also required.

Kızılot east beach

ID-number:	672
Co-ordinates:	36.42/31.34 - 36.40/31.39
Length:	8.5 km
Description:	Fine and coarse grained sand all along the beach. Sometimes banks of shingle with pebbles up to 3 cm in diameter embedded in the sand. The width of the beach is 30-70 m. Soft sand dunes behind the beach in the west, otherwise a vegetation zone with a rather hard core and grass and scrub on the surface. Some cliffs in the sea in the middle of the beach.
Land use:	A large hotel and a recreation development of the State Hydraulic Works (DSİ) and of the Petrol Ofisi are situated on the beach. Both are illuminated during the night. Several other houses and smaller buildings along the shore. The main road Antalya - Alanya runs rather close to the shore at some places.
Turtle situation:	20 tracks were counted on 23.6.1988 (13 with nests, 7 false crawls) which were concentrated towards Alara Çayı mouth in a certain degree. On 24.7.1988, the number has increased to 75 tracks (47 of them with nests, 24 false crawls). On 12.8.1988, 5 tracks and 33 body pits were found. From 13 of these, young had hatched. Two nests proved to be <i>Caretta</i> nests as was judged by young still found in the pit during the daytime. Two other <i>Caretta</i> young were found on the beach, but the body pit of the adult could not be found. About 20% of the tracks were concentrated on the eastern half of the beach. With up to 8.8 tracks/km (and 5.5 nests/km) on 24.7.1988, the beach is among the most important Turkish nesting grounds. This has to be seen in conjunction with the beaches bordering the west (no. 666 - 671).
Recommendations:	See Kızılot west beach (no. 670-671), where a proposal for a turtle reserve and a management plan which includes this section was made.

Alara beach

ID-number:	675
Co-ordinates:	36.39/31.39
Length:	2.5 km
Description:	The section is bordered by the Alara River mouth in the northwest and by coastal rocks (Kara Burun) in the southeast. The beach consists of coarse shingle with pebbles up to 15 cm in diameter. The width of the beach is at least 30 m, sometimes more. The sea deepens sharply at the front of the beach. Sand dunes lie behind the beach.
Land use:	The greater part is used as a shingle pit which has destroyed the natural structure of the beach.
Turtle situation:	13 tracks there on 25.7.1988 (7 false crawls, 4 with nest). On 14.8.1988 only one

or two possible tracks were seen which were however too old to be clearly identified as turtle tracks.

Incekum beach

ID-number: 680
Co-ordinates: 36.38/31.45
Length: 1.5 km
Description: The beach is surrounded by rocks. Slightly sloping from the sea. Fine sand which has given the beach its name: Incekum means "fine sand". Width of the sandy beach 50-60 m.
Land use: A few hotels, clubs with tennis courts, umbrellas and deck-chairs on the beach etc. The beach is over-crowded during the day-time.
Turtle situation: None on 23.6.1988 and 25.7.1988. However, two nests from which young had hatched on 14.8.1988.

Malta beach

ID-number: 681
Co-ordinates: 36.37/31.46
Length: 0.8 km
Description: 20-30 m wide beach in a small bay close to Malta Burnu and to the east of Incekum beach. Very fine sand. Beach slopes rather sharply from the sea, but becomes flatter after a few metres.
Land use: Shore completely covered with tourist facilities (5 hotels, restaurants etc.).
Turtle situation: Two very old tracks of adult sea turtles were identified on the beach on 14.8.1988.

Avsallar - Fugla beach

ID-number: 682
Co-ordinates: 36.36/31.48
Length: 1.5 km
Description: 20-30 m wide band of fine sand in a coastal bay. The eastern border is formed by the mouth of the Kargi Çayı, the western by the steep coast of Kara Tepe.
Land use: Completely developed for tourism (hotels, restaurants etc.).
Turtle situation: None on 25.7.1988 and on 14.8.1988.

Mandıra beach

ID-number: 683
Co-ordinates: 36.36/31.48 - 36.34/31.54

Length:	8.2 km
Description:	The beach extends from the Kargi Çayı mouth in the west to Kışlabeleden Tepesi in the east. The width of the beach varies greatly. In general, it is between 5 and 30 m wide, but narrower and wider sections occur. Sections with hardly any sand occur, especially in the west. Behind the tide zone, the vegetation zone begins immediately. The beach texture varies from fine sand to coarse shingle with pebbles up to 10 cm in diameter. The eastern half consists predominantly of fine sand. The shore sometimes slopes rather steeply from the sea, but not in the more sandy parts. Some coastal rocks (cliffs) in the sea.
Land use:	The main road from Antalya to Alanya is close to the shore. Tourist developments (hotels, restaurants, a holiday village) are concentrated on the eastern half of the beach, many of the buildings are still under construction. The beach close to Kargi Çayı mouth is used as a sand and shingle pit.
Turtle situation:	7 tracks of emergences were counted on 23.6.1988 (3 false crawls, 2 with nest) and 5 on 25.7.1988 (2 false crawls, 2 with nests). On 16.8.1988, 2 body pits were found. In addition, one track of a young turtle which had wandered around between deck-chairs in front of a hotel was observed on the latter date.

Böcölüsü beaches

ID-number:	685 - 689
Co-ordinates:	36.34/31.54 - 36.33/31.57
Length:	approx. 4.5 km (total length)
Description:	Along the coast from Kışlabeleden Tepesi to Böcölüsü, there are five small bays with sandy beaches, which were numbered subsequently from 685 - 689 from the west to the east. Their length is approx. 0.8 - 1.0 km each and the structure and texture of these beaches are very similar to each other. On both sides they are bordered by rocks. Fine sand, 30-60 m wide. Rocks also occur in the sea in front of the beaches (cliffs).
Land use:	Modest use of all beaches by tourists, mainly during the day, with some rather primitive restaurants etc. Only a few buildings along the shore.
Turtle situation:	At the beach to the west of Ulaş, two turtle tracks (one of them with a nest) were found on 23.6.1988. On 25.7.1988, two tracks of emergences were seen in one of the western bays. On 17.8.1988, one track with a nest plus two nests from which young had hatched on 685, three nests from which young had hatched on 686, one track with nest plus three nests from which young had hatched on 687 and one track with a nest plus a nest from which young had hatched on 688. No tracks or nests found on 689.

Alanya west beach

ID-number:	690
Co-ordinates:	36.33/31.58
Length:	3.2 km
Description:	Beach with fine sand. Width 30-50 m, slightly increasing from the sea.
Land use:	Used 100% by tourists with a complete coverage of the skyline by hotels, guest-houses etc. The main road from Antalya - Alanya is behind the row of buildings along the beach.
Turtle situation:	Geldiay (1978) has received information on turtle nesting on the beach. However, he did not survey the beach because it was "full of tourist facilities" even in 1978. For the same reason, the beach was not surveyed in 1988, too.

Alanya - Mersin region

The Alanya - Mersin region comprises an area with many narrow beaches at the foot of the Taurus mountains. Somewhat longer stretches of beach are found near Alanya, Anamur in the Göksu delta and towards Mersin. Alanya is a high priority tourist centre in Turkey, but other parts of the region are less developed for tourism. However, the coastal strip Silifke - Erdemli - Mersin has been developed with holiday villages and recreation facilities mostly for people from Mersin and other nearby towns. Altan & Sirel (1987) list in a study on the recreation and tourist development between Mersin and Silifke 221 recreation facilities.

The survey has covered 42 beaches or beach units with a total length of 127.8 km.

Alanya east beach

ID-number:	700 - 702
Explanation:	700 Alanya to Oba Çayı 701 Oba Çayı to Alara Çayı 702 Alara Çayı to southeast edge
Co-ordinates:	36.33/32.00 - 36.27/32.07
Length:	15.0 km (700: 2.7 km, 701: 2.8 km, 702: 9.5 km)
Description:	Slightly sloping beach with a width of about 30 m. Fine sand, but shingle along the tide line. Much of the tide zone is covered with coastal rocks.
Land use:	The northwestern section near Alanya is partly within the bay of Alanya and also within the city of Alanya. It has been completely developed by hotels etc. and is almost entirely illuminated at night. During the day, there are many people on the beach. The following section (no. 701) up to the Alara Çayı mouth is entirely used by tourists, too, but the hotels and restaurants are situated on the other side of a road which forms the landward border of the sandy beach. On beach no. 702 which is by far the longest section, the tourist use is greatly reduced in comparison to the other sections. The buildings again are only situated on the landward side of the coastal road and stand alone, i.e. they do not form a closed chain. There are some tourist facilities (clubs etc.) concentrated on the eastern side of the beach (near Kargıcık). The beach apparently was cleaned or flattened in 1988, as parallel tracks covered the whole beach. Some of the tourist establishments also leave their umbrellas and deck-chairs on the beach at night.
Turtle situation:	In 1978, Geldiay (1978) stayed on the beach for one week towards the end of the nesting season and found 31 "mature animals" (probably the tracks of these rather than the animals themselves). Geldiay & Koray (1982) and Geldiay (1984) show the Alanya beach on maps as a nesting site for green turtles (over 1 nest/km/day) and for loggerhead turtles (less than 1 nest/km/day). In the text of their paper, however, Geldiay (1984: 72) reports the Alanya beach as a loggerhead nesting area with occasional green turtle nesting. No tracks of sea turtles were found during the survey on 13-14.6.1988. On 17.8.1988, 4 tracks of emergences, one body pit and one nest from which young had hatched were found. In all tracks it did not become clear whether eggs had been laid. Three tracks and one nest was found in the southern half of 702, one track and one nest in the northern half. Although Geldiay's figures and notes are rather confusing, it becomes clear that turtle nesting was more frequent some 10 years ago than it is now.
Protection:	None.

Demirtaş beach

ID-number:	705 - 706
Explanation:	705 is the northern half of the beach 706 is the southern half of the beach
Co-ordinates:	36.26/32.09 - 36.22/32.11
Length:	7.4 km (705: 2.7 km, 706: 4.7 km)
Description:	The beach lies below the small town of Demirtaş which is situated in a valley in the Taurus headlands. A small river (Sopa Deresi) travels down the hills and bisects the beach. The coastal road runs in some distance parallel to the shore which is surrounded by rocky slopes on which bananas are cultivated. The northern section of the beach is formed by a narrow sandy beach with high rocks behind. Small islands (rocks, cliffs) are found in the sea in front of the beach there. This section is a few hundred metres long and is followed to the south by a 50-120 m wide beach consisting of sand mixed with shingle in some places. Rocky cliffs extend onto the beach over its whole length, but are especially pronounced towards the river mouth. They continue beyond the river to the southern tip of the beach (Domalan), but are sometimes hardly visible being submerged. The depth of the sea in front of the shore slopes quickly. South of the bridge over the river, the headlands extend to the coastal road and pine forests lie close to the beach there.
Land use:	There is one hotel with about 50 beds and a camp site (Çağ camping) on the southern part of the beach. A primitive restaurant is on the hillside on the southern edge. Other tourist facilities are missing and even the existing hotel is rarely frequented. Local people come to swim in the sea especially on the shore closest to Demirtaş. However they leave again during the day and do not spread themselves out much over the beach. Even at weekends, there are hardly more than tens of people on the shore. Lights may reach the beach from the hotel, from the road and from a village on the southern shore. There is one wood store close to the shore south of Sapa River mouth. There are many tracks of dogs, cars, tractors and humans on the shore. Shingle and sand are extracted from the beach for construction work. The masterplan for the development of tourism does not foresee a tourist development on the beach.
Turtle situation:	On 15.6.1988, 11 tracks were counted (3 with nests, 1 false crawl) and on 26.7.1988 74 tracks (38 with nests, 30 false crawls). The August survey on 15.8.1988 revealed 16 tracks of emergences (3 with nests of which 2 were destroyed by predators). 14 out of the 16 tracks were rather old and hardly visible. In addition, four nests from which young had hatched were identified. On 15.6.1988, 36% of the tracks and nests were localized in the northern part of the beach (no. 705) and on 26.7.1988 this proportion was 38% and on 15.8.1988 it was 65%. Taking into account that beach no. 705 is shorter than no. 676, this might indicate a more or less equal use of the beach by laying turtle females. The density of the tracks was up to 10.0 tracks/km and up to 5.1 nests/km (on 26.7).
Recommendations:	The beach which holds very important numbers of nesting sea turtles should be preserved as a sea turtle nesting refuge. No tourist development on the beach is foreseen by the Ministry of Tourism and legal protection should prohibit any development. An existing small hotel should be screened. The extraction of shingle from the beach should be stopped.
Protection:	None.

