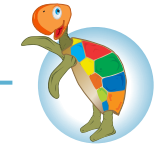
TURKISH MINISTRY OF ENVIRONMENT AND FORESTRY
ENVIRONMENTAL PROTECTION AGENCY FOR SPECIAL AREAS

# MONITORING AND CONSERVATION PROJECT OF THE SOFT-SHELLED NILE TURTLE *(TRIONYX TRINUNGUIS)* AND SEA TURTLE *(CARETTA CARETTA, CHELONIA MYDAS)* POPULATION ON DALYAN BEACH, KÖYCEĞİZ-DALYAN SPECIAL ENVIRONMENTAL PROTECTION AREA

2008

T.C.
Çevre ve Orman
Bakanlığı

T.C. ÇEVRE VE ORMAN BAKANLIĞI
ÖZEL ÇEVRE KORUMA KURUMU



Environmental Protection Agency for Special Areas is responsible for protection and improvement of land, freshwater and marine resources and also responsible for scientific research and investigation in Special Environmental Protection Areas.

In this respect, our Agency has been carrying out various scientific researches in our Special Environmental Protection Areas focusing on the determination of rare or endangered plant and animal species, their population statues, their protection, protection of natural resources and trying to find out problems that threatening these natural resources. In parallel with this aim, one of these projects was the monitoring of the sea turtles (*Caretta caretta*, *Chelonia mydas*) and soft-shelled Nile turtles (*Trionyx triunguis*) their population status in Köyceğiz-Dalyan Special Environmental Protection Area (SEPA).

One of the most important nesting sites of sea turtles in Turkey is Köyceğiz-Dalyan Special Environmental Protection Area. We aimed, by launching this project, to determine the necessary protection and population monitoring and necessary steps to be taken in order to minimize the negative effects to the sea turtle population in Köyceğiz-Dalyan SEPA in the following years. In addition to this, the leaflets prepared and the booklets published and DVD films prepared as a result of this project will provide information in order to better understanding of the status of the sea turtles and increase the public awareness.

Our Agency has also planned to continue monitoring and protection projects, according to results of this study, in sea turtle nesting sites in Köyceğiz-Dalyan and other Special Environmental Protection Areas.

I would like to thank firstly to our Agency personnel and everyone who take place for both preparation of this precious publication and carrying out the scientific studies.

**Ş. Önder KIRAÇ**
**General Director of EPASA**

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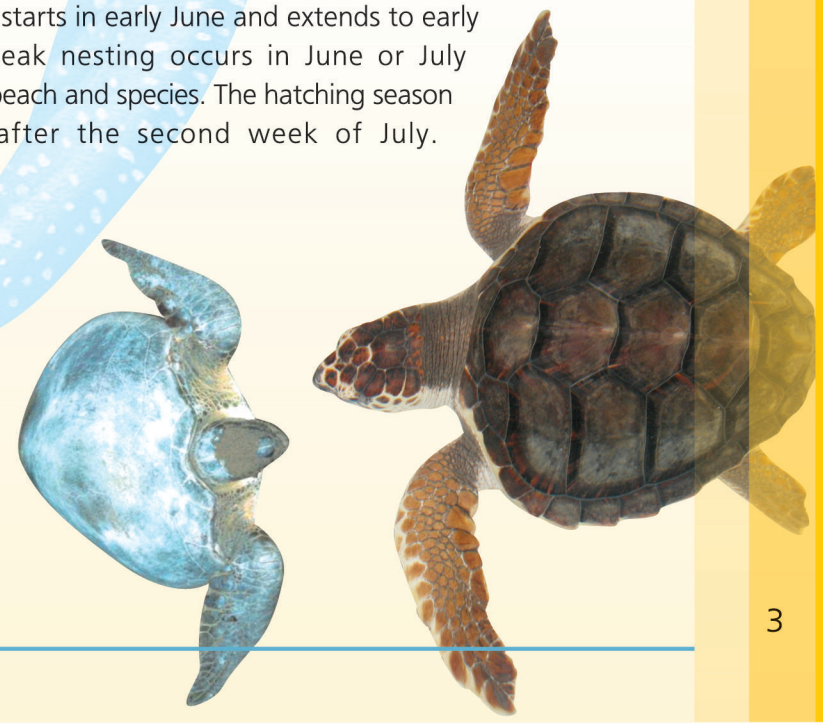
**Environmental Protection Agency For Special Areas**

There are 8 species of sea turtles are living in the world. These turtles are *Dermochelys coriacea* (Leatherback Turtle), *Chelonia mydas* (Green Turtle), *Chelonia agassizii* (Black Turtle), *Caretta caretta* (Loggerhead Turtle), *Ertmochelys imbricate* (Hawksbill Turtle), *Lepidochelys olivace* (Olive Ridley), *Lepidochelys kempii* (Kemp's Ridley), *Natator depressus* (Flatback Turtle) (Lutz and Musick, 1997). Two of these species (*C.caretta* and *C.mydas*) are nesting on the beaches of the Mediterranean coast of Turkey (Baran and Kasperek, 1989).

Three species of marine turtle – *Caretta caretta*, *Chelonia mydas* and *Dermochelys coriacea* – have been reported from Turkish waters (Baran and Kasparek 1989; Baran et al., 1998; Taşkavak et al., 1998; Sönmez et al., 2008). Only the first two are known to nest on the Turkish coast of the Mediterranean, whereby green turtle nesting is mostly limited to a few eastern beaches. Baran and Kasparek (1989) conducted the first comprehensive survey of the Turkish Mediterranean coast for turtle nesting sites. Their primary objective was to locate nesting sites and to assess their relative importance. More recently, a series of population studies have been carried out on selected beaches, and problems affecting the turtles there were determined. The studies carried up to date covers all nesting sites and information on those nesting beaches are available. In spite of some regional studies (Oruç, 2001) the main information gap at present is the interaction of fisheries and marine turtles in Turkey. The overall mortality and/or injury rate of captured turtle is still unknown.

The Mediterranean coasts of Turkey are important nesting grounds for both loggerhead and green turtles. Turtle nesting mainly occurs in a region over a coast length of 2577 km, of which 606 km are beaches (Baran & Kasparek, 1989). Based on the nest numbers, Turkey holds the most important green turtle stocks (Kasparek et al. 2001) and the second most important loggerhead turtle stocks (Margaritoulis et al. 2003) in the Mediterranean.

The loggerhead turtle is categorized as endangered (EN) on the IUCN Red List (IUCN, 2003). The survival of this species primarily depends on the nesting beaches as well as on the protection of mating, feeding, migration and wintering grounds. Predation, tidal inundation and tourism constitute the major impacts on sea turtle populations (Magnuson et al., 1990). Generally, relocation (i.e., Başkale and Kaska, 2005), fencing and screening (i.e., MacDonald et al., 1994), head starting (i.e., Bell and Parsons, 2002), chemical control, and trapping or shooting of predators (Stanyck, 1982) are used for protection of sea turtle nests and hatchlings. The breeding season starts in early June and extends to early October. The peak nesting occurs in June or July depending on a beach and species. The hatching season usually starts after the second week of July.



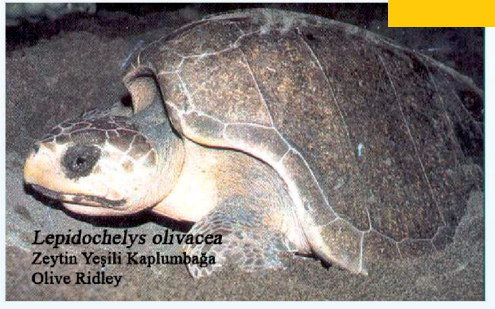
## Nesting Species in Mediterranean

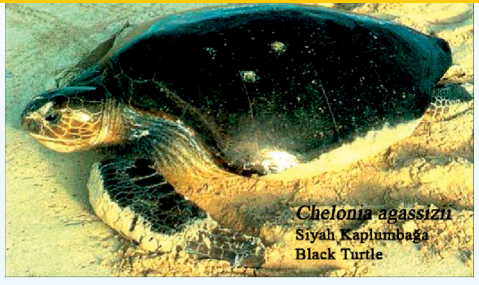


## Non-nesting species in the Mediterranean




## Species not recorded in the Mediterranean



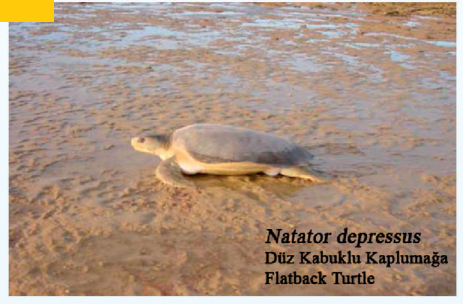
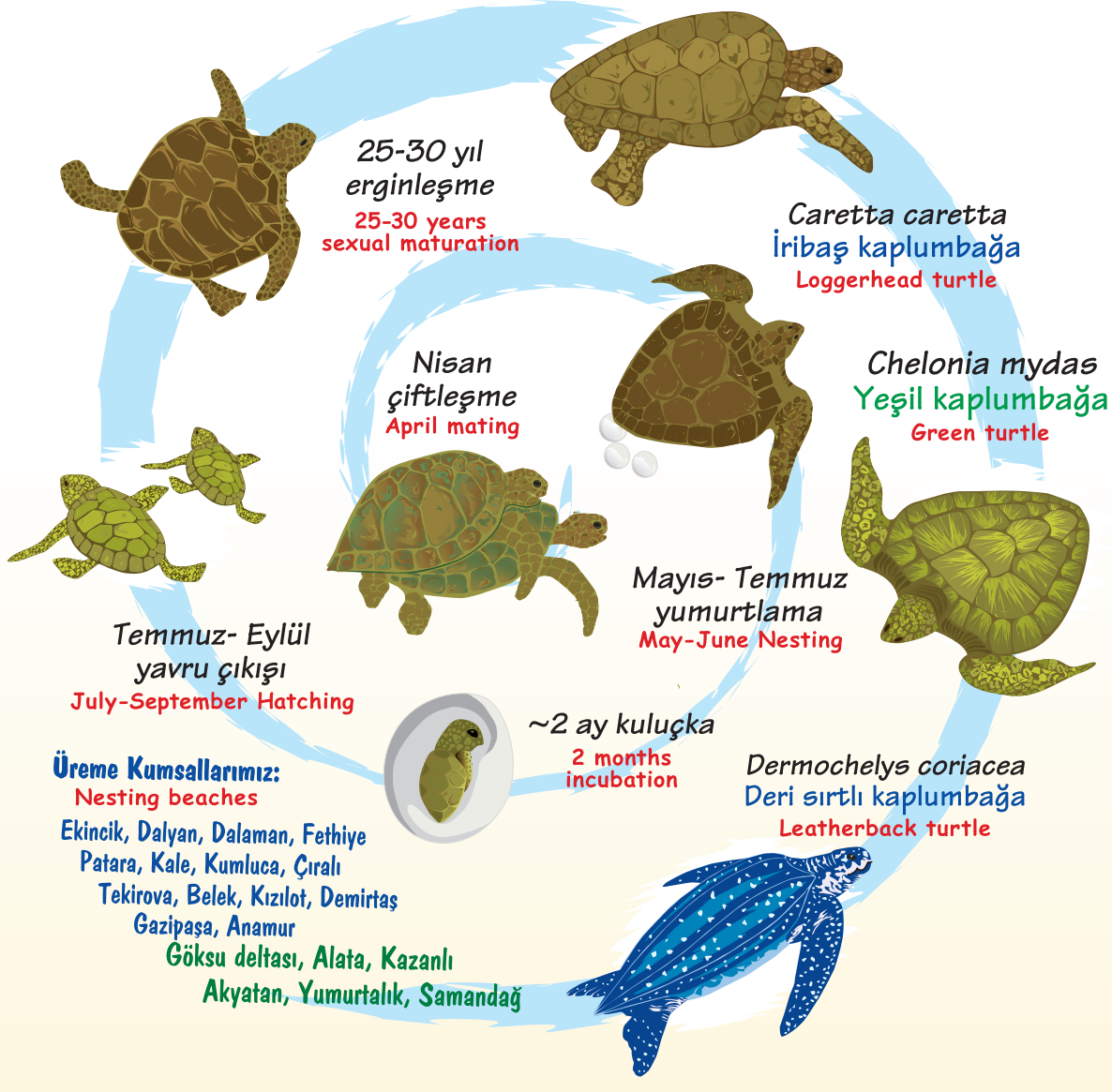




