

**The Sea Turtle Protection Society of Greece**



**Short Report on  
Sea Turtle Conservation on Zakynthos Island,  
Greece, during 2008**

Submitted to  
the European Commission, and the Standing Committee of the  
Bern Convention (Council of Europe)

Prepared by  
Aliko Panagopoulou, Christopher Dean, Dimitris Margaritoulis

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## Foreword

This short report includes progress made from January 2008 to 14 September 2008 regarding sea turtle conservation on Zakynthos Island, Greece. Presented nesting data are considered preliminary as analyses are still in process. ARCHELON's field leaders of the project on Zakynthos 2008, contributed to the drafting of this report.

## 1. Background

Laganas Bay, at the southern part of the Island of Zakynthos, western Greece, hosts the largest nesting aggregation of the loggerhead sea turtle *Caretta caretta* in the Mediterranean. The average number of nests in Laganas Bay account for about 26% of the total documented nesting effort of loggerhead turtles in the Mediterranean. The nesting habitat of Laganas Bay consists of six distinct beaches (Marathonissi, East Laganas, Kalamaki, Sekania, Daphni, Gerakas), totalling 5.5 km in length, plus the main inter-nesting area at sea (where female turtles remain between successive nestings), which is considered the entire marine area of the Bay.

ARCHELON, the Sea Turtle Protection Society of Greece (STPS), has been systematically monitoring the Bay's nesting beaches since 1984 and records annually the nesting levels and other associated data. ARCHELON's standardized monitoring project in Laganas Bay is the oldest in the Mediterranean and one of the oldest in the world. As a result Laganas Bay is used as an "index" nesting area, by the Red List Task Force of IUCN's Marine Turtle Specialist Group (MTSG), in assessing population trends for the loggerhead turtle in the Mediterranean.

The long-term project of ARCHELON involves monitoring of the nesting population, as well as protection of endangered nests. Further, it includes an extensive public awareness component towards residents and visitors. The project operates annually from May to October, under a research permit by the Ministry of Agriculture (Wildlife Department) and the approval of the Management Agency of the National Marine Park of Zakynthos (NMPZ). The project receives great assistance from a contingent of international volunteers who are organized, trained and supervised by experienced ARCHELON personnel. The actual costs of the project (incurred on Zakynthos), estimated at about 65,000 € per annum are derived exclusively, since 2003, from ARCHELON's own funds.

Due to the significance of Laganas Bay as a sea turtle nesting habitat, and the threats it faces from increasing tourism pressure and development, the Greek state has attempted, since 1984, its protection through various legislative acts. However, these measures were not endorsed by part of the local community and generally were poorly enforced. Following substantial pressure from domestic, foreign and international NGOs, the Council of Europe (through the Bern Convention) and the European Union, and after several years of deliberations, the National Marine Park of Zakynthos (NMPZ) was eventually established in December 1999 and its Management Agency in July 2000. It must be noted that ARCHELON and WWF-Greece participate with one combined seat in the 11-member Board of the Agency.

The enabling Presidential Decree includes a zonation scheme with varying regulations on land and at sea. The marine area of Laganas Bay is divided in three zones controlling maritime traffic annually from 1 May to 31 October (Zone A: no boating activity; Zone B: speed limit of 6 knots, no anchoring; Zone C: speed limit of 6 knots).

The Management Agency discontinued its operations in April 2004 because of lack of funds, the greater part of which came from the government. The Park became again operative since August 2005, after the appointment of a new President and a new Board by the Ministry of Environment. It should be noted that non-compliance with long-standing recommendations of the Council of Europe (incl. demolition of illegal buildings in Daphni) has led to a Ruling of the European Court of Justice, which threatened the Greek government with a severe penalty.

During 2006 the Management Agency worked towards establishing a conservation scheme, mainly through wardening, control of visitors and involving local people, especially in the problematic area of Daphni. This work continued in 2007 and included the addition of research assistants to further investigate the status of the nesting beaches and maritime area.

Herewith, we present the situation at the nesting habitat (on land and at sea) during 2008 (until 14 September), and the conservation status of the entire area, as these were witnessed through ARCHELON's fieldwork. Further, we provide a set of recommendations for the improvement of the conservation prospective of this regionally very important sea turtle population.

## **2. ARCHELON's Fieldwork in 2008**

### *General*

Fieldwork for the 2008 season commenced on 5 May and will continue until 20 October. The main research field station at Kalamaki was set up on 5 May, with a peripheral station based at Gerakas, operative since 10 May. Daily monitoring of all six beaches commenced on 16 May. A large part of ARCHELON's work is devoted to direct nest protection through the protection of nests laid in vulnerable areas either *in situ* by placing a metal or wooden cage or by relocation to safer locations.

Further, hatching nests affected by artificial lights are shaded to reduce hatchling disorientation. The specific criteria for the protection of nests are agreed with the NMPZ and adapted each year as new information is collected and evaluated. Regular beach patrols in cooperation with Marine Park wardens are also conducted to prevent accidental or deliberate damage to nests by visitors.