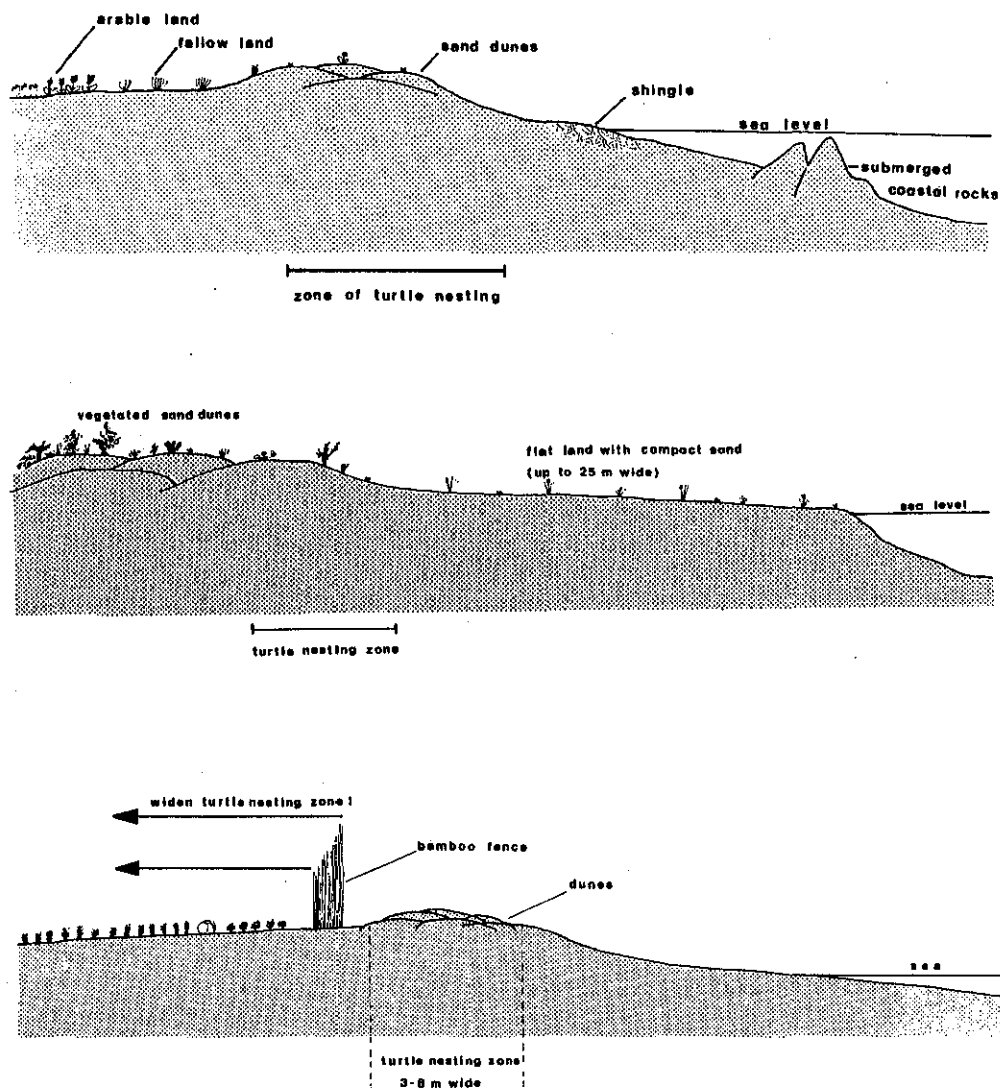


Fig. Cross sections of the beaches of Demirtaş (top), Göksu delta (middle) and Kazanlı (bottom).

The Demirtaş beach has characteristic submerged coastal rocks. Turtle nesting occurs in a rather wide zone. — The beach of the west side of the Göksu delta is extremely flat and comprises of compacted sand. Sea turtles cross this zone and use the beginning of the dunes for egg-laying. — The dunes at Kazanlı have been partly destroyed in order to gain agricultural land, so that only a 3-8 m wide strip has remained for egg-laying. A fence of bamboo-like reed separates the fields from the nesting zone. It is recommended to move the fence further back and to restore the dunes as the narrowness of the nesting zone already has negative effects on turtle nesting.

Kömürlük beaches

ID-number:	710 - 711
Co-ordinates:	36.19/32.14
Length:	approx. 0.5 km
Description:	These are two small beaches (200-250 m length each) close to Kömürlük Burnu with a width of 25-30 m and a sandy beach. Surrounded by high rocks.
Land use:	None.
Turtle situation:	Two turtle tracks in one bay on 15.6.1988 and one track each in both bays on 26.7.1988.
Protection:	None.

Gazipaşa north beach

ID-number:	715
Co-ordinates:	36.17/32.16
Length:	2.4 km
Description:	Beach 30-70 m wide. Wide belt of gravel along the tide line, but the beach texture becomes sandy towards the landward side. Banana plantations lie behind the beach.
Land use:	Main road close to the northern tip of the beach. On the southern end, great quantities of shingle and sand are extracted for use at construction sites. There are also many recreational activities and fishing by people from a nearby village. No tourist use is foreseen by the masterplan for the development of tourism.
Pollution:	The beach was polluted with tar on 16.6.1988.
Turtle situation:	None on 16.6.1988, but 17 tracks of emergences on 26.7.1988 (12 with nests, 5 false crawls). No tracks, but 11 body pits on 18.8.1988. Two of these were destroyed by predators and young had hatched from two others. With 7.8 tracks/km and 5.0 nests/km the density is relatively high, but the absolute number of sea turtles is low according to the short length of the beach.
Protection:	None.

Gazipaşa İskelesi beach

ID-number:	716
Co-ordinates:	36.16/32.17
Length:	2.0 km
Description:	The beach which is situated to the west of Gazipaşa and which is connected with it by a wide asphalt road is surrounded by high rocky mountains to the north and south. A small freshwater stream flows into the sea at the shore's southern edge. The sand is usually fine (but somewhat more coarse grained along the tide line) and covers an area about 50-80 m wide.
Land use:	One camp site and three restaurants are situated on the southern part of the beach. Many car, tractor and jeep tracks were seen in the sand. The masterplan for the development of tourism foresees the coverage of almost the whole beach by tourist facilities.
Protection:	The southern headlands are protected as an "archeological site" (the ancient Selinus).
Turtle situation:	7 tracks of emergences of which at least 4 ended in a nest and 2 were false crawls were counted on 16.6.1988 and 5 tracks (4 with nests and one false crawl) on 26.7.1988. On 18.8.1988, four tracks of false crawls and two sets of tracks of young turtles (i.e. from two nests) were observed.

Gazipaşa Çiftlik beach

ID-number:	717
Co-ordinates:	36.15/32.17
Length:	2.4 km, of which only 1.6 km are favourable for turtles
Description:	Beach relatively steep. In some places, 4-5 m high wall-like edges have been formed after a break-down of sand dunes. The width of the beach is about 40 m

in the north and increases to almost 200 m in the south. The beach consists of fine gravel with larger pebbles mixed together. A band of coastal rocks begins in the middle of the beach, first on the bottom of the sea but then it becomes wider, emerges from the sea and covers a 20-30 m wide area along the tide line.

The area behind the beach belongs to a state farm and consists mostly of agricultural fields (water melons, bananas etc.).

Land use:

The southern third of the beach is heavily exploited for its sand and shingle. The excavations have reached such a stage that not much remains of the original structure of the beach. A few fishermen were observed along the shore.

Turtle situation:

Local people informed us that many turtle eggs were dug up on the beach in 1987 and two dead sea turtles were also found which were deprived of their shells.

On 16.6.1988, 8 tracks (3 with nests, 1 U-turn) were counted. On the following night, one *Caretta* was observed on the beach and tagged. On 26.7.1988, 39 tracks were counted (28 with nests, 11 false crawls) plus 4 body pits. These and one other nest were destroyed by predators.

In the August count, on 18.8.1988, there were still 26 tracks (2 with nests, 2 U-turns) plus 4 nests destroyed by predators plus one nest from which young had hatched were observed.

Taking into account that the whole beach cannot be used by sea turtles for egg-laying due to the presence of coastal rocks, up to 24.4 tracks/km or 17.5 nests/km were calculated. This value is extraordinarily high and the area needs strong protection because of this outstanding turtle density.

On 28.6.1988, one turtle was caught and sold for TL 200,000 (approx. DM 270,- at that time). One turtle track on 26.7.1988 ended in front of human tracks and it was concluded that the turtle was taken away.

Recommendations:

The high nesting density on a short beach provides the possibility to protect a relatively large population with relatively little effort, i.e. by protecting a relatively short beach. At present, the beach is not used by tourists and an adequate protection status should secure the area for the future.

Despite beach excavations are going on at present, they do not cause much harm to the turtles as they occur on a section of the beach which cannot be used by the turtles anyhow for other reasons. It should be made sure that the excavation will not extend to the turtle nesting area.

Killing sea turtles to use their shells for decorations seems to occur regularly and egg excavations were also reported. An education programme together with wardening can be useful. Perhaps some personnel from the state farm can be trained for turtle wardening.

Protection:

None.

Yakacık beach

ID-number: 720

Co-ordinates: 36.06/32.34

Length: 1.4 km

Description: The beach is surrounded by headlands on both sides and has banana plantations behind it. High rocks lie behind the beach in the eastern third of the beach. A small river flows into the sea in the western half. Rather flat beach with coarse shingle (pebbles 5-10 cm in diameter) along the shore and fine sand in the interior parts of the beach.

Land use: No tourist use, fishermen and farmers on the beach. Exploitation of shingle on the western side.

Turtle situation: Two tracks, both ending in nests, on 29.6.1988. On 18.8.1988, one track of a turtle emergence (with nest?), two nests from which young had hatched and three nests which had been destroyed by predators (dogs?) were found.

Protection: None.

Anamur south beach

- ID-number:** 730 - 732
- Explanation:** These are the parts of Anamur beach which are to the south of Dragon Çayı
730: Anamuryum to Sultançayı mouth
731: Sultançayı mouth to İskele
732: İskele to Dragon Çayı mouth
- Co-ordinates:** 36.01/32.49 - 36.04/32.52
- Length:** 8.9 km (730: 2.2 km, 731: 5.7 km, 732: 1.0 km)
- Description:** Sandy and shingly beach. In general the northern parts are more sandy and become shingly to the south. The river Sultansuyu and two drainage channels run into the sea. The distances are 4.1 km (Sultansuyu - southern drain), 3.2 km (distance between drains) and 1.7 km (northern drain to İskele).
The beach in front and to the north of Anamuryum consists of coarse shingle. The slope is relatively steep and the width is some 17 m. Behind that line, a flat area of low vegetation (low scrub etc.) borders the beach. To the north, the pebbles become smaller and the beach less steep. Beyond Sultançayı which is dammed up naturally before it flows into the sea, sand is found on the beach, although the tide zone still consists of shingle. This general pattern, a sandy beach with a zone of shingle along the tide line, continues to the mouth of Dragon Çayı although it is greatly disturbed (as is its shape) by the excavations (see below).
- Land use:** About 2.0 km of the beach (the northernmost 2 km including all of 732) is subject to tourism. Many guest houses, holiday homes, restaurants and a few hotels are found there. A pier for boats and ships from Cyprus and customs are also found there. There is also a military camp. Many new buildings are being constructed around the northern drainage channel, however, they are a few hundred metres away from the shore.
The beach between Sultançayı and the northern drainage channel is subject to excavations for sand and shingle to an enormous degree. Most of the beach here has lost its natural shape. Sand is taken mostly from the dunes, shingle from the shore. An excavated turtle nest was observed on 14.7.1988 and it is thought that young turtles cannot cross the deep tracks of tractors and lorries on the beach.
Some boats are found along the beach. The deck-chairs and umbrellas of one of the hotels are not collected at night.
- Turtle situation:** Aygün Kılıç (unpubl.) was informed about turtle nesting on the beach in 1986. 11 tracks were counted on 19.6.1988, 4 of them with nests and 4 false crawls. At least a further 5 tracks were present on the beach, but the degree of obliteration did not allow a positive identification. On 13.7.1988, there were 28 tracks, 15 with nests and 6 false crawls. In the August survey, no tracks but 20 body pits (nests) were counted on 19.8.1988. At 10 of these, tracks of young turtles were observed, and one dead young found on the beach was identified as *Caretta*.
On 13.7, 12 out of 28 tracks were noted in section 730, 8 between Sultançayı and the southern drainage canal, 3 in the space between both drainage canals and 5 from the northern drainage canal to Dragon Çayı. On 19.8, 14 out of 20 nests were in 730 and three each in 731 and 732. 43% and 70% of the items were thus recorded in 730, although this takes up only a fourth of the beach length. Sea turtles thus seem to prefer the most remote, but also the most stony beach.
- Recommendations:** The exploitation of sand and shingle not only destroys the natural habitat of sea turtles and other animals, but also prevents tourists using the beach in the future. It is proposed to protect the southern part of the beach for its archeological site (Anamuryum), habitats (unspoilt beach, small freshwater and brackish

Protection: water habitats) and wildlife (sea turtles).
None.

Anamur castle beach

ID-number: 733 - 735

Explanation: This is the beach from the Dragon Çayı mouth to Pullu Orman Kampı
733: Dragon Çayı mouth to Mamure castle
734: Mamure castle to western edge of Pullu
735: Pullu beach

Co-ordinates: 36.04/32.52 - 36.05/32.54

Length: 3.1 km (733: 1.6, 734: 1.1, 735: 0.4 km)

Description: The western part close to Dragon Çayı (Anamur River is another name) is rather steep and rises to a sand dune which is relatively densely covered with vegetation. Towards the castle, the beach becomes flatter and wider, being about 35 m wide at its broadest point. Much flotsam has been washed onto the shore. Mamure Kalesi, the castle of Anamur, is situated on a rocky promontory on the shore and divides the beach. To the north, the beach is narrow, often only 2-3 m wide and consists of fine sand. Rocks are interspersed in the sand and give the beach a rich structure. The northeastern tip of the beach (no. 735) is separated from the rest by rocky formations. It is a small bay with a broad sandy beach about 10-40 m wide. The hill behind the bay is covered by a pine forest. Small rocky islands are situated along the shore.

Land use: The main road from Anamur to Mersin is very close to the shore of section 734 and several restaurants are located along it. The castle is a tourist attraction but tourists usually stay only for short visits during the day. The Pullu beach belongs to the General Directorate of Forestry which has established a camp site in the forest behind. The beach is crowded during the day and many lights from the restaurant, from the tents and from the illuminated paths can be seen from the shore at night.

In 1988, the turtle issue became very popular among the visitors of the camp site and its managers. Many people thus stayed on the beach to watch sea turtles. Groups of tourists were regularly standing around egg-laying sea turtles. As "protection measures" the turtle nests were marked with stones and notices in three languages ("please keep off, here is a sea turtle nest!"), nests which were supposed to be in the tide zone were transplanted and the lights of the camp site were switched off at midnight.

The camp site is being enlarged for the 1989 season and its capacity will be a few times larger than now.

Turtle situation: In the June survey, 8 tracks (5 with nests, 1 false crawl) were counted on 733 on 19.6.1988, 6 tracks (3 with nest, 2 false crawls) on 734 and one track (with nest?) on 735. About 10 more nests were present here which had been marked by tourists before (see above).

On the night of 18 to 19.6.1988, two loggerhead turtles came onto the beach in section 735 (Pullu) and were tagged after laying their eggs. On the night of 27-28.6.1988, two sea turtles were observed on the beach, but they returned to the sea without laying any eggs. No turtles came onto the beach the following night.

