

The Sea Turtle Protection Society of Greece



Sea Turtle Conservation on Zakynthos, Greece, during 2009

Short report submitted to
the European Commission, and the Standing Committee of the
Bern Convention (Council of Europe)

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Foreword

This short report includes progress made from January to October 2009 regarding sea turtle conservation on Zakynthos Island, Greece. Presented data are considered preliminary as analyses are still in process. ARCHELON's field leaders of the project on Zakynthos 2009, 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 the terrestrial part comprised of six distinct beaches (Marathonissi, East Laganas, Kalamaki, Sekania, Daphni, Gerakas), totalling 5.5 km in length, and the marine part comprising of the main inter-nesting area (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 by the Red List Task Force of IUCN's Marine Turtle Specialist Group (MTSG) as an "index" area for the assessment of long-term 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 labour assistance from a contingent of international volunteers who are organized, trained and supervised by ARCHELON. The actual costs of the project (incurred on Zakynthos), estimated at about approximately 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 were generally 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 was set up in July 2000. It must be noted that ARCHELON and WWF-Greece participate with one combined seat in the 11-member Board of the Management 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 a lack of funds, the greater part of which came from the government. The NMPZ became operative again in 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 2008, included the addition of research assistants to further investigate the status of the nesting beaches and the maritime area.

Herewith, we present the situation at the nesting habitat (on land and at sea) during 2009, 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 2009

Introduction

Fieldwork for the 2009 season commenced on 10 May and terminated on 10 October. The main research field station at Kalamaki was set up on 10 May. Daily monitoring of all six beaches commenced on 15 May. Nests deposited in vulnerable areas are protected either in situ by placing a 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 NMPZ 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 11 May. The PA programme is conducted in a variety of formats: information tables, kids clubs and presentations in hotels and on commercial tour boats, informing visitors on the nesting beaches and through an Information Station in Kalamaki (opened on 18 May) and whilst present on Turtle Spotting Boats (see Appendix 2). It should be noted that another ARCHELON Information Station, located in Gerakas, was not operational this season.

Following the establishment of the Management Agency, ARCHELON conducts its monitoring and PA work in agreement with the NMPZ. This partnership commenced in 2002 and continued throughout 2003, before the NMPZ'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 NMPZ'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 ten-day reports (fortnightly until 2008), including preliminary nesting data per beach, observed violations of regulations, and turtle stranding data; at the end of the year a final and comprehensive 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 third year "fieldwork observers" who follow ARCHELON's beach monitoring teams and also collect additional data. In addition, 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 for the smooth operation of the NMPZ.

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 located in Glyfada, a suburb of Athens.

To implement the field work at Zakynthos, ARCHELON uses cars and inflatable boats; in 2009 it was necessary to use one inflatable boat, two of its own cars plus one and occasionally two rented cars, however at no point were there more than three cars being utilized for the purposes of the project. The increased need for cars was caused by the expanding work in both Monitoring and Public Awareness routines as well as the fact that the inflatable boats were not used as much as in previous seasons, after a request by the Management Agency. The cars were operating for at least 18 hours per day and registered a total mileage of more than 34,000 km.

Results

A. Nesting

During the 2009 nesting season a total of 3,441 turtle emergences were recorded on all six beaches of the Bay, of which 826 resulted in nests. Additionally, the narrow beach sector to the east of Daphni beach was also monitored, and gave 423 emergences of which 4 were nests. It must be noted that monitoring on this beach sector (named East Daphni) began in 2007 since it is largely unsuitable for nesting.

It is worth to note that the number of nests during 2009 represents the lowest number ever recorded since the beginning of ARCHELON's long-term standardized project in 1984.