Figure 1. Sea turtle species

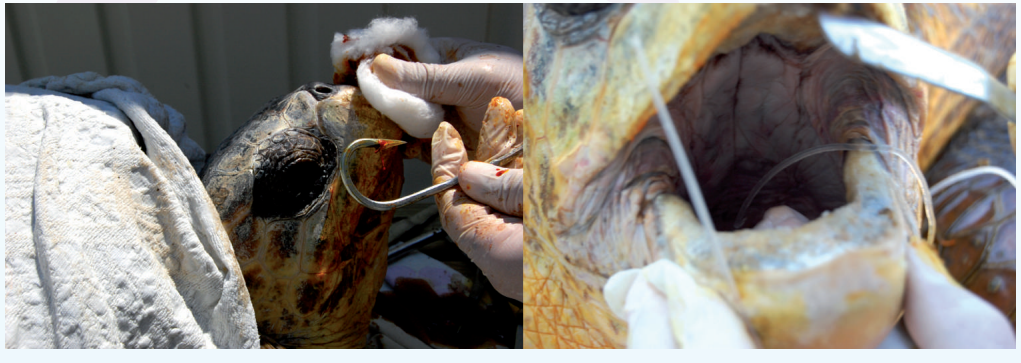
# SEA TURTLES IN TURKEY AND THEIR LIFE CYCLE



## 1.1. Threats to Mediterranean Sea Turtles

It seems that sea turtles in the Mediterranean are mainly threatened by degradation of their nesting habitat through beach development and tourism. Different strategies for the conservation of sea turtles have been reviewed by Pritchard (1980). These strategies are; 1-) The passage of laws to prevent sea turtles from featuring in international commerce, 2-) The protection of nesting female turtles from poaching by the establishment of beach patrols, 3-) The movement of eggs to beach hatcheries or to artificial incubators such as Styrofoam boxes with release of hatchlings as they emerge, 4-) Maintaining hatchling turtles in captivity for a period of time until they have grown sufficiently to be deemed safe from the majority of hatchling predators (head-starting), 5-) The distribution of hatchlings (or eggs) from a healthy breeding population to areas where the turtles have disappeared. Pritchard's list is, however, incomplete. For example, artificial light can seriously disturb the breeding behaviour of adult nesting females and the water finding behaviour of the hatchlings(Frazer, 1986), but protection of nesting beaches against photo pollution is not included in the five categories of sea turtle conservation plans discussed by Pritchard (1980). The installation of artificial light should be considered as habitat destruction and is likely to adversely affect the local sea turtle population. Declines in nesting populations of loggerheads in Florida are attributed by Worth and Smith (1976) to urban development, artificial lights and human activities. Bustard (1972) considered coastal development and construction in nesting areas the greatest threat to sea turtles in Queensland, Australia. Since sea turtles depend strongly on optical cues for finding the sea (Ehrenfeld, 1968; Mrosovsky, 1978), artificial lights in the vicinity of the nesting beaches disorient both nesting females and hatchlings. Sea turtle hatchlings can be protected against lights of an adjacent highway by strips of scrub vegetation between beach and road (McFarlane, 1963).

Sand extraction, vehicular pressure, beach erosion, litter, tar and oil, and high tides can all affect nest excavation, incubation, development of embryos and hatching. Most beaches in Turkey have on the high beach a conspicuous strip of oil and tar, carried by storms. Tar bars are also present under the surface of the sand. It has been suggested that turtles may mistake marine debris for edible items: plastic bags appear like jellyfish in the water, and jellyfish are more common in the diet of some marine turtles (Gramentz, 1988). That is why sub lethal effects of debris ingestion have an unknown but probably negative effect on the demography of sea turtles. Excessive rainfall and / or inundation can indirectly affect natural turtle nests by lowering the ambient sand temperature, thereby increasing the incubation period. Inundation can also harden upper sand layers, slowing the digging efforts of emerging sea turtle hatchlings. Fishing nets, speed boats and lines cause trouble to adult turtles in the sea as they may become entangled and drown.



In the whole Mediterranean, an estimated 50,000-100,000 mature and young turtles are caught each year on long line hooks and in nets set to catch fish (Groombridge, 1990). There is clearly a need for better data on fishing related mortality, especially concerning adults. In the absence of reliable data, it would be sensible to minimise risks especially to adult turtles, by restricting fishing close to known turtle feeding grounds, and nesting beaches. Natural predation is one of the most important problems for the eggs and hatchlings of loggerhead turtles. At many sites around the Mediterranean, predation by mammals has also been a major cause of egg and hatchling mortality.

Similar results were also recorded from the Turkish beaches. Another species predating the eggs of the loggerhead turtles is golden jackal (*Canis aereus*). This species is mostly effective on the eastern beaches where the green turtles mainly nests. Cages over nests can be used in order to avoid fox predation (Canbolat, 1991; Kaska, 1993; Baran et al., 1992, 1996; Başkale and Kaska, 2005). For the hatchlings, fox, crab, bird and strong sunlight and dehydration caused hatchling loses on the nesting beaches. The main threat to the beach is natural predation by fox on the nests and hatchlings of the loggerhead turtles.

Figure 2. Red Fox (*Vulpes vulpes*), a predated nest and a screened nest by using fixed grid cage

# DENİZ KAPLUMBAĞALARININ BAZI İLGİNÇ ÖZELLİKLERİ

## SOME INTERESTING CHARACTERISTICS OF SEA TURTLES

ÇEVRE KORUMA GELECEĞİMİZDİR.

ENVIRONMENTAL PROTECTION IS OUR FUTURE

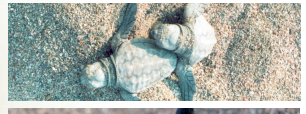
Türkiye sahillerine 2 tür deniz kaplumbağa yuva yapar: Deniz kaplumbağaları doğdukları kumsallara yuva yapmak için gelirler. *Caretta caretta* (İribaş deniz kaplumbağası) ve *Chelonia* mydas (Yeşil deniz kaplumbağası). Nisan içerisinde çiftleşme başlar ve çiftleşmeden yaklaşık 15 gün sonra yumurta bırakmak için geceleyin kumsala çıkarlar. Her dişi her 2-3 yılda bir 3-5 yuva yapar. İki yuva arasında yaklaşık 15 gün geçer.

Two species of sea turtles nesting on the beaches of Turkey. They show natal homing (nests on the beaches that they born)
*Caretta caretta* (Loggerhead turtle) and *Chelonia mydas* (Green turtle). They mate in April and nest 3-5 times every 2-3 years. The nesting interval is about 15 days.

*C. caretta* etçil, *C. mydas* ise otçul beslenir. *C. caretta* denizde 200 m derinlerde dolaşabilirken, *C. mydas* ise otçul olduğu için 20-50 m derinliklerde dolaşır ve beslenir. Bu türler ortalama olarak deniz altında 15-25 dakika nefes almadan kalabilir. Balık ağlarına (özellikle tirol) takılarak boğulan kaplumbağa ölümleri giderek artmaktadır. Ancak boğulan kaplumbağalar yakalandıktan sonra baş kısımları alçakta kalacak şekilde arka kısımları 20 cm kadar kalkacak bir ıslak ortamda bekletilirse büyük çoğunluğu ayılmaktadır.

*C.caretta* is carnivorous and swims at about 200 m depth of the sea. *C. mydas* is herbivorous and swims at 20-50 m. depth. They often bychatch by fishing nets and trawls.
These drown turtles often gets well if they positioned at the posterior sides lifted about 20 cm.

Cinsiyetleri sıcaklığa göre değişmesi (Yüksek sıcaklıkta (32 °C) -dişi; Düşük sıcaklıkta(26 °C) - erkek)



Temperature dependent sex: higher temperatures make them females and lower temperatures make males.

Kumsalda yaklaşık *C.caretta* için 50-60 cm derinliğinde *C. mydas* için 90-100 cm derinliğinde arka ayaklarıyla kazılan çukurlara 50-150 arasında pinpon topu büyüklüğünde yumurtalar bırakırlar. Bu yumurtalardan 45-65 gün sonra yavrular yine geceleyin çıkarlar.

The nests are about 50-60 cm depth for loggerhead turtle and 90-100 cm for green turtles. The clutch size about 50-150 eggs at the size of about a ping pong ball. The incubation period is about 45-65 days.

Yavrular denizin parıltısı, dalgaların titreşim ve beyaz köpüğü, ayın yansıması gibi denizden aldığı iç güdüsel işaretlerle denize doğru giderler ancak kumsalın geri planında daha kuvvetli ışıklar olduğunda yanlış olarak karaya doğru yönelirler ve bir çoğu da ölürler. Bu nedenle kumsaldan görünen ışıklar perdelenmeli ve çok etkili olan Mor, mavi ve yeşil (dalga boyu düşük, enerjisi, şiddet ve frekansı yüksek) ışıklar yerine, kaplumbağalar üzerine daha az etkili olan Kırmızı, sarı ve turuncu (dalga boyu yüksek, şiddeti düşük) ışıklar kullanılmalıdır.

The hatchlings turtles disorientate when they see a light source other than sea.

Please use low energy lamps and screen your visible lights from sea.

Yaklaşık 25-30 yıl sonra cinsel erginliğe ulaşırlar.
Her 100 yavrunun ancak 3-5 adeti erginliğe ulaşabilmektedir. Ekolojik denge içerisinde, denizde beslendiklerini karaya getirip yumurtlayarak deniz ve kara arasında besin dengesini sağlarlar.

25-30 years sexual maturity
3-5 % able to survive
Sea turtles are ecotransformers (eat in the sea and transport them to the land) between sea and land.

Dişleri yoktur ve çok güçlü bir çeneleri ve testere gibi bir damakları mevcuttur. Yakaladıkları yengeç, balık gibi avlarını alır ağzının dışında kalan küçük parçacıklar da diğer canlılara besin olur.

They do not have teeth but have very strong jaws. They eat crabs, jellyfishes but also make small pieces of food for other animals.