On 13.7.1988, only one track of an emergence ending in a nest was present on 735. On 20.8.1988, one track of an emergence (with nest?) plus 8 nests (from 7 of them young had hatched) were present on 733 and no tracks but 18 body pits on 734-735. From 12 of these, young had hatched.

The intensive use of the Pullu beach by tourists obliterates the turtle tracks at once. The figures here are thus only those of the preceding night.

On the 400 m section of Pullu camp site, at least 12 sea turtles had successfully laid eggs which is 30 nests/km!

Recommendations: A small turtle population is concentrated on a beach section which is 400 m long and is intensively used by tourists. The area belongs to a camp site which has expanded. The only possibility for the protection of this site would be the removal of the camp site which is impossible for political reasons. Protection measures are therefore confined to limited access to the beach at night and the prohibition of illumination. The managers of the camp site (forestry people!) are very interested in turtle protection and tried to give some protection in 1988, but they need some guidance. Otherwise the "protection measures" can be counter productive. Although marking nests is not a proper tool in turtle protection in general, it seems to be a favourable means here under the present circumstances of the small over-crowded beach. Otherwise the threats of sticking umbrellas into a turtle nest, by compacting sand through walking on it etc. are too great. Care should be taken that this is not used as an example for similar actions on other turtle beaches.

Protection: None.

Bozyazı beach

ID-number: 740
Co-ordinates: 36.06/32.57
Length: 3.8 km
Description: The beach consists of shingle (large pebbles mixed with medium-sized pebbles), but is sandier in its eastern range. In general, only a few metres (less than 10 m) wide.
Land use: The agricultural fields extend almost to the shore, some buildings are close to the beach. A harbour is situated on the western edge of the beach.
Turtle situation: 4 tracks (2 U-turns, 2 with nests) on 19.6.1988. On a second survey on 20.8.1988, 21 body pits were identified. From 7 of these, young had hatched and 9 were destroyed by dogs.
Other fauna: One dead young Nile Soft-shelled Turtle *Trionyx triunguis* was found at the mouth of the Sarısu and children reported other larger specimens.
Protection: None.

Çubukkonagi beach

ID-number: 743
Co-ordinates: 36.06/33.00
Length: 0.7 km
Description: Small stony beach consisting of large pebbles. Rather steep in the splash zone.
Land use: Many excavations on the beach for shingle.
Protection: None.

Aksaz beach

ID-number: 745
Co-ordinates: 36.06/33.07 - 36.08/33.10
Length: approx. 7.0 km

Description:	The southwestern half of the beach consists of extremely coarse shingle with pebbles much too large for turtle nesting. A river flows into the sea there. The northern shore has much finer grains, however, its width is usually only a few metres. Slightly sloping stretches interchange with steep shore and the eastern edge of the beach is hard to define because of its slow transition into steep coast.
Land use:	Almost no use of the southwestern stony beach, apart from some children swimming in the sea. The main road Anamur - Mersin is very close to the northern shore and houses, a tea-house, a restaurant, garage etc. are situated along the road. Some daily visitors to the beach.
Turtle situation:	Local people informed us that sea turtles came "in much larger numbers to the beach" a few years ago than now. During the survey in 1988, only one track of an emergence which ended in a nest was found on the northern shore on 19.6.1988.
Protection:	None.

Sipahili beaches

ID-number:	750 - 752
Co-ordinates:	36.09/33.29
Length:	0.5 - 0.8 km each
Description:	Three beaches very close to each other, only separated by rock formations. Sandy to a width of 50-80 m, but narrower towards the edges. Steep rocks behind no. 750. The open area, most of which is uncultivated, is covered predominantly with <i>Vitex agnus-castus</i> vegetation.
Land use:	The coastal road leads above no. 750 and is close to no. 751. Some campers regularly park their cars on the beach and also stay the night.
Turtle situation:	One track of an emergence each on 750 and on 751 on 13.6.1988. A U-turn on 751 on 19.6.1988. On 25.8.1988, two nests of which one has been destroyed by predators. Young had hatched from the other one.
Protection:	None.

Ovacık beach

ID-number:	755
Co-ordinates:	36.10/33.39
Length:	1.5 km
Description:	The beach is bisected by the mouth of Şehitler Deresi. The village Ovacık, now called Hacıışaklı is situated on the eastern edge of the beach. A coastal road runs parallel and at a close distance to the shore. The width of the beach is greatest in the middle, being some 40-50 m here. Sandy with larger pebbles intermixed. Some rocks on the shore.
Land use:	Several houses on the beach. Disturbance from the road. Moderate use of the beach by people swimming, mostly from the nearby village.
Pollution:	Some tar on the beach.
Turtle situation:	7 tracks (3 with nests, 4 false crawls) on 20.6.1988. No tracks or nests on 25.8.1988.
Protection:	None.

Göksu delta west side

ID-number:	760 - 763
Co-ordinates:	36.19/33.54 - 36.18/34.02
Length:	22.4 km (760: 10.5 km, 761: 4.5 km, 762: 5.7 km, 763: 1.7 km)
Description:	The Göksu River formed its delta in historical times. On its right bank two large lagoons are found: Akgöl and Paradeniz Gölü, the latter being connected with the sea through a small channel (Dalyan). To the south of the lagoons, a spur of extremely flat land extends several kilometres into the sea. The northernmost part of the southwestern beach (no. 760) has been flattened for tourist use. The central section which is about 5 km long consists of fine sand. There is a steep slope in the splash zone. Otherwise, the slope of the beach from the sea is very slight and after a few metres the beach turns into dunes. These are covered with sparse vegetation. Higher sand dunes (2-3 m in height) are found further towards Akgöl and the vegetation is relatively dense there. The southern 3 km of the southwest beach becomes extremely flat and waves seem to wash over the land during storms. Beach no. 761 which is from the southern tip (i.e. from the lighthouse) to the pumping station is similar. The flat tip which is only about 0.5 m above sea level, has no vegetation and the very fine sand is rather compact (hard). The stretch from the pumping station to Dalyan (no. 762) which connects Paradeniz Gölü with the sea also consists of fine sand. The beach slopes slightly from the sea and vegetation begins some 15 m beyond the tide line. Beach no. 763 which is the segment from Dalyan to the Göksu River mouth is a similar slightly sloping sandy beach on which much flotsam is found. Its width is up to 150 m.
Land use:	The northernmost 2.5 km of beach no. 760 is used for tourism. Several holiday villages of Turkish people are located here. The houses are behind the beach, but the beach itself is crowded in summer by swimmers. It has been artificially flattened and cleared of vegetation. It is planned to expand the holiday village. Land has even been bought by a co-operative. In the middle of section no. 760 there is illegal excavation of the beach for its sand (during the night!). A pumping station is pumping sewage from a paper factory into the sea at the border from 761 to 762. The area around Dalyan is intensively used by fishermen.
Turtle situation:	Nesting of loggerhead turtles has been mentioned by Beiers (1982) and Aygün Kılıç (pers. comm.) has collected shells of sea turtle eggs from the preceding year on beach section 760 (south of the holiday village) in April 1987. Two old carapaces from loggerhead turtles were present at Dalyan in 1987 and still there in spring 1988 (Kasperek & Kılıç, unpubl.). 39 turtle tracks were counted on beach no. 760 on 21.6.1988, 17 of these with nests and 20 false crawls. Four of the nests were destroyed by dogs. There were probably 10 more turtle tracks which were however too faint to allow positive identification. In section 761, there was only one U-turn found, but one loggerhead turtle was tagged the following night after she had layed her eggs. In 762, 4 tracks were found on 22.6.1988 which were all U-turns. No tracks were present in 763 on that date. On the night of 24-25.6.1988, one <i>Caretta</i> was tagged after she had layed eggs on section no. 760. On 12.7.1988, 78 tracks plus 6 body pits were counted on beach no. 760. 36% of the tracks were very new, probably from the night before, the others were older. Beach no. 760 was divided into five more or less equal sized sections: The number of tracks and nests per section from the north to the south were: 0 - 11 - 12 - 36 - 25. The lack of any turtle tracks in the northern section which is used by tourists is striking. However, the percentage of false crawls varied greatly from section to section. Again from the north to the south, they were: 1 - 18% - 42% - 92% - 88%. The flat compact sand on the southern spur of the

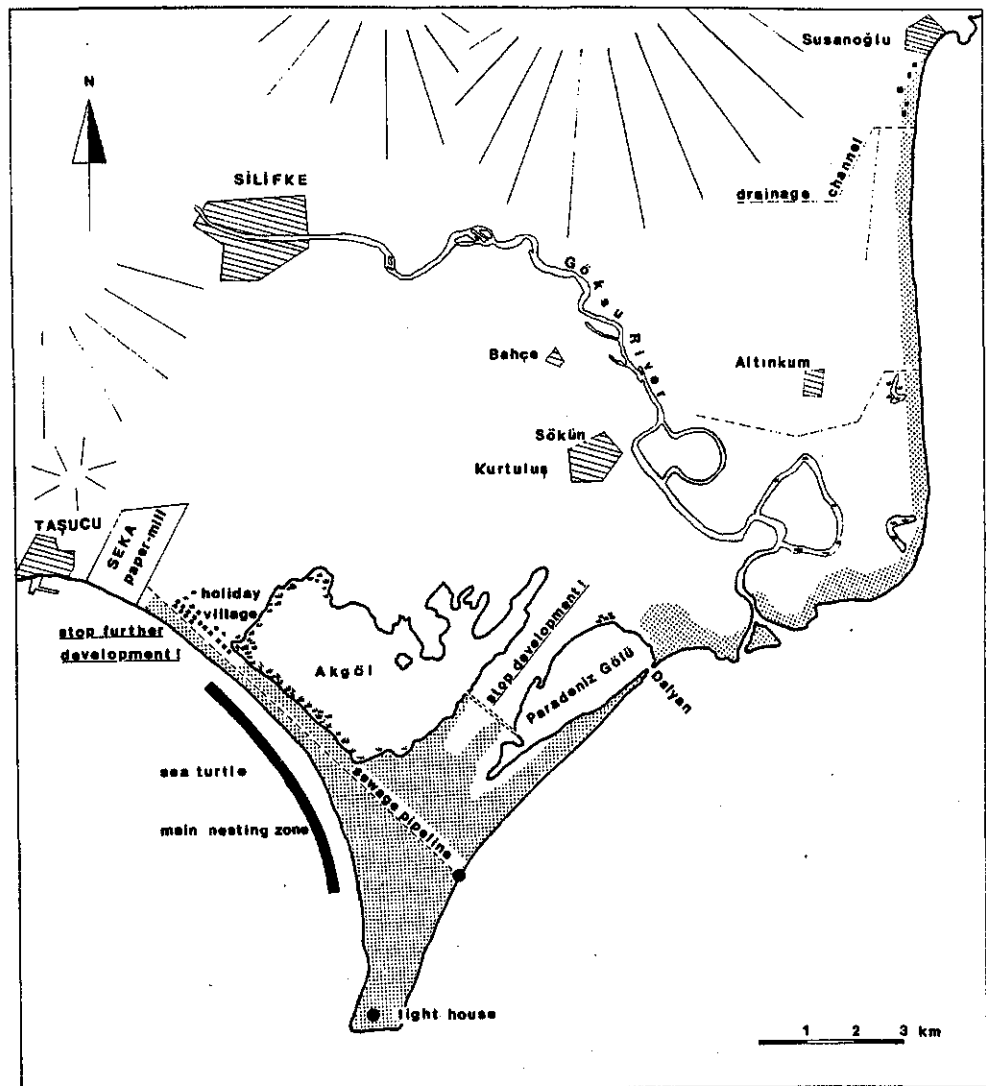


Fig. Map of the Göksu delta. Most of the turtle nesting occurs on the southwest beach of the western side of the delta. The eastern side of the delta is hardly used by nesting sea turtles, although favourable nesting habitats also exist there. The extension of an existing holiday village should be stopped.

delta does not allow the sea turtles to lay their eggs. As they do not find favourable conditions there, they return to the sea without laying their eggs. Many turtles e.g. returned to the sea after a few metres walk on the beach. On the same date, 3 tracks (at least 2 with nests) were found on 761, 5 tracks (at least one with a nest) on 762, 3 tracks (nest?) on 763, 4 tracks (one with a nest) on 764, 2 tracks (one with a nest) on 765, 2 tracks (both with nests) on 766 and 2 tracks (both with nests) on 767.

In the August count, only one nest which was destroyed by predators on beach no. 760 and two old tracks of emergences on 763 were noted.

Other fauna:

The lagoons, the dunes, *Salicornia* salt marshes, sandy beaches etc. are one of the most important bird areas in the Middle East. About 310 bird species have been recorded in the delta. Breeding purple gallinules, *Porphyrio porphyrio*, (20+ pairs, the only site in Turkey) and marbled teal *Marmaronetta anguirostris* (30+ pairs, the largest population in Turkey) is particularly noteworthy. Other breeding species include pygmy cormorant, *Phalacrocorax pygmaeus*, white pelican *Pelecanus onocrotalus*, (presumed), Dalmatian pelican, *P. crispus* (possibly), great bittern, *Botaurus stellaris* (possibly), little bittern, *Ixobrychus minutus*, night heron, *Nycticorax nycticorax*, squacco heron, *Ardeola ralloides*, little egret, *Egretta garzetta*, great white egret, *Egretta alba*, purple heron, *Ardea purpurea*,

glossy ibis, *Plegadis falcinellus*, spoonbill, *Platalea leucordia*, ruddy shelduck, *Tadorna ferruginea*, ferrugineous duck *Aythya nyroca*, lesser kestrel, *Falco naumanni*, black francolin, *Francolinus francolinus*, little crane, *Porzana parva*, avocet, *Recurvirostra avosetta*, spur-winged plover, *Hoplopterus spinosus* gull-billed tern, *Gelochelidon nilotica*, Caspian tern, *Sterna caspia*, white-breasted kingfisher, *Halcyon smyrnensis*, and pied kingfisher *Ceryle rudis*. Counts of waterfowl include important numbers of flamingo, *Phoenicopterus ruber*, wigeon, *Anas penelope*, pintail, *A. acuta*, garganey, *A. querquedula*, shoveler, *A. clypeata*, and marbled teal, *Marmaronetta anguirostris*.