The public awareness (PA) programme, through which residents and visitors are informed about the plight of the loggerhead turtle and how they can utilise the beaches without disturbing turtles and nests, started on 8 May. The PA programme is conducted in a variety of formats: information tables, presentations in hotels and on commercial tour boats, informing visitors on the nesting beaches, through Information Stations in Gerakas (opened on 10 May), and Kalamaki (opened on 12 May) and whilst present on Turtle Spotting Boats (see Appendix 2).

After the establishment of the Management Agency, ARCHELON conducts its monitoring and PA work in agreement with the Park. This partnership commenced in 2002 and continued throughout 2003, before the Park's functioning was discontinued in April 2004. From this time until August 2005, when the Management Agency was re-activated, ARCHELON carried out its monitoring and PA work with increased presence on the beaches to offset, as much as possible, the absence of the Park's staff and wardens. After the reactivation of the Management Agency, new agreements were signed to cover subsequent seasons. According to these agreements ARCHELON provides the Agency with a fortnightly report, including preliminary nesting data per beach and observed violations of regulations; at the end of the year a more detailed report is submitted.

Partnership with the Agency foresees that ARCHELON project members work in conjunction with the Park wardens patrolling the beaches to supervise enforcement of regulations. Multi-lingual volunteers are of great assistance when conversing with foreign visitors on the beaches. The Management Agency continued to employ for a second year running "fieldwork observers" who follow ARCHELON's beach monitoring teams and also collect additional data. ARCHELON's volunteers act as independent observers on the Park-endorsed Turtle Spotting Boats, reporting violations on these boat trips as they occur (see Appendix 2). The ongoing relationship and cooperation between ARCHELON and the Management Agency is an essential component of the smooth operation of the Park.

Close cooperation continues with the Coast Guard of Zakynthos for incidents of turtle strandings and the transportation of injured turtles to ARCHELON's Sea Turtle Rescue Centre in Glyfada, Athens.

To implement the field work at Zakynthos, ARCHELON uses two cars and three inflatable boats; further in 2008 it has been necessary to rent one more car for the project's needs.

## *Results*

### A. Nesting

Preliminary data show that during the 2008 nesting season 3423 turtle emergencies have been recorded on all six beaches of the Bay, of which 983 resulted in nests.

Additionally, the narrow beach sector to the east of the standard Daphni beach was also monitored, and gave 321 emergencies of which 21 resulted in nests. This beach sector, largely unsuitable for nesting, was not monitored in previous years because of its low nesting success.

Although the total number of recorded nests during 2008 is below the 24-year average (1984-2007) of 1242 nests, this is considered to be part of the intense annual fluctuations observed over the years (see Figure 1). It is thought that these fluctuations may hinder detection of any long-time trend in the annual number of nests.

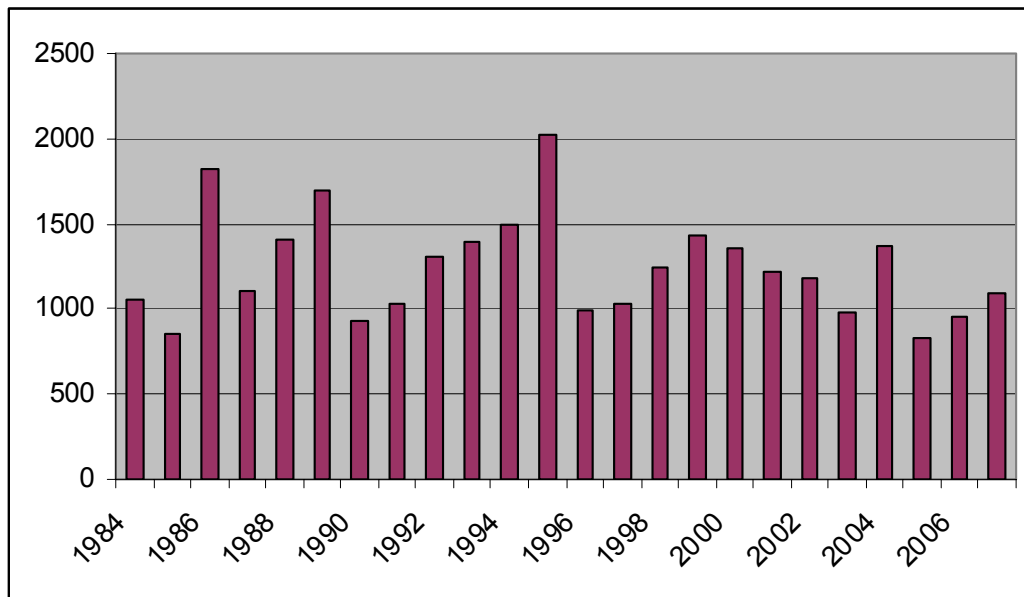


Fig. 1. Annual number of nests in Laganas Bay, Zakynthos Island, over 24 years (1984-2007), deducted from ARCHELON's long-term standardized project.

