Biogeographia - vol. XXI - 2000
(Pubblicato il 30 giugno 2000)
Biogeografia dell'Anatolia

Five years of research at Akyatan Beach (Turkey): one of the main nesting site for green turtle, *Chelonia mydas*, in the Mediterranean

MONICA AUREGGI*, GUIDO GEROSA*, SEDAT V. YERLI**
**CHELON Marine Turtle Conservation and Research Program, Viale Val Padana, 134/B - I-00141 Roma (Italy)*
***Department of Biology, Hacettepe University, P.O.Box 40 - 06696 - Ankara (Turkey)*

Key words: Turkey, green turtle, *Chelonia mydas*, Mediterranean, predation, nesting site.

SUMMARY

Akyatan beach is located on the South East coast of Turkey in the Cukurova region. The beach, composed of fine sand, has a rather homogeneous aspect throughout its 19.7 km length. The area is still unaffected by human influences, apart from limited local tourism which is mainly concentrated during the weekends. In 1994, a long-term monitoring project was initiated at Akyatan beach in order to investigate the area and to suggest a conservation strategy plan. As result of the first year of research, Akyatan is the most important nesting site for green turtle in the whole Mediterranean. *Chelonia mydas* was always the predominant species, while the loggerhead turtle, *Caretta caretta*, were such a low percentage that they do not represent a significative portion of a population, compared with all other nesting places in the Mediterranean. From 1994 to 1998, yearly surveys were conducted along the entire beach during the breeding season, which was estimated to be from the end of May until October. The total number of marine turtle nests laid varied during the five years of research. It was similar in 1994 and 1995, then, a drastic decrease of about the same amount was recorded in 1996 and 1997, whereas a considerable increase was found in 1998. The spatial nest distribution within each kilometre along the beach resulted to be similar during 1994, 1995 and 1997 whereas in 1998 a different situation was observed. As natural predation resulted to be the main threat to the green turtle population, detailed analyses relating to its impact and distribution within a stretch of four kilometres, 14-17 km, were carried out in 1995, 1997 and 1998. Predation rate during the egg incubation period varied during the three years. The number of predated nests was always similar, while the number of total nests laid was different.

INTRODUCTION

Akyatan was firstly cited as marine turtle nesting site by Geldiay (1982) and then its importance for green turtle was highlighted by Baran and Kasparek (1989).

In 1994, a long-term monitoring project was initiated at Akyatan beach in order to investigate the area and to suggest a conservation strategy plan. The research focused each year on the entire length of the beach (20 km) in order to evaluate the nest distribution between years and detailed studies on natural nest

predation (1995,1997 and 1998) were carried out on a stretch of four kilometres, which showed the highest number of nest since the beginning of the research.

STUDY AREA

Akyatan beach is located on the South East coast of Turkey in the Cukurova region. The beach is totally included in a Permanent Wildlife Reserve Area, which is managed by the National Park Division and Corp of Foresters of Adana (Fig. 1).

The beach, composed of fine sand, has a rather homogeneous aspect throughout its 19.7 km length. The area is still unaffected by human influences, apart from limited local tourism which is mainly concentrated during the weekends.

MATERIALS AND METHODS

From 1994 to 1998, yearly surveys have been carried out along the entire beach during part of the breeding season, which was estimated to be from the end of May until October.

Daily survey allowed us to draw up the green turtle nesting distribution along the beach with the exception of the 1996 survey, which was conducted for a short period and late in the nesting season. Although data were collected following different methodology, a comparison with the 1996 survey (Yerli and Canbolat, 1998) was done in order to evaluate the nest distribution of five consecutive years. Turtle tracks and nests were recorded in the morning by at least two persons walking the total length of the beach. Nest predation was identified through observation of predator tracks and the presence of eggshells scattered out of the nest was considered as prove of predation.

RESULTS AND DISCUSSION

At Akyatan, green turtle, *Chelonia mydas,* was the predominant species, while the loggerhead turtle, *Caretta caretta,* were such a low percentage that they do not represent a significative portion of a population, compared with all other nesting places in the Mediterranean (Tab. I).

Tab. I - Total number of nests found per species green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*) und unidentified species, during the five years of research.