Protection: None.

Göksu delta east side beaches

ID-number: 764 - 767

Explanation: 764: Göksu mouth to Öktem Çiftliği (river mouth)
765: Öktem Çiftliği to mouth of southern drainage channel
766: area between both drainage channels
767: northern drainage channel to Susanoğlu

Co-ordinates: 36.18/34.04 - 36.25/34.05

Length: 13.7 km (764: 3.0 km, 765: 4.1 km, 766: 4.6 km, 767: 2.0 km)

Description: The east side of the Göksu delta does not have lagoons, but the old bed of the Göksu River forms some wetlands. The beach is sandy along the whole coast and does not have any large pebbles. The mouths of a former river branch of the Göksu and those of two drainage canals divide the beach into several sections.

In the southern part of the beach (no. 764 - 765), the width of the beach varies

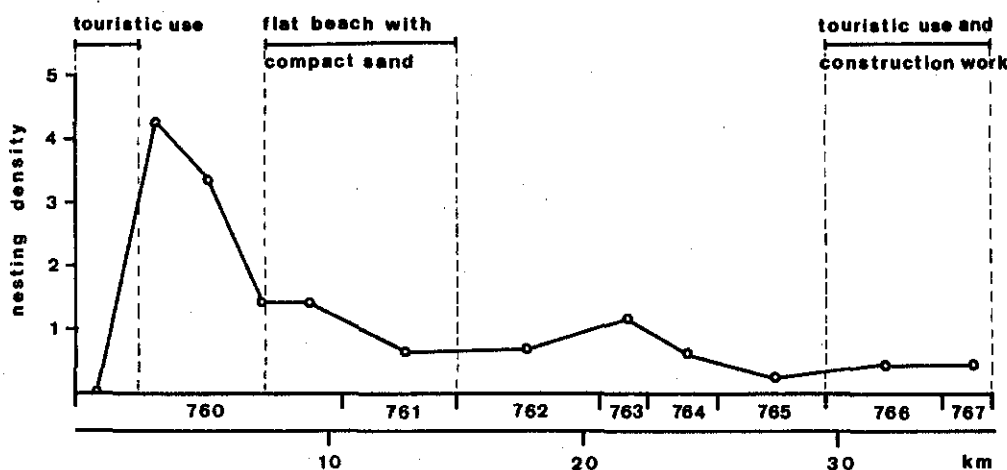


Fig. Nesting density of sea turtles in the Göksu delta, based on track counts in 1988. The upper abscissa shows the beach numbers (ID-numbers of the beach inventory), the lower abscissa the distance from a holiday village near Taşucu. For the calculation of the nesting density, all tracks were used which were not definitively false crawls.

from a few metres to about 80 m. Behind the beach, low sand dunes, rice fields and wetlands are located. The sand dunes are densely covered with scrub and are often rather steep. On the beach, there is much flotsam like branches of trees etc. Towards the north, the beach becomes somewhat wider and the sand dunes at the back higher. Dunes of 10 m height are found there.

Land use: The beach to the south of Susanoğlu is used for tourists and many new tourist projects are underway in 766-767. One tourist centre at Altinkum is particularly worth mentioning. However, the infrastructure (especially roads) is still bad,

there are e.g. no bridges over the drainage channels close to the mouths.

There is some camping on the beach (mainly in the northern half) and anglers are active mainly around the mouths of the small stream coming from Öktem Çiftliği and the drainage channels.

The excavation of the beach and the sand dunes for construction purposes is considerable.

Pollution: Tar on the beach, among stranded branches of trees around the Göksu mouth, there is also a lot of litter.

Turtle situation: On 14.6.1988, no turtle tracks on 767 (other beaches not surveyed). On 22.6.1988, 7 tracks (one with nest, 3 false crawls) in 764, two false crawls in 765, one track of emergence (with nest?) in 765 and nothing in 766 and 767. On 12.7.1988, 4 tracks (one with nest, one U-turn) on 764, 2 tracks (1 with nest, 1 U-turn) on 765, 2 tracks (both with nests) on 766 and one track with nest on 767. On 22.8.1988, one nest was situated in 764 and 6 nests in 765. Four of these were destroyed by predators and from one young had hatched.

Other fauna: One dead Nile Soft-shelled Turtle, *Trionyx triunguis*, was found at Göksu River mouth on 12.7.1988. The wetlands behind the sand dunes have a rich bird life which is however less well-known.

Protection: None.

Kızkalesi beach

ID-number: 775
Co-ordinates: 36.28/34.09
Length: 0.5 km
Description: Very flat beach hardly sloping from the sea. Fine sand, but hard due to intensive human use.
Land use: Used for tourism 100%. A lot of hotels, guest houses, restaurants, discos etc. are behind the beach at some distance. Still many people on the beach during night (beach parties etc.).
Protection: None.

Tirtar beach

ID-number: 776
Co-ordinates: 36.33/34.14
Length: 2.7 km
Description: Narrow beach between Tirtar village and the mouth of the Lamas River. Sometimes only 2 m wide. Shingly, very coarse in the west. In the east, shingle is found only in the splash zone, but sand is found in the upper parts of the beach.
Land use: Several tourist developments on the beach. Gardens and agricultural areas border the shore in areas without such developments.
Protection: None.

Limonlu beach

ID-number: 777
Co-ordinates: 36.34/34.16
Length: 3.1 km
Description: This beach extends from the mouth of the Lamas stream to Kocahasanlı (Akkale). In general, it consists of sand and its width varies between 10 and 30 m. The slope of the beach from the sea is often rather steep.
Land use: The beach between the Lamas stream and the Marine Institute of Middle East Technical University is greatly exploited for its sand. The main road Silifke - Mersin is immediately behind the beach. Houses, camp sites, and the Institute of Marine Sciences of the Middle East Technical University are scattered over the beach.
Turtle situation: One old track of a sea turtle was found on the beach on 23.6.1988. People from the University Institute reported 4 nests earlier in the season. On 23.8.1988, four sea turtle nests were identified. Young had hatched from two out of 4 nests.
Protection: None.

Erdemli south beach

ID-number: 778
Co-ordinates: 36.35/34.17
Length: 4.0 km
Description: The beach extends from Akkale to Erdemli. It consists of fine sand, but rather large pebbles are mixed with it. A pine forest is located behind the beach.
Land use: Most of the beach is occupied by a camp site belonging to the General Directorate of Forestry. The beach is over-crowded with people during summer and light reaches the beach at night.
Turtle situation: None on 23.6.1988 and two nests of which young had hatched on 23.8.1988.
Protection: None.

Erdemli north beach

ID-number: 779
Co-ordinates: 36.36/34.18 - 36.38/34.22
Length: 6.0 km
Description: The beach extends from Erdemli to Arpaçbahşiş and is rather stony with pebbles of 5-10 cm in diameter, and rather narrow. Rocks are found along the shore. However, a 1.5-2.0 km long section of the beach consists of sand (some shingle only in the splash zone) and turns into dunes. The slope of the beach from the sea is rather steep (a height of 3-4 m is reached at a distance of 14 m from the sea).
Land use: Intensively used by tourists, such as camp sites, hotels and private recreation facilities.
Turtle situation: On 23 and 24.8.1988, 10 nests were found. Young had hatched from all of them.
Protection: None.

Tömük beach

ID-number: 780
Co-ordinates: 36.39/34.23
Length: 3.0 km
Description: The beach which extends from Arpaçbahşiş to Altın is divided by the Tömük stream. It consists of fine sand, but has large pebbles in it. Towards Altın the sand is replaced by shingle. The width of the beach is about 20 m. Agricultural areas border the beach, unless they are used by holiday villages.
Land use: Several holiday villages of Turkish people lie behind the beach. The beach is over-crowded during summer.
Turtle situation: One track of a turtle emergence (with nest) was found on 23.6.1988.
Protection: None.

Çeşmeli south beach

ID-number: 781
Co-ordinates: 36.39/34.25
Length: 2.5 km
Description: The beach extends from Altın to the road which leads straight onto the beach coming from Çeşmeli. The northern part consists of coarse shingle and is rather narrow. A road at the edge of the beach separates it from agricultural fields on the other side of the road. After about 1 km, the beach becomes wider and the coarse shingle is replaced more and more by fine sand. Larger pebbles however are still embedded in the sand. Sand dunes are found behind the beach.
Land use: Road close to the beach in the north, many people swim in the south (sandy beach!). Some sand excavations in the southern part.
Turtle situation: Four nests from all of which young had hatched were found on the sandy part of the beach on 23.8.1988. Out of three dead turtle babies which were found there, two belonged to *Caretta*, one to *Chelonia*.
Protection: None.

Çeşmeli - Tece beach

ID-number: 782
Co-ordinates: 36.40/34.26 - 36.43/34.28
Length: 5.0 km
Description: Beach extends from the road leading from Çeşmeli to the beach in the south to Tece in the north. Very narrow. Sandy in principal, but mixed with very large pebbles.
Land use: More or less intensively used for tourism.
Protection: None.

Davultepe beach

ID-number: 783
Co-ordinates: 36.43/34.29
Length: 3.5 km
Description: The beach extends from Davultepe to the Forestry Education Centre which is situated on the promontary to the north of Davultepe. The width of the beach is up to 30 m, but is also often reduced to 2-3 m. Fine sand mixed with stony, rocky sections. Behind the beach it consists of gardens and rural areas.
Land use: Some camping and recreation facilities on the beach, several construction sites for tourist establishments. An education centre for forestry people at the northern edge of the beach. Lights illuminate the beach there.
Turtle situation: 8 turtle nests were identified on 24.8.1988. From 7 of these young had hatched. Forestry people reported that one sea turtle laid its eggs on the beach belonging to them in 1987 and that another was killed by people in the same year.
Protection: None.

Mezitli beach

ID-number: 784
Co-ordinates: 36.44/34.30
Length: 3.3 km
Description: The beach extends from the Gümüşkum Education Centre in the south to the ancient Pompeiopolis (Viranşehir) in the north. Rather narrow sandy beach with shingly parts. Some sandy parts seem to be made artificially for tourist use.
Land use: Mostly under intensive tourist use.
Turtle situation: None on 23.6.1988 and on 24.8.1988.
Protection: The ancient Pampeiopolis is protected as an archeological site (SİT alanı).

Çukurova

Çukurova is a large alluvial river delta formed by the rivers Berdan (= Tarsus), Seyhan and Ceyhan during the last 2000 years. The delta area has an approx. 130 km long coast which consists mainly of fine sand. The lowland has been settled in rather recent times, as the area has been subject to heavy malaria sickness which still occurs from time to time. The main settlements are Karataş and Yumurtalık. Karataş in particular is expanding its tourist facilities mainly for people from Adana which is 50 km to the north of it and which is Turkey's fourth largest city. The area between Mersin and Kazanlı is completely covered with industrial areas. The survey has covered 27 beaches or beach units with a total length of 103.8 km.

Karaduvar beach

ID-number:	801 - 802
Co-ordinates:	36.49/34.42
Length:	0.9 km (801: 0.3 km, 802: 0.6 km)
Description:	Within the industrial area of Mersin, two small beaches have remained: One in the west of Karaduvar (no. 801) is an approx. 300 m long, narrow sandy beach. The sand is always wet and behind it a wall-like layer of sandy clay and deposits of calcium compounds rise. The other beach (no. 802) which is surrounded by a thermal power plant and by Deliçay is, with a length of 600 m, somewhat longer. It consists of sand in which larger pebbles (diameter up to 5 cm) are embedded. Its width is about 10 m. Behind that a 5-50 m wide zone of flat land (covered with grass and herbs) follows. A small deciduous forest lies behind it.
Land use:	The area lies within the industrial area of Mersin.
Turtle situation:	None on 10.8.1988.
Protection:	None.

Kazanlı beach

ID-number:	803 - 806
Explanation:	803: soda factory 804: soda factory to shipyard 805: shipyard to municipal beach 806: municipal beach to mouth of drainage channel
Co-ordinates:	36.49/34.44 - 36.49/34.47
Length:	4.5 km (803: 0.4 km, 804: 0.5 km, 805: 0.5 km, 806: 2.5 km)
Description:	Kazanlı beach is sandy with shingly parts mostly along the splash zone. Its width varies greatly especially due to human use. The sea is very shallow here, the 10 m isobathe is 3.5-4.0 km in front of the shore line. The westernmost beach (no. 803) lies within the area of a soda and a chrome factory (and could only be visited with special permission). It is a sandy beach about 10-20 m wide on which many pebbles with a mean diameter of 5 cm are found. A layer of clay and rock forms a steep slope behind the beach. That has a height of 0.5-1.5 m. Some 10 m behind that there is another slope a few metres high on which the factories have been built. A sewage channel separates this beach (803) from the eastern one (804). The channel dikes are rather high and extend into the sea. They consist of white clay. The eastern beach slopes slightly from the sea. Some 10 m are rather flat. Behind it, a zone of sand dunes (width 10-15 m) is found. Their height does not exceed 2.5 m above sea level. To the rear, a dense fence of bamboo is found

which separates the dunes from arable land. Water melons, tomatoes, paprika etc. are cultivated there.

The next section of the beach (805) becomes wider (some 20-25 m) and flatter: the higher sand dunes are missing here. A very small stream flows into the sea. A road separates the beach from the flat sandy area behind the beach.

The next section which is the longest (no. 806) extends up to Çomak Kanalı (D7 drainage channel of DSI, the State Hydraulic Works) and is very similar to the preceding sections: Once more the beach becomes somewhat wider, now being some 25-30 m wide and rather low sand dunes lie between the beach and road on the landward side.

Land use:

The soda and the chrome factory surround the beach no. 803 and border the beach no. 804. During the night, they are illuminated and their lights can be seen from all parts of the beach and from even further away.