### B. Dead and injured turtles

For the second consecutive year, there is an increasing number of sea turtle strandings in the area of the Marine Park. Up to 14 September 2008, there were 18 turtles reported dead within the boundaries of the Marine Park. It must be noted that although it cannot be assessed if these died within the Bay or drifted there by sea currents, these numbers are nevertheless alarming for the survival of the Zakynthos population because they mostly involve adult and sub-adult individuals. The cause of death for these turtles is difficult to assess due to varying levels of decomposition. Still, the relatively good state of the carcass and the lack of external lesions, suggest that 14 of them drowned as a result of their accidental capture in fishing gear. A further two turtles died of propeller injuries, while the remaining two were in advanced decay and the causes of death were impossible to identify.

Further, eight turtles were found alive with fresh injuries requiring transport to ARCHELON's Rescue Centre in Glyfada. Six of these turtles were suffering from injuries related to ingestion of, or external entanglement with, fishing lines and hooks. One sub adult was diagnosed with non fishing-related foreign bodies in the digestive tract. The cause of disease in the remaining turtle was not determined prior to transportation. Once again it must be stressed that this represents a high incidence of dead and injured turtles for 2008, and suggests that problems offshore are undermining protection measures at the nesting habitat.

### C. Public awareness

So far this season ARCHELON has carried out more than 365 Slide Show Presentations, conducted 315 Beach Patrols, completed 70 Information Table shifts while the combined operation of the Information Stations of Gerakas and Kalamaki is 259 days. Further, ARCHELON project members participated in

168 all-day and half day cruise trips, 17 cruising catamaran boats, and 203 trips on Turtle Spotting Boats. Throughout all the above activities, visitors were provided with information on sea turtle biology and explained the NMPZ's regulations. In addition, project members were regularly informing beach visitors in the course of their monitoring duties. As a result of these activities, from 5 May until 14 September, a total of 56,663 visitors were informed by ARCHELON (Table 1).

TABLE 1. NUMBER OF PEOPLE INFORMED DURING ARCHELON'S 2008 PUBLIC AWARENESS PROGRAM ON ZAKYNTHOS ISLAND

| <b>Activity</b>          | <b>Number of people informed</b> |
|--------------------------|----------------------------------|
| Beach Patrols            | 14,161                           |
| Boat Trips               | 18,558                           |
| Information Tables       | 4,077                            |
| Information Stations     | 8,366                            |
| Beach Field Work         | 2,076                            |
| Slide Show Presentations | 9,425                            |
| <b>TOTAL</b>             | <b>56,663</b>                    |

### **3. The Work of the Management Agency during 2008**

The creation of the Marine Park and the associated Management Agency were major steps in protecting the most important nesting habitat of *Caretta caretta* in the Mediterranean.

The disruption of the Park's operation from about April 2004 to summer 2005 meant that there was neither official wardening nor supervision of regulations' enforcement pertaining to the nesting habitat on land and at sea. It is to be reminded that ARCHELON, being an NGO, can only provide advice and information. Since the Agency resumed operation in 2005 it has been necessary to re-establish acceptable practices within the protected area. A major concern of the Management Agency since its re-activation was the collaboration of Daphni owners, in order to accept a minimum number of conservation practices. Indeed during the 2006 nesting season several improvements were noted on Daphni beach, including wardening. Inevitably, in exchange for this cooperation the 15 illegal buildings were not demolished as the law orders.

In 2008, as in 2007, the Agency continued its efforts to acquire control in the problematic area of Daphni by involving in the process local owners. However the case of Daphni remains difficult to solve with an uneasy compromise between the NMPZ and local landowners. All the illegal buildings in Daphni still exist and create a false "precedent" for others to come, if circumstances permit. More details on Daphni can be found in section 4.1.

In 2008, overall the NMPZ has continued in a positive direction improving the enforcement of the Park's legislation particularly on land and to a lesser extent at sea. The wardens generally responded well to violations observed on the beaches and the cooperation between ARCHELON and the wardens was stronger than ever.

During 2007 the Management Agency took further steps to restrict vehicular access on the beaches by adding new barriers at unofficial entrances on East Laganas beach, which in the past had been used to access the beach illegally. During 2008 the Management Agency elaborated on these actions by adding barriers at the western end of East Laganas beach and installing wooden posts along the back of the beach, which in effect restricted vehicular access from the dunes.

Wardening was affected on all protected beaches in 2008 with Sekania continuing to have a part-time warden (see Appendix 1). Also in an effort to protect the beaches from damage caused during the winter some wardens were present from late January on the beaches of East Laganas and Kalamaki. More wardens were also employed at the end of March in Daphni and Gerakas and it seems that it is the Park's intention to warden these beaches all year round. This represents a major step towards more effective protection of the nesting habitat.