Year	*Chelonia mydas*	*Caretta caretta*	unidentified
1994	496	21	0
1995	504	29	21
1996	179	?	0
1997	231	2	0
1998	735	10	0

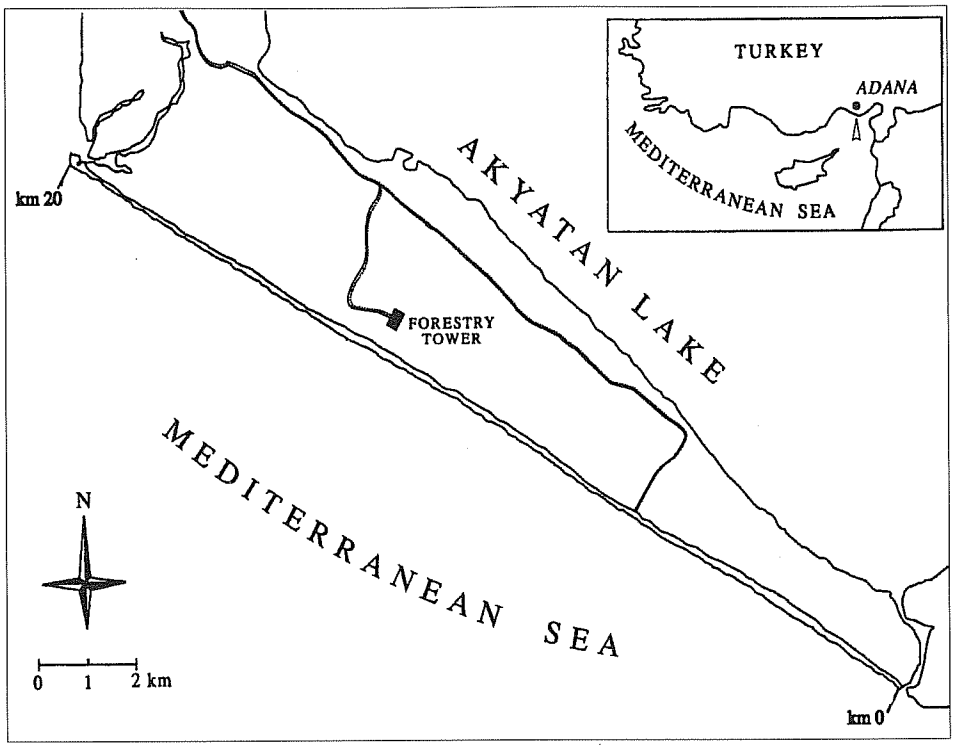

Fig. 1 - Akyatan beach, south-east coast of Turkey.

The total number of marine turtle nests laid varied during the five years of research. It was similar in 1994 and 1995, then, a drastic decrease of about the same amount was recorded in 1996 and 1997, whereas a considerable increase was reported in 1998 (Fig. 2). An analogous inter-annual variation (1994-97) in nesting was observed in northern Cyprus (Broderick et al., 1997). Although inter-annual variation was recorded in the total number of green turtle nests, these data confirm Akyatan as the single largest green turtle rookery in the Mediterranean.

It is believed, that the density of green turtle nesting can fluctuate dramatically from year to year (Hirth, 1997; Demetropoulus and Hadjichristophorou, 1995) and that even a decade of observation may not give a reliable evaluation (Limpus, 1996). Therefore, a continuous yearly long-term monitoring program is needed at Akyatan. The spatial nest distribution within each kilometre along the beach resulted to be similar during 1994, 1995 and 1997 whereas in 1998 a different situation was observed (Fig. 3).

Nesting in the southern end of the beach, 0-6 km, was relatively insignificant in the first three years, then an increase in number of nests was recorded in 1998. The stretch between km 14 and 17, which has been always the most important

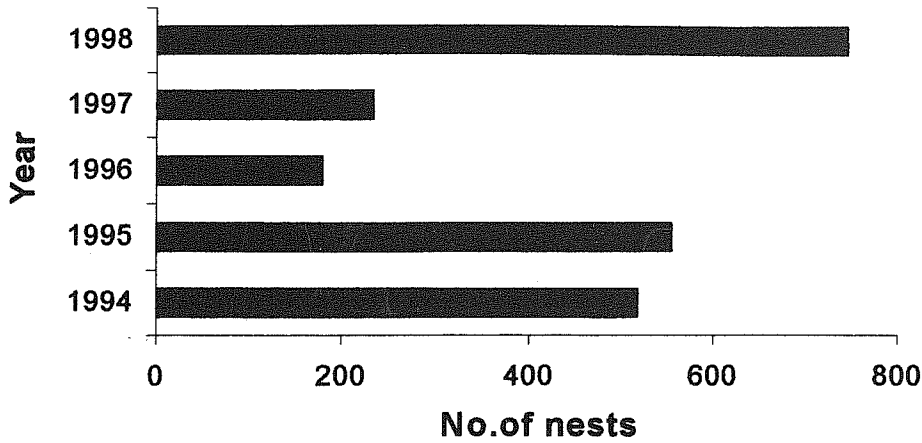

Fig. 2 - Total number of nests found during the five years of research.