The location of the bamboo fence which separates the dunes from the arable land changes from year to year and is getting closer and closer to the sea shore. Thus the size of the dunes is becoming much smaller (land reclamation!). The most recent renewal of the fence was seen in January 1989 (Kasperek): It was pushed forward again for some 40-50 cm so that the width of the dune reaches a critical level of narrowness. The dunes are public property (municipality of Kazanlı) and are leased by private people every year. The arable land which has been gained from the cultivation of the dunes is very productive after irrigation: Three yields are achieved a year.

The sewage of the chrome factory and the soda factory is passed to the sea through two different channels, the chrome canal being in the west of beach no. 803, the calcium channel in the east. The sewage from the soda factory forms a layer of lime on the bottom of the sea. After storms, this layer is disturbed and lime is found even on the beach. Here, it becomes an impediment for turtle babies.

A primitive shipyard which marks the border of section 804 to 805 is operating without any buildings. A few people are working there on the beach during the daytime on 2-3 ships or boats.

A summer camp of local people lies behind the road at some distance to beach no. 805. It is situated under trees. The lights and the noise on the beach are modest. A public camp site belonging to the municipality of Kazanlı is directly on the beach. A restaurant and some rather primitive houses for renting belong to it. Although the camp site is not much frequented, many people use the beach here to swim in the polluted sea.

Trawlers were observed very close to the beach (50-100 m). They are fishing for shrimps. Military exercises with canons etc. were noted over the sea some 1 km in front of the shore. Anglers are found in low numbers all along the beach.

Pollution:

The sea is extremely polluted by sewage from the soda and from the chrome factory at Kazanlı (sewage canals to the sea!). The sea is milky, sometimes (depending on the introduction of sewage) even milky-greenish and its visibility is almost zero. Plastic, tar and oil are found all along the shores, washed ashore by waves.

Turtle situation:

Beach no. 803 could only be visited once, on 9.8.1988, when 22 tracks plus 27 body pits (of which at least 2 were destroyed by predators) were counted.

The other sections of the beach were selected for regular observations on the breeding success of the sea turtles in August/September. The table gives the results on emergences of adult sea turtles. Those results on breeding success will be published elsewhere.

According to these results, 192 tracks of emergences were counted of which at least 125 led to egg laying. 95 nests (= 76%) were made on a 0.5 km long section of the beach (on no. 804). With about 80 tracks/km this is the beach with by far the highest nesting density in Turkey. The nesting density declines quickly towards the eastern side of the beach.

Other fauna:

Dolphins were seen on 22.8.1988. The Blue Crab *Callinectes sapidus* lives in the sea there.

Recommendations: The problem with by far the highest priority is the pollution of the sea with sewage from the soda and the chrome factory. This is primarily a problem to

	804			805			806		
	all	nest	U-turn	all	nest	U-turn	all	nest	U-turn
20.6	40	35	2	20	13	4	10	7	3
24.6	13	11	2	-	-	-	2	2	-
25.6	13	7	4	-	-	-	7	4	2
26.6	5	4	0	-	-	-	-	-	-
27.6	-	-	-	-	-	-	6	2	1
3.7	31	18	9	9	2	5	-	-	-
4.7	5	2	3	1	-	1	-	-	-
5.7	4	4	-	1	-	1	-	-	-
6.7	7	4	3	-	-	-	-	-	-
10.7	4	3	1	-	-	-	-	-	-
11.7	3	2	1	2	-	-	-	-	-
8.8	4	1	2	-	-	-	-	-	-
9.8	1	1	-	-	-	-	-	-	-
11.8	2	1	1	-	-	-	-	-	-
12.8	-	-	-	-	-	-	-	-	-
13.8	1	1	-	-	-	-	-	-	-
14.8	-	-	-	-	-	-	-	-	-
15.8	-	-	-	-	-	-	-	-	-
16.8	-	-	-	-	-	-	-	-	-
17.8	-	-	-	-	-	-	-	-	-
18.8	1	1	-	-	-	-	-	-	1

Tab.: Sea turtle nesting in the Kazanlı area. The table gives the total number of tracks of emergences ("all"), those emergences which apparently resulted in nests ("nest") and the false crawls (= "U-turns"). The numbers 804, 805 and 806 are three different beach sections. The beach was patrolled until September 17th every day, but no tracks of emergences have been found after August 18th.

human health, but nevertheless, its possible long-term effect on sea turtles should also be emphasized. Sewage farms and regular sewage controls are urgently recommended.

Photopollution, i.e. the disturbance of the natural environment with artificial lights, occurs from the factory and from the restaurant (camp site). The lights cause great disorientation among the turtle babies: not so much on the beach with the highest nesting density (no. 804), because a fence made of thick bamboo-like reeds screens the lights there to some degree, but more in the sections to the east of it. In section no. 805, the tracks of turtle babies can be seen there regularly searching in vain for the way to the sea after they have been disorientated by the lights of the restaurant and camp site. There should be an attempt to screen the lights of the factory. This is not an easy task and it is expected that complete screening is impossible. Therefore, the photopollution should be reduced as much as possible by screening and in addition to that, a bamboo fence should be constructed behind the beach. It should be similar to an existing fence, but it should be higher, denser and further back.

Also the lights from the restaurants and the camp site should be screened. It seems that this can be done with relatively simple methods such as curtains, altering the position of the lamps etc.

The road behind section no. 805 is made of almost white limestone (waste product of the soda factory!). This road glimmers in the night and causes much disorientation among turtle babies should be covered with a dark material (e.g. asphalt) or — much better — should be constructed further away from the shore.

The sand dunes have been reduced greatly in size in section 804 and have been completely destroyed in no. 805. In 804, the width of the dune is reduced year by year through land reclamation. A minimum is retained as it is used as a barrier against the sea and is even elevated by pushing the sand together. Further-

more, large stones were brought in January 1989 to bind the sand. These activities have to be stopped immediately, i.e. before the 1989 nesting season. A restoration of the former sand dune has to be started immediately, too. The bamboo fence has to be pushed at least 20 m behind its present position and the regained land has to be returned to its original status of a sand dune. For this purpose, stones and humus have to be removed and the area has to be filled up with sand.

The shipyard should be removed from its present site. It can move e.g. to section 806 of the beach.

Much litter which is washed ashore should be collected.

Protection:

None.

Tarsus beach

ID-number: 810 - 812

Explanation: 810: From Çomak (D7) canal to Karabucak canal
811: From Karabucak canal to Berdan River mouth

812: from Berdan River mouth to Seyhan River mouth (outflow of Dipsiz Gölü)

Co-ordinates: 36.49/34.47 - 36.44/34.54

Length: 12.2 km (810: 2.2 km; 811: 3.5 km; 812: 6.5 km)

Description: The beach is divided by the mouth of the Karabucak drainage canal and by the mouth of Berdan River. Tarsus River is another name for Berdan.

The width of the beach varies from 50 to 100 m. The first 15 metres are rather flat and the sand is relatively compact since waves often splash over the beach. The next 35 m are slightly sloping and consist of loose fine sand. A wide zone (300 m) of sparsely vegetated sand dunes follow it. Behind the dunes, Eucalyptus forests are found. Only in the easternmost 3-4 km (towards Dipsiz Gölü), do agricultural areas and fallow land form the background. A small strip of gardens is often situated in between the dunes and the forest.

The current of the sea seems to be from the south to the northwest: On 30.5.1988, the sea was yellowish-brownish for a length of 4-5 km by the influx of Seyhan River.

Land use: Beyazkum Plajı which is the public beach of Tarsus municipality is situated on the western half of section 812 and can be reached by a suspension bridge over Tarsus = Berdan River. A restaurant, a long row of cabins and about 6 houses are situated there. Electricity is available.

Anglers are active all along the shore. They mostly use motorcycles for moving across the beach. Some people (east Anatolian day labourers) live in the sand dunes in very primitive huts. Tractor tracks are found all along the beach.

Pollution: Beach heavily polluted with oil and tar on 30.5.1988. Moderately polluted with waste washed ashore.

Turtle situation: No tracks of turtles on 812 on 30.5.1988 and none on 810-812 on 20-21.6.1988. On 8.8.1988, one track ending in a nest on 811 and one false crawl on 812.

Protection: None.

Tuzla beach

ID-number: 815 - 816

Co-ordinates: 36.43/34.54 - 36.41/35.07

Length: 20.0 km (815: 16.0 km, 816: 4.0 km)

Description: The beach extends from Seyhan River mouth along the shore south of Tuzla to

the mouth of the so-called "YD-4 drainage channel". A lagoon (Tuzla or Tuz Gölü) is situated behind the shore. The lagoon has a small outlet to the sea. The width of the beach is 40-65 m. It consists of fine sand. Behind it, dunes with sandy hills reaching 2-3 m in height are found. In general, agricultural fields begin immediately behind the dunes.

Land use:

Some simple huts of local people are located on the beach which serves as a summer residence. Tracks of tractors on the beach. A large camp is situated on the shore where the route from Tuzla ends. It belongs to the Ministry for Education and scouts spend their summer holiday there. Some other tourist facilities (public beach, camping, restaurant, tea garden etc.) are also available. In August, some 2000 tents are on the beach.

Pollution:

Plenty of stranded waste on the shore.

Turtle situation:

On 11.6.1988, 7 tracks (3 with nests, 3 U-turns) were counted on 815 and none on 816. On 22.6.1988, only one track (with nest?) was present on 815 and again none on 816. On 6.8.1988, two tracks (both ending at nests) were found in 815 (and also a dead adult loggerhead) and one track of an emergence (with nest?) was observed in 816.

On 7.8.1988, 6 young sea turtles were taken from children at the recreation camp on the border from 815 to 816. The pupils had collected them in front of the camp the night before. They were all *Caretta*.

Akyatan beach

ID-number:

817 - 821

Co-ordinates:

36.41/35.05 - 36.33/35.19

Length:

21.7 km (817: 4.5 km, 818: 1.5 km, 819: 4.5 km, 820: 8.0 km, 821: 3.2 km)

Description:

The beach extends from the mouth of YD-4 drainage channel at the south of Tuzla to Akyatan Dalyanı which is the junction of Akyatan Gölü with the sea. This lagoon is situated behind the beach so that the Akyatan beach is more or less a land bridge between the lake and the sea with a width of a few kilometres.

The whole beach consists of fine sand. It has a near constant width of about 50-70 m. The slope from the sea is modest, apart from a steep edge in the splash zone (some 30-40 cm high). The sand dunes behind the beach (up to 200 m wide) emerge up to 10 m above the ground. They are covered with plants sometimes also with *Eucalyptus* trees (which have been planted at the border from 818 to 819). In sections 817 and 818, marsh land is found behind the dunes.

Land use:

Only the westernmost section (no. 817) is used for tourists. 36 holiday homes of Turkish people are close to the mouth of the drainage canal and some 3 km to the east of it, a camp site with a restaurant and 150-200 tents in summer is found. Otherwise, almost no humans use the beach. Only one house (on the border from 819 to 820) lies on the beach, belonging to the General Directorate of Forestry. People collect flotsam from the beach from time to time. Therefore some tractor tracks on the beach.

Pollution:

Plastic and other waste are among the flotsam. Beach slightly polluted with oil and tar.

Turtle situation:

On 2.6.1988, 18 tracks of sea turtles (5 with nests, 13 false crawls) were counted on section 820. On 10.6.1988, 33 tracks (12 with nests, 15 false crawls) were present on 820-821 and 10 tracks (1 with nest, 8 false crawls) on 817-819. An incomplete count (night observations) yielded 3 tracks (1 with nest, 2 false crawls) on 820-821 on 16.6.1988.

On 22.6.1988, 14 tracks (1 with nest, 9 false crawls) were counted on 817 and 10 tracks (3 with nest and 6 false crawls) on 818. Three tracks (1 with nest, 2 false crawls) during a night excursion on beach 819 on 1-2.7.1988 and 12 (6 with nests, 4 false crawls) on 817-818.

On 17.7.1988, one false crawl in section 817, 16 tracks (6 with nests, 10 false

crawls) in 818, 35 tracks (15 with nests, 18 false crawls) in 819, 189 tracks (55 with nests, 105 false crawls) on 820 and 10 tracks on 821. About 22% of the tracks seen on section 820 were supposed to be new, the others seemed to be old.

On 7.8.1988, 6 tracks (1 with a nest, 4 false crawls) were seen on section 820 and one track (with a nest) on 821.

With over 250 tracks on 17.7 this is one of the main nesting beaches of sea turtles in Turkey. This is 11.6 tracks/km with a concentration on beach no. 820: the density here is 23.6 tracks/km.

Recommendations: This beach is among the most important Turkish nesting sites and it is one of the few Turkish beaches which are almost untouched by tourism and other human influences. Some camping etc. in one edge of the beach does not cause further harm. An extension of these tourist facilities should be avoided. The area should receive legal protection status. It is proposed as a strict nature reserve and the bureaucratic process is well underway.

Karataş - Dalyan beach

ID-number: 822
Explanation: beach to the southeast of Akyatan Dalyanı
Co-ordinates: 36.33/35.20
Length: 1.0 km
Description: A 30-40 m wide beach consisting of fine sand. It is bordered by rocky headlands (towards Karataş Burnu) and the channel connecting the lagoon Akyatan Gölü to the sea.
Land use: Several houses are on the beach which is also used in summer by many camping families. A soldiers camp is also found there. Many excavations of the beach are made by the municipality of Karataş and also apparently by private people for the exploitation of the sand. Tractors driving on the beach leave deep tracks.
Turtle situation: One track of an emergence (false crawl) was seen on 2.6.1988 and none on 19.7.1988.
Protection: None.