B. Dead and injured turtles

For the third consecutive year, there was an increasing number of turtle strandings in the area of the NMPZ. **Up to 10 October 2009 there were 28 turtles reported dead.** These comprised 5 males, 8 females, 2 probable females, and 13 of unidentified gender (includes juveniles/sub-adults or in advanced decay). It must be noted that although it cannot be assessed if these deaths occurred within the Bay or if the carcasses drifted there by sea currents, these numbers are nevertheless alarming for the survival of the Zakynthos population because they mostly involve large-sized individuals, which are the most valuable to the population. The exact cause of death for all these turtles is difficult to assess due to varying levels of decomposition. However, 8 turtles bore injuries related clearly to fisheries interaction, and 5 were victims of boat strikes.

Further, mature eggs were observed inside the carcass of two female turtles, and a dead adult male bore an NMPZ satellite transmitter from 2008. It is worth noting, also, that one of the adult male dead turtles was found as recently killed by a speed boat inside the protected marine area. The location and the recorded weather data lead to the conclusion that this turtle was probably killed within the boundaries of the Park. Such an outcome was expected due to the high density of speedboats and recorded violations by ARCHELON within the marine area of the NMPZ, despite regulations.

In addition, five turtles were found alive with fresh injuries requiring transport to ARCHELON's Rescue Centre in Glyfada. Four of these turtles were suffering from injuries related to ingestion of, or external entanglement with, fishing lines and hooks. Moreover, one adult male turtle found alive but entangled in bottom longline for days, was rescued by ARCHELON project members.

The high incidence of dead and injured turtles, in the last few years, highlights the severe problem which turtles face in the waters around Zakynthos. **These problems, if not addressed immediately, may undermine protection measures and efforts at the terrestrial habitat.**

C. Public awareness

From 11 May until 10 October, ARCHELON carried out more than 400 Slide Show Presentations (mainly in tourist facilities), conducted 249 Beach Patrols (on the nesting beaches to inform day-visitors), completed 125 Information Table Shifts (including schools and kids' clubs) while the Information Station in Kalamaki operated for 145 days. Further, ARCHELON project members participated in 281 all-day and half-day cruise trips, and 311 trips on Turtle Spotting Boats (see Appendix 2), totalling a number of 592 boat trips. Throughout the above activities, visitors were given information on sea turtle biology and explained the NMPZ's regulations. Additionally, project members were regularly informing beach visitors in the course of their monitoring duties. As a result of these activities, from 11 May until 10 October, a total of 76,300 visitors were informed by ARCHELON (Table 1).

TABLE 1. NUMBER OF PEOPLE INFORMED DURING ARCHELON'S 2009 PUBLIC AWARENESS PROGRAM ON ZAKYNTHOS ISLAND

Activity	Number of people informed
Beach Patrols	11,806
Boat Trips	28,831
Information Tables	4,466
Information Stations	14,256
Beach Field Work	1,925
Slide Show Presentations	15,016
TOTAL	76,300

3. The Work of the Management Agency during 2009

The creation of the National Marine Park of Zaynthos (NMPZ) 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 NMPZ's operation, from approximately April 2004 to summer 2005, meant that there were neither official wardening nor supervision of regulations' enforcement. Since the Agency resumed operation in 2005 it has been necessary to re-establish acceptable practices. A major concern of the Management Agency, since its re-activation, was the collaboration with 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 2009, as in 2007 and 2008, the Agency continued its efforts to acquire control in the problematic area of Daphni by involving local owners. However the case of Daphni remains difficult to solve with an uneasy compromise between the NMPZ and local landowners. All of the illegal buildings in Daphni still exist and create a false "precedent" for others to come, if circumstances permit it. More details on Daphni can be found in Section 4.1.

In 2009, the NMPZ warden program was expanded, fulfilling its responsibilities in most of the cases. Three drivers and 74 local wardens were employed by the NMPZ to implement a 24-hour guarding of the nesting beaches and the marine area. Thirteen of them are employed all year round while the rest are seasonal (6-month contract) to cover needs during the high tourist season. Furthermore a car equipped with NMPZ personnel to prevent or extinguish fires was present this year. All this lead to an effective 24-hour safeguarding of the nesting beaches, besides Sekania which continued to have a part-time day-warden. For more information on wardening see Appendix 1.