compared with the rest of the beach, it became less important in 1998, whereas the zone between km 9 and 12 has shown an increasing percentage contributions of nest present in 1998. The northern end of the beach also assumed more importance with respect to the previous years.

The analogous nest distribution found during three years of research could be explained with the strong nest site fidelity of adult green turtles revealed by long term studies (Meylan et al., 1990, Mortimer and Portier, 1989), indeed females exhibit within-beach natal philopatry even nesting one or two years apart (Peare and Parker, 1995). Nevertheless, the results of the 1998 season seemed to be not in accordance with the results of previous years.

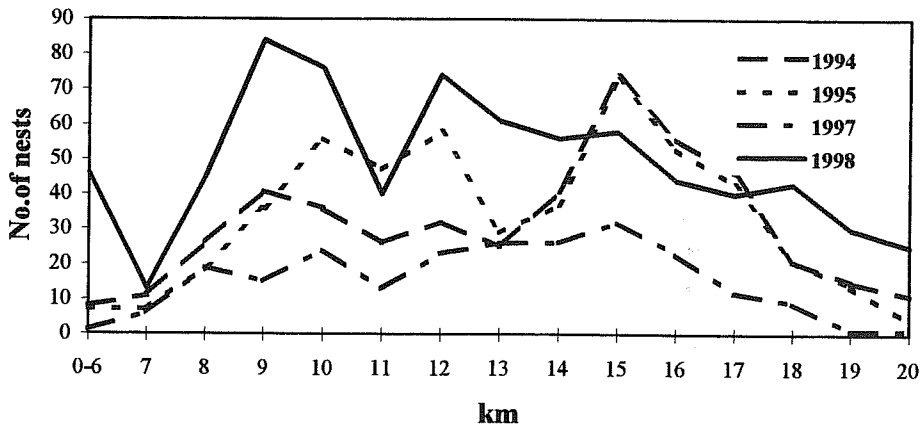

Fig. 3 - Spatial distribution of nests within each kilometre along the beach.

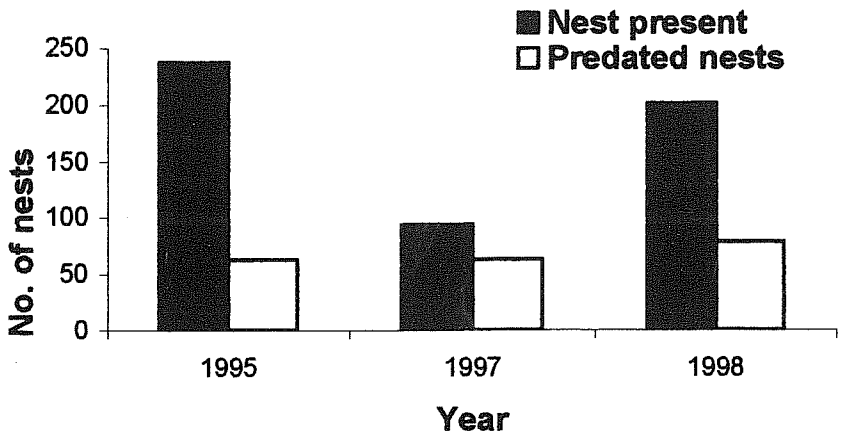

Fig. 4 - Number of nests present and predated nests within four kilometres during 1995, 1996 and 1998.

A multi-year tagging programme would provide essential information on the nesting population, which would allow us to evaluate the population dynamic at Akyatan.

As natural predation resulted to be the main threat to the green turtle population, detailed analyses relating to its impact and distribution within a stretch of four kilometres, 14-17 km, were carried out in 1995, 1997 and 1998. The number of predated nests was always similar, while the number of total nests laid each year was quite different (Fig. 4).