Karataş east beach

ID-number: 830 - 831
Explanation: area between Karataş and the mouth of YD2 drainage channel near Bahçe
region: 36.34/35.24 - 36.35/35.28
Length: 6.0 km (830: 4.5 km; 831: 1.5 km)
Description: The western part of the beach (no. 830, west of a vertical line from Bahçe village to the beach) is generally very narrow and flat. It is often only 2-3 m wide and almost never exceeds 10 m. It is divided by rocky formations of relatively soft limestone which also form steep slopes. The beach itself is sandy but so flat that it is probably always flooded during storms. Towards the mouth of the drainage channel (border no. 830/831) the beach becomes wider and is somewhat above sea level. Its width reaches some hundred metres and sparse vegetation is found at the back of it. A steep edge is present in some places of the splash zone.
Land use: The beach around Karataş is used heavily throughout the year. A large forestry camp where many families spend their summer months is situated some 1.5 km

to the east of the town. A large recreation centre belonging to the State Hydraulic Works (DSİ) is found in the middle of the beach. Houses, holiday villages, tents, beach huts etc. are scattered all over the beach. About 50% of the beach length is under the influence of developments, but the usage of the beach rises to almost 90% in August when many families put their tents there.

Fishermen are active along the shore and a fishing harbour is available in Karataş. Fishermen are regularly seen especially around the mouth of the drainage channel. Vehicle tracks are found almost everywhere on the beach.

Pollution: The beach was heavily polluted with oil and tar in June 1988. Modestly polluted with litter such as plastic.

Turtle situation: Geldiay has reported important turtle nesting at Karataş. As almost no nesting grounds are found there, he probably referred to Akyatan beach. No tracks were found on 25.5.1988. On 31.5.1988, two tracks (apparently with nest) were present on 831 and none in 830. On 6.6.1988, there were 4 tracks (one with nest, 2 false crawls) on 830 and none on 831. On 15.6.1988, 4 tracks (at least 2 false crawls) were found on 830/831 and on 19.6.1988, there was only one track (with nest) on 830. In 831, one track was present on 23.6.1988 and on 30.6.1988, one track each was present in 830 and 831. No turtle tracks were found in either sections on 19.7.1988.

Protection: None.

Agyatan beach

ID-number: 835 - 836

Explanation: mouth of DY2 drainage channel to mouth of the Ceyhan River

Co-ordinates: 36.35/35.28 - 36.35/35.34

Length: 8.4 km (835: 6.0 km; 836: 2.3 km)

Description: A large sandy beach. Its width is some 30 m, but it is followed by an extensive dune area with sandy hills over 10 m in height. Only towards the eastern end, where the lagoon Ağyatan Gölü opens to the sea, does the beach becomes narrower in some places.

Land use: Apart from a fishermen's hut at the mouth of the Ceyhan River, there are no buildings on the beach. Great amounts of drifted wood collect near the river mouth and also to a lesser degree along the beach. It is collected by local people and transported by tractors.

Pollution: Litter is mainly brought by the Ceyhan River. It is washed ashore and distributed all over the beach. Tar was also present in June 1988.

Turtle situation: Two tracks of emergences which apparently succeeded in egg laying were seen on 835 on 31.5.1988. In 836, there were no tracks on that date. On 7.6.1988, three tracks (one with nest, 2 false crawls) were seen on 835. On 19.6.1988, 3 tracks (2 false crawls) were seen on 835 and none on 836. On 5.8.1988, one track (with nest) was recorded on 835 and none on 836.

Protection: Proposed as a strict nature reserve. The legal formalities are already at an advanced stage.

Yelkoma beach

ID-number: 840 - 843

Explanation: beach between the mouths of the Ceyhan and Old Ceyhan Rivers plus Kokar beach to the north of the Old Ceyhan mouth

Co-ordinates: 36.35/35.34

Length:	23.1 km (840: 2.0 km; 841: 11.0 km; 842: 8.5 km; 843: 1.3 km)
Description:	This is probably the most remote sandy beach of a considerable size in Turkey. It is some 23 km long and no road or even a track leads onto the beach. Its width is mainly 40-60 m, but exceeds some 100 m at Kokar which is the northern tip of the beach (to the north of the mouth of Old Ceyhan). Over its total length, the slope of the beach from the sea is extremely low: it is thought that most of the beach is flooded during storms. Therefore, all the beach has rather compact sand with a high humidity. At Kokar, the sand is even wet.
Land use:	Fishing is important especially at the river mouths. Moorings are at some parts to the rear of Kokar. The only building on the beach is a shepherd's hut which marks the border of 840 to 841. In the south in particular, sheep and cows graze at the rear of the beach. From time to time, villagers drive their tractors onto the beach in order to collect driftwood.
Pollution:	Much litter (plastic) is found on the shores. It passes through the rivers into the sea and is then washed ashore.
Turtle situation:	On Kokar beach (no. 843), two false crawls were found on 29.5.1988 and nine false crawls on 30.5.1988. No tracks were here on 18.6.1988 and 4.8.1988. On 30.5.1988, one nest which was destroyed by predators was seen on no. 842 and none on 840-841. On 18.6, no turtle tracks were found on 840-842. On 4.8.1988, no tracks were found on 840-841 and one false crawl and two nests were destroyed by predators on 842.
Protection:	Proposed as a strict nature reserve. The legal formalities are already at an advanced stage.

Yumurtalık

ID-number:	850 - 851
Explanation:	850 beach west of Küçük Yumurtalık 851 beach between Küçük and Büyük Yumurtalık
Co-ordinates:	36.46/35.42 - 36.46/35.46
Length:	6.0 km (850: 2.3 km; 851: 3.7 km)
Description:	A beach with fine sand mixed with pebbles up to 4-5 cm in diameter especially towards the mouth of a creek (Bağırsak Deresi) which runs into the sea near Küçük Yumurtalık. The slope of the beach to the sea is modest in general. Its width varies between 10 and 50 m. There are steep slopes in the southwest corner (Liman Burnu). In the east, the beach ends about 1 km in front of Ayas Kalesi which is the castle of Büyük Yumurtalık, where a steep rocky slope forms the shore.
Land use:	There are several recreation facilities on the beach, among them are those of the American military personnel and those of Çukurova University (Adana).
Turtle situation:	The warden of the university camp reported turtle nesting before 1987 (Altan, Kasperek & Kılıç). On 18.6.1988, one track with a nest was found in no. 850 and 11 tracks (7 with nests, one false crawl) on 851. Later in the month, on 27.6.1988, 4 tracks were counted (2 with nests and one false crawl) on 851 and 5 tracks (4 of these with nests) were there on the following day. On 850, none were found on 28.6. No tracks were seen on either sections on 16.7.1988.
Various:	Geldiay has stated in several publications that Yumurtalık is one of the most important nesting grounds for sea turtles in Turkey. On a map he indicated >6 nests/km/day. However, the natural structure and texture of the Yumurtalık beach is not very suitable for turtle nesting and it is not probable that the beach once hosted a greater nesting population. The same is true for other beaches in the surrounding area, as well as for the Yelkoma beach. Yumurtalık is very important for sea turtles, but rather as a feeding area for immatures and in the interesting season than for reproduction.

İskenderun - Samandağı region

This region includes the bay of İskenderun which is greatly affected by industry. İskenderun is an industrial city and has a harbour where oil and steel are the main goods. The bay is very polluted from the shipping. Much tar which was found on many beaches in the Çukurova (preceding region) stems without doubt from the industrial ships of the İskenderun bay. The region includes many small beaches, often too small for turtle nesting. The most important nesting beach of the region is Samandağı. The occurrence of loggerhead turtles in the bay of İskenderun ("golfe d'Alexandrette") was first mentioned by Lortet (1887).

The survey has covered 10 beaches or beach units with a total length of 38.8 km.

Yumurtalık northeast beaches

ID-number:	901 - 906
Co-ordinates:	36.46/35.46 - 37.00/36.00
Length:	8.5 km (approximative total length)
Description:	There is a set of small beaches in the bay of İskenderun along the shore to the northeast of Yumurtalık. Most of them are very narrow and are often very steep. None of them exceeds 1.5 km in length.
Land use:	Most of the beaches are not used by man, but occasionally tents are erected here in summer. Two oil pipelines end at the shore between the beaches, moorings for ships are found there.
Turtle situation:	A survey on 11.6.1988 yielded 14 tracks distributed over all the small bays on that half of the coast which is towards Yumurtalık. 12 of these seemed to have nests.

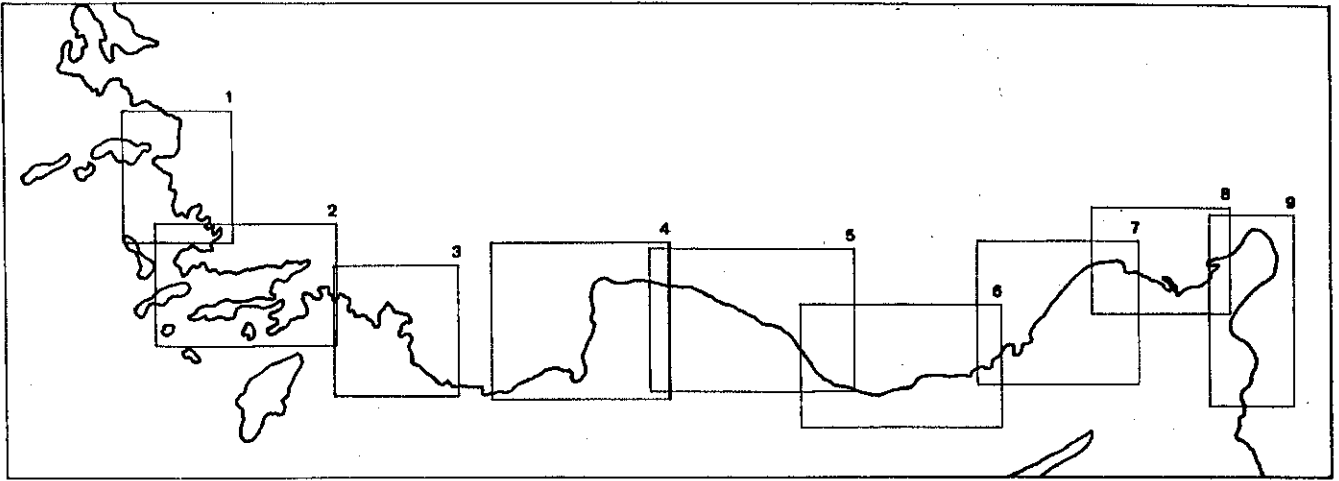
Dört Yol beach

ID-number:	910
Explanation:	37.00/36.01 - 36.49/36.11
Length:	approx. 20.0 km
Description:	A sandy beach with compact sand over a width of approx. 15 metres. The beach texture becomes looser at the rear of the beach. The total width of the beach is some 50 m. Towards the southeast, the proportion of pebbles in the sand increases and parts of the beach become shingly. The slope of the beach from the sea is very shallow so that a very flat beach is formed.
Land use:	The beach is used intensively by people who spend the summer months or weekends there. A large camp site is situated in the middle of the beach. Many car, tractor and lorry tracks were seen on the beach.
Turtle situation:	Three tracks (one with nest, 2 false crawls) were recorded on the beach on 12.6.1988.

Samandağı

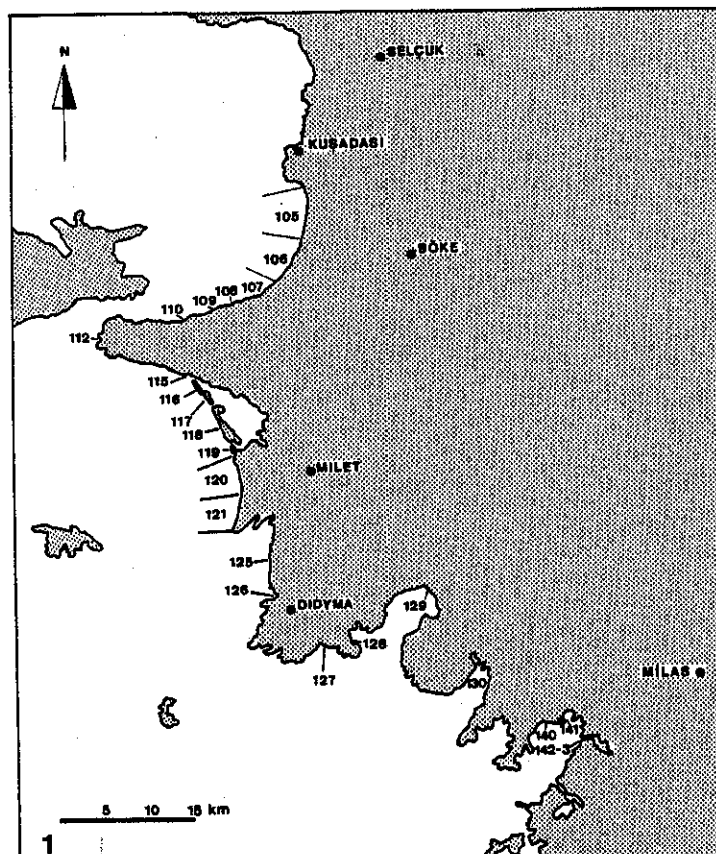
ID-number:	910 - 912
Explanation:	this is the area around the mouth of Asi Nehri = Orontes river

