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**TURTLES** AND TOURISTS: A HANDS-ON EXPERIENCE OF CONSERVATION FOR SIXTH FORMERS FROM KING'S COLLEGE, TAUNTON, ON THE IONIAN ISLAND OF ZAKYNTHOS

**Contents**

1. [Abstract](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Abstract)
2. [Introduction](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Introduction)
3. [Protection](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Protection)
4. [Aims of the expedition](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#expedition)
5. [Preparations](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Preparations)
6. [Activities and the survey method](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#method)
7. [Results of the questionnaire](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#questionnaire)
8. [Tourists' interest and concern](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#concern)
9. [Discussion](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Discussion)
10. [Conclusions](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Conclusions)
11. [Acknowledgements](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Acknowledgements)
12. [Table 2 Results to the question, 'Before arriving on the Island, had you heard about the sea turtles?: how had you heard about the turtles?'](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#turtles?)
13. [References](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#References)

This article describes how sixth-form biology students from King's College, Taunton, made a practical contribution to the conservation of the Mediterranean Loggerhead **turtle** (Caretta caretta) on the **greek** Ionian Island of Zakynthos.

The purpose o the work was to provide information needed by the local conservation bodies on tourists' awareness of the **turtle** and its problems, and their willingness to modify their holiday activities to increase its chances of survival. The survey used an oral, interactive style of questionnaire and the results were analysed using an Acorn A4 portable computer and the Logotron Questionnaire program, Pinpoint. A low level knowledge of the **turtle** was found amongst tourists, but concern for its future was apparent; concern was also expressed for the lack of enforcement of the **Greek** government's current protective legislation.

Key words: Conservation, Tourism, Questionnaire, Sixth form.

Sixth-form environmental biology students helped with the conservation work and, using a questionnaire, surveyed the knowledge and reactions of tourists to the problems of protecting Caretta caretta (the Loggerhead **turtle**) during its laying season in Laganas Bay, in July 1993

[Introduction](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Introduction)

Conservation has become an important topic in most biology syllabuses at A level, and direct involvement of pupils in a conservation issue is an effective way of helping them to appreciate the complexity of the problems involved. The protection of the breeding beaches of the Mediterranean Loggerhead **turtle** (Caretta caretta) in Laganas Bay on the southern coast of the **Greek** island of Zakynthos (figures 1 and 2) provided an opportunity for a group of sixth formers, aged 16 to 18 years, from King's College, Taunton (an independent secondary school of 500 boys and girls) to gain this experience, and to give some practical help to the Sea **Turtle** Protection Society (STPS) over a two-week period in July 1993 when the Loggerheads' nesting activity was at its peak.

A conflict of interests is apparent on the Island of Zakynthos between environmentalists on the one hand who want to maintain the present nature of the coastline and its **turtle** population, and developers and small landowners on the other, who are keen to exploit the financial benefits of a tourist boom. The numbers of visitors to Zakynthos increased from a few hundred in the 1970s to 350 000 in 1992.

The preservation of the **turtle** breeding sites in Laganas Bay is vital to the survival of this species in the Mediterranean. Between 800 and 1000 females nest on the beaches each year (Margaritoulis, 1991), approximately 80 per cent of the whole population.

Loggerhead **turtles** once bred throughout the Mediterranean region but are now restricted to a few beaches in Greece, Turkey, and Cyprus. In Laganas Bay, only 3.5 km of the original 11 km of beach is suitable for nesting (figure 2).

The decline of the population of Loggerhead **turtles** results from a combination of human activities. Like other marine **turtles**, Caretta caretta lives in the sea, feeding in the surface waters on fish, crustacea, algae, and jellyfish. Consequently, **turtles** are more prone to be accidentally caught in drift nets (Groombridge, 1989) and on swordfish long lines (Panou et al., 1992). Large numbers of **turtles** are lost in this way, but the destruction of the breeding area as a result of coastal development is likely to result in a greater reduction in the **turtle** population. Pollution also takes its toll, at sea, particularly because plastic bags and oil lumps (Wietrich, 1994) are swallowed by young **turtles**.

Only female **turtles** return to land and then only to nest. The beach conditions necessary for nesting are very specific, and research is underway to determine the specific requirements of **turtles** for beach gradient, sand texture, humidity, and temperature. It is known that beaches must be undisturbed and the sand free from stones. The females climb to the upper regions of the beach at night to dig flask-shaped egg chambers, and lay about 100 eggs at a depth of between 10 and 40 cm. Each female may lay from two to four clutches in a season (May to August) every three to four years. Research using tagging techniques shows that each female tends to return to the same site on each laying occasion (Hays and Sutherland, 1991).

