

ARCHELON, the Sea Turtle Protection Society of Greece



Conservation efforts during 2018 at the nesting habitat of *Caretta caretta* in Laganas Bay, Zakynthos, Greece

Short report submitted to
the European Commission, and
the Standing Committee of the Bern Convention

Athens, October 2018

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Prologue

This short report, a follow up to the previous reports submitted annually, presents the major events concerning sea turtle conservation on Zakynthos Island, Greece, during the 2018 reproductive period. Specifically, this report presents the ARCHELON's field project and the work of the Management Agency (MA) of the National Marine Park of Zakynthos (NMPZ), as well as the actual situation at the nesting beaches and the protected marine area during 2018, as recorded by the ARCHELON field project.

1. Background

1.1. Location and the National Park's creation

Laganas Bay, at the southern part of Zakynthos Island, in the Ionian Sea, hosts one of the largest reproductive habitats of the loggerhead sea turtle (*Caretta caretta*) in the Mediterranean Sea. The nesting habitat of Laganas Bay consists of a terrestrial part comprised of six distinct nesting beaches (Marathonissi, East Laganas, Kalamaki¹, Sekania, Daphni, Gerakas), of a total length of 5.5km, and a marine part comprising of the entire Bay, of a total area of 51.363sqkm. Map of the region is shown in Illustrations 1 and 2.

Due to the significance of Laganas Bay as a nesting habitat, and the pressures it faces from mass tourism and development, the Greek State has attempted, since 1984, to protect it through various legislative acts. However, these were not endorsed by part of the local community and were generally poorly enforced. Following substantial pressure from domestic and international NGOs, the Council of Europe (Bern Convention) and the European Commission and after several years of deliberations, the NMPZ was eventually established in December 1999 and its MA was set up in July 2000. The relevant Presidential Decree (PD, Government Gazette D906/22-12-1999) includes a zonation system with varying regulations on land and at sea.

1.2. The long-term field project of ARCHELON

ARCHELON has been systematically monitoring the Bay's nesting beaches since 1984 and records annually nesting activity as well as associated conservation measures. ARCHELON's systematic beach monitoring project (nest counts) in Laganas Bay is the oldest in the Mediterranean and one of the oldest in the world. The long-term project of ARCHELON, carried out yearly from early-May through mid-October, involves monitoring of the nesting population, protection of endangered nests against inundation and trampling, protection of hatchlings, recording of turtle strandings and transportation of injured turtles to ARCHELON's Rescue Centre in Glyfada, Athens, as well as recording of violations on the nesting beaches and at the marine area. In addition, it includes an extensive public awareness programme to inform visitors and residents.

ARCHELON collaborates with the MA of the NMPZ since the Agency's establishment. This consists mainly of ARCHELON continuing its monitoring and public awareness work, following mutually agreed upon methodologies, and reporting to the MA violations of regulations on land and at sea. It must be noted that ARCHELON, WWF-Greece and MOM (Society for the Study and Protection of Monk Seals) hold one joint seat on the 11-member Board of the MA.

¹ The MA of the National Marine Park of Zakynthos calls the beaches of East Laganas and Kalamaki as Kalamaki and Crystal respectively.

2. The work of ARCHELON during 2018

2.1. Monitoring of nesting beaches

In 2018, fieldwork commenced on 5 May (monitoring of Gerakas, Daphni, Kalamaki, East Laganas and Sekania started on 11 May and of Marathonissi on 2 June) and terminated on 10 October. As in previous seasons, nests laid in vulnerable sites were protected either *in situ* by placing wooden cages over the nest or by relocating the nest to a safer location. Hatching nests with the potential to be affected by light pollution were shaded in order to reduce or eliminate hatchling disorientation.

According to preliminary data, on all six monitored nesting beaches of the Bay approx. 1,500 nests were assessed, which is well above the average annual number of nests since the beginning of nest counts in 1984 (1174 nests). It should be noted, however, that in 2018 high numbers of nests were also recorded in other nesting areas monitored by ARCHELON in Greece. Therefore, solely the 2018 nest count does not allow a conclusion regarding the conservation status of the regional loggerhead population.