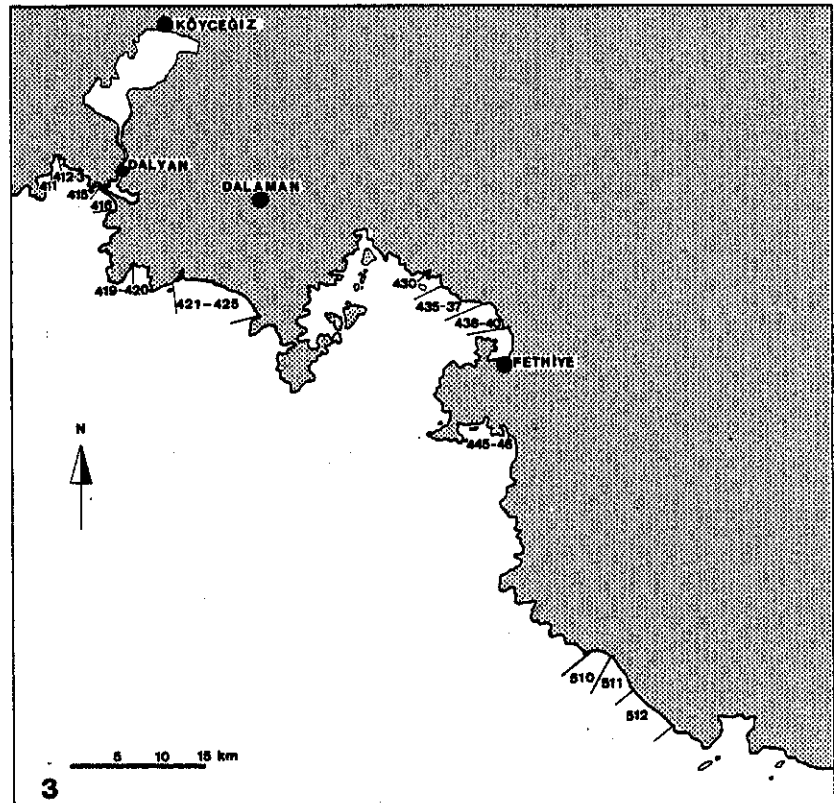
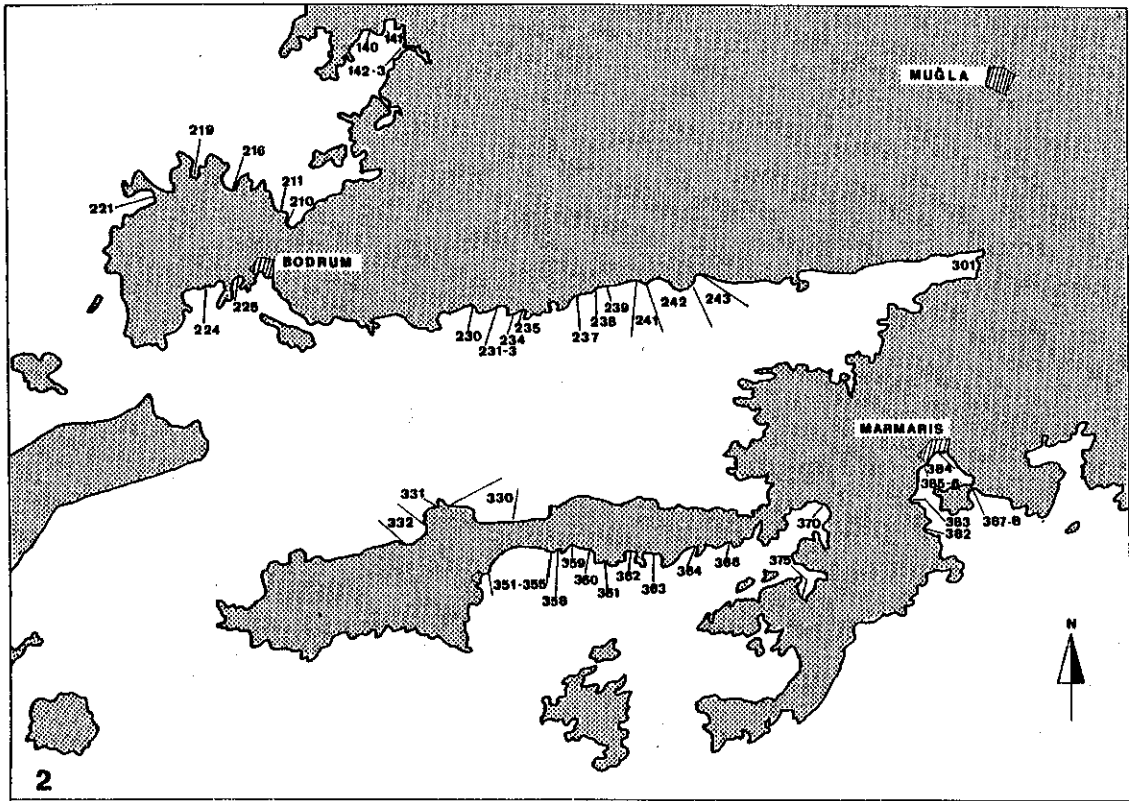
Co-ordinates:	36.07/35.55 - 36.01/35.58
Length:	10.3 km (910: 4.0 km; 911: 5.0 km; 912: 1.3 km)
Description:	The section to the north of Samandağı holiday village (Çevlik beach, no. 910) consists of fine sand and is some 60 m wide. An accumulation of freshwater occurs behind the beach and this is the reason that the sand on the beach is rather wet. Some places along the shoreline are rather muddy. Agricultural fields lie behind the beach. The central section (no. 911) which is from the holiday village to Orontes mouth is rather flat and rather wide near the village, but becomes smaller towards the river. Its width there is some 15 m. Behind the beach, there are flat dunes (< 1 m high) near the holiday village, but these also become narrower and higher (1-2 m) towards the river mouth. A zone of low scrub is situated behind the dunes. A sandy track runs parallel to the dunes. The section to the south of the river mouth (no. 912, towards Keldağ) also consists of fine sand and the beach is 10-30 m wide.
Land use:	A holiday village on the beach directly to the west of Samandağ is the most striking feature. To the south of the river mouth (in 912), the sand from the beach is exploited commercially. It also seems that the dunes near the holiday village have been considerably excavated some time ago. Several vehicle tracks were seen on the beach. Anglers are found there regularly.
Pollution:	The whole beach is extremely polluted with waste and litter. Plastic is scattered over the whole area and even floats in the sea. Dead animals (cows etc.) were seen regularly along the shore.
Turtle situation:	Kinzelbach (pers. comm.) found a dead female green turtle and a destroyed nest of the same species (shortly before egg hatched) on 19.9.1982. In 1988, two tracks of emergences were recorded in the northernmost section on 19.6. At least two of them were false crawls. A dead immature green turtle was also found there. No tracks of emergences were present on that date on the other parts of the beach. A census on 30.7.1988 yielded two tracks in 910 (both false crawls), 52 tracks in 911 (13 of which were with nests, 32 were false crawls) and one track (a false crawl) on 912. Further to the tracks in 911, there were 20 nests where the tracks of the adult females had been obliterated. On 9.-10.8.1988, Kinzelbach (pers. comm.) counted 7 nests in section 911.
Various:	A regulation prohibits access to the beach at night (8 p.m. to 5 a.m.).
Recommendations:	Almost all turtle nesting is concentrated in the central section (no. 911) between the Samandağı holiday village and the mouth of the Orontes River. Important numbers of green turtles nest there, but further study is needed to determine in more detail the degree of importance. Growth of the holiday village should be limited and any lights from there should be screened.

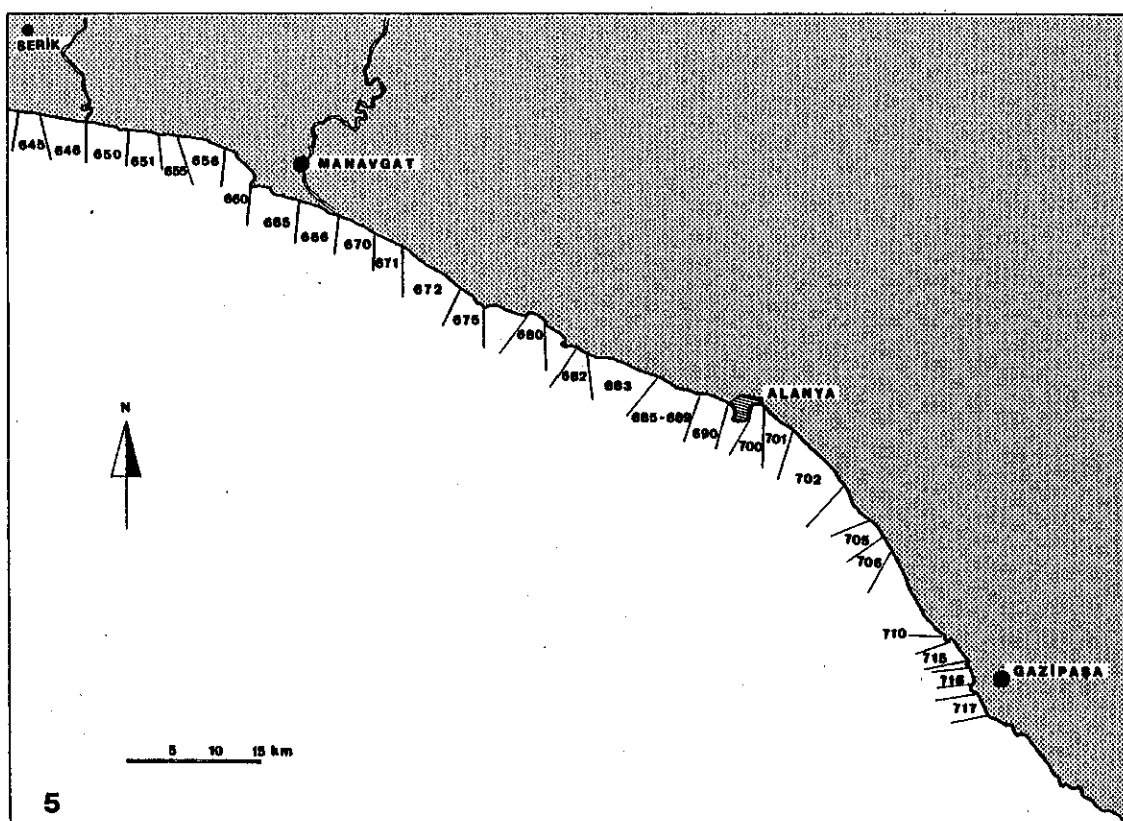
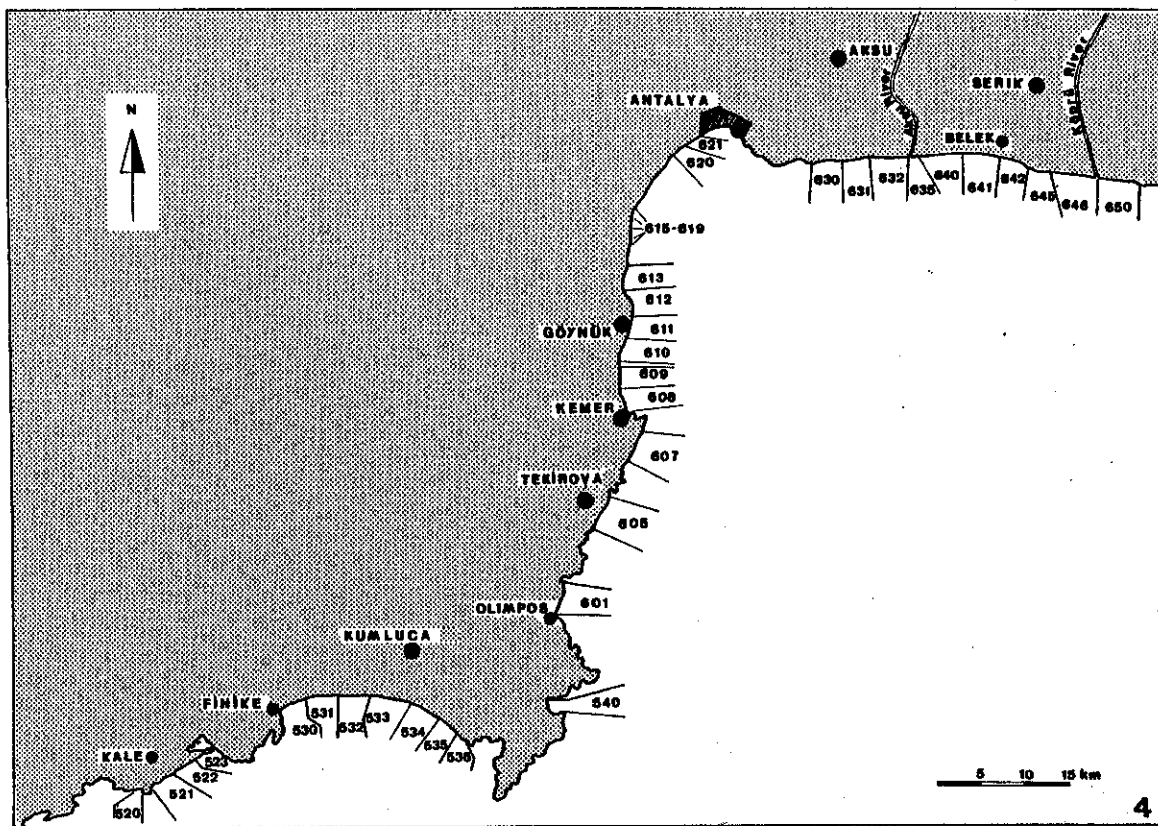