It is thought, although not yet proven, that female **turtles** return to the beach where they were born.

The incubation period of the eggs is about 52 days and is temperature dependent. The hatchlings emerge from the sand in the early hours of the morning, and move directly down the beach towards the brightness of the sea. Losses of the eggs and hatchlings by predation are negligible on Zakynthos (Margaritoulis, 1991). The exact movements of the hatchlings once at sea are unclear, but it is probable that, like the Florida Loggerhead population, they remain for months floating offshore before dispersing to different locations throughout the Mediterranean (Wietrich, 1994).

Tourism creates a variety of threats to these breeding beaches (see table 1). In Laganas town, the uncontrolled sprawl of small hotels, tavernas, and disco-bars along the beach front together with the high level of day and night activity on the beach itself, prohibit successful nesting. During the present survey, students found tracks of a few emerging **turtles** that had all returned to the sea without nesting, some after encountering beach furniture.

Despite the government prohibiting the building of tavernas at Dafni (see map, figure 2), the number had increased from one to eight since 1992, and both at Dafni and on Gerakas there were large numbers of beach umbrellas and several power boats although these were illegal! The airport which has recently been built in the valley behind Laganas and Kalamaki required draining the nearby marshland which has led, according to local workers, to an encroachment of plant growth in the sands at the upper reaches of the beach, inhibiting **turtle** nesting.

[Protection](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Protection)

The STPS, funded by the World Wide Fund for Nature (WWF, Greece), and the Mediterranean Association to Save the Sea **Turtles** (MEDASSET) are the major groups involved in **turtle** conservation in the area. Both organizations carry out research into the **turtles**' behaviour, breeding success, and present distribution, as well as being responsible for protecting the breeding beaches and promoting knowledge of and concern for the **turtles** both locally and internationally. These bodies have the support of the Tourist Development Union of Zakynthos (ETAZ), which comprises mostly the owners of the Island's larger and older hotels, who are interested in protecting the environment so it will encourage wealthier tourists to visit rather than the cheap holiday end of the market.

Their combined efforts have persuaded the **Greek** government to introduce legislation that protects the **turtles**' interests. Measures needed to enforce the legislation have been financially supported by the European Union. However, there has been strong opposition to this legislation from some sections of the local population, so that enforcement by the politically elected Prefecture has been inadequate. The local administration is also responsible for erecting signs above the nesting beaches, requesting tourists not to venture on to the beaches between dusk and dawn: these signs were in urgent need of repair and refurbishment, many having been vandalized by locals.

[Aims of the expedition](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#expedition)

MEDASSET and STPS find themselves increasingly stretched both in terms of human resources and finance, as the rate of development around Laganas Bay increases. A great deal of the STPS's time is spent in promoting knowledge about the **turtle** amongst visitors, and in encouraging people to obey the protective laws. The STPS distributes leaflets, gives excellent slide shows in hotels, and works in conjunction with holiday tour operators. The STPS needed to evaluate the effectiveness of its methods and the level of support for **turtle** conservation amongst tourists. In response to its invitation, the King's College study aimed to:

1. Assess tourists' knowledge and understanding of the **turtle** issue.
2. Evaluate the effectiveness of the different methods of providing this information.
3. Assess tourists' attitudes towards the **turtle** and their views regarding the restrictions that would result from enforcing the legislation, or that associated with setting up a National Park. The survey also sought to ascertain tourists' willingness to pay.
4. Assist with increasing public awareness and concern for the **turtle**.
5. Provide an educational opportunity for the students to experience and witness the methods, conflicts, difficulties, and successes in nature conservation.
6. Give practical help to the STPS on the beaches.

[Preparations](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Preparations)

1. The expedition leader visited Zakynthos, in August 1992.

* 2. In the preceding year, the party of 16 students and four teachers became familiar with the biology of the **turtle** and its conservation.
* 3. A questionnaire was designed to fulfill the aims above. It included questions requested by MEDAS-SET and the STPS. It also included a section to ascertain tourist opinion of Zakynthos as a holiday resort.
* 4. The students were trained in asking questions and recording results to ensure a consistency of style and method when using the questionnaire.
* 5. A simple 'snakes and ladders' type of board game was designed to be used as a means of providing information.
* 6. ETAZ played an important role by introducing King's College pupils to its members. 7. Funding for the expedition was raised by the pupils and nearly £3000 was collected by undertaking a variety of events such as discos, a prize draw, and a weekly snack bar. This money was used to provide transport on the island and to pay for all the printing.