2.2. Turtle Strandings

From the beginning of 2018 and until the ARCHELON field project inception, the MA staff and the Coast Guard of Zakynthos recorded 9 sea turtle strandings (8 dead animals and 1 injured). During the operation of the ARCHELON field project (5 May until 15 October), 23 more turtle strandings were recorded. Of these, 22 turtles were found dead while 1 was injured. Of the total number of strandings (32) during 2018, 10 strandings were located within the marine protected area of Laganas Bay (Illustration 3).

2.3. Public Awareness

The public awareness programme of ARCHELON started on 6 May and ended on 13 October. Through this programme, residents and visitors were informed about the threats sea turtles face and how they could use the beaches and the marine area without disturbing the protected animals or their nests. The programme was conducted mainly through seasonal information stations, presentations in hotels and tour boats, direct information to beach users and on Turtle-Spotting Boats (see 2.4) and through public awareness events (e.g. turtle releases). In total ARCHELON carried out during 2018 more than 850 public awareness (PA) shifts, informing approx. more than 60,000 residents and visitors.

2.4. Monitoring of the protected marine area

In 2018, ARCHELON carried out systematic monitoring of the NMPZ protected marine area from 1 June until 25 September in order to estimate the situation in the marine area and the possible harassment of sea turtles (see 4.2). ARCHELON field observers attended Turtle-Spotting Boats², and tour boats³, as on-board observers and also as part of the ARCHELON's

² Professionals who are supposed to be exclusively involved with sea turtle observation in Laganas Bay. In the previous years, the NMPZ MA used to sign a Memorandum of Understanding with the professionals, who were committed to comply with the Turtle-Spotting Code of Conduct, providing them with a Badge of Special Associate Endorsed by the NMPZ (“**Observation of the Sea Turtle in the Area of the NMPZ**”). Since 2015, this practice is not being applied.

³ Professionals who are supposed to be exclusively involved with sea tours lasting between 3 and 6 hours. Their main task is to inform/educate visitors about the natural environment and sea turtle biology. In the previous years, the NMPZ MA used to sign a Memorandum of Understanding with the professionals, who were committed to

PA programme. During these boat trips the ARCHELON personnel informed visitors about management measures and recorded: (a) Violations of legislation for the protected marine area (see 4.2.1), (b) non-compliance with the Turtle-Spotting Code of Conduct (see 4.2.2 and Appendix 2), (c) geographic co-ordinates of turtle observations, (d) number and categories of vessels taking part in turtle observations, (e) the use of the Turtle-Spotting Zone⁴ (Illustration 4) and (f) behaviour of sea turtles during observation.

As in previous years, ARCHELON personnel reported to both the NMPZ MA and the local Coast Guard major incidents and problems frequently observed.

3. The Work of the Management Agency during 2018

During the period 2015-2017, due to the financial and political instability in Greece even the the existence of the NMPZ MA was put at risk (the operation of all MAs in Greece was extended annually for only 1 year). In February 2018 however, Law 4519/2018 (Government Gazette A 25/20-2-2018) was issued. According to which, the operation of the MAs was assured, and the jurisdiction of the 35 (existing or new) Management Agencies of the country was extended to cover all Natura 2000 sites. As a result, the NMPZ MA is responsible for the sites GR 2210002 “Kolpos Lagana Zakynthou kai nisides Marathonisi & Pelouzo”, GR 2210003 “Nisoi Strofades”, GR 2210004 “Nisides Strofades & Thalassia Zoni” as well as for the site GR 2210001 “Dytikes & Voreioanatolikes Aktis Zakynthou”. Although Law 4519/2018 foresees the funding of the MAs, the problem of deficient and inconsistent funding of the NMPZ MA was not fully addressed during 2018 nesting season.