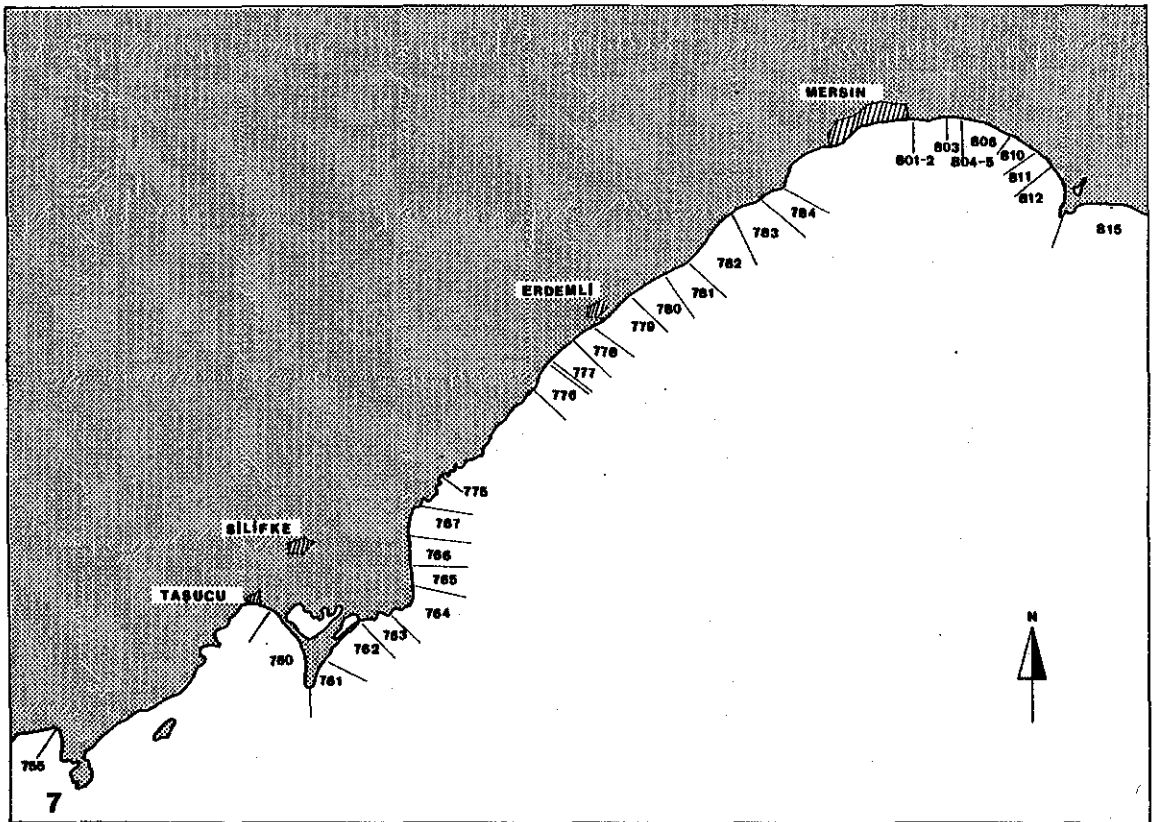
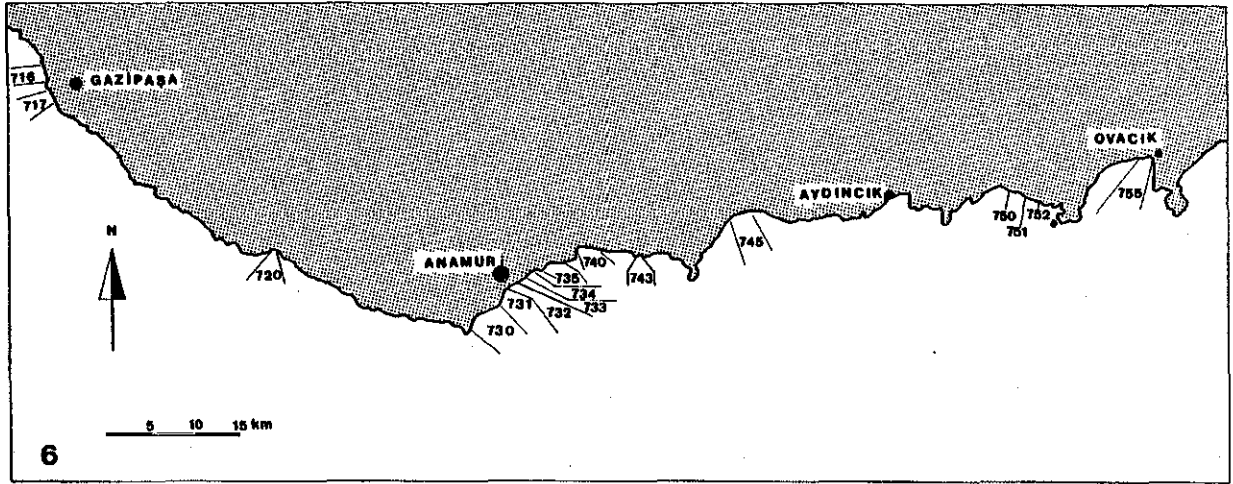
Location of the nesting habitats

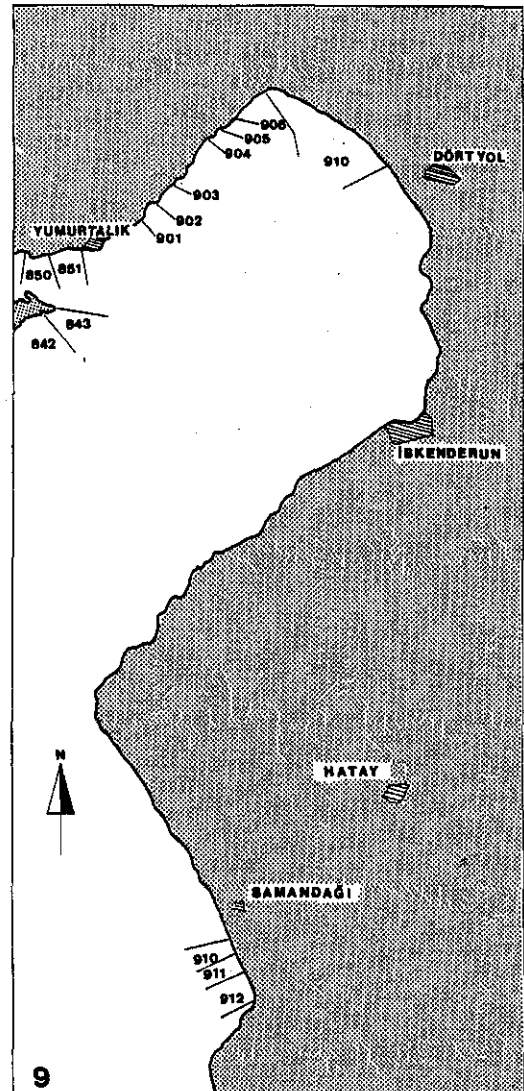
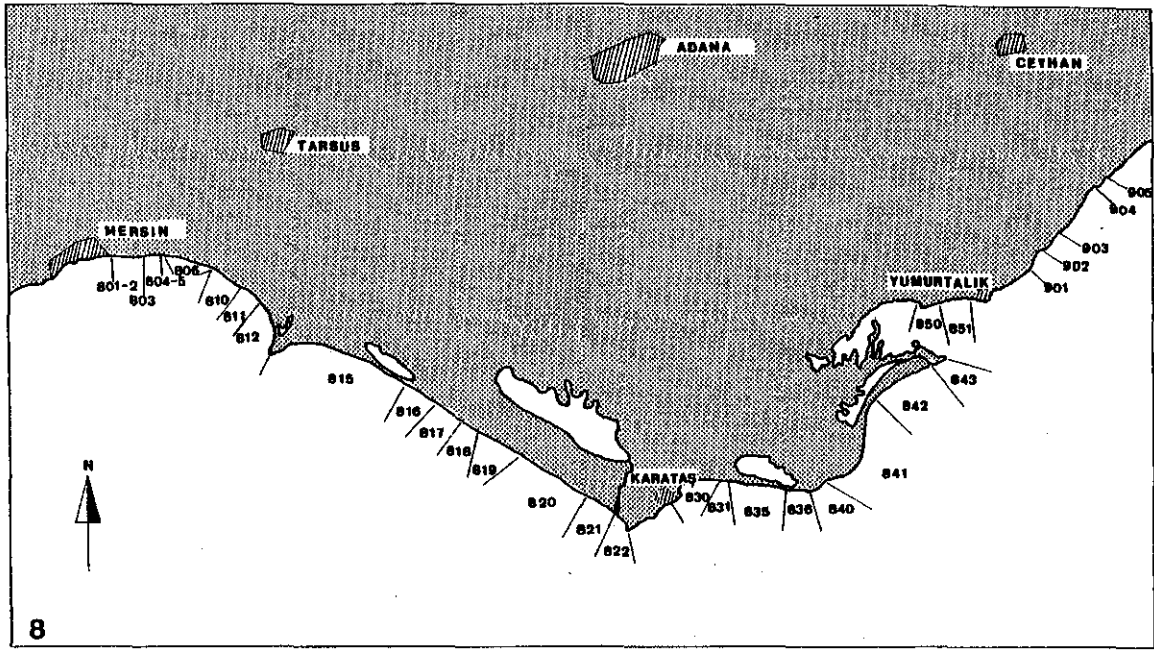
Outline map of south and south-west Turkey. The map shows the position of the larger scale maps.











Plates

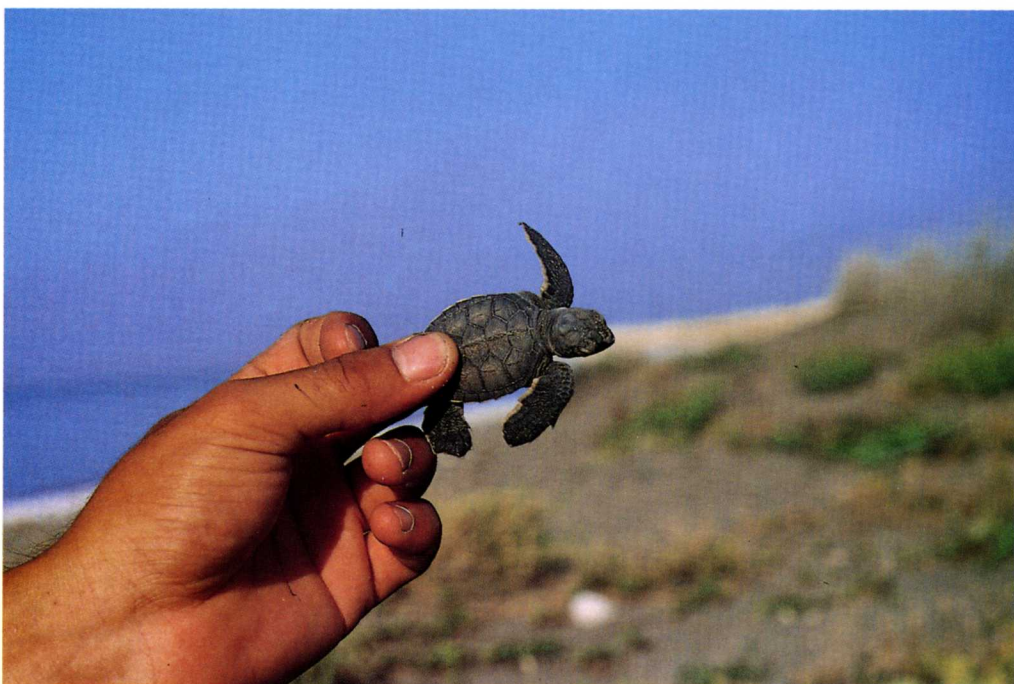
- Fig. 1. A loggerhead turtle, *Caretta caretta*, returning to the sea after egg-laying.
- Fig. 2. A young freshly hatched green turtle, *Chelonia mydas*.
- Fig. 3. Turtles shells are still offered as souvenirs in Turkey.
- Fig. 4. The rear of the Dalyan - İztuzu beach, one of the major sea turtle nesting beaches in Turkey, is formed by a large wetland which is the habitat of many other endangered animal species.
- Fig. 5. The Dalyan River is one of the few sites of the Nile soft-shelled turtle, *Trionyx triunguis*, in Turkey.
- Fig. 6. İztuzu Gölü (Dalyan area) is separated from the sea by a narrow sand dune.
- Fig. 7. The Patara beach close to the mouth of Eşen Çayı. This beach is among the most important sea turtle nesting beaches in Turkey.
- Fig. 8. Sea turtles nest on a few beaches in the Olimpos-Beydağları National Park. 45,930 beds are planned along the coast within the boundaries of the park. This will probably destroy all nesting beaches.
- Fig. 9. The loggerhead turtle nesting beach at Patara.
- Fig. 10. Many new hotels are being built on the Turkish coast. The tourist development is the main threat to marine turtles in Turkey.
- Fig. 11. Many sea turtle nesting beaches have been destroyed by tourist developments.
- Fig. 12. There is an enormous demand for sand and shingle for all the construction activities along the Turkish coast. The exploitation of the beaches has already affected some turtle populations.

Photographs: Aygün Kasperek, Max Kasperek, Yiğit Ergin.

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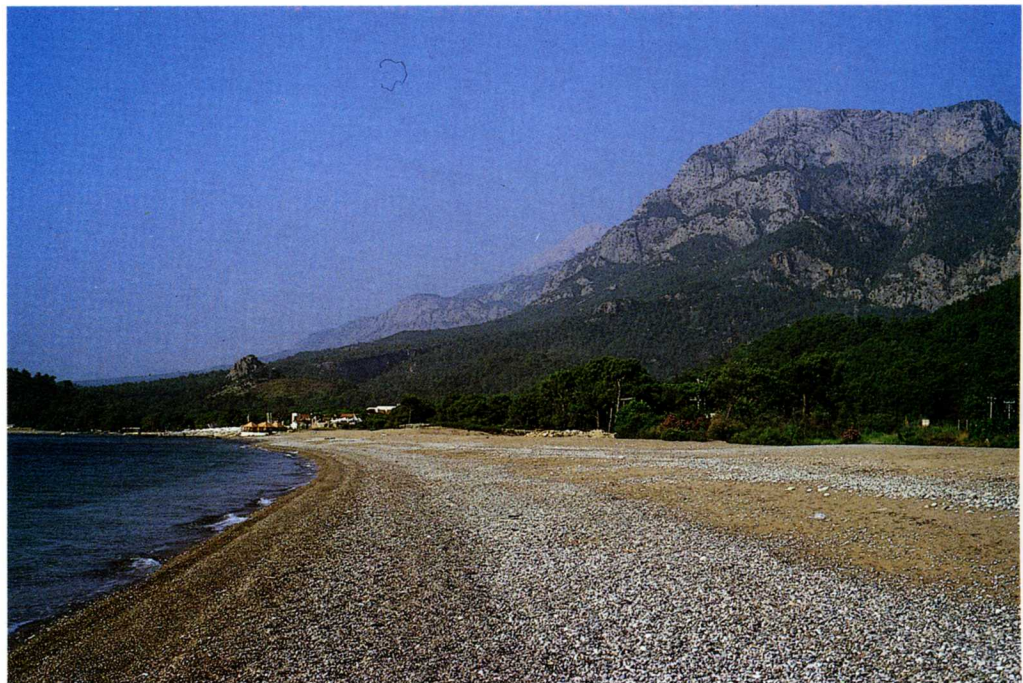
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