Deniz analarının da en büyük yiyicileri deniz kaplumbağalarıdır ve bazen denizdeki poşetleri de yedikleri için boğularak ölebilmektedirler. Çöplerinizi atmayınız.

They sometimes mistaken the plastic bags instead of jellyfishes and suffocate or die. Do not throw your rubbishes.

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Figure 3. Some interesting characteristics of sea turtles

Previous studies showed that 5 sea turtle species are living in Mediterranean (*C. caretta*, *C. mydas*, *E. imbricata*, *D. coriacea* ve *L. kempii*), (Başoğlu, 1973; Groombridge, 1990). Only two of them (*C. caretta*, *C. mydas* ) are nesting in Turkey (Baran, 1990; Baran et al., 1991, 1992; Baran and Kasparek, 1989; Başoğlu, 1973a; Canbolat, 1991; Geldiay, 1983, 1984; Geldiay and Koray, 1982; Hathaway, 1972). Also a few leatherback turtle, *D. coriacea*, were found in Turkey's shore (Baran et al., 1998; Taşkavak et al., 1998; Sönmez et al., 2008).

Together with Turkey, Greece has important nesting beaches (see Margaritoulis et al. 2003). Except these two countries, Cyprus, Syria, Egypt, Israel, Libya, Tunisia and Italy has secondary nesting beaches in terms of nesting activities (Margaritoulis et al. 2003). Remaining nesting sea turtle population in the world and in Mediterranean is given below. Mediterranean Sea turtle population is fairly small in comparison with the world population but a significant part of the nesting population is using Turkey's beaches and this shows us Turkey's importance for protection of sea turtles in Mediterranean.

Estimated number of adult female *Caretta caretta* is about 60.000 in all over the world and 2.000 for Mediterranean. Of these 450-900 *C.caretta* are using Turkey as a nesting site. The number of adult female *Chelonia mydas* is estimated as 200.000 in the world and only 500 of them are living in Mediterranean and of these 230-380 *C.mydas* are nesting in Turkey (Broderick et al., 2002; Canbolat, 2004; Kaska et al., 2005).

## 1.2. Legislations about Sea Turtle Protection In Turkey

Turkey has been playing an important role for the conservation of marine turtles for a long time in the Mediterranean. As in other Mediterranean countries, there are some success stories during these conservation efforts as well as some unsuccessful results for the conservation of marine turtles. The lack of the control of the applications of the regulations and lows giving local people to act how they want and this turns many dangers for turtles especially in terms of costal development on light usage on the beach. Turkey has national legislations for conservation of marine turtles. One of them is 1380th Water Products Circular regarding the law on water products and therefore the collecting and hunting of sea turtles is forbidden in Turkey. This is followed by 2872nd Environment Law, 3621st Coastal Law, 2873rd National Park Law and 2863rd The Law of Protection of Natural and Cultural Beauties all of which have been serving marine turtle conservation in Turkey. In addition to national laws, Turkey has been a part of some international

conventions such as the Paris Declaration on the protection of the World Heritage of Cultural and Natural Diversities since 1983, the Barcelona Convention since 1988, the Bern Convention since 1984, Rio Convention since 1996, CITES since 1996. The most well-known success story comes from Dalyan. Dalyan has served as a ''flagship beach'' for the conservation of marine turtles in Turkey ever since an action of stopping a construction of a hotel complex on the beach in 1987. This is, I think, the start point of the marine turtle conservation in Turkey. Since that day, the understanding of conservation has been changed in the local communities as well. When conservation measures first applied in Dalyan, the local people was quite angry due to limitations. However, now, they are very friendly to turtles and they know that the turtles are one of the most important diversities of Dalyan which serves them as one of the important income. The Köyceğiz-Dalyan area was designated as a "Special Environmental Protection Area" in 1988. Public access is not allowed on Dalyan beach after 1900 till 0800 in the morning. The existing wooden poles, extending through the beach with approximately 50 m intervals and 50 m away from the water line were used for the beach division. However, the main duty of these poles is keeping the day-time users not to use this area, which is identified as a core site for turtle nests. Beach guards control the beach for 24 hours. The beach has been monitored by scientist since 1987 regularly with the financial support from Environmental Protection Agency for Special Areas. This is a good example of both conservation and research activities.


*Figure 4. Dalyan beach and signboards showing beach usage*

First sea turtle studies in Turkey were carried out by Hathaway (1972) and he bring out that sea turtles *C. caretta* (Loggerhead Turtle) and *C. mydas* (Green Turtle) are using Turkey's beaches for nesting. In 1973, two sea turtle shells from İzmir and one from Köyceğiz were found and these shells were identified as *C.caretta* shell (Başoğlu, 1973a). Geldiay and Koray (1982), Geldiay et al. (1982), Geldiay (1983, 1984) made studies on nesting *C.caretta* and *C.mydas* populations in Turkey and their conservation on Turkey's Aegean and Mediterranean coasts. According to results of these studies, 17 important nesting beaches in Turkey were identified (Baran and Kasparek, 1989). Of these 13 beaches classified as nesting beaches with primary importance. Recent researches show that Alata, Yumurtalık and Çıralı beaches are also important nesting areas and after addition of these beaches, Turkey has 20 important nesting beaches and recently presented some important results in the national sea turtle symposium (Kaska, 2008) (Figure 5). Of these beaches Ekincik, Dalyan and some part of Dalaman, Fethiye, Patara, some part of Belek and Göksu are Special Environmental Protection Area; Akyatan is a wildlife refuge under protection status of the Ministry of Environment and Forestry; Demirtaş, Gazipaşa, Anamur, Alata, Yumurtalık, Kazanlı, Tekirova and Kale are protected as Natural SIT areas (1th degree); Kumluca, Samandağ and Kızılot are Sea Turtle Protection Area.

From the beginning of 90s until today, lots of sea turtle studies have been carrying out. Evaluation of these studies and 2nd National Sea Turtle Symposium reports show that annual mean nest number is 5031 nest/season in Mediterranean and of these 1366 nests (27.2%) are being nested in Turkey (Margaritoulis et al., 2003). These numbers were reported in different figures due to the nature of the studies whether it covers the entire beach and entire season. Türkozan et al. (2003) reported 1267 nets/season (663-1991), Canbolat (2004) reported 2000 (1547-2485) and Kaska et al. (2005) reported 1360 to 2710 nests per season. Differences between annual nesting turtle population and study methodologies can be the reason of changes between suggested nest numbers by different researchers. Even though very small beaches are not taken into account, it's certain that annual nest numbers are higher then given numbers above.

Sea turtles take first place about awareness among endangered species. Thus, they are accepted as flagship species for playing important role for both species protection and environmental protection. Although there are 2 sea turtle species (*C.caretta* and *C.mydas*) nesting in Turkey, *C.caretta* (loggerhead turtle) is well known in comparison with *C.mydas* (green turtle). Loggerhead turtles are mostly using western part of Turkey's Mediterranean coast for nesting while green turtles are using eastern part of Turkey's Mediterranean coast.


Figure 5. Important sea turtle nesting beaches in Turkey.

Uppercase indicates primary nesting beaches, lowercase indicates secondary nesting beaches, italic indicates additional nesting beaches or beaches with potential importance.

1; Ekincik, 2; Dalyan, 3; Dalaman, 4; Fethiye, 5; Patara, 6; Kale, 7; Kumluca, 8; Çıralı, 9; Tekirova, 10; Belek, 11; Kızılot, 12; Demirtaş, 13; Gazipaşa, 14; Anamur, 15; Göksu, 16; Alata, 17; Kazanlı, 18; Akyatan, 19; Yumurtalık, 20; Samandağ

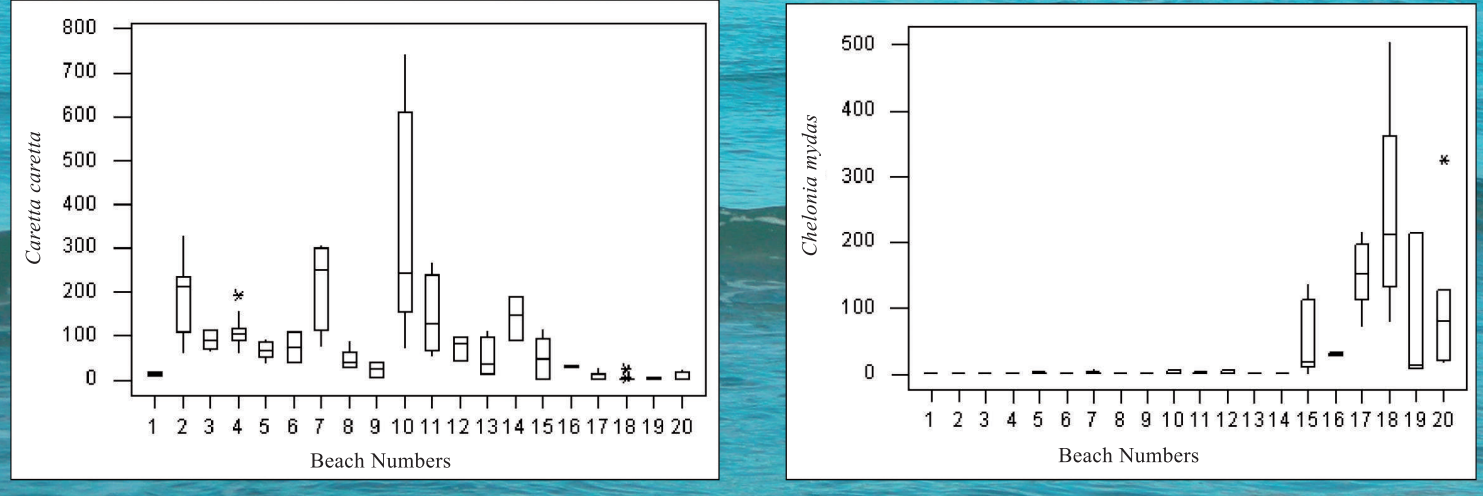



*Figure 6. Nesting size of the beaches for Caretta caretta and Chelonia mydas*

Dalyan Beach is a very important nesting beach in terms of nest numbers, nesting density and regular sea turtle surveys for both Turkey and Mediterranean. Every year researchers from different Universities are carrying out scientific projects supported by Environmental Protection Agency for Special Areas. The results of these studies are summarized and given in Table 1. Although the Dalyan Beach is 4.5 km long, average nest numbers are 213 per season (57-330) (Figure 8). One of the common points of these studies is high fox predation pressure over sea turtle nests.