Wardening is crucial for the protection of the nesting beaches as well as of the protected marine area in this mass tourism destination island. In order to achieve an effective 24-hour wardening of all nesting beaches and the marine area, seasonal wardens (under a 6-month contract) need to be employed in addition to the permanent ones, to cover the needs during the touristic season. Unfortunately, in 2018 not only no seasonal wardens were employed due to the deficient and inconsistent funding, but also 4 of the permanent ones resigned, leaving the task of all wardening to the 15 remaining ones. It must be noted that there are 9 wardening posts on the nesting beaches, which need to be staffed 24 hours, while in the peak hours of the day 2 people are needed at most of these posts. Because of the lack of proper wardening throughout the season, only 5 posts were staffed (however not on a 24hour basis). As a result, management measures, as defined by the PD, were poorly enforced. The effect was particularly severe with regards to the night-time wardening, as during night hours the turtle nesting activity takes place on the beaches and the species is the most susceptible to disturbances. For instance, in the eastern side of East Laganas beach (locations of Pastras and Stanis) no wardens were present day or night throughout the whole season, while in Kalamaki beach a warden was present only one night per week. These 2 nesting beaches are directly bordering on tourist areas and therefore people visiting the beach at night is frequently the case. Where wardens were present there was only one at each station, meaning that patrols of the beach were not possible and so members of the public could enter the beach at a number of locations undetected. This lack of wardening resulted in high number of violations recorded throughout the season (see 4.1.1).

With respect to wardening of the protected marine area of the NMPZ, regulations are supposed to be enforced by the combined efforts of the MA and the local Coast Guard on a daily basis

follow the MA guidelines, providing them with a Badge of Special Associate Endorsed by the NMPZ (“**Eco-tourist Sea Tour in the area of the NMPZ**”). Since 2015, this practice has not been applied.

⁴ In 2006, a “**Turtle-Spotting Zone**” was introduced by the MA. This zone hosting a high density of turtles, as it is an important habitat during their pre- and inter-nesting periods, was supposed to be exclusive for “endorsed Turtle-Spotting Boats”.

(according to information provided by the MA). However, the number of the marine area wardens was also very limited (1 warden from Monday to Thursday and 2 wardens from Friday to Sunday) and could not cover the entire Laganas Bay with only 1 boat (see 4.2.3).

In order to deal with this problematic situation and as result of the collaboration between the MA of the NMPZ and ARCHELON, the ARCHELON project members made efforts to compensate for the lack of wardening by increased night-patrols as well as by extended hours at information stations near the nesting beaches. However, the work of ARCHELON's staff can not in any way compensate for the lack of proper wardening.

4. Conservation Status of the Reproductive Habitat during 2018

4.1. The terrestrial habitat

4.1.1. Anthropogenic disturbances on nesting beaches during 2018

This section focus on the anthropogenic disturbances that resulted in direct and indirect damage to sea turtles (adults and hatchlings), their nests, and the nesting habitat in Laganas Bay during the 2018 nesting season, as these disturbances were experienced through the standard fieldwork of ARCHELON. A brief description of the nesting beaches is given in Appendix 1.

Beach use and beach furniture

Based on legislation (Law 2971/2001 as amended by Law 4467/2017) and the Joint Ministerial Decision (Government Gazette B1636/12-05-2017 as amended by Government Gazette B2970/07-06-2017) prescribing beach use, which is valid until 31-12-2019, Municipalities can lease portions of the beach to tourism and leisure related businesses. In the case of sea turtles nesting sites, including Laganas Bay, the competent Municipalities can concede to local businesses the “simple beach use” for 2018, provided that the implementation of (a) protection management measures (Annex 3I of the Joint Ministerial Decision) and (b) terms of the Presidential Decree is ensured during the nesting and hatching season. Unfortunately, the measures of the Decision and the terms of the PD were not enforced by the Municipality of Zakynthos and the competent Public Land Authority.