Since 2006 control of beach furniture (umbrellas, sun beds) was implemented by the Agency by providing distinctive furniture carrying the Park's logo. In 2008, as in 2007, beach furniture owners on all protected beaches were made to remove all sun beds at night allowing an increase in available nesting area. It should be noted that beach furniture on Daphni is deployed on a flattened dune area behind the actual beach, and this furniture was not removed at night as it was not intervening with nesting.

Beginning in 2006 signposting was implemented at the major entrances of the nesting beaches as well as on roads crossing the boundaries of the Park. These signs continue to be in place in 2008 and were maintained or replaced, if necessary, before the nesting season.

In Gerakas, despite a ticketing system supposed to control the number of visitors, tourist numbers in August exceeded the set quota of the Presidential Decree.

Enforcement of the maritime restrictions was generally insufficient in 2008. Generally it was rare to see boats in zone A and the NMPZ and Coast Guard reacted in most occasions. However elsewhere in the Bay speeding boats were a common sight in zones B and C. It is sad to report that one of the NMPZ's own boats could be frequently observed speeding on routine trips to exchange wardens on Marathonissi. The NMPZ did not get a second vessel which could be used to warden the maritime zone until late August leaving it almost entirely reliant on the Coast Guard to enforce the regulations. Even after the acquisition of this new boat, it proved very difficult for the Park to realistically control all the boating activity within the Bay. With this in mind many violations noticed from land-based ARCHELON and NMPZ personnel were not appropriately dealt with.

In previous years the Management Agency had used buoys to mark out maritime zone A (no boating zone) which protects the nesting beaches of Sekania, Daphni and Gerakas. These buoys have a twofold role: they inform boaters on the exact boundaries of the protected zone and assist Coast Guard and Park wardens to detect violations. Unfortunately in 2008 these buoys were put in place not earlier than the first week of August, almost at the end of the nesting season. This made it difficult for Coast Guard personnel, as well as for both ARCHELON staff and Park wardens, to detect violations of the maritime regulations.

Since 2006 a restriction on vessels in the northern part of the Bay, with the highest concentration of turtles, has been imposed with the intention of only NMPZ-endorsed vessels (Turtle Spotting Boats) being allowed to sail in this area (see Section 4.2 and Appendix 2 for details). However this zone has been poorly policed by either the NMPZ or the Coast Guard. Also this zone was not marked out by buoys, again making it difficult to recognize and report violations. The poor enforcement of this zone has led to some disappointment from NMPZ-endorsed boat owners who otherwise have supported the Park's intentions. Despite this ARCHELON personnel, working on these vessels, have continued to report infractions to the Park as they occur (see Appendix 2).

## **4. Conservation Status of the Nesting Habitat during 2008**

### **4.1. Protected beaches (in geographical order)**

Marathonissi (zone A2: Nature Protection Site, maritime zone B)

Marathonissi is a small island within the Bay and its nesting beach is characterized by low sand temperatures, because of its northern orientation and whitish colour. Low nest temperatures in Marathonissi produce predominantly male hatchlings and this makes this short beach a very exceptional one, having in mind that all other beaches in Laganas Bay produce predominantly female hatchlings. The value of male-producing beaches is enhanced with the incoming climate change. The beach is a popular destination for day-visitors who arrive by boat from several locations within the Bay. A NMPZ sign is in place to inform visitors of the beach regulations. However, this sign would be better placed on the beach near the boat drop-off zone close to the wall, an area where nesting does not occur. Despite being in maritime zone B, boats still moor at Marathonissi and drop anchor in the waters just offshore as well as on the beach, often on dry sand more than 10 meters from shore. In order to inhibit this in 2007, buoys were placed to create a zone where boats were allowed to pull up, at the same time marking a swimming-only boundary around the whole beach. Although this measure remained in place in 2008 frequently it was not enforced and boats could anchor outside the pulling up zone. Further, visitors to Marathonissi are largely unaware of the regulations before they arrive. On a few occasions boats were present on the beach after 7pm despite a Park warden being present at that time. During high season wardens often have difficulty enforcing beach regulations resulting in moved nest markers and protective cages.

As in previous years hatchling disorientation remains a problem on Marathonissi with hatchlings often walking great distances in the direction of

Laganas village's lights to reach the sea. It is hoped that the Park will take care of this serious problem with the appropriate management measures.

#### East Laganas (zone Π3: Nature Protection Site, maritime zone B)

This beach, backed partially by an extensive sand dune field, stretches for about 2.7 km towards the western end of the protected beaches in the Bay. The international airport to the back of the beach is closed during the night and this avoids substantial light and noise pollution on the nesting beaches in the Bay. The main entrances to the beach each have a barrier to prevent vehicle entry, and signs detailing the NMPZ regulations. In 2008 a higher proportion of non-English speaking tourists visited the park area than in previous years. However the signs at the beach entrance are only in English and Greek and are difficult to read due to the small font size. The signs at East Laganas and Kalamaki were all deliberately vandalised in early May. In addition to this the NMPZ's warden hut near Kalamaki Beach Taverna was severely damaged by gunfire. A total of four warden kiosks were in place in 2008; however the warden kiosks between Kalamaki Beach Taverna and Stanis Taverna have not been staffed for of the entirety of the season due to a shortage of personnel.