**Table 1. Annual nesting activities of Dalyan Beach**

(a: Geldiayet. et al., 1982; b: Canbolat, 1991; c: Erk'akan, 1993; d: Baran et al, 1992; e: Canbolat, 2004; f: Yerli and Demirayak, 1996; g: Baran et al, 1996; h: Ilgaz and Baran, 2001; i: Yerli and Canbolat, 1998; j: Canbolat, 2001; k: Canbolat, 2002; l: Canbolat, 2004; m: Türkozan and Yilmaz in press; n: Canbolat, 2006a; o; Canbolat, 2007)

| | 1979 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Nests | 330 | 146 | 235 | 57 | 271 | 217 | 235 | 86 | - | 107 | 135 | 193 | 277 | 264 | 197 | 286 | 232 | 223 | 221 | 269 | 274 |
| Length (km) | 4.7 | 4.2 | 4.2 | 4.2 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 | 4.7 |
| References | a | b | c | d | e | e | e | f | - | g | h | i | e | j | J | k | l | m | m | n | o |

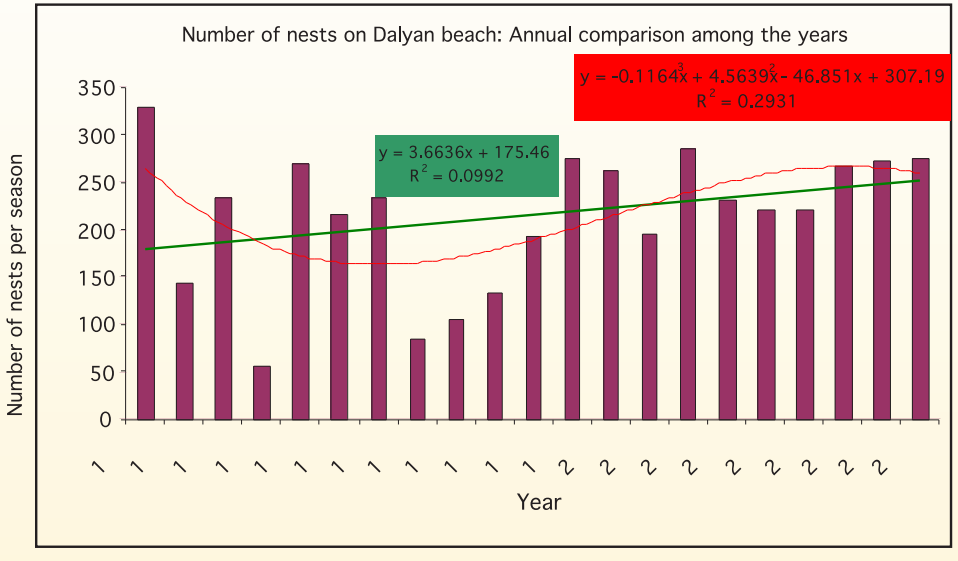



*Figure 8. Annual sea turtle nesting fluctuations on Dalyan Beach*

*Figure 9. Dalyan Beach*

## 2. Soft-shelled Nile Turtle Studies in Turkey

The Nile Soft-shelled turtle, *Trionyx triunguis* (Forskal 1775) are protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and the Convention for the International Trade in Endangered Species (CMES) and classified as Critical Endangered (CR-2A) by IUCN (International Union for the Conservation of Nature and Natural Resources). The largest populations were expected to occur in Mediterranean and it is confined to a few countries in Israel, Syria, Lebanon, Egypt and Turkey. In Turkey, at least 15 sub-populations are known (Kasparek 1999). The distribution sites of *Trionyx triunguis* is presented in Figure 10 (Gidiş and Kaska, 2004).

The first scientific research in Turkey was done by Başoğlu (1973b) who defined a preliminary report about a specimen of Soft-shelled turtle from South-western Anatolia. Later, Atatür (1979) investigated the morphology, osteology, biotope and distribution of T. triunguis in Anatolia; he also reported the survival chance of the Nile soft-shelled turtle in the Dalyan area (Atatür 1991). The distributions of the species from Cheloniidae and Trionychidae along the Çukurova coast of Turkey were also investigated by Berk, Langeveld and Sarıgül (1988). Kasparek and Kinzelbach (1991) described the distribution and bionomics of T. triunguis in the Eastern Mediterranean. At least 15 sub-populations are known to exist in Turkey according to Kasparek (1999). The small populations are present around Patara, Fethiye, Köprü Çayı\Acısu, Bozyazı and Asi River. The relatively large populations are present around Dalyan, Aksu\Acısu, Anamur, Göksu, Berdan River, Tuzla Drainage Channel, Karataş Dranage Channel and Ceyhan River. The largest populations are present around Dalaman and Seyhan regions (Kasparek, 1999). Also Gramentz (1990, 1993, 1994) reported about conservation status and population size of this species in Turkey. The hatchlings of Soft-shelled Nile turtles hibernated for 5-10 days under 18 °C and normal activity between 22-25 °C in laboratory conditions (Atatür, 1979), but no information about the adults.

In Kukürtlü Lake (Dalaman, Muğla), Gidis and Kaska (2004) studied recently the reproductive biology of soft-shelled Nile turtles. In this study, A total of 77 emergences of nesting females were recorded with only 22 (28.57 %) of them resulting in nests and their incubation periods have been reported. The adult emergences occurred from May to mid July. The hatching success of these nests was 69%, 20% of the eggs were predated and 11% were recorded as infertile and dead in shell embryos. The incubation periods were between 55-56 days.

The Soft-shelled Nile turtle population in Dalyan SEPA is also monitored regularly within the projects supported by EPASA.

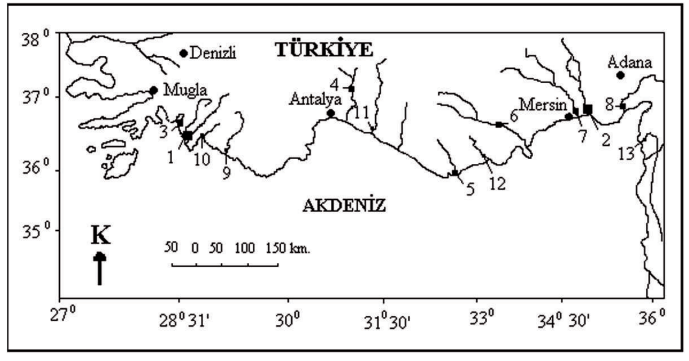



Figure 10. The distribution of *Trionyx triunguis* in Turkey.

- Large population: 1 Dalaman ; 2 Seyhan River and Tuzla Drainage Chanel
- Small Population: 3 Dalyan; 4 Aksu River; 5 Anamur; 6 Göksu River; 7 Berdan River; 8 Ceyhan River and Karatas Drainage Chanel
- Rare population: 9 Patara; 10 Fethiye; 11 Köprü Stream; 12 Bozyazi; 13 Asi River

Figure 11. The adults of *Trionyx triunguis* (feed with chicken meat) and Nile turtle hatchlings.

Figure 12. Some examples from our fieldwork and public awareness.

A total of 798 emergences, all of which belongs to loggerhead sea turtles, occurred in 2008, of which 277 (35 %) nests were deposited and the remaining 521(65 %) non-nesting emergences were recorded. Mean nesting density was 61.5 nests/km in 2008.

A total of 34 nesting females were tagged and 6 remigrant turtles that tagged in previous studies were observed. The mean of straight carapace lengths (SCL) and widths (SCW) of the females tagged were 72.8 and 54.5 cm respectively and the curved carapace lengths (CCL) and widths (CCW) were 76.9 and 68 cm respectively.

The peak nesting occurred in June. Of the overall number of nests recorded, 4.7% occurred in May, 63.2% in June, 30.3% in July and 1.8% in August. These figures for non-nesting emergences recorded were 48% occurred in June, 51% in July, 1% in August. The temporal distribution of nests and non-nesting emergences is presented in Figure 13 and the spatial distribution of nests were given in Figure 14.

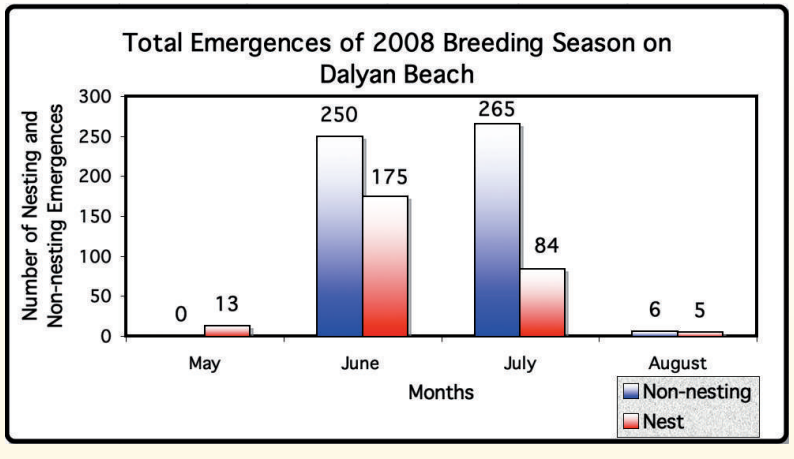



Figure 13. Temporal distribution of turtle activities on Dalyan beach.

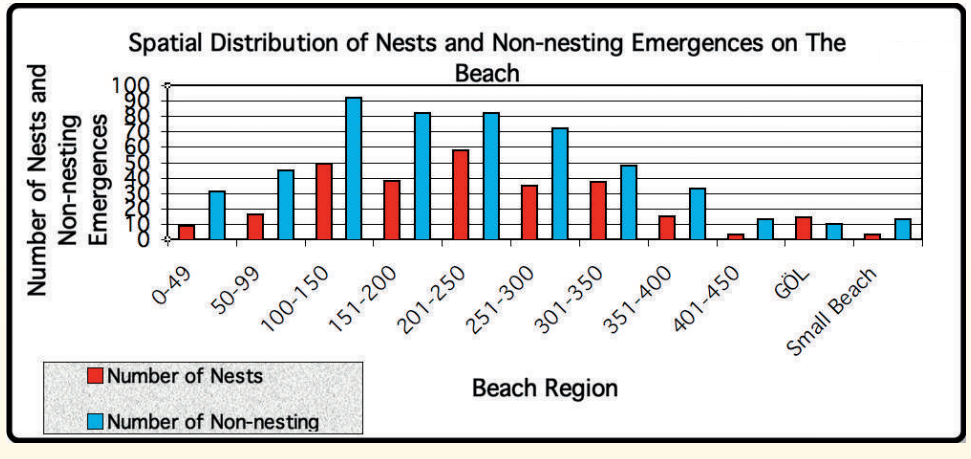



Figure 14. The spatial distribution of turtle activities on Dalyan beach.

The majority of the nests (157) were recorded within the 20 meters zone of the beach from sea. 16 of the nests were relocated due to in the inundation zone within the 15 meters from sea. A total of 561 eggs in another 13 nests that faced inundation and as a result of the changes in ecological conditions, were completely decomposed. There were 88 nests between 20 and 30 meters from sea and only 32 nests were found further 30 meters. The distances of nests perpendicular to the sea is given in Figure 15 and the exact GPS locations of nests were given on the map of Dalyan in Figure 16.

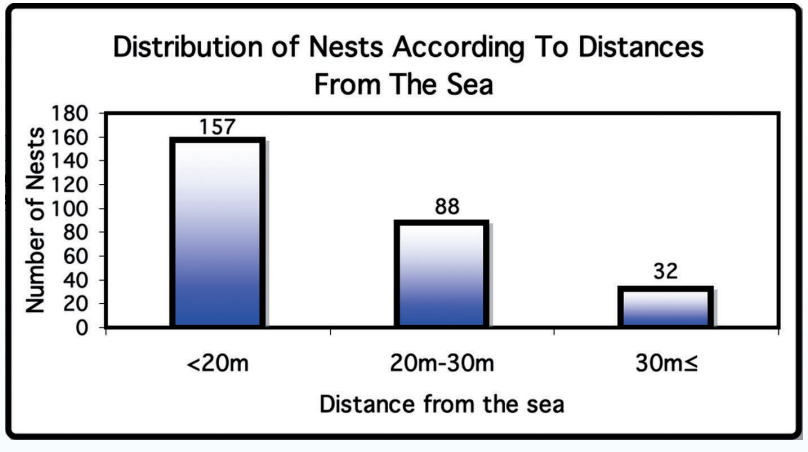



Figure 15. The zone distribution of the nests perpendicular to sea.