[Activities and the survey method](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#method)

Eight hundred and twenty tourists were interviewed, many of whom were members of families and holiday groups. From these, 763 questionnaires were accepted as complete and representative of English-speaking, short-stay visitors. Most of these tourists were based in Laganas or Kalamaki, but the pupils spent a day at the airport interviewing departing tourists including many from other resorts.

Most interviews were conducted around hotel swimming pools and along the beaches. Samples were taken at random by working in one direction and stopping at prearranged intervals, for example, at each sunbed if the numbers were low or at every fifth sunbed along a crowded stretch of beach. No attempt was made to persuade anyone to cooperate, if they were unwilling to do so. Interviewers wore easily identifiable **turtle** T-shirts and introduced themselves before asking any questions. The interviewers worked in the same pairs throughout the seven days of the survey.

The questionnaire was of an oral, interactive style with mostly option-type questions (see figure 3). The students considered that this was likely to increase the number of interviews possible, particularly as writing would be an unreasonable task for sunbathers or people standing in queues, such as at the airport (Cape, 1991). Most questions were of 'yes/no' or tick-box form, so it was possible to quantify these results. In addition, several free response questions provided an opportunity for people to express themselves more fully.

The teaching staff of the school also undertook some interviews to provide a comparison with the students' results. However, most of the staff's time was spent contacting hotel owners and discussing the issue of conservation of Caretta caretta. On occasions, students joined in these meetings to gain a clearer understanding of the local politics and protocol involved.

The information gained from the questionnaire was processed daily using the Longman Logotron program, Pinpoint, on an A4 portable desktop computer loaned by Acorn Computers. This proved highly efficient so that it was possible to compare different sets of data quickly and in different combinations. This work was overseen by Mr A.R. Hopwood, Head of King's College's Computer Department.

Interviewers took the opportunity to inform the interviewees about the **turtles** by discussing the questions after finishing the questionnaire, and by handing out leaflets and board games (250 in total) (see figure 4). A debriefing meeting was held each evening to discuss the problems and findings of the study. Students were also reminded of the importance of maintaining an objective approach in this type of study.

The expedition also assisted the STPS directly by providing transport and by participating in its Beach Guarding programme on the roads leading to the nesting beaches, to attempt to stop people from breaking the law by going on to the shore between dusk and dawn. Since the STPS has no executive powers, the role was purely advisory and not always successful. Students also joined in dawn patrols which counted and eliminated **turtle** tracks and nests created during the previous night. Two mornings during the visit were spent clearing litter from the beaches; one of these clear-ups was well publicised by Thomson Holidays, resulting m a number of volunteer tourists participating as well.

These various activities aroused local interest in the project and led to radio and television appearances, which resulted in furthering one of the aims of the project i.e. to increase public awareness. The newly appointed Prefect in Zakynthos proved to be a willing ally, and immediately reinstated paid beach wardens and promised to replace the many vandalized warning notices.

[Results of the questionnaire](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#questionnaire)

The sample

By carrying out the interviews over a two-week period, it was possible to include tourists on different days of their stay on Zakynthos; 89 per cent were on their first visit to the island.

Of those staying in Laganas and Kalamaki, 63 per cent were at hotels and 24 per cent were using self-catering studios. Of those interviewed in hotels, 20 per cent were non-resident and came from other accommodation: this incursion of visitors into hotels with swimming pools is an important consideration when selecting hotels to give slide-show presentations, and for distributing posters or leaflets.

Ninety-one per cent of the tourists were on holiday with British tour companies: 32 per cent travelled with Thomson; 17 per cent with Grecian. This is significant information when planning the distribution of information leaflets and in-flight video showings.

Knowledge of the **turtle**

Seventy-five per cent of tourists claimed to have heard about the **turtles** of Laganas before arriving, with travel brochures and friends providing the most information (table 2). The percentage increased to 84 per cent after arrival and most had heard from their tour representatives (figure 5).

Understanding the threats

Most people (69 per cent) who had heard about Caretta caretta had some knowledge of its requirements and gave values to the various hazards detailed in the questionnaire (figure 6), which corresponded reasonably well with the assessments given by the STPS. It was surprising that 31 per cent of tourists did not know the reason for or importance of avoiding the beaches at night.