Being the number of predated nests analogous for three years, it could be assumed as hypothesis that the number of predators was stable. However, there are no records or studies on the local canids population and therefore it is not possible to draw any conclusion about the interaction between canids and turtles at Akyatan beach.

The main nest predator at Akyatan was the red fox (*Vulpes vulpes*) (Aureggi et al., 1999). Presence of golden jackal (*Canis aureus*) and for the first time in 1997, also confirmed in 1998, the hog (*Sus scrofa*) was also recorded (Gerosa et al., 1997).

Despite the need for more studies on natural predation along the overall beach, individual nest protection could be an appropriate technique to start with. A pilot wire screening programme should be applied in order to protect nests during the overall incubation period.

ACKNOWLEDGEMENTS

The success of the project would not have been possible without the continued support of all the officials of the Ministry of Environment (Ankara), the General

Directorate of Forestry (Adana), the Park Division (Adana) who lent so much support and encouragement. Special thanks to Nuray Erik (Embassy of Turkey, Roma, Italy), Ebru Coskun (Ministry of Environment, Ankara), Erhan Karakaya (Kaymakam, Karatas, Adana), Mustafa Pekel (General Directorate of Forestry, Adana), Paolo Casale (CHELON, Roma, Italy), Barbaros Agcacil. Finally, we thank the Italian volunteers and students for the help and support at Akyatan.

REFERENCES

AUREGGI M., GEROSA G., YERLI S.V. 1998 - Observations on predation of marine turtle nests at Akyatan, Turkey, Eastern Mediterranean. Chelonian Conserv. Biol., 3 (3): 487-489.

BARAN I., KASPAREK M. 1989 - Marine Turtles of Turkey, status survey 1988 and recommendation for conservation and management. WWF Verlag, Heidelberg: 123 pp.

BRODERICK A.C., GODLEY B.J., KELLY A., MCGOWAN A. 1997 - Glasgow University Turtle Conservation Expedition 1997: Expedition report. Marine Turtle research Group, Division of Environmental and Evolutionary Biology, Graham Kerr Building, University of Glasgow, Glasgow, Scotland.

DEMETROPOULOS A., HADJICHRISTOPHOROU M. 1995 - Manual on marine turtle conservation in the Mediterranean. UNEP (MAP) SPA/IUCN/CWS/Fisheries Department, MANRE (Cyprus).

GELDIAY R., KORAY T., BALIK S. 1982 - Status of sea turtle populations (*Caretta caretta* and *Chelonia mydas*) in the Northern Mediterranean Sea, Turkey. In: K.A. Bjorndal (ed.), Biology and Conservation of sea turtles, Smithsonian Inst. Press, Washington D.C.: 425-434.

GEROSA G., YERLI S.V., AUREGGI M., CONTI C. 1997 - Report on a sea turtle nesting beach study (Akyatan, Turkey), 1997. *CHELON* Marine Turtle Conservation and Research Program,V.le Val Padana, 134/B, 00141 Rome: 9 pp.

HIRTH F.H. 1997 - Synopsis of the biological data on the green turtle *Chelonia mydas* (Linnaeus 1758). Fish and wildlife Service, U.S. Department of the Interior, Washington, D.C. 20240. Biol. Rep., 97 (1).

LIMPUS C.J. 1996 - Myths, reality and limitations of green turtle census data. In: J.A. Keinath, D.E. Barnard, J.A. Musick, B.A. Bell (eds.), Proceedings of the 15th annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFC-387: 170-173.

MEYLAN A.B., BOWEN B.W., AVISE J.A. 1990 - A genetic test of the Natal Homing Versus Social Facilitation Models for green turtle migration. Science, 248: 724-727.

MORTIMER J.A., PORTIER K.M. 1989 - Reproductive homing and internesting behaviour of the green turtle (*Chelonia mydas*) at Ascension Island, South Atlantic Ocean. Copeia 4: 962-977.

PEARE T., PARKER P.G. 1995 - A comparison of the genetic structure of two nesting populations of green turtles. In: J.A. Keinath, J.A. Keinath, D.E. Barnard, J.A. Musick, B.A. Bell (eds.), Proceedings of the 15th annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFC-387: 170-173.

YERLI S.V., CANBOLAT A.F. 1998 - Results of a 1996 survey of *Chelonia* in Turkey. Mar. Turtle Newsl., 79: 9-11.