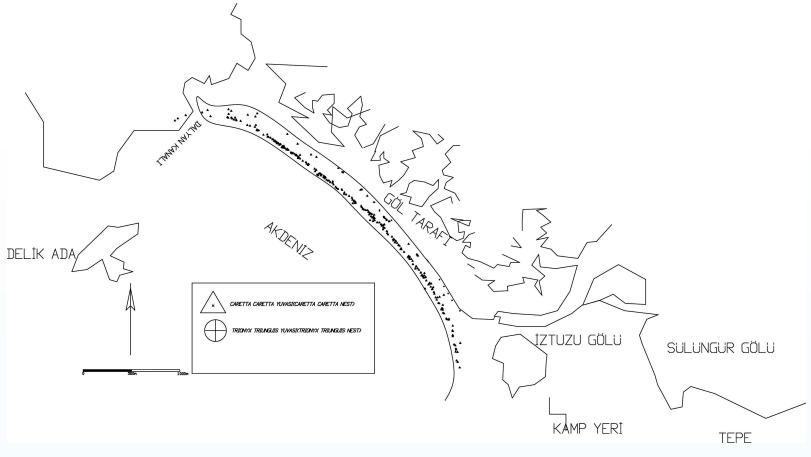



Figure 16. Physical map of the both sea turtles and soft-shelled Nile turtle nests.

16 of the nests were relocated due to in the inundation zone within the 15 meters from sea. Relocation of the nests always occurred within the first 24 hours after laying. For the transfer we used a plastic bucket with 5 cm of sand in the bottom in order to minimize the possibility of damage to the eggs. The eggs from each clutch were carefully transferred to separate nests in the hatchery, constructed according to the original nest dimensions. The amount of sand placed in the hatchery nests reflected the small amount between eggs in the natural nests. Nest data regarding clutch size, laying and relocation dates were noted individually for each nest.

A total of 171 nests were predated mainly by foxes and wild boars. Eggs in 86 nests were completely predated and eggs in 85 nests were partly predated. 106 nests were protected from predation by screening. A total of 146 nests were screened against predation and these screens were fixed with long metal hooks from corners for additional safety. The electronic photo-trapping and cheesing system were tested against foxes in order to understand the population size of the mammalian species and the utilisations of such techniques were suggested in order to understand the impact of predators to the sea turtle nests.

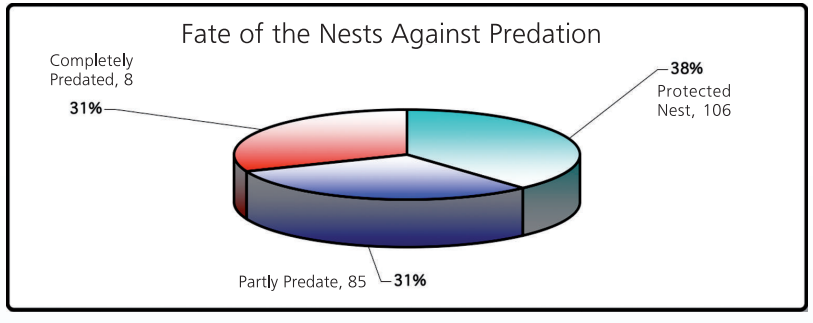
Hatching was observed in 182 nests. After excavating the nests, a total of 18051 eggs were counted, of which 768 of them were unfertilised, 1884 dead in shell embryos, 6922 predated eggs and 8477 empty eggshells that produced hatchlings. The hatching success was calculated as 41.8%.

From the total of 8477 hatchlings, 7782 of them were able to reach the sea. Hatchling success rate of reaching to the sea was calculated as 92%. Mean depth of the nests was 48.2 cm, diameter of egg chamber was 22.1 cm. The mean incubation period was 51 days and mean clutch size was 65.2 eggs.

Figure 17. Tagging and measuring the adult turtle and screening the nest against predation.

## 3.1.2. Predation, Hatching, Embryonic Stages of the Nests

Hatching was observed in 182 (65,3%) of total 277 nests on Dalyan Beach. 171 nests (61,7%)were predated by both foxes and wild boars in 2008. 106 nests (38%) were protected against predation, 85 of these were partly-predated (31%) and 86 nests (31%) were completely predated. The fate of nests and eggs are given in Figures 18-21.




18. Predation rates of the nests

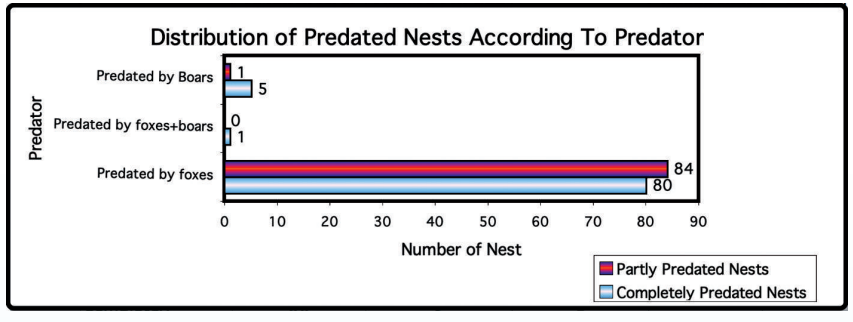



Figure 19. Distribution of the nests according to predation type

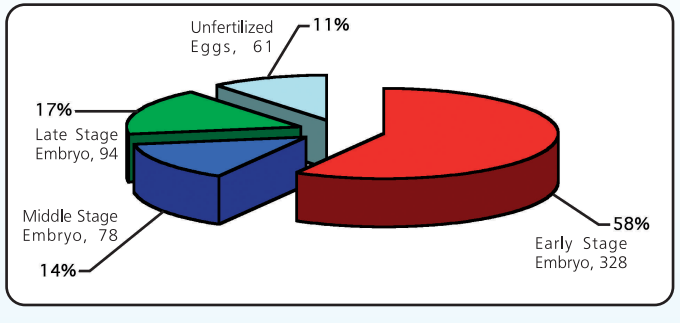



Figure 20. Distribution of eggs in totally damaged nests

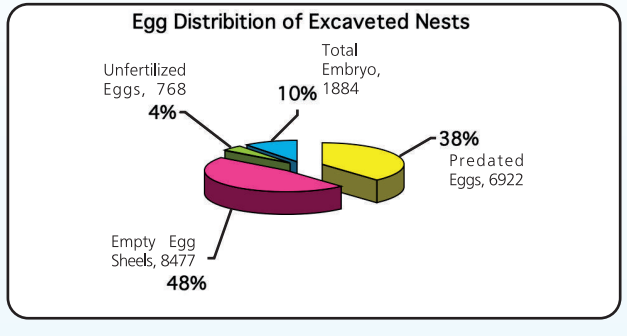



Figure 21. Distribution of eggs after excavation of the nests

There were 18.051 eggs in 277 nests. 6.922 eggs were predated. There were 11.129 eggs left after predation in total 277 nests on Dalyan Beach. Of these 8477 (76.2%) eggs produced hatchlings. The total number of eggs in the clutch was calculated as the sum of empty eggshells (Ee), unfertilized eggs (Ue), dead-in-egg embryos (DiEE), and predated embryos (PE). Hatching success rate (HSR) was also calculated as: HSR=Ee/(Ee+Ue + DiEE+PE)*100.

768 (29%) of the total 2652 unhatched eggs were unfertilized. 1884 eggs were dead in shell embryos. 960 of these eggs were in the early embryonic stage (51%), 289 were in the middle embryonic stage (15.3%) and 635 were in the late embryonic stage (33.7%).

The mean hatching success was calculated as 53.7% in 2008. In 8477 hatchlings, 7871 (93%) of them were able to reach the sea. 606 (7.1%) hatchlings could not emerged from nests. Of these, 424 were founded alive in the nests during daily controls of the nests or during the excavation of nests and 182 hatchlings were founded dead in nests.

The hatching success rate of reaching to the sea was calculated as 93 %. The mean depth of nests was 48.2 cm, diameter of egg chamber was 22.1 cm. The mean incubation period was 51 days and the mean clutch size was 65.2 eggs.

Figure 22. A hatchling trying to reach to sea and its track on the beach

Figure 23. Hatchlings tracks from a nest

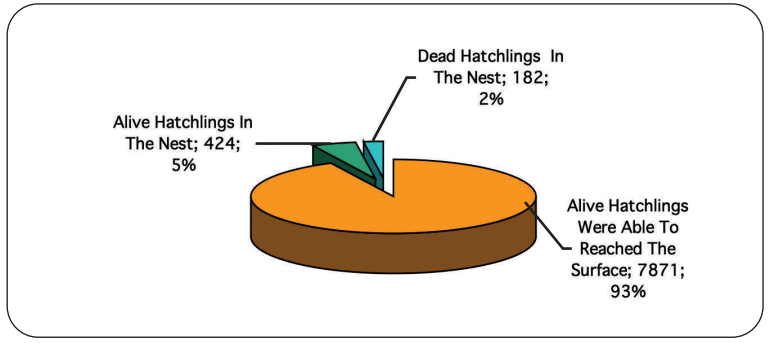



Figure 24. The success rates of hatchlings reaching to nest surface.

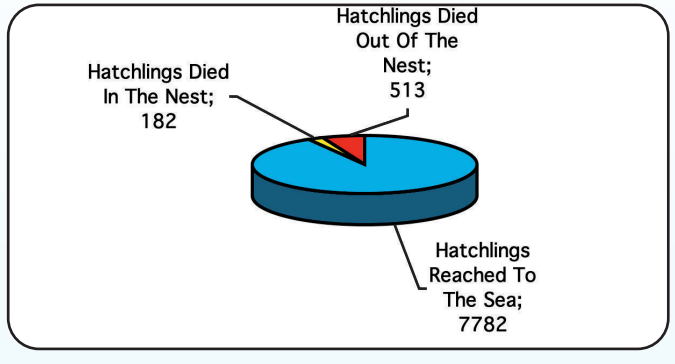



Figure 25. The success rates of hatchlings reaching to sea

Sea turtles have no X or Y chromosomes. Thus, sex of sea turtles is determined by the temperature. Higher temperature results female while lower temperature is resulting male. Temperature is thought to be effective during the middle third of the incubation period (i.e., from 20 to 40 days) (Kaska et al., 1998, 2006).

Temperatures of 27 loggerhead turtle nests were examined during the 2008 nesting season on the Dalyan beach. These nests were selected on the same night of laying, one close to and one further from the sea. Electronic continuous temperature recorders, launched and offloaded via computer, were placed into the middle of the nests (ca. 45 cm depth) either during oviposition or on the same night or following morning in the case of relocated nests. Sand temperature was also measured from different zones during the nesting season to determine the temperature profile of the beach. After evaluation of temperature data of these nests, mean temperature was founded 30,6°C (29,1°C-32,9°C). These values calculated and sex ratio of the hatchlings were founded as 76.1% (between 55,7% to100%) female and 23,9% male.