Since 2006 control of beach furniture (umbrellas and sun beds) was implemented by the Management Agency by providing distinctive furniture carrying the NMPZ's logo. In 2009, as in 2007 and 2008, beach furniture owners on all protected beaches were made to remove all sun beds at night allowing an increase in available nesting area. Moreover, numerous pedaloes remaining on the beach during the night are still a major problem, as they reduce the available space for nesting. Especially on Kalamaki beach, this year, almost half of the beach was covered with a thick layer of washed-ashore sea grass that turtles couldn't overpass. The remaining part of this small beach, still available for turtles to nest, had a number of pedaloes onshore occupying a part of the fine sand by creating a barrier for the turtles.

Beginning of 2006 signposting was implemented at the major entrances of the nesting beaches as well as on roads crossing the boundaries of the Marine Park. These signs continue to be in place in 2009 and were maintained or replaced, if necessary, before the nesting season.

Enforcement of the maritime restrictions was generally insufficient in 2009, as was in 2008. In 2009, four NMPZ boats were available (a 4.5m inflatable boat, two 4m boats for the marine area and transportation to Strofades Islands, and a 7m inflatable for emergencies). However, only one of the boats was mainly being used for the purposes of the marine area patrolling. As a result numerous violations were observed every day; especially in the maritime zones B and C, where speeding boats were a common sight in 2009. Further, it is sad to report that one of the NMPZ's boats was frequently observed exceeding the speed limit on routine trips within the Bay.

In previous years the Management Agency had used buoys to mark out maritime zone A (no boating zone) which circles the nesting beaches of Sekania, Daphni and Gerakas. These buoys have a twofold role: they inform seamen on the exact boundaries of the protected zone and assist Coast Guard and Park wardens to detect violations. In 2008 these buoys were put in place very late, almost at the end of the nesting season. In 2009, however, under continuous recommendations by ARCHELON, these buoys were set early in place, leading to decreased boat entrance in Maritime Zone A.

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

In 2009, the disappointment of the NMPZ-endorsed boat owners was higher, as the number of vessels in the Bay increased. There was constant complaint from the boat owners about the lack of authority use from the Management Agency to enforce the regulations in the marine area. Many larger cruise boats daily entered this zone to turtle spot and also a higher number of hired boats were

present in the Bay. This competition has led to undisciplined behaviour from the small boat owners causing them to break the regulations on a daily basis. A minor pressure from ARCHELON, to deal with the continuous violations occurring, was to cease collaboration with a number of cruise boats until they appeared more conscientious with regulations such as large boats not entering the Turtle Spotting Zone, a measure that turned out to be effective.

The ostensible absence of the Management Agency from the active management of the marine area was highlighted by its hesitation to ban immediately **nocturnal turtle spotting trips** inside the Bay! The nocturnal trip was to take place on a new semi-submersible boat with over 25 passenger capacity using strong, bright underwater spotlights. Although both ARCHELON and WWF-Greece expressed their definite opposition to the Management Agency, one night-trip was realised on 20 July 2009, an active night in terms of nesting activity on the nearby beaches. The NMPZ's hesitation to ban immediately such attempts led to aggressive behaviour from the semi-submersible boat owner towards the collaborative NGOs, thus the NMPZ being indecisive exposed the NGOs as being the only opposites to such a blatant intention. Similar exposure was obvious in a BBC News report concerning the situation in the marine area, released on 4 August 2009 ¹, claiming that ARCHELON is responsible for the violations occurring within the marine area.

Since 2007, the Management Agency employs research assistants with expanding responsibilities to the respect that their work in several cases duplicates unnecessarily the work of ARCHELON. Further, the Agency is increasingly involved in basic research which either has been previously assessed or is deemed unnecessary in view of more pressing issues (e.g. increased strandings).

After several years of delay, and recommendations on the part of ARCHELON (see previous reports), the NMPZ has eventually contracted a consultancy to work on the elaboration of a Management Plan for the area. It is expected that the MP will also resolve various matters, not covered completely by the existing legislation.