As a result, the businessmen infringed the regulations concerning the nesting beaches and did not apply the terms of the PD and the Joint Ministerial Decision. Specifically, the foreseen maximum numbers and density of beach furniture, as well as the distances from the back of the beach were not observed (Photo 1), while the removal of beach furniture at sundown was implemented either not at all or incorrectly (Photo 2). Throughout the season, ARCHELON recorded 146,950 violations regarding the removal of sunbeds (either being completed left out overnight or folded on their side) in Gerakas, Kalamaki and Laganas, while in 2016 and 2017 29,040 and 68,047 violations were recorded respectively. This fact made those parts of the beaches non accessible for turtles and caused them to abandon nesting attempts (Photos 3, 4). Moreover, regarding the maximum numbers, ARCHELON project members recorded in mid-August 342 sunbeds in Gerakas (while the foreseen by the PD number is 120) and 1,025 sunbeds in Kalamaki and east Laganas (while the foreseen by the PD number is 300).

The passive attitude of all competent authorities and bodies to this problematic situation and despite the repeated appeals of the NMPZ MA and the Environmental NGOs⁵, shows a paramount lack of understanding in fulfilling their obligations towards the National and European environmental legislation and results in direct negative impact on sea turtle nesting.

⁵ Complaint letter from the NGOs ARCHELON, MEDASSET, Mom and WWF Hellas to the Prosecutor of Zakynthos Ref. No. ARCHELON 28331/2-5-2018

Although the representative of Zakynthos Municipality on the Board of the MA committed audits to be carried out, eventually no audits took place.

Pedalos and Boats

The operators of non-motorized boats (pedalos and canoes) are supposed to moor these in the water or to remove them from the beach at sundown. During 2018 not only pedalos were recorded to be stored on the beachfront in Kalamaki and East Laganas, blocking the access for turtles (Photo 5), but also a new post for pedalos was created on East Laganas beach (location Louros) despite the opposite opinion of the competent Coast Guard (according to recent legislation amendment – Government Gazette B 1929/30-05-2018 – the competent committee may approve new licenses without unanimity).

Light Pollution

The westernmost part of East Laganas beach, bordering Laganas village, suffers from light pollution from nearby hotels and streetlights. Additional light pollution in this location is caused by the bar area of Zante beach hotel (which is located behind the beach). Moreover, light pollution, causing hatchling disorientation, was observed at the middle of East Laganas beach, possibly attributed to the airport of Zakynthos. Although the airport is supposed to be closed at night, in order to eliminate disturbances to turtle nesting, during 2018 flights were reported after 10 p.m. (i.e. until approx. 11 p.m.) during the high tourist season (July-August).

In Kalamaki beach light pollution was observed during 2018 because of the already closed but not yet restored illegal landfill site (see 4.1.2).

Regarding light pollution, Daphni faces serious problems because of the operation of 7 illegal businesses behind the beach, where private properties are found (see below in “Illegal constructions at Daphni beach”). During 2018, ARCHELON recorded hatchling disorientation on Daphni beach, which was attributed to light pollution. Additionally, to the recorded disorientated tracks, visitors informed ARCHELON that they had been suggested by the owners of the illegal businesses to visit the nesting beach during nighttime for turtle nesting or hatchling observation, although human presence on the NMPZ nesting beaches is strictly banned by the PD. This activity is a major cause of disturbance for nesting turtles and can cause the animals to abandon nesting attempt.

Human presence on the nesting beaches at night

According to the PD, human presence is not permitted on the nesting beaches from sundown to 7 a.m. of the next day. Unfortunately, during 2018 the lack of wardening (see 3), combined with the mass tourism, resulted in a high number of violations regarding human presence (Photo 6). ARCHELON project members recorded 1,652 violations, with the majority of those being recorded on the beaches of Kalamaki and East Laganas (during 2017 4,368 violations were recorded).

Beach users

Beach visitors are required to remain close to the shoreline and to avoid the nesting area in the hind part of beach in order for incubating nests to be protected from trampling, shading and damage from umbrellas. To ensure this measure can be applied effectively, the enabling PD and the relevant decisions of either the NMPZA MA⁶ or the Zakynthos Prefect⁷ dictate

⁶ Decision No. 34/2006.