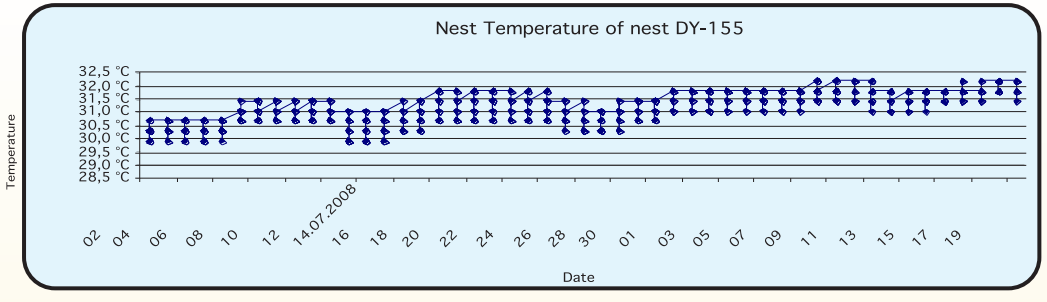



Figure 26. Temperature changes of a nest during the entire incubation period

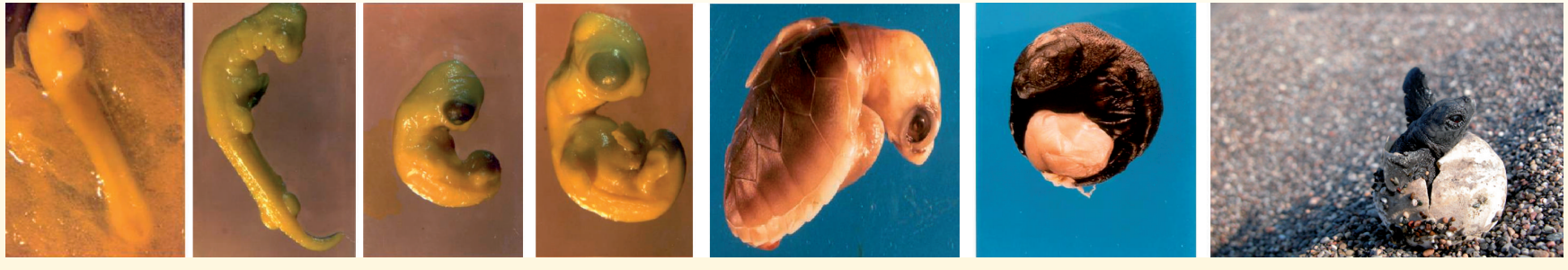


Figure 27. Embryonic developmental stages of sea turtles

## 3.2. Soft Shelled Nile Turtle (Trionyx triunguis)

The Nile soft-shell turtle, *Trionyx triunguis* (Forskal 1775), is one of the largest species of all the freshwater turtles living in Turkey. These turtles live mainly in lower water courses where freshwater and seawater meet and can, thus, be characterized as a brackish water turtle. This species is omnivorous, with a diet consisting of living or dead insects, crustaceans, mollusks, fish, amphibians and plant materials (Gidiş and Kaska, 2004).

The nesting season for *T. triunguis* started in May and ended in July. Hatchling emergence periods took place from July to September.

Almost all soft shelled Nile turtle (*Trionyx triunguis*) nests were destroyed and protections via screening were not successful. It's seen that screening Soft-shelled Nile Turtle nests by grid cage against predation is not an effective protection method on Dalyan Beach. Thus, moving original nests to hatcheries and transferring eggs to styrofoam boxes tested as a protection method.

In 2008 nesting season, 67 adult tracks were observed. Of these 38 tracks (56.7%) were non-nesting emergences and 29 (43.3%) of them resulted with nests. 58 eggs from 4 nests transferred to Styrofoam boxes and 44 (75.86%) of them produced hatchlings.

Figure 28. Transferring of soft-shelled Nile turtle eggs to Styrofoam boxes and emerged Nile Turtle hatchlings

Taking into account that the Nile soft-shell turtle is under serious threat in the whole Mediterranean, conservation efforts should be concentrated on these main populations and an appropriate stakeholder involvement should take place to enhance the effects of the highly important conservation measurements. One of the main threats to the population is changing their diet types by providing them the chicken meat for touristic purposes.

The guidelines for sea turtle rescue centres were prepared (RAC/SPA, 2004) and more detailed information can be found elsewhere (i.e., Bentivegna, 2007).The sea turtles Rescue Centre should be structured and organized so as to carry out year-long activity. Its success will depend on the type of equipment with which it is furnished and the methods used in the treatment and maintenance of the animals. Therefore, besides being operated by skilled staff with herpetological experience, it should also have enough rooms for rehabilitation, easy access and closely linked with a University, a Scientific Institute or a Research Centre (Bentivegna, 2007).

A rescue centre should include the following sections: Reception and Emergency, Surgery Radiology, Convalescent Pools, Treatment Pools, Kitchen, Locker room and equipment storeroom, Laboratory, Post-mortem and Secretariat. The Centre could use the services of other public or subsidized radiology departments in another facility.

The majority of sea turtles, accidentally captured or sighted in difficulty, require care and an observation period in the Rescue Centre. The public awareness in the presence of an injured sea turtle should be given to the all stakeholders and tourists. Fishermen could be supplied with a more detailed first-aid pamphlet with pictures illustrating how to reanimate a sea turtle caught in a net and the preliminary care to be given as they bring it to shore. This awareness campaign should get support from the mass media that has a greater potential to reach the public at large.

The centre can also set up pools and aquariums exhibiting sea turtles that can no longer be released into their natural habitat owing to their injuries. These initiatives are not only valuable from an educational point of view but also incisive as a conservation message. This is very important for Dalyan beach, due to its closure to the public no one can see the turtles despite the fact that the beach called "turtle beach". Some people gave misinformation about the sea turtles, showing the freshwater turtles as sea turtles and/or feeding the turtles for touristic attraction.

The Rescue centre will provide therefore; the treatment of injured turtles, investigation of the cause of mortalities, recording the tag information, make collaborations both national and international scientific institutions, carrying out detailed scientific researches on the sea turtle biology, such as sex ratio, genetic diversity...etc., public awareness, hosting the scientific meetings for the turtle experts. The sea turtles treated in a Rescue Centre represent a biological sample that would be hard for scientists in a different context to obtain, due to the logistical difficulties involved in long-term sampling of such a migratory, solitary and wild marine population.

For these reasons those involved in the protection of sea turtles both in marine and nesting habitats should be encouraged to routinely collect material, in order to avoid the loss of valuable scientific information. All the samples can then be frozen at - 20 °C and stored for several years until the chemical analysis is completed.

The ill or injured sea turtle, immediately after being rescued, is to be taken to the Rescue Centre. Upon arrival, an experienced staff member is to give the turtle an accurate eye examination. The examination of the sea turtle is to begin by recording the animal's weight and measurements. Then an assessment of the animal's general conditions (good, normal, bad) is to be made. Oral cavity should be also examined to see ulceration or presence of mucoid exudates. Blood tests and X-rays are to follow. A personal file for each sea turtle is to be compiled. This file has to be updated daily with the treatments carried out and the results obtained (Bentivegna, 2007).

Most of the injuries affecting sea turtles are caused by the crashing impact with boats. The injuries mainly involve the head, carapace and the pinna. Each wound must be carefully examined to establish both the degree of extension and the depth. Fractures or lesions, present on hard body parts, are to be treated as soon as possible. Firstly, the sea turtle is to be freed of any debris, washed in hydrogen peroxide, a physiological solution or fresh water and disinfected with Betadine 5% (Frye, 1991). Animals with serious and extended cuts on the carapace should be maintained in a clean environment in pools without water (treatment pools) for a period from 2 to 6 weeks. This will ensure that the infections caused by pathogens in the water will be limited and will make the treatment more effective. After the blood test results are obtained, the veterinarian will prescribe, if necessary, an antibiotic. It should be noted that old wounds, apparently healed, could have caused internal damage. Phenomena such as 'increased buoyancy' due to spinal cord injury or 'debilitation' caused by dead bones and debris that have remained inside the animal are signs of internal damage (Bentivegna, 2007).

Removal of fishing hooks and foreign bodies in the digestive tract, foreign bodies and fishing hooks can either be removed by hand, with an endoscope or by means of a surgical operation. Fishing hooks that are in the stomach or intestine are very often expelled spontaneously after some times if they are not entangled to the tissues (RAC/SPA, 2004). At any rate, if the object or hook is found in the bottom portion of the digestive tract and the animal is active and eats and defecates regularly, it is advisable not to subject the animal to a surgical operation. Considering that a surgical operation could cause complications or negative consequences, it is to be performed only if, strictly, necessary. With regards to anesthetics, it should be pointed out that injectable anesthetics like Ketamina and gassy ones like isofluoran should be used (Bennet, 1996). Before the operation, the sea turtle is to be kept on an empty stomach for two days and receive the proper antibiotics. Following the operation, that is to be performed in an adequate operating room, the animal is to be placed in a shower box in a 20°C. Temperature-controlled environment until it is able to raise its head to breathe.

Tank disinfection should occur once a week, by draining the tank and removing the turtle positioning it in a basin lined with a foam pad, rinse and clean the walls and bottom of the tank with fresh water, rub the tank walls and bottom with its own sponge soaked in a Betadine solution and let the solution stand for 30 minutes, rinse the tank thoroughly with fresh water, carefully eliminating any residue of the disinfectant solution, fill the tank with seawater and reposition the turtle when the water level is at least 20 cm. Turtles require natural sunlight.

A Rescue Centre was established on Dalyan beach in2008, an injured male loggerhead turtle was received from Kas (Antalya) on 28th June 2008. There was a visible hook in the oesophagus of the turtle with visible line. This hook was removed with non-surgery method, the turtle was supplied with vitamins and antibiotics for two weeks and after feeding and observation of the faeces, the turtle released with a ceremony organised by the Environmental Protection Agency For Special Areas. This event was the first of the releasing after treatment of an injured turtle on Dalyan beach and attracted many tourists.

Figure 29. The different stages of the treatment of an injured turtle.

Scientific researches and protection measures itself are not enough to save these creatures. Thus, public awareness campaigns are very important. To achieve public awareness, different stakeholders (locals, students, tourists, tourism investors etc.) informed and participated to our activities. In addition to our team, we contacted with a local organisation "Dalyan Turizm ve Çevre Derneği" and these public information and awareness were carried out by participation of their volunteers. Also 3 different posters were prepared and hanged on to information offices, cafes on the beach and to containers in our camp site. Local organization's volunteers participated to our awareness studies until the end of field-work. Hand brochures prepared by EPASA were also given to visitors and tourists.