4. Conservation Status of the Nesting Habitat during 2009

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 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 mainly female hatchlings. The value of male-producing beaches is enhanced with the incoming global warming.

¹ Internet link for this BBC video report: <http://news.bbc.co.uk/2/hi/science/nature/8183308.stm>

The beach is a popular destination for day-visitors who arrive by boat from several locations within the Bay. In previous years, despite maritime regulations of zone B, boats used to moor and drop anchor in the waters just offshore. However, at the start of the 2009 season a floating pontoon was placed in front of the boat drop off zone for boats to moor to. This has been a large improvement for boat traffic around the island of Marathonissi, with the exception of a light placed on the pontoon for safety reasons. Under suggestions from ARCHELON this light was covered by the side of the beach not to disorientate hatchlings. 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 must be noted that visitors to Marathonissi are largely unaware of the Park's regulations before they arrive. During high season wardens often have difficulty enforcing beach regulations resulting in moved nest markers and cages.

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 at the northernmost part of the Bay. The international airport to the back of the beach is closed during the night and this avoids substantial light and noise pollution. The main entrances to the beach have barriers to prevent vehicle entry, and signs detailing the NMPZ regulations. In 2008 the signs at East Laganas and Kalamaki were all deliberately vandalised in early May. A total of four warden kiosks were in place in 2008; however the warden kiosks between Kalamaki Beach Taverna and Stanis Taverna were not staffed for the entirety of the season due to a shortage of personnel.

The situation changed in 2009 when all four warden posts along the beach, were staffed 24 hours a day between June and August and during daytime in May, September and October. This was largely successful at leaving the beach undisturbed from human presence however there is another entrance to the beach in front of Nostos Villas, where sometimes tourists were encountered during night work.

The westernmost part of the beach, bordering Laganas village, suffers from light pollution associated with local hotels, which deters nesting females and disorients hatchlings. Hatchling disorientation was also consistently noted by ARCHELON personnel in about the middle of East Laganas beach. Light pollution that disturbed nesting turtles occurs as well at Louros beach entrance, due to the car spotlights from the road and the nearby taverna car park. However, the NMPZ has begun to take steps in improving this situation by investigating the occurrence of light pollution on all beaches.

The situation with beach furniture on East Laganas was significantly improved in 2008 and remained in this good state in 2009. 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 night.

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

Despite that this beach stretches in maritime zone B (no anchoring, speed limit of 6 knots), 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 featuring a barrier preventing vehicle access. However access to the beach may be gained through two smaller entrances that are difficult for the warden stationed at the main entrance to monitor. Night wardening improved this year and there were very few incidences of people on the beach during the night, however all accessed the beach via these alternate entrances.

There is one hotel present at the back of Kalamaki beach; 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 2009, as was the case in 2008. However, some disturbance occurs from lights of the hotel's car park, as observed in many occasions, with female turtles abandoning their attempt for egg-laying.

Beach furniture numbers at Kalamaki remained within the allocated number and were removed at night. However it was noted that the large amount of pedaloes left on the nesting area at night was a problem for emerging turtles and hatchlings getting to sea. Especially this year, the existence of pedaloes had a definitely negative impact on the nesting success as the remaining beach was unavailable for nesting due to a great quantity of washed-ashore sea grass. Through morning surveys it was established that very few turtles emerged at this area possibly due to the fact that the grass created a 'barrier' too high for them to crawl through. In agreement with the NMPZ, ARCHELON and WWF-Greece (and after various complains from locals) made efforts to remove the sea grass on 30 May, albeit with no positive final outcome as the next days more sea grass was accumulated.

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.

In comparison to 2008, where a warden was present intermittently either on the beach or on the road behind the beach, 2009 has seen a warden present at the roadside throughout the whole season for two daily, eight-hour shifts (06:00 to 14:00 and 14:00 to 22:00), therefore covering the peak hours. The consistent placement of a warden at the entrance to the land behind Sekania has resulted in fewer incidents of trespassing on the beach during 2009.