Vehicle traffic on the beach, a long-standing problem, was further restricted in 2008. In addition to the 15 barriers added last year, in 2008 the Management Agency placed a new barrier at Zante Beach Hotel as well as a large amount of wooden posts along the dunes at the back of the beach, resulting in few violations being observed (for more information, see Appendix 1).

The westernmost part of the beach also suffers from light pollution associated with local hotels, which deters nesting females and disorients hatchlings. However the NMPZ have begun to take steps in improving this situation by investigating the occurrence of light pollution on all beaches. The NMPZ have worked directly with hotels at the westernmost end of East Laganas to implement measures to reduce light pollution, so while the issue is not yet resolved it is improving. Hatchling disorientation was also consistently noted by ARCHELON personnel in the centre of East Laganas beach.

The situation with beach furniture on East Laganas was significantly improved in 2008. Several sets of illegal beach furniture, noted in previous years by ARCHELON, were removed. The remaining beach furniture all bore the NMPZ logo of endorsement and sun bed and umbrella numbers did not exceed the allocated amount. Further, beach furniture was consistently removed from the beach at the end of each day as in 2007.

#### Kalamaki (zone Π3: Nature Protection Site, maritime zone B)

Despite Kalamaki beach being in maritime zone B boats can still be seen intermittently anchoring close to the beach or speeding past. Access to Kalamaki is gained through a single main beach entrance where the barrier preventing vehicle access was replaced in 2006. However access to the beach may be gained through two smaller unofficial entrances that are difficult for the warden stationed at the main entrance to monitor. These alternate entrances are well known to local people. During night work, ARCHELON staff came into

contact several times with visitors who had accessed the beach via these alternate entrances.

There is one hotel present on the back of Kalamaki beach; namely the Crystal Beach Hotel which has a pool bar facing the nesting beach. The hotel is generally considerate with its lights and hatchling disorientation was not recorded in the vicinity of the hotel during 2008.

The main access point to the beach was controlled 24 hours a day by NMPZ wardens throughout the summer. It must be noted that from late January 2008 to the beginning of the summer season, Kalamaki beach had a warden present during the daytime. Beach furniture numbers at Kalamaki remained within the allocated number throughout the summer and were removed at night as required by the NMPZ.

Sekania (zone A1: Absolute Protection Site, maritime zone A)

Sekania has one of the highest nesting densities for *Caretta caretta* in the world. It stretches at the centre of maritime zone A meaning that no access is allowed by boat. It is reminded that WWF-Greece acquired the land behind the beach preventing development and vehicular access. In 2006 the NMPZ erected a sign on the land behind Sekania, advising that there is strictly no access to the beach. A barrier has been constructed at the entrance to the beach to further discourage access. In 2008 a warden has been present intermittently either on the beach preventing access by foot or boat; or on the road preventing access by foot. Due to the sporadic frequency in which a warden was present on Sekania occasional visitation by boat and violations of maritime rules were observed. Due to the delayed placement of the buoys delineating maritime zone A several boats accessed the waters near Sekania and the number doing so was seemingly reduced once the buoys were in place.

Minor hatchling disorientation was observed on the western part of the beach due to the lights of Laganas village, and also noise from the bars and clubs in the Bay. Due to its remote location and the high level of hatchling production Sekania beach is particularly susceptible to hatchling predation by sea gulls, most of them coming from the nearby landfill site (see section 4.3). In response to the issue of hatchling predation the NMPZ began a study, in collaboration with ARCHELON, to investigate the extent of the problem. ARCHELON observed hatchling emergence patterns over 3 separate 3-day periods throughout the hatching season. This will then be combined with data collected by the Park concerning sea gull activity to lead to an estimation of hatchling predation levels. Initial results from this study will be available in early 2009. It must be noted that the Ornithological Society of Greece has provided the NMPZ with information and guidelines regarding the monitoring of seagull activity and behaviour.

Daphni (zone Π1: Nature Protection Site, maritime zone A)

In 2003, there were 13 illegal buildings at Daphni, considered to be the second most important nesting beach on Zakynthos. In 2004, a newly constructed building was observed and subsequently reported to the relevant authorities on

Zakynthos, as well as to the delegation of Public Administration Inspectors of Greece by the then Management Agency of the NMPZ. The removal of illegal buildings at Daphni has been an obligation of the Greek Government since 1987, when only two buildings existed, following recommendations by the Council of Europe (Recommendation No. 9, Bern Convention). However, no action has been taken for their removal, even though demolition protocols have been issued by the courts.