Figure 30. Some examples from Public Awareness


Figure 31. Some examples from Public Awareness Studies

# Best Open Space Europe 2008; Turtle Beach, DALYAN, TURKEY

**From Times Online- December 2, 2008**
**Green Spaces: Dalyan, Turkey-Category winner: Best Open Space (Europe)**

(Professor Yakup Kaska)
Annie Gatti
Iztuzu beach in Dalyan is that rare thing in the Mediterranean: a 4.5km arc of golden sand stretching from the base of a pine-clad mountain to a river delta, with not a single house, shop or hotel in sight.
During the day people swim, walk, lie in the sun to the sound of the crumping waves but at night a barrier comes down and the beach is claimed back by nature, in particular by hundreds of loggerhead turtles, one of the oldest surviving species in the world, which lay their eggs there from May to September. Iztuzu is the second most important site for endangered loggerheads in Turkey, and with its hinterland of briny lakes and reed-fringed river channels, arguably its most beautiful beach. But when I first visited it in 1990 I was chilled by the sight of a great slab of concrete - the foundations, I later discovered, of a government-approved1800-bed holiday village.
The story of how a handful of Turkish and European conservationists, galvanized by English 'Turtle Lady' June Haimoff, saved Iztuzu from development is remarkable. For several summers Haimoff had lived in a wooden hut on the beach, alongside families from the town, and had watched the huge females digging their nests (even saving one from a knife-wielding local man who wanted its shell for a cradle) and had rescued hatchlings that were disorientated by the artificial lights and noise from the settlement. Eventually the huts were dismantled but, unknown to the conservationists, permission was given for the much more damaging holiday complex instead. When bulldozers arrived on the beach Haimoff sent a frantic telegram to the WWF. Prince Philip, as president of the WWF, asked the Turkish Prime Minister to delay the project, to allow an environmental impact study to be carried out.
This was done, the Prime Minister acted, and in the summer of 1988 the beach, along with the area's red pine and sweet gum forests and marshlands, was given SPA (Special Environmental Protection Area) status and the building project cancelled.
News of Dalyan and its turtles spread fast and soon the town became a tourist hot spot. I myself have been back many times, usually in non-peak times, but until I was asked to assess it for an Open Spaces award I had no idea that the beach was so heavily visited - up to 5000 people in a single day in the high season. Many of these are day trippers who arrived on large boats, are transferred to river boats to visit the various sites around Dalyan, and finish off with a swim on Iztuzu. But despite this influx, the protection, which includes a demarcated nesting zone where digging, using umbrellas, or lying is forbidden and a 1-mile exclusion zone for speedboats and jet skis, is working: a 21-year monitoring programme of the turtles, currently being undertaken by a team from the University of Pamukkale, shows that the population is stable and that the number of nests is slightly increasing. The students locate the nests, put metal cages over them to prevent foxes or dogs digging them up, and are on hand when the hatchlings emerge.
The tourist facilities at either end of the beach are sympathetically designed to minimize environmental impact. The cafes, cabins, sunbeds (which are nearing their permitted maximum of 850) and boardwalks are made of wood, the roofs from reeds; brackish water is used for the showers, toilets and cafés, and the waste water is removed daily. There are plenty of litter bins, with separate containers for recycling waste at the delta end; and the Belediye, (Municipality) which manages the facilities, uses the revenue from the sunbeds, beach entry fees and cafés to clean the shore daily, to provide jobs for local people and for services in the town.
The greenest way to reach the beach is by bike, and it's an exhilarating climb through the resinous mountain road, with panoramic views of the beach and the lakes from a number of roadside pancake houses.
There's a co-operatively run dolmus (minibus) service too, which takes the same route, and a fleet of co-op river taxis which travel at 5mph down through the reedbeds. This gentle pace is the official speed limit for the delta, but patrols are rare and conservationists are concerned that the reedbeds are degrading, especially at the mouth of the river, partly because of the wash from powerful, fast-moving boats.
On the beach, however, the 24-hour patrols by SPA officials ensure that the demands of mass tourism and of the *Caretta caretta* turtles, which have become Dalyan's unofficial logo, remain in balance.
'It's not perfect', says June Haimoff, who would like to see many more signs, fewer sunbeds and an environmental tax levied on day trippers, 'but it is a magnificent beach and we are very lucky that we have protection for the turtles.'
MORE INFORMATION
Conservation
Turtle population monitored annually; beach closed to the public at night, all year, so dune flora preserved from activities such as camping. Some concern that non-native palms have been planted at the road end, but these are few in number and so not, in my view, a problem
The beach is protected nationally since 1988 as part of the Koycegiz - Dalyan Special Environmental Protection Area (SPA) by the Ministry of Environment and Forestry. Terms of the protection were influenced by June Haimoff's proposal for national park status and by campaigning by other conservationists, including the Turkish NGO DHKD. Loggerhead Turtles (*Caretta caretta*) are on the IUCN Red list of endangered species. Protection of the beach is excellent due to 24-hour patrolling by Ministry officials and annual monitoring by university ecologists. The same level of protection of the reedbeds at the mouth of the river, which are becoming degraded, is a priority but this area is inland of the beach and therefore not counted for the purposes of this award)
Natural materials are used for the beach facilities, including the umbrellas and sunbeds (which are made locally); three cafes in total, but all are small, three showers at one end, one at the other, and a small number of changing cabins at each end; no speed boats or jet skis)
Daily cleaning of beach, with plenty of bins at both ends for visitors, including pots filled with sand for cigarette butts; evidence of some rubbish on river bank at the back of the beach so patrols there may be less frequent.
Enviroment
Separate bins for recycling at one end of the beach but not the other; waste water from cafes, toilets and showers removed daily, by boat and road, to the town's new sewerage plant.
Water management - one-mile zone free of speed boats and jet skis helps to keep sea clean; use of briny water from lake behind the beach for the café, showers and toilets ensures that fresh water is not added to the fragile coastal ecosystem however there is concern that the water quality in the river, which flows into the sea at the delta end, is not being monitored and that the increase in numbers in boats is detrimental to the cleanliness)
Society
Most Dalyan residents recognize that Iztuzu beach is one of their strongest tourist draws and so understand the need to conserve it but in the town itself, there is very little evidence of green activities or policies. One tour operator, Kardak Tourism, has given financial support for turtle protection activities, but they also take tourists in their boats to look for turtles, and try to attract them with food - this verges on exploitation. This year Dalyan Dermek, a small charitable group of Turkish and English residents, has been helping the university volunteers on the beach.
Transport
Bike rental available and both bus and boat access are run by co-operatives. But no green energy being used for these, and diesel pollution of the river is a concern with the increase in number of boats permitted.
Food
Food is very limited: sandwich snacks, using local tomatoes and bread, and a range of bottled and canned drinks, including foreign beer, and there is a separate stall where pancakes are made in the traditional way by local ladies
NOMINATED BY I have just returned from Dalyan In Turkey which is a World heritage site due to the 5km beach being the breeding ground of the Giant Loggerhead turtle, the Carretta Carretta. Two thing swere absolutely sublime, taking a solar powered boat silently out onto the lake and watching the shooting stars in the sky as you listened to the cacophony of sounds from the wildlife. The second experience was to cycle to the beach past unspoiled vistas, swim int he warm waters and stop on the way back to have a Gozleme pancake with views to die for of the local mountains, rivers lakes and beaches. Definitely one of the last unspoilt wildernesses of the world - Charles Bentley, Sunderland
Need to know
Dalaman International Airport, which is served by Turkish Airlines for flights to other Turkish cities and by charter airlines and Cyprus Turkish Airlines for flights from the UK, is 25 minutes from Dalyan. There is a regular bus service to Ortaca where national buses can be picked up.
There are a wide range of hotels, pensions and rental villas. Small family-run pensions often offer an evening meal as well, and use locally-grown food. See www.dalyan.travel.com (which also gives details of activities in and around Dalyan) and www.dalyanvillas.com.
Travel to the beach is by river taxi (look for the fixed-price co-operative boats) and by dolmus (minibus). Journey price includes entry to the beach.
For environmental information see www.ockkb.gov.tr; www.caretta.pamukkale.edu.tr; Kaptan June and the Dalyan Turtles by June Haimoff (published by Hardinge Simpole)

THE TIMES Saturday December 6 2008

BEST OPEN SPACE

Europe

Iztuzu beach, Dalyan, Turkey
Iztuzu beach is that rare thing in the Mediterranean: a 4.5km arc of golden sand stretching from the base of a pine-clad mountain to a river delta with not a single house, shop or hotel in sight.
During the day people swim, stroll and relax in the sun, but at night a barrier comes down and the beach is reclaimed by nature, in particular by hundreds ofl oggerhead turtles, which lay their eggs from May to September.
Iztuzu is the second most important site for endangered loggerheads in Turkey, and is arguably the country's most beautiful beach. But when I first visited it in 1990 I was chilled by the sight of a great slab of concrete — the foundations, I later discovered, of an 1,800-bed holiday village.
The story of how a handful of Turkish and European conservationists, galvanised by English "Turtle Lady" June Haimoff, saved Iztuzu from development is remarkable.
The beach, along with the area's red pine and sweet gum forests and marshlands, was given Special Environmental Protection Area status in 1988 and the building project cancelled. News of Dalyan and its turtles spread fast and soon the town became a tourist hot-spot with up to 5,000 people visiting in a single day in the high season.
But the protection, which includes a demarcated nesting zone where digging, using umbrellas or lying is forbidden and a one-mile exclusion zone for speedboats and jet skis, is working: a 21-year monitoring programme of the turtles shows that the population is stable.
The tourist facilities at either end of the beach are designed to minimise environmental impact. The cafés, cabins, sunbeds and boardwalks are made of wood; brackish water is used for the showers, toilets and cafés, and the waste water is removed daily. There are plenty ofl itter bins, and the Belediye (municipality) that manages the facilities uses the revenue from the sunbeds and beach entry fees to clean the shore daily.
"It is not perfect," says Haimoff, who would like to see better signs, fewer sunbeds and an environmental tax levied on day-trippers. "But it is a magnificent beach and we are very lucky that we have protection for the turtles."
Anne Gatti
Exclusive Escapes (www.exclusive escapes.co.uk) offers trips to Dalyan. For pensiones see www.dalyan. travel and www.dalyanvillas.com.
Environmental information: www.ockkb.gov.tr; www.caretta.pamukkale.edu.tr

Iztuzu beach in Turkey is popular with swimmers of all ages and sizes

DALYAN (TURTLE) BEACH IS SELECTED BY THE TIMES NEWSPAPER AS BEST OPEN SPACE IN EUROPE IN 2008.


THE TIMES NEWSPAPER ANNOUNCED ONLINE ON 2ND OF DECEMBER 2008 AND AS PRINTED NEWS ON 6TH OF DECEMBER 2008 AND THE ABOVE CERTIFICATE WERE SENT TO US. THANKS FOR EVERYONE WHO WORKED FOR THAT.

Dalyan represents 4.4% of the total loggerhead nesting in the Mediterranean and 16.3% of the nesting in Turkey. Canbolat (2004) considered Dalyan beach as the second most important loggerhead turtle nesting site in Turkey based on percentage of nesting and, Türkozan at al. (2003) ranked it the most important among 20 nesting sites based on the number of nests and nesting females. Our results on the present nest size and the apparent long-term stability of the Dalyan population add weight to the assertion that this is an important turtle nesting site. There was slightly higher nesting success on Dalyan beach. The higher nesting success at Dalyan beach compared to other nesting beaches across the Mediterranean could be due to a lack of human disturbance at night. The hatching success was relatively lower due to the heavy predation pressures on nests primarily by mammals such as foxes and wild boars. Predation by mammals has also been a major cause of egg and hatchling mortality at other sites around the Mediterranean. Protecting nests with metal gratings resulted in lower predation rates in comparison to previous studies (Erk'akan 1993). However, we still lost some amount of our screened nests in Dalyan and therefore we started fixing with metal hooks from the each corners. Monitoring of predators with photo-trappings and screening of nests with metal grids and relocation of nests to a fenced area should be considered in order to minimise the effect of heavy predation.