⁷ Decision No. 748/3-8-2006.

restrictions regarding the maximum number of visitors in the nesting beaches of Marathonissi, Daphni and Gerakas. Specifically, it is stated that people are only allowed to visit Marathonissi through organized tour boats (and not by privately operated vessels) and up to 10 boats and 200 people at any time, following approval by the MA. The maximum number of visitors in Daphni should not exceed 100 people at any time, while in Gerakas the limit is 350 people at any time. These provisions not only were not implemented during 2018 but the number of visitors and boats (in the case of Marathonisi) was in great excess of the limits. The MA tried to reduce the effect of this problem to incubating nests by placing a rope along the beaches of Marathonissi and Gerakas (Photo 7) but not in Daphni. The same measure should be applied to the beaches of Kalamaki and East Laganas (where the number of beach users is not limited) due to mass tourism.

Vehicles

During the entire 2018 nesting season a large number of 4x4 vehicle tracks and quad bikes was observed on the beach. In total 309 vehicles were recorded mainly on East Laganas and Kalamaki (while during 2016 and 2017 were recorded 134 and 246 vehicle tracks respectively). The sand compaction caused by the vehicles can cause damage to turtle eggs and potentially cause hatchlings to emerge prematurely. Emerging hatchlings can be trapped within car ruts for hundreds of meters before they can exit them or die of exhaustion, dehydration or predation. Moreover, vehicles moving on the beach cause damage to the sand dune vegetation.

Horses

ARCHELON has observed significant growth of commercial horse-riding activity in the sand dunes behind East Laganas since 2016 (Photo 8). During 2018 nesting season horses were recorded in 87 cases behind or on the nesting beach. Horses have significant negative effect not only on incubating nests but also on the sand dunes which are an important element (for example protecting the nesting beaches from light pollution and erosion).

Illegal constructions at Daphni beach

Daphni beach is subject to many illegal activities such as building and road constructions, flattening of dunes and sand removal. Following recommendations by the Council of Europe, the removal of illegal buildings at Daphni has been an obligation of the Greek government since 1987, when only 2 businesses existed (Recommendation No. 9, Bern Convention). Although at present the operating illegal businesses are 7, no action for their removal has been taken and the relevant issued demolition protocols are not applied. As a result, not only the illegal construction activities continue year by year (illegal buildings and businesses are increasing in size, areas around the buildings are planted with grass, showers are added with their water ending on the nesting beach, illegal roads are flattened for easy access, wide parking area is constructed, new lines of sunbeds are set in suitable areas for nesting – Photo 9), but also the businesses' owners, following the recent legislation of illegal buildings' legalization, applied during 2016 for building permits. Moreover, during 2018 the Municipal Council of Zakynthos, without prior consultation with the NMPZ MA, approved the power supply in Daphni area, although according to legislation power supply to illegal buildings is not permitted.

Recent illegal actions

In December 2015 the wardens of the MA found that a new illegal road was constructed within the boundaries of the NMPZ and partly within the Natura 2000 site. The road was constructed in the area between the nesting beaches of Gerakas and Daphni (zone Φ1: protected landscape) and was about 6m wide and 1km long, connecting the main road to Vasilikos with a small beach next to Gerakas (Photo 10a). Not only no restoration works took place since 2015, but

also in March and April 2018 the construction works continued (Photo 10b). Since August 2018 though, fines were imposed on the alleged perpetrator.

At the end of 2017 the wardens of the MA located two new illegal buildings in the area behind Gerakas beach (zone Π2: nature protection zone), where any building activity is prohibited. In particular, one new stone house (of approx. size 80sqm) and one stable (of approx. size 150sqm) were located (Photos 11a, 11b). Although the competent Urban Planning Authority imposed fines, no demolition and restoration works took place until now.

In mid-March 2018, behind the nesting beach of East Laganas (location Louros, zone Π3: nature protection zone), heavy vehicle intervention took place in the sand dune zone, resulting in total destruction of dune vegetation (Photo 12). Although the NMPZ MA as well as the environmental NGOs complained to all competent authorities, no action was taken.

4.1.2. The landfill site

Within the boundaries of the NMPZ (behind Vrodonero beach, between Kalamaki and Sekania) exists an overused landfill site. Unlike previous years, when the landfill site was still operating⁸, since 2018 it is closed but not yet restored, continuing to constitute a permanent toxic pollution threat to both the nesting beaches and the marine area (Photo 13), as after a rainfall surface runoff is observed.