In 2008 minor hatchling disorientation was observed on the western part of the beach, possibly due to the lights of Laganas village. Due to its remote location and the high level of hatchling production Sekania beach is particularly susceptible to hatchling predation by seagulls, most of them coming from the nearby landfill site (see section 4.3). In 2008, in response to the issue of hatchling predation, the NMPZ performed a study, in collaboration with ARCHELON, to investigate the extent of the problem. In 2009 it was observed

that there was a noticeable reduction in seagulls, possibly a result of changing some field protocols (e.g. to bury hatchlings found dead on beach instead of throwing them into the sea).

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

Background

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 courts.

In 2003, two tavernas and two bars operated on Daphni. These businesses operated throughout the 2004 and 2005 season, mainly during the day but in some cases their operation extended into the night. It has to be noted that in 2005 four owners of bars and tavernas were arrested and taken to court with the accusation of operating illegal businesses within the protected area of the NMPZ. In 2009, four taverna and bar owners were also arrested and taken to court with the same accusation.

Previous changes to the morphology of the beach include 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 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. During daytime, tourists wishing to visit the beach were transported to the area by NMPZ vans, with restrictions to visitor numbers and staying time. Also an Education Centre (in a rented house on the hills behind the beach) was created and guided tours were implemented on the beach during daytime.

In 2007 the NMPZ created 2 new car-parks closer to the beach and no longer provided free transport to the beach, as done in 2006. During 2008 the Education Centre and the two large car-parks continued to operate.

In comparison to previous seasons, the incurred changes in the period 2006-2008 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, 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.

Daphni during 2009

All 15 illegal buildings constructed behind the beach of Daphni have not been removed. The non-native tamarisk trees are still in place. The Education Centre and the two car-parks continued to operate. On arrival to the car-parks visitors were informed of beach regulations by Park wardens. Throughout the summer 24-hour wardens were employed by the NMPZ, with the wardens facing some unpleasant incidents by locals.

In 2007 and 2008, 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. This wasn't continued as planned in 2009, mainly due to the characteristics of the beach this year. The strong southern winds during winter and spring changed the profile of the beach, revealing a large amount of stones. It is worth noting that the sand dunes in Daphni have been destroyed by the illegal buildings, so any renewal of the beach by sands at the back of the beach was not possible. Moreover, the strong waves reached even the flattened sand dunes and destroyed in some cases the fences of the illegal buildings. Thus, many parts of the beach were rendered unsuitable for nesting as there was not much sand remaining. This change of the beach was not pleasant for the locals either.

On 28 May 2009, the ARCHELON and NMPZ personnel noted that illegally transported sand was moved in front of one taverna to cover up stones in order to create a pathway down to the sea for visitors. Immediate action was taken from both parts to ensure that a similar incident will not happen. Such interventions falsely attract the turtles to unsuccessfully attempt to nest, as the location seems suitable.

Following a devastating bush fire on the hills behind Daphni on 26 July 2009, immediate anti-erosion works were discussed and planned by the NMPZ and the local Forest Service to be implemented before the autumn rainfalls.

In 2009, the relationship between the NMPZ and the residents of Daphni and Vassilikos reached a crucial point. The owners of Daphni, under legislative procedures relevant to the NMPZ, are obliged to pay large fines for their illegal constructions, as well as the expenses for the reconstructions that the NMPZ forced them to do as per the Memorandum of Collaboration, signed in 2006. As a result, the local community representatives at the Board of the Management Agency resigned their duties and accused the President of the NMPZ of being un-cooperative, arrogant and indifferent to the needs of the local people. Furthermore, the President of Vassilikos Community Council was arrested for removing one of the Park's barriers at Gerakas beach. He claimed that the Municipality of Zakynthos, having the legal authority in the area, never gave permission for that particular barrier. The case is under legal investigation.