There were photo-pollution form PTT radar, Çandır Village and Caunos Antique Ruins which caused a disorientation of the hatchlings. Other problem related to artificial light is using of such strong projector lights to catch the Blue crabs in the estuaries of Dalyan channels. This has direct and indirect results in terms of turtle conservation and ecosystem conservation. This is also another light source for hatchlings to disorientate. There is a heavy consumption of blue crabs which are the one of the food item of turtles. Some local people used to feed turtles with these crabs by hands. This makes the turtle lazy and search for food from the people's hands. Both the feeding behavioural and migration pattern changes in the life cycle of turtles cause many problems. Sometimes chicken meat used instead of crab and this even makes the problem worse. Regular patrols of the coast-guard by Muğla office of EPASA should be done more frequently.

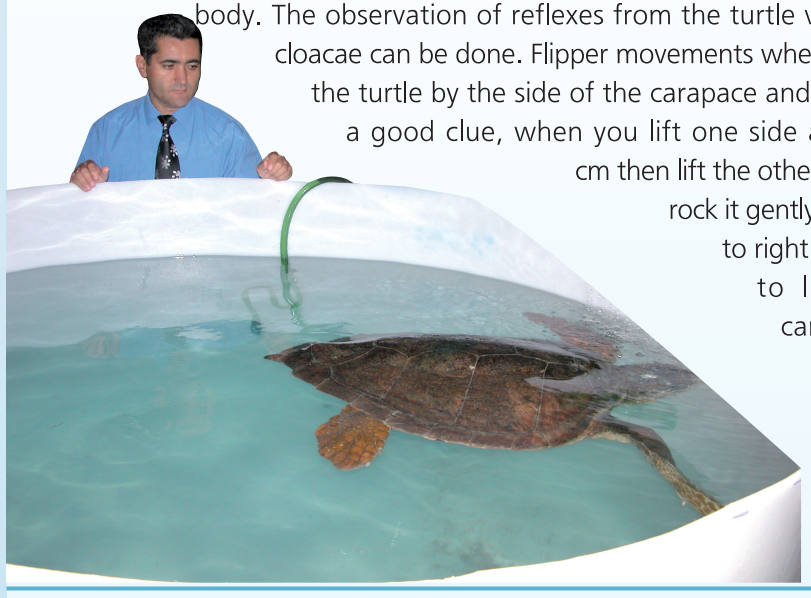
The destabilization of the beach sand especially at the both ends due to the heavy public use should be considered artificially especially during the low tourism seasons of winter months. The natural beach vegetation should be protected in these areas which will keep the sand.

The establishment of the turtle rescue, rehabilitation and information centre at Dalyan beach would give both the information on turtles and let people to see the turtles.

Figure 32. A wrong sea turtle activity (feeding a turtle), the safe coast-guard control and releasing of an injured turtle.

## 6.1. Assessment of Turtle's Condition and First Aid

During beach patrol, or at the sea, understanding a floating or a stranded turtle's condition is important. If condition of turtle could be good examined, we would increase efficiency of required operations. In order to assess the turtle's condition it is possible to use some techniques which allow the caught animal to be classified as healthy, injured, not active or dead. The turtle is healthy when the turtle lifts its head strongly when breathing. When a flipper is pulled, there is a strong withdrawal reaction. When the turtle placed on solid ground such as a floor, the turtle attempts to make crawling movements. The understanding the situation of a turtle is very important. When the turtle is lifted, it does not move and its limbs and head are held below the plane, of the ventral surface of the body. The observation of reflexes from the turtle via eye or cloacae can be done. Flipper movements when holding the turtle by the side of the carapace and also give a good clue, when you lift one side about 10 cm then lift the other side and rock it gently from left to right and right to left, you can see the movement of the front and back limbs. When you lightly touch the eye or the upper eyelid with your finger, the animal exhibits a flinch response closing its eyes. When you pinch the cloacae, the animal contracts the cloacae and/or move the tail sideways



While we doing these, we should take the note of the species of turtle and required measurements must be taken quickly. These measurements must be the same as normal emergences measurements and if the turtle is tagged, tag information should be taken. If turtle is not tagged, it should be tagged after recovery. If the turtle is injured, wounded place should be identified and dressed. If this process takes to long time, turtle should be fed. If there is a fishing-line in the mouth, line should not be pulled. Line should be cut after taken on the board. Eye reflex should be checked. If the turtle responds, it means turtle is injured and first-aid applications should be applied. If the turtle does not respond, it means turtle is dead. In this case, required information should be taken and necropsy can be operated. If there is an injury and cut on the flippers etc, the necessary treatment with antibiotic creams and the cleaning of the wound should be done. The turtle should be feed, either force feeding or if the turtle eating less, then the turtle can be supplied with additional vitamins.

If the turtle is dead, the best thing to do is to bring it to the Centre and do a proper necropsy. If there is a hook we should leave any entangled hooks or line in place. If the turtle is not active, we should keep the turtle on board and keep it wet with a towel. Then we should raise the hindquarters of the turtle about 20 cm by putting a towel underneath, and we should keep it damp using a water-soaked towel. We should not place the injured turtle that having difficulties in breathing in a container with water. If the turtle reacts, it can be considered injured. If there is no response or if the response is undetectable, after 24 hours the turtle can be considered dead. If a turtle is floating on the sea, it should be taken on to board and should be placed in a shady and safe place to prevent dehydration.

If the turtle entangled with the net or hook, we should remove the line to release the turtle by using clippers to cut the line. If the turtle hooked externally on the body or the beak, and the whole shank of the hook is visible, we should draw the barb of the hook out and cut it with a clipper, then remove the rest of the hook. We should always handle with care because we may get bitten. A wood or metal barrier (mouth gap) can be put in the mouth of a turtle at this stage to make removing the hook easy. If the monofilament or plastic line is loosely wrapped around the turtle we carefully cut and remove the line. If the monofilament enters the turtle's mouth and exits the cloacae, we trim the line as close to the mouth and cloacae as possible. We should never pull the line. The turtle may be able to pass the line naturally. In order to facilitate monofilament as well as any other foreign bodies expulsion, we should give Vaseline oil for oral administration. If the hook is placed in the oesophagus we remove it by surgical operation. Given that a surgical operation could cause complications or negative consequences, it is better to underline that the staff, involved in such a delicate operation, should be highly trained in similar techniques as well as in the correct use and dosage of the anaesthetic (Ross and Ross, 1999). With regards to anaesthetics, it should be pointed out that injectable anaesthetics like Ketamina and gassy ones like isofluorane should be preferably used (Bennet, 1996). A combination of the aforementioned anaesthetics guarantees major success of the operation and prevents post-operative complications. Before the operation, the sea turtles have to be kept on an empty stomach for two days and receive the proper antibiotics. Following the operation, that is to be performed in an adequate operating room, the animal has to be placed in a shower box in a 20°c temperature-controlled environment until it is able to raise its head to breathe.

The turtle might be injured when the head and limbs are mostly held below the plane of the ventral surface of the body. The movements are very erratic or spasmodic and non-directional, appearing uncontrolled. The first thing to do, in case of turtles with fractures or lesions on hard body parts, is to clean each wound softly and to remove any dead tissue and foreign material that comes loose with minimal resistance. The best way to wash wounds is to use a broad-based topical microbicide, such as povidine-iodine antiseptic solution like 5 % Betadine (Frye, 1991). Animals with serious and extended cuts on the carapace are maintained in a clean environment in pools, without water (shower box) for a period from 2 to 6 weeks. This ensures that the infections caused by pathogens in the water will be limited and will make the treatment more effective. The wounds are treated every day and dead tissues are removed. Each time it appears a rose coloured tissue under the lesion it means it is time to replace the animal in a tank with water and reduce topics treatments. The use of hard material such as acrylic and fibreglass to seal fractures present on the carapace is not recommended in the literature, and we agree, as these materials delay the healing of the wound and because the debris can cause infection to the underlying soft tissues (Walsh, 1999). When we find difficulties in the replacement of pieces of carapace it is recommended to use bands by fixing them on the healthy part of the shell.

If the turtle feed well and reacts well, it means it is ready to return to natural environment. The principal aim and final step of the rehabilitation process is the release of the turtle into its natural environment. Before proceeding with this final phase, the turtle should be transferred to the largest pool in order to acclimatization to the sea water temperatures in the release area. The turtle should also feed with live prey to reinforce hunting instinct for monitoring of swimming and diving capacities. We should always release the turtles in a site not so far from the location where the animal was initially found and in an area not too much dangerous or polluted. We never release the turtle if the water temperature is under 16°C (the optimum is 18°C). Before being released every sea turtles should be tagged (Bentivegna, 2007).

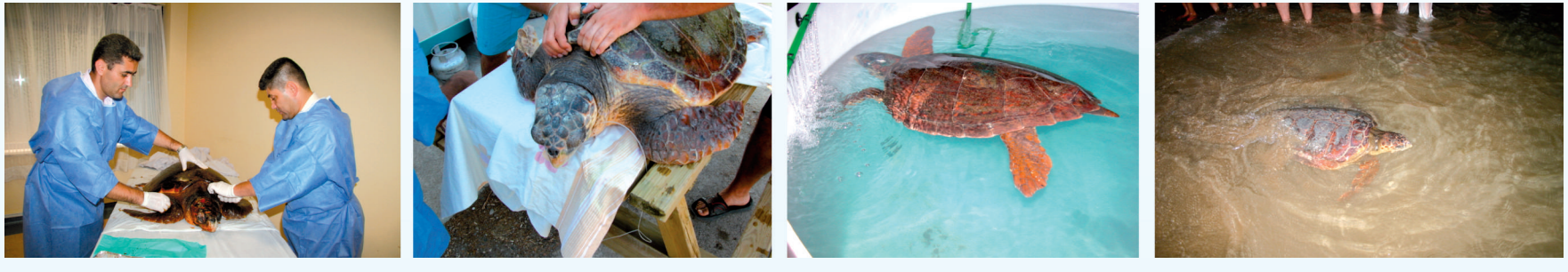


Figure 33. The treatment of injured turtles and releasing them.

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Monitoring And Conservation Of The Soft-Shelled Nile Turtle (*Trionyx triunguis*) And Sea Turtle (*Caretta caretta*, *Chelonia mydas*) Population During The 2008 Nesting Season On Dalyan Beach, Köyceğiz-Dalyan Special Environmental Protection Area

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"It is said that every country has three types of richness; economical, cultural and biological. We know very well the first two as they are the main issues of our daily life. Biological richness is the less recognized. This is a very desperate and strategic mistake which will be increasingly repented as the time goes by"

*Edward O. Wilson*


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THIS STUDY IS CARRIED OUT BY THE PAMUKKALE BİLİM MERKEZİ DERNEĞİ DANIŞMANLIK VE ORGANİZASYON İKTİSADİ İŞLETMESİ ON BEHALF OF THE ENVIRONMENTAL PROTECTION AGENCY FOR SPECIAL AREAS