4.2. The marine area

4.2.1. Violations of the maritime legislation

The protection status and permitted activities in the protected marine area of Laganas Bay are defined by the PD, Article 4. This area is a Nature Protection Site (Zone Ia) and includes three zones (A, B and Γ) regulating maritime traffic and fishing annually from 1 May to 31 October (Illustration 2).

In 2018 (1 June – 25 September), 1,227 violations of legislation were recorded by ARCHELON in the marine area, during 242 hours of observation. Of these, 995 incidents were boats breaching the speed limit of 6 knots, which is in place to prevent lethal collisions with sea turtles. Taking into consideration that during 2017 486 violations of the speed limit were recorded, this season's very high number indicates the problematic situation in the protected marine area of the NMPZ resulting in direct disturbances to marine turtles.

In the case of boats entering zone A, 14 incidents were recorded, while 216 incidents of anchored in zone B boats were documented. Regarding recreational fishing activity, which is not permitted throughout the entire year by the PD, a considerable number of tourists and locals were recorded during the entire season in the port of Agios Sostis.

4.2.2. Violations during the Turtle-Spotting activity

Within the protected NMPZ Marine Area, several businesses are operating wildlife-watching boat trips focusing on marine turtles. In order to minimize the negative impact of the observation of sea turtles, the MA, in cooperation with ARCHELON, has issued guidelines for proper observation procedures of sea turtles (see Appendix 2). These guidelines for Turtle-

8. Although the Head of Ionian Islands' Region issued in 2014 Decision (No. 10917/2569/4-2-2014) for immediate closure and the European Court of Justice condemned Greece for the ongoing operation of the landfill site (case C-600/12 Decision of 17 July 2014), the landfill site was still active until 2017 nesting season. In 2018 it was launched the Mobile integrated waste management unit outside the NMPZ (area of Livas).

Spotting, which are required to be implemented by all boat operators⁹, minimize disturbances of sea turtles during observation and regulate (a) approach distance, (b) approach angle, (c) maximum number of boats that can be present in an observation / queuing distance for boats waiting to enter the observation, (d) maximum duration of observation, (e) obligation to terminate the observation when the turtle seems disturbed or tries to escape, (f) the ban of disturbing or noisy behavior, (g) the ban of physical contact with sea turtles, (h) the ban to feed sea turtles and (i) the ban to dive off vessels to swim with sea turtles. Moreover, in 2006 the MA introduced the “Turtle-Spotting Zone”¹⁰. This zone, hosting a high density of turtles, was supposed to be exclusive for “endorsed Turtle-Spotting Boats” with carrying capacity <25 passengers.

Due to poor implementation during the previous years’ of both the proper observation guidelines and the Turtle-Spotting Zone, the NMPZ MA tried to deal with this problematic situation by establishing in 2017 a “Marine Area Committee”¹¹, in which ARCHELON participates. Within this Committee emphasis was given in non-compliance with the Turtle-Spotting Guidelines. As a result, in May 2018 the competent Coast Guard issued a special decision (i.e. legislative act) which included the proper observation guidelines (Ref. No. 2131.13/2063/29-05-2018). This was the first year since the Park’s establishment, that the proper observation guidelines were not voluntary. On the contrary, the Turtle-Spotting Zone is not supported by legislation.

In particular, any boat can currently enter the Turtle Spotting Zone without consequences. During 430 turtle observations in 2018, ARCHELON recorded 322 boats with a carrying capacity >25 passengers (the largest boat regularly recorded with a carrying capacity of 200 passengers), 545 rental boats (motorized as well as non-motorized, i.e. pedalos and canoes) and 515 the small boats (i.e. carrying capacity <25 passengers), which is the only category intended for the Turtle-Spotting activity within the Turtle-Spotting Zone. Regarding the guidelines for Turtle-Spotting, due to inadequate wardening and despite the relevant decision of the Coast Guard, ARCHELON recorded 2,754 incidents of non-compliance (Photos 14a, 14b). Of these, in 1,003 incidents the approach distance was violated, in 290 incidents the approach angle was violated, in 660 incidents more than 2 boats were present, in 298 incidents the boats observed the turtle more than 10 minutes, in 237 incidents the observation was not terminated even if the turtle was disturbed and in 260 incidents the boats demonstrated disturbing behavior. Lastly, during 2018 nesting season the phenomenon of sea turtles’ feeding, which was a common practice during 2016 and 2017, was only sporadically recorded.