Previous changes to the morphology of the beach have included levelling of the low dunes behind the beach, as well as deposition of soil to allow umbrellas to be utilised. Moreover, non-native plants were planted replacing the original vegetation.

It must be noted that land owners in Daphni, supported by the local community of Vassilikos, never accepted Park wardens and regulations before 2006. In 2006 the Management Agency came to a compromise with landowners, which led to several changes on the beach and the area behind. Some construction works, including demolitions of walls, new constructions and modifications took place. Daphni was closed to visitors in the evenings and vehicle access was restricted by a road barrier and the presence of wardens at the main entrance of the area. During daytime, tourists wishing to visit the beach were transported to the area by NMPZ vans; reportedly there were restrictions to visitor numbers and staying time. The control of visitor numbers during the day was enabled by the implementation of a pilot eco-tourism programme which included the operation of an Education Centre (located in a rented house on the hills behind the beach) and guided tours on the beach. Moreover, the NMPZ removed obstacles and rubbish from the beach in order to provide a more suitable terrain to turtles attempting nesting. In comparison to previous seasons, the incurred changes during 2006 generally provided a better space for turtle nesting on the beach, put some control over the number of visitors, and reduced other potential disturbances (lights, noise, traffic, etc.). Nevertheless, the above actions of the Management Agency do not stem from an integrated management plan which would have taken into consideration all possible factors towards the long-term conservation of the area.

In 2007 the NMPZ created 2 new car-parks closer to the beach and no longer provided free transport to the beach from the Education Centre, as done in 2006. During 2008 the NMPZ employed daytime wardens from the end of March and 24-hour wardens for the duration of the summer. The Park's Education Centre and the two large car-parks continued to operate. On arrival to the car-parks visitors were informed of beach regulations by Park wardens. As in 2007, a special area was created on the beach for displaying sea turtle tracks and nests to interested visitors. The tracks were chosen and left intact each morning by the Park's fieldwork observer and ARCHELON monitoring team.

#### Gerakas (zone Π2: Nature Protection Site, maritime zone A)

The Presidential Decree states that a maximum of 60 umbrellas, 120 sun beds and 350 visitors are permitted on the beach. Occasional counts of beach furniture showed the number of umbrellas to be consistently at or below the

allowed number. However the number of sun beds frequently exceeded 120. Use of private umbrellas was allowed only in the western end of the beach which was marked with an NMPZ chain. This area has no recorded nesting activity and therefore was utilised to relieve pressure on the rest of the beach.

Gerakas beach is free from development and light pollution, and access is through one entrance. In 2007 two barriers at the beach entrance prevented access by cars and these were still in place in 2008. In addition to this, the Management Agency restricted parking in the area closest to the beach with the 2006 parking area being unused. Thus car parking close to the beach became more difficult and this helped to discourage excess beach users.

As in 2007 the NMPZ continued to operate a ticket scheme and a time limit of 2 or 3 hours in order to control visitor access. Upon entering the beach tourists were given a ticket and a time limit, however the time limit was not enforced and tickets were often not handed back as people left the beach. Generally, the ticket scheme caused a reduction in visitor numbers however on many days the legal quota was exceeded and therefore the scheme needs revising.

As in 2007 the clay area at the eastern end of the beach was roped off in order to prevent erosion caused by beach users taking the clay. However this was not very effective, as there were many incidences recorded of visitors taking and bathing in the clay. The signs on the rope were only written in Greek and did not look very official. On many occasions tourists were aware of the regulation but chose to ignore it.

In 2008 the Management Agency installed a wooden boardwalk from the main entrance to the beach. By using this boardwalk visitors could reach either the waters edge, through a roped path, or the western end of the beach behind the sun beds. In addition to the boardwalk the management agency also created a viewing platform behind the beach from which visitors were permitted to view the sunset before being asked to leave by the wardens.

On 45 occasions boats were seen from Gerakas beach within maritime zone A (no boats allowed), several times entering and anchoring within Gerakas Bay. On the majority of occasions the wardens reacted quickly, by informing either the Coast Guard or the NMPZ's own sea guard. However there was often a considerable delay in the arrival of the authorities and on some occasions the offenders would leave without being notified of their offence.

## **4.2. Protected marine area**

### *General*

As in previous years, Laganas Bay was patrolled this year by the Coast Guard. In addition from early August onwards the Management Agency patrolled the maritime zones with one boat. Until the introduction of the NMPZ's sea guard, violations were checked and observed from the shore and this was very ineffective. ARCHELON personnel onboard turtle spotting and cruise boats would note violations and report them to NMPZ staff. The majority of violations were not responded to by either the Coast Guard or the Park's sea guard. This is particularly true for violations for the NMPZ's special turtle spotting zone and for guidelines for turtle spotting behaviour. A good cooperation was witnessed

between the NMPZ and the local Coast Guard, however limited resources of the Coast Guard made it difficult for them to properly enforce regulations. It must be stated that many of the rules are still frequently broken, this is particularly the case with the 6 knot speed limit.

