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## IN THE ISLAND OF CRETE: A NEW NESTING AREA OF THE LOGGERHEAD TURTLE IN THE MEDITERRANEAN

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### INTRODUCTION

The loggerhead sea turtle, a circumglobal species, has evolved local populations in the Mediterranean Sea. Colonization of the Mediterranean by loggerheads, occurred at the end of the last glacial period, about 12,000 years ago, probably by animals originating from Florida (Bowen et al., 1993).

Loggerhead populations in the Mediterranean nest mainly in the Central (Greece, Libya) and eastern basins (Turkey, Cyprus). In Greece, the main nesting areas of *Caretta caretta* (i.e., Zakynthos, Kiparissia Bay, Lakonikos Bay), totaling about 2,800-3,000 nests per season, are monitored each year by the Sea Turtle Protection Society of Greece (Fig. 1). At the same time, management measures in the form of nest protection, public awareness, and local participation are taken.

Recently, in a rapid assessment study that covered about 7,000 km of coastline in Greece (Margaritoulis et al., 1992) new nesting areas were discovered on the island of Crete, three areas were considered as important. These areas, (i.e., Rethimnon, Bay of Hania, and Bay of Messaras), total about 37 km in beach length, 31.8 of which is suitable for nesting and used by turtles (Fig. 1).

Preliminary work conducted before 1995, has shown that sea turtles on Crete are subject to heavy human pressure mainly because their traditional nesting areas are also tourist areas. This implies that many nests are destroyed during the 2-month incubation period by intensive beach use and vehicular traffic. Even when eggs succeed to hatch, hatchlings get disoriented by bright artificial lights.

Another serious problem on Crete is the high rate of nest destruction by sea water, due to narrow beach width (caused by human interventions along the coast) and the predominant winds during the summer.

Nevertheless, as it was seen during the preliminary work, both the above major threats might change for the benefit of the sea turtle.

The loggerhead turtle is considered an endangered species in the boundaries of the European Union and is protected through international conventions (e.g., Bern Convention), European Commission directives (e.g., Habitats Directive), and national legislation. A 3-year project for the recovery of the turtle populations nesting on Crete, was designed and undertaken by the STPS with 75% financial assistance from the European Commission.

The specific objectives of the project are the following:

1. To protect as many nests as possible and thereby increase the hatching rate of the nesting populations.
2. To raise public awareness (of both inhabitants and visitors) on the need to protect these sites, providing also specific guidelines for such protection.
3. To produce Management Plan proposals, in cooperation with local communities, and submit them to competent authorities for implementation.

Nesting Activity and Protection of Nests - Nesting activity on Crete during 1995 started on 4 June and ceased on 30 August. During this period, 3,357 emergences were recorded, of which 780 resulted in nests (Table 1).

Rethimnon area is the most important area on Crete with 511 nests over 10.8 km of nesting beaches (nesting density: 47.3 nests/km). These data rank Rethimnon as the third most important area in Greece after Zakynthos and Kiparissia Bay, featuring average nesting densities of 400 nests/km and 80 nests/km, respectively (Arapis and Margaritoulis, 1994; Margaritoulis, 1988).

The Bay of Hania and the Bay of Messaras host a much less nesting potential. However, the prospects of conservation work at these sites are very encouraging as local authorities, communities, and hotel owners express a genuine interest to help sea turtles while protecting the beaches from erosion and degradation by appropriate management measures.

Out of the 780 recorded nests, 162 nests (20.8%) were considered "doomed" and moved to 6 beach hatcheries constructed at appropriate locations. During 1995, clutches moved to hatcheries produced more hatchlings than clutches left in situ (Table 2).

Most of the nests, left in situ, were fenced with special cages against intense beach-use by humans, including vehicles. Nest cages proved a successful management technique for the physical protection of nests and an important public awareness tool. Each caged nest featured a conspicuous sign in three languages, explaining the reason of the caging.

Conservation and Management - Public awareness efforts were addressed to the general public through the mass media (both national and local) and to specific target groups, i.e., authorities, tourists, and schoolchildren.

Authorities were informed by frequent visits and by their involvement in providing permits for information stations and camps. Local communities were generally very helpful; two of them provided direct support to the project by offering office and store space and community provided free accommodation for project volunteers at the community camping site.

Inhabitants and visitors were sensitized through specially constructed Information Stations erected at the waterfront promenade in the town of Rethimnon, at the old harbor of the town of Hania and at Matala, the main tourist village in the Bay of Messaras. Another means of public education, aimed at tourists, was carried out through slide shows organized in hotels along the nesting areas. A total of 246 slide shows were conducted during the summer of 1995 in hotels and hostels of Rethimnon, Hania Bay, and Messaras Bay.