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

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 and 2009 (in 2009 one

barrier was taken away by the President of the Vassilikos Community Council, which resulted in his arrest).

A ticketing scheme, to impose a time limit to visitors (max 350 permitted), operated in 2007 and 2008 seasons, but not during 2009 because of local reactions.

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. The wooden boardwalk and the viewing platform were still intact in 2009. However, the global financial downtrend had caused locals to ask for relaxation of rules (e.g. increase time limit for visitors, permission to install private sun umbrellas).

The Presidential Decree states that a maximum of 60 umbrellas and 120 sun beds are permitted on the beach. Occasional counts in previous years showed the number of umbrellas to be consistently at or below the allowed number. However the number of sun beds frequently exceeded 120. In 2009, 56 umbrellas were allowed to private business by the NMPZ, and these were set at the western end of the beach which generally has a low nesting activity.

An innovative collaboration was attempted this year in Gerakas between NMPZ and an umbrella-rental owner, with the owner carrying out the morning survey to record turtle tracks, thus being more involved and willing to participate in the conservation measures set by NMPZ, such as the removal of umbrellas set close to newly laid nests. This move is though positive if controlled adequately by the NMPZ.

In previous years, boats were often seen from Gerakas beach within maritime zone A (no boats allowed), sometimes even entering and anchoring within Gerakas Bay. Although the wardens reacted quickly, by informing either the Coast Guard or the NMPZ's sea guard, there was often a considerable delay in the arrival of the authorities. In 2009, the 24-hour presence of the Park's wardens made the patrolling more effective by contacting immediately, in most cases, the NMPZ boat or the Coast Guard.

4.2. Protected marine area

General

During the 2009 nesting season, the maritime protected areas were patrolled, as in 2008, by both the Coast Guard and the NMPZ sea guards. Until the introduction of the NMPZ's sea guards, violations were only detected from the shore and this was not very effective.

As in previous years, ARCHELON personnel onboard Turtle Spotting Boats and cruise boats would note violations and report them in detail to the NMPZ (see Appendix 2). However, the majority of violations were not responded to by either the Coast Guard or the Park's sea guard. This was particularly true for violations at 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 in general several regulations were frequently broken, this is particularly true with the 6-knot speed limit.

Furthermore, this year all the warden huts and NMPZ boats were equipped with mobile phones, made available to ARCHELON staff as well. This assisted greatly the communications between ARCHELON and NMPZ during incidents,

Maritime zone A

By law all boating activity is prohibited within Zone A. However, in 2009 over 50 different incidents of boats were observed within zone A, many of which exceeding 6 knots. This happened despite the fact that the special buoys delimiting this zone were put in place early in the season. The NMPZ and the Coast Guard reacted on most occasions.

Maritime zone B

In this zone there is a speed limit of 6 knots, but anchoring and mooring are not permitted. The nesting beach on Marathonissi, located within Zone B, is visited by many people. By law only organised trips are permitted; however many private or hired boats visit the island every day. All boats are limited to a maximum of 1 hour stay and must stop in an area designated by the NMPZ's buoys. 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 in place. Boat speeds above the permitted 6 knots are common near the island and even water sports have been observed.

In previous years, all boats anchored (although prohibited in Zone B) either in the shallow waters in front of the beach or were dragged ashore and their anchors dug into the sand. In 2009, a floating pontoon was placed by NMPZ in Marathonissi reducing effectively the random anchoring of the visiting boats.

The NMPZ-endorsed Turtle-Spotting Zone

As a pilot scheme, in 2006 a new maritime zone was introduced strictly for NMPZ-endorsed turtle spotting trips. This zone runs parallel to the East Laganas beach, from about Aghios Sostis to Kalamaki, at a distance of 1.4 km from the shore. Although it was assumed that only the NMPZ-endorsed boats would use it, it has been overwhelmed with many non-endorsed boats. 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 (see Appendix 2). ARCHELON observers aboard endorsed boats often observe other boats driving over turtles, exceeding observation time limits, chasing turtles, trapping turtles between vessels or in shallow waters, using the boat horn or revving their engine to force the resting turtles to swim, etc. The lack of enforcement of this rule was not helped by the lack of buoys in place to mark this zone. Many of the endorsed boat drivers feel disappointed at the NMPZ's poor enforcement as while they follow the set guidelines, these are not followed by the other boats. Moreover, large cruise boats are daily entering that zone to turtle spot.