[Tourists' interest and concern](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#concern)

A large proportion of tourists surveyed were prepared to support the conservation of **turtles**, although only 35.9 per cent were prepared to join a Conservation Group. Only two people gave the **turtles** as their major reason for selecting Zakynthos for their holiday destination. Eighty-nine per cent thought the **turtle** to be an important issue and, surprisingly, 75.9 per cent said that they would be prepared to pay a small surcharge on their tickets for the maintenance of a National Park (perhaps copying the system adopted by Ecuador for people visiting the Galapagos--the Ecuadorians themselves do not pay for this): a significant number of tourists were anxious about the control over the use of money raised for this purpose.

Although many tourists had some difficulty in understanding the concept of a National Park and in appreciating the limitations that it might impose on their holiday activities in Laganas Bay, once explained to them, 79.9 per cent accepted the proposal. Tourists said that they would not be deterred from returning to Zakynthos by any such restrictions. In fact, only 10 per cent were thinking of returning to the island: the majority of tourists felt that Laganas Bay was becoming too overcrowded, 'Becoming a Black-pool in the Sun', was a frequent comment.

[Discussion](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Discussion)

Using an oral-type of questionnaire, particularly one requiring the interviewer to judge the answers as good, moderate or poor (as in the section on understanding the importance of different threats), has a number of dangers (Cheeson, 1993); an enthusiastic interviewer can lead the interviewee into a preferred answer. Practice surveys undertaken by the pupils before leaving England were organized. Analytical comparisons of each pair's results on different days and with other groups were undertaken, and showed an acceptable level of consistency.

In the answers to the questionnaire, both option-type and open, there was a strong current of support for the conservation measures and a willingness to support them by a surcharge (for example, a surcharge of £5 per visitor could raise at least £500 000 in most years, which could contribute to the running of a National Park). A significant number of tourists, however, were anxious about the supervision and use of the money, and pointed to the failure of the **Greek** authorities hitherto to enforce the laws on building, beach use, and power boat activities in Laganas Bay. Many people were anxious that possible restrictions of a National Park might prevent local people from earning their living by developing their land, or by renting out beach furniture and boats, as the demand for these might be considerably reduced.

Most tourists wanted to see and learn more about **turtles**. They were prepared to 'look and not touch'. Ideas from British television's 'Badgerwatch' and 'Foxwatch' schemes were suggested as a way of providing both a focus of interest, and of commercializing the **turtles** without disturbing them. A **turtle** centre with captive animals, displays, and organized boat trips to watch **turtles** basking in the Bay would be a valuable attraction, and a means to increasing knowledge about **turtles** and their habitat.

The general level about knowledge of the **turtles** and the laws designed to protect them should be improved. Holiday brochures and leaflets accompanying tickets can play an important part in disseminating knowledge, but they must be accurate and contain more information. The holiday brochures for 1994 ranged in their references to the **turtles** from very good ('Go Greece') to totally irresponsible ('Inspirations'). A quote from the latter brochure reads, 'By day the **turtles** are far out to sea, so even ardent conservationists can try the outrageous water sports . . . powerboats . . . wailing passengers cling on for dear life' (Inspirations, March, 1994).

Tour guides are generally the most effective means of communication but they need to be more accurately briefed as some can give misleading messages: one guide encouraged his party of tourists 'to wander along the beaches at night to watch the **turtles** laying'.

There are more opportunities to provide information in aircraft bringing tourists to Zakynthos, and the STPS is currently developing an in-flight video to offer to the airlines. The STPS evening slide-shows (300 in a year given in the hotels) are highly professional and much enjoyed by those who attend, but they need to be promoted and advertised more effectively. Many visitors expressed embarrassment and annoyance at the lack of legible beach signs, when they were asked to leave the beach at night by STPS workers.

[Conclusions](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Conclusions)

King's College achieved its aims and fulfilled its commitments to MEDASSET and the STPS. The immediate impression gained by the questioners was that the general level of understanding of tourists was low, and that much depended on the interest and effectiveness of the tour representatives. They were, however, surprised by the strong level of support for the **turtle**. Most interviewees accepted the idea of a National Park, in spite of the limitations that this might exert on their activities, and the majority were prepared to pay a surcharge on their tickets to finance such an enterprise. Tourists also showed considerable concern about 'over-development' in Laganas Bay, and nearly 70 per cent said they would not return.