#### *Maritime zone A*

Over 50 separate incidents of boats being seen in zone A were recorded during 2008, many of which also dropped anchor or were observed at speeds in excess of 6 knots. By law all boating activity is prohibited within zone A. During 2008 the NMPZ buoys, delimiting maritime zone A, were not placed until early August and this renders them useless as the nesting season is almost over.

#### *Maritime zone B*

Marathonissi island is visited by many boats. All of the boats anchor either in the shallow water (prohibited in Zone B) or are dragged ashore and their anchors dug into the beach sand. By law only organised trips to Marathonissi are permitted; however many privately hired boats visit the island every day. All boats visiting Marathonissi are limited to a maximum of 1 hour stay and must stop in an area designated by the NMPZ's buoys. These buoys also show a designated swimming area around Marathonissi. Nevertheless, enforcement of this regulation by the Coast Guard has been haphazard at best. Private hired boat companies fail to inform customers of the maritime regulations which are in place to protect the turtles. Boat speeds above the permitted 6 knots are common near the island and even water sports, such as jet skis, have been observed.

On many occasions professional fishing vessels dropped gill-nets close to Marathonissi often leaving them in place all night. These nets, both close to Marathonissi and generally within the Bay, represent a clear and grave danger to sea turtles, especially during the nesting season.

#### *Special NMPZ zone*

As a pilot scheme, in 2006 a new maritime zone was introduced strictly for NMPZ endorsed turtle spotting trips. This zone runs parallel with the beach at a distance of 1.4 km from the shore. It also stretches from Aghios Sostis in the west until the beginning of maritime zone A. Since the introduction of this zone it has been poorly enforced with non-endorsed boats in the zone every day. These non-endorsed boats have seemingly little regard for the NMPZ's turtle spotting guidelines often exceeding the number of boats per turtle and going closer than the NMPZ's safe viewing distances. ARCHELON observers aboard NMPZ endorsed boats often observe boats driving over turtles and exceeding the NMPZ's observation time limits. The lack of enforcement of this rule was not helped by the lack of buoys in place to clearly mark the zone. Many of the endorsed turtle spotting boat drivers feel disappointed in the NMPZ's poor enforcement and feel that by letting other boats in the zone that they are not supporting the cooperation. Many private hire boat vendors do not inform their customers of the NMPZ's rules and many will send them to follow turtle spotting boats to see a turtle. The private hire boat vendors should be made to inform customers of the NMPZ rules and not allowed to turtle spot in the special zone like all other boat traffic.

## *Water Pollution*

Intermittently, poor water quality is observed associated with the rivulet of Bouka at East Laganas or with off shore boats. Sewage discharged from large commercial tour boats have also contributed to water pollution in the Bay. This is a continuing problem which needs to be addressed. Worries about pollution from the nearby landfill have also been expressed.

### **4.3. The landfill site**

A landfill site is in place within the boundaries of the NMPZ, behind Vrondonero beach, between Kalamaki and Sekania. The landfill site causes an artificially high level of sea birds to populate the area and this results in increased predation pressure on sea turtle hatchlings. This is particularly apparent at Sekania where sometimes the beach is covered with seagulls waiting for the hatchlings.

It should be noted that the landfill site is nearing its maximum capacity and any plans to extend the existing site or to make a new one within the boundaries of the Park would be illegal (national legislation does not allow landfill sites within protected areas).

## **5. Recommendations**

### **5.1 General Recommendations**

- 1 A Management Plan for the NMPZ should be immediately elaborated. This will delineate the vision of the Management Agency, something that is very much needed.
- 2 Alternative measures and compensation schemes for confirmed affected landowners should be sought.
- 3 Removal of illegal buildings and restoration of beach profile.
- 4 Acquisition of a strip of land (approx. 4ha) at Sekania where an illegal road was built in 1995.
- 5 The land planning survey for the rest of the island should be completed and implemented in order to secure balanced development for the whole island.
- 6 The problematic sanitary landfill will have to be removed from the NMPZ and other sources of pollution investigated.
- 7 The NMPZ should extend its present management methods to include the entire area both terrestrial and marine.
- 8 Protection measures should be included for all species found within the area.
- 9 The NMPZ, as begun in 2008 should continue to protect the area both in summer and winter as damage caused at winter can not be rectified with summer time protection methods.

## **5.2 Recommendations for the Nesting Beaches**

The Management Agency should continue improving the conditions on the nesting beaches and should become hard on tackling illegal activities. The respective local authorities should ensure that the NMPZ legislation is enforced at all costs. In particular:

10 No single stretch of beach currently being used by turtles for nesting should be compromised, in fact stretches of the developed beach in West Laganas, not used any more by turtles, should be in the long term reclaimed - by means of simple light and beach furniture control - for turtles. Sector T in East Laganas needs attention, as increased tourist use may eventually push out nesting turtles.