A leaflet in three languages (Greek, English, and German) provided guidelines and instructions for the protection of turtles and their nests. Another leaflet explained the problem of artificial lights along the beaches. The leaflets were widely distributed and generally accepted by the local community and the tourist and industry.

Raising awareness among schoolchildren was done through the STPS Environmental Education Programme (Kremezi-Margaritoulis, 1992). Besides the standard presentations at schools, four specially designed traveling kits on sea turtles were given to the Education Departments of Crete to be used in the schools of each area. As a follow-up action to environmental education activities, a group of 16 children with 2 teachers from Rethimnon came to Athens for a 4-day trip as guests of the STPS.

Data for the elaboration of the three Management Plans started to be collected during 1995. The main abiotic, biotic, and anthropogenic parameters influencing nesting/hatching were documented per beach sector. A draft Management Plan for each area will be presented to the authorities by the end of 1996.

Crete presents a unique opportunity of working with local communities and tourism for the benefit of the sea turtle. The interest shown by local people, visitors, and hoteliers can establish the much needed compromise. The tourist industry in Crete has seized immediately the offered prospects of having a "popular" endangered species nesting on the beaches of Crete.

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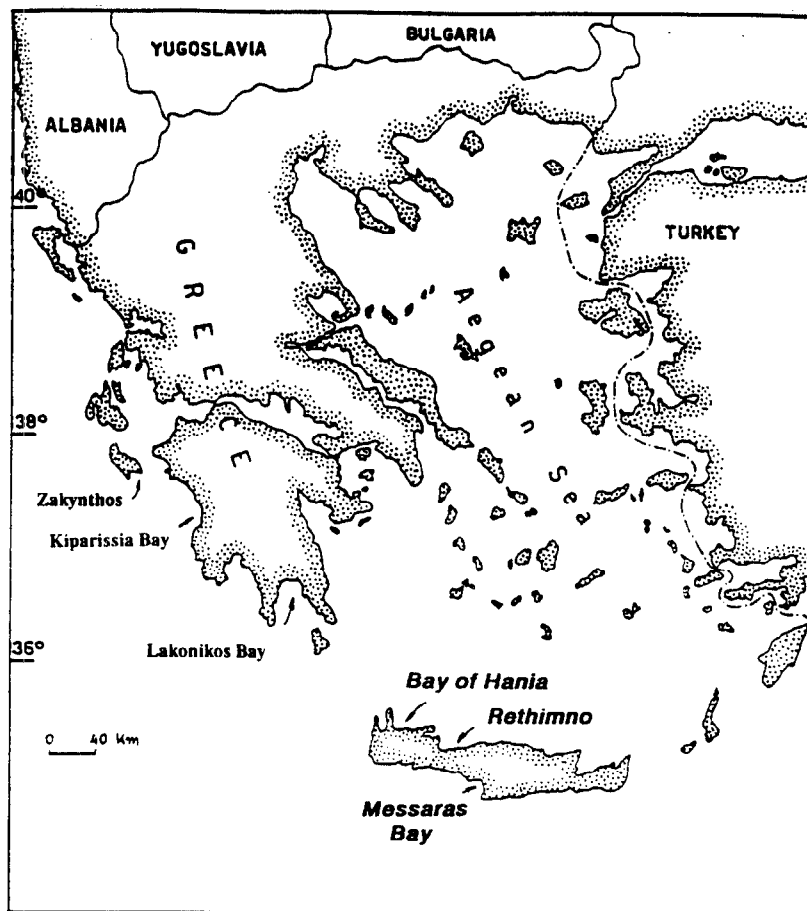


Fig. 1. Sketch map of Greece showing position of Crete and important nesting areas

TABLE 1. DISTRIBUTION OF EMERGENCES, NESTS, NESTING SUCCESS AND NESTING DENSITY ALONG THREE NESTING AREAS ON CRETE DURING 1995.

Nesting area	Length (km)	Emergences (include nests)	Number of nests	Nesting success (%)	Density (nests/km)
RETHIMNON	10.8	2.262	511	22.6	47.3
HANIA	13.0	752	192	25.5	14.7
MESSARAS	8.0	343	77	22.4	9.6
Total	31.8	3.357	780	23.2	24.5

TABLE 2. COMPARIS ON OF HATCHING SUCCESS BETWEEN NESTS *IN SITU* AND HATCHERY NESTS ON CRETE DURING 1995.

Nesting area	Hatching Success	
	Nests <i>in situ</i>	Hatchery nests
RETHIMNON	57.6	71.9
HANIA	62.5	73.9