In 2009, the situation within the Turtle Spotting Zone was unacceptable. According to the guidelines, the number of boats around one turtle should be at any time maximum two. **In high season, though, more than 10 vessels were observed over a single turtle almost daily!** Further, the number of boats, exercising turtle spotting, increased as well, leading to intense competition among boat operators. Concerning the fact that this year was a “low” year in terms of turtle numbers, the stress imposed on the turtle population in the marine area was notable. The competition of boat operators was so great that, for first time ever and in view of the inadequacy of the NMPZ to control this situation, **boat operators discussed the possibility to run night trips!**

Also in 2009 a half-submersible boat (with passenger seats below sea level) operated in the Bay to watch during the day sea turtles underwater. Later on the owner of this boat insisted **in conducting also night trips with use of strong lights**. Despite strong opposition by ARCHELON and WWF Greece, the NMPZ showed little reaction but eventually banned such trips. Finally this boat managed to make one trip in the night of 20 July, in the middle of nesting season!

Fisheries Interaction

In 2009 and the last two years (2007 and 2008), a great increase has been noted in the number of dead and injured turtles within the boundaries of the Park. Many of them have signs of interaction with fishing gear. It has been occasionally observed that fishing vessels drop gill-nets close to Marathonissi and in other areas within the Bay. These nets represent a grave danger to sea turtles during the nesting season. Also, fishing activities outside but in proximity to the NMPZ’s boundaries, definitely impact the turtle population. It should be noted that these turtle strandings are only those recorded by or reported to ARCHELON, with unknown numbers of other incidents going unobserved or unreported.

There is an urgent need for the Management Agency to look into this serious matter and invest in mitigating the effects of fisheries interaction impacting the population of sea turtles at Zakynthos.

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 has also contributed to water pollution. In 2009 incidents of oil or polluted water discharged from boats inside the Bay were reported – and videotaped - by divers (the case is in court) and by ARCHELON volunteers attending cruise boats. Further, worries about water pollution from the nearby landfill site (see Section 4.3) have also been expressed, as liquid pollutants from the landfill site seem to reach the sea.

4.3. The landfill site

An active landfill site is located within the boundaries of the NMPZ, behind Vrondonero beach, between Kalamaki and Sekania. The landfill site attracts a high number of seagulls and this results in increased predation pressure

on hatchlings. This is particularly apparent at Sekania where sometimes the beach is covered with seagulls. In 2009, however, seagull numbers were seemed decreased. Further, liquid pollutants from the landfill site seem to have reached the sea waters within the Bay.

It should be noted that the Ministry of Environment refused approval for a requested extension of the landfill site (it has reached its maximum capacity) as legislation does not allow landfill sites within protected areas.

5. Recommendations

5.1 General Recommendations

- 1 Alternative measures and compensation schemes for confirmed affected landowners should be sought.
- 2 Removal of illegal buildings and restoration of beach profile (wherever needed).
- 3 Acquisition of a strip of land (approx. 4ha) at Sekania where an illegal road was built in 1995.
- 4 The problematic sanitary landfill will have to be removed from the NMPZ and other sources of pollution investigated.

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. In particular:

- 5 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.
- 6 A specific study must be elaborated in order to fully protect and restore the remaining sand dune ecosystem backing the East Laganas nesting beach.
- 7 An environmental impact study should be carried out to minimise light and noise pollution.
- 8 The NMPZ should take action in restricting any damage caused to sea turtle nests by the invasive roots of certain non-native plants.