11 An environmental impact study must be elaborated in order to fully protect and restore the remaining sand dune ecosystem backing the East Laganas nesting beach.

12 An environmental impact study should be carried out to minimise light and noise pollution.

13 The NMPZ should act on their information gathered in 2008 to restrict the damage caused to sea turtle nests by the invasive roots of certain plants.

## **5.3 Recommendations for the Maritime Area**

14 The Management Agency should put more emphasis on improving conditions at sea and should endeavour to police more closely the NMPZ's maritime regulations and guidelines.

15 The NMPZ should ensure proper resources are allocated to the protection of the maritime zones; namely enough guards at sea and the placement of buoys to delineate the boating zones.

16 The NMPZ should ensure proper enforcement of the special turtle spotting maritime zone by properly restricting access of non-endorsed turtle spotting boats.

17 The cause of turtle deaths by speedboats and particularly fishing practices should be investigated.

18 The NMPZ should address the private hire boat vendors to ensure those hiring these boats are properly informed of the maritime rules.

19 The NMPZ should take steps to prevent non-endorsed boats from advertising and running turtle spotting trips within the Bay.

20 The NMPZ should begin to phase out the use of glass bottom boats for turtle spotting.

### **Furthermore, the following should be ensured:**

1 Continuation of the long-term standardized monitoring and public awareness programmes conducted systematically by ARCHELON, since 1984, is vital to assessing nesting population trends, effectiveness of conservation measures and evaluating the operation of the NMPZ.

2 Continuous presence of the Coast Guard is essential, due to the Island's National Marine Park status and the lack of knowledge and/or abiding of rules by the general public.

## **6. Appendices**

### **Appendix 1: The warden programme of the Park**

During 2008 there have been 9 warden stations located around the Marine Park. These include Marathonissi, Sekania, Kalamaki, Gerakas, two locations on Daphni and three on East Laganas. The NMPZ constructed in 2006 permanent warden stations replacing the temporary huts from previous years. These have been attended for 24 hours a day.

Signs have been erected by the NMPZ at the entrance to all of the nesting beaches. These inform tourists that they are entering a nesting beach, as well as describing the beach regulations. Wardening of the beaches commenced this year on many beaches in January, (East Laganas, Gerakas & Kalamaki) with others beginning in March and 24 hour wardens from Early May with ARCHELON multi-lingual volunteers assisting wardens in informing visitors during the summer. Adherence to beach regulations has improved greatly this year as a result of the permanent warden presence. Unlike 2005, this season ARCHELON project members did not carry out safeguarding of the nesting beaches to prevent public beach access at night. NMPZ wardens were present on the nesting beaches this year, removing the necessity for volunteers to carry out this task.

Protection by NMPZ wardens, and the presence of ARCHELON monitoring teams (during the egg-laying season) on the other nesting beaches has effectively prevented access to the public during the night.

### **Appendix 2: Turtle spotting boats**

In 2001, a Memorandum of Cooperation between the majority of the turtle spotting entrepreneurs and the Management Agency of the Marine Park was signed. Two turtle spotting stations (namely the Association of Turtle Spotting Boats of Laganas Bay) located close to Laganas village were endorsed by the NMPZ in June 2003 via a written agreement. The agreement specified turtle spotting guidelines to be followed on commercial turtle spotting trips. One of the clauses specifies that turtle spotting operators must inform their customers about turtles during a turtle spotting trip. In an agreement with the Management Agency, ARCHELON provides multilingual volunteers to go on trips with the task of informing tourists on the boats about sea turtles, and the conservation measures of the NMPZ. Equally importantly, ARCHELON members report any violations of the code of conduct pertaining to turtle spotting. This information is then passed onto the Management Agency on a regular basis in a report format. The NMPZ boats attended by ARCHELON volunteers generally have a high level of compliance with the regulations; where as endorsed boats not attended by volunteers are frequently observed flouting the guidelines.

One area of concern associated with turtle spotting is the regular incidence of private hired boats as well as commercial glass bottomed boats violating the guidelines for viewing a turtle. Private hired boats are not regulated in any way and constantly follow endorsed turtle spotting boats in high numbers in order

to view turtles. Visitors who are using these boats are very poorly informed and frequently cause stress to resting turtles. Violations associated with turtle spotting tend to worsen towards the end of the nesting season when there are less female turtles in the Bay and viewing a turtle becomes more difficult.

Regulation of turtle spotting activities needs improvement, particularly in the area of private boats and some commercial turtle spotting trips. To remedy these problems, endorsements of turtle spotting companies should be revised regularly and revoked where necessary.

### **Appendix 3: Beach cleaning activities**

Rubbish on the beach and at sea poses serious threats to sea turtles and other marine species.

During May ARCHELON, together with NMPZ wardens, conducted beach cleans on the beaches of East Laganas, Kalamaki, Sekania, Daphni and Gerakas. This was then continued during the season by NMPZ wardens and ARCHELON volunteers as part of our public awareness program.