The Local Administration of Zakynthos and the **Greek** State should take advantage of the eco-conscientiousness of their largely British tourists to plan for sustainable tourism, keeping the **turtle** as an indicator of the health of its overall environmental quality.

Note

In July 1995, a paper on this work was presented to the Conference on European Coastal Management: as a result of the interest shown and the questions asked, particularly those relating to the impact of tour companies on **turtle** conservation, a further investigation is now under way (table 2 and figure 5). Tour operators are to be asked about their knowledge of **turtle** nesting sites and their attitude to sustainable eco-tourism in those areas: the accuracy of the information contained in brochures will be evaluated, and small parties of staff and students will visit Zakynthos, Crete, Kephalonia, and Turkey to question tour couriers and their clients on the quantity and quality of information reaching them. The final results will be collated with those of a Dutch conservation group, Natour, that is carrying out similar work with Dutch companies.

[Acknowledgements](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#Acknowledgements)

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**Table 1 Threats resulting from tourism**

1. Building developments on **turtle** nesting areas

2. Night-time use of the beaches

3. Light pollution from cars, tavernas

4. Obstacles on beaches such as beach furniture and beached boats

5. Shading the nests by beach umbrellas and sunbeds, reducing sand

temperatures

6. Riding of motor-cycles, cars, and horses

7. The building of sand-castles

8. Power boats and water sports in the Bay (nine **turtle** bodies

scarred by propellors were recovered in 1993)

[Table 2 Results to the question, 'Before arriving on the Island, had you heard about the sea turtles?: how had you heard about the turtles?'](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#turtles?)

The following results are for the 537 (70 per cent of the total) questionnaires only selected because they were staying for 14 days or less and were not interviewed at the airport--these were primarily Laganas Resort tourists

75% answered YES, they had heard about the **turtles** before they arrived

How had you heard? %

a) From a travel brochure 49.6

b) From the travel agent 12.2

c) From a guide book 6.5

d) From the media--TV, etc. 11.5

e) From friends 20.0

f) On the plane (video or leaflets) 0.2

**Figure 6 Results of the survey into the assessment of tourists' ratings of the importance of various activities that might affect the survival of the turtle. (Their response was recorded on a 1-5 scale.)**

Results of the survey

% of those who answred 4 or 5

(a) Never touch 89.6

(d) Not drive 81.8

(h) o speed boats 81.1

(i) ight keep off 69.1

(f) Plastic bags 66.7

(l) No noise 62.4

(c) Beach equipment 57.8

(j) Flash lights 55.2

(k) Balcony lights 55.2

(e) Not walk beach top 53.7

(b) Sandcastles 49.9

(g) Not swim far out bay 14.9

Suggested importance

(based on an STPS leaflet)

Essential (i) (h)

Very important (d) (e) (c)

Important in (a) (b) (f)

Important to (k) (j)

Possibly (l) (g)

Questions asked:

a) Never touch a hatchling **turtle**

b) Remove sandcastles after day on beach

c) Do not use beach equipment in protected area

d) Do not drive on beach

e) Do not walk at the top of beach

f) Pick up plastic bags

g) Do not swim far out into bay

h) Do not use fast speed boats

i) Keep off beaches after dusk and before dawn

j) Avoid flash pictures near beach

k) Turn off balcony lights near beach

l) Avoid loud noises/music near beach

During the interview, their response was determined using the following scale.

Essential -5, Important -4, Very Likely to be important -3, Possibly matter -2, Not Matter -1

MAP: Figure 1 Map of the Eastern Mediterranean basin.

MAP: Figure 2 Zakynthos Island and Laganas Bay nesting sites.

DIAGRAM: Figure 3 Questionnaire used in the survey.

DIAGRAM: Figure 4 **Turtle** game. This page can be photocpied (enlarge to a suitable size).

GRAPH: Figure 5 Tourists' knowledge about the **turtle**: source of information.

PHOTO (BLACK & WHITE): Figure 7 Female Loggerhead **turtle** (Caretta caretta) returning to the sea after laying (by courtesy of R.H.C. Poland).

[References](http://easy.squareis.com/http/web.ebscohost.com/ehost/detail/detail?sid=f9a7dede-2592-40ae-a4bf-688504e0a362%40sessionmgr104&vid=13&hid=4107&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d&____x=1248#References)

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