5.3 Recommendations for the Maritime Area

In the last three years (2007-2009) a great increase on turtle deaths, within the boundaries of NMPZ, has shown that protection measures at sea are inadequate or poorly enforced. Therefore:

- 9 The NMPZ should focus on the strict enforcement of existing regulations in the marine area, and introduce new legislation for turtle's protection at sea.
- 10 The cause of turtle deaths, particularly by fishing practices, should be investigated.

- 11 The NMPZ should address the increase of boats (private and for rental) within the Bay and take steps in reducing them.
- 12 The NMPZ should ban non-endorsed boats from advertising and running turtle spotting trips within the Bay.
- 13 The NMPZ should exclude night trips for turtle spotting.
- 14 The NMPZ should control pollutants discharged by boats operating in the Bay.
- 15 The NMPZ should enforce the obligation of boat owners, especially of TSBs, to equip propellers with protective rings, preventing damage to turtles.

6. Appendices

Appendix 1: The warden programme of the Park

During 2008 there have been 9 warden-posts spread out in the Park (Marathonissi, Sekania, Kalamaki, Gerakas, two on Daphni and three on East Laganas). In 2009 these warden-posts, increased with one more on East Laganas, have been attended for 24 hours a day.

Signs have been erected by the NMPZ at the entrance of all nesting beaches. These inform tourists that they are entering a nesting beach, as well as describing beach regulations. Wardening of the beaches commenced this year with 13 wardens employed in January, with others in March, and finally with 24-hour wardens from early May (77 local wardens in total, 3 drivers included). ARCHELON multi-lingual volunteers assisted wardens in informing visitors during the summer, especially in Kalamaki and East Laganas. Unlike previous years, in 2009 no beach patrols (for informing visitors) were carried out by ARCHELON personnel in Gerakas, a task that was fully undertaken by the NMPZ's wardens stationed on this beach. Adherence to beach regulations has improved in 2009 as a result of the permanent warden presence.

It is crucial for the protection of the nesting beaches, though, that every person working within the boundaries of the NMPZ to be totally aware of the impacts to turtles' nesting caused by human activities and actions. Inevitably, with the employment of 77 new wardens minor mistakes occurred unwillingly. Ideally, training seminars concerning the legal obligations and working routines performed by the NMPZ as well as simplified information on the possible impact to turtles' nesting of any potential human activity should be offered to all employees of the NMPZ, especially its wardens. This information should also be given to all persons allowed business within the NMPZ (e.g. umbrella and pedalo rental). This would improve the prevention of unwanted events as well as their immediate diagnosis. Furthermore, it would be a good way to incorporate and motivate people to become more involved in conservation issues as they will be more aware of the reasons for existing regulations.

Appendix 2: Turtle spotting boats

In 2001, a Memorandum of Cooperation between the majority of the turtle spotting entrepreneurs and the Management Agency 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 turtle spotting trips. In an agreement with the Management Agency, ARCHELON provides multilingual volunteers to go on trips with the task of informing tourists onboard about sea turtles and conservation measures. 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-endorsed boats, attended by ARCHELON volunteers, generally have a high level of compliance with the regulations; whereas 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 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.

Incompatible behaviours, noted during 2009, included speeding in the Bay; threatening, stressing, trapping and chasing sea turtles; revving the boat engines and using their horns while turtles were in very close proximity, to force the resting turtle to emerge from the bottom so their passengers would have a better glimpse, and gathering too many boats around one turtle for exceeded durations.

Appendix 3: Beach cleaning activities

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

During May 2009 ARCHELON, together with NMPZ wardens, conducted beach cleans on the beaches of East Laganas, Kalamaki, Sekania, Daphni, Gerakas and Marathonissi. This was then continued during the season by NMPZ wardens and ARCHELON volunteers as part of ARCHELON's public awareness program. Furthermore, ARCHELON staff and personnel from a collaborative tourist agency carried out a beach clean of West Laganas on World Environment Day, with really positive feedback from residents.