4.2.3. Uncontrolled growth of boating activity

Non-enforcement of either the restrictions of the PD (see 4.2.1) or the Turtle-Spotting zone and guidelines (see 4.2.2) combined with the problematic legislation regarding vessels’ licensing¹², which allows the issue of licenses without requiring notification of the boats’ seat capacity or estimation of the carrying capacity for protected areas, has resulted in rapid and uncontrolled increase of boating activity in recent years. In 2018, it is estimated that over 400

9 Compliance with these guidelines and the participation in the NMPZ’s framework for the Turtle-Spotting activity (see Appendix 2) was incentivized by the endorsement by the NMPZ.

10 Decision No. 20/2006.

11 Decision No. 43/2016.

12 General Port’s Regulations 20 (Government Gazette B 444/26-4-1999 as amended) and 38 (Government Gazette B 748/19-5-2004 as amended).

vessels operate in the NMPZ waters. The Turtle-Spotting industry in Zakynthos is estimated to carry out more than 4,500 trips transporting 100,000 passengers per year and to generate annual revenue of over 1.5 million EUR¹³.

The operation of a wildlife-watching industry at this large scale, focusing on a protected species in its breeding habitat, without a distinct management scheme, not only constitutes a major threat for sea turtles, but is also an insult to the NMPZ as a Protected Area. Indicative of the collapse of a sustainable Turtle-Spotting operation in Zakynthos is the fact that the MA, already in 2010, called attention to “the need to examine alternative solutions that would minimize the consequences of this uncontrolled situation” (National Marine Park Zakynthos 2010 Annual Management Measures, p.60 [in Greek]). Similarly, indicative is the fact that since 2015 none of the NMPZ' collaborators in the framework of the endorsement of Turtle-Spotting activity has renewed their annual agreement¹⁴. The above described uncontrolled growth of boating activities combined with the lack of wardening by the MA and local Coast Guard (see 3) results in an overall harassment of sea turtles in the habitat of Laganas Bay.

5. The Recommendation No. 9 (December 1987)

In December 1987 the Standing Committee of Bern Convention issued to Greece the Recommendation No. 9 on the protection loggerhead turtles in Laganas Bay. The Recommendation consists of 9 points. Unfortunately, 21 years after the Recommendation and 18 years after the NMPZ's establishment, very little progress is made during some points. Specifically:

- 1) Not only the prefabricated houses in Daphni were not removed, but as explained above (see 4.1.1 under “Illegal constructions at Daphni beach”) 7 illegal businesses (6 tavernas and 1 hotel) operate at present at this beach, consisting of concrete buildings. Moreover, areas around the buildings are planted with grass, showers are added, illegal roads are flattened, wide parking area is constructed, lines of sunbeds are set in suitable areas for nesting (Photo 9).
- 2) Walls and concrete platforms still exist at Kalamaki and East Laganas beaches.
- 6) As mentioned above (see 4.1.1 under “Vehicles”) vehicles are still a serious threat for sea turtle nesting, mainly at Kalamaki and East Laganas beaches.
- 7) Light pollution and hatchlings' disorientation (see in 4.1.1 under “Light Pollution”) is still recorded at the beaches of Daphni, East Laganas and Kalamaki.

¹³ Data according to ARCHELON study in 2015.

¹⁴ In 2001, within the framework of EU LIFE project ENV/000/751 (“ICZM: Demonstration Actions in the National Marine Park of Zakynthos”, 2001-2004), a memorandum of cooperation between Turtle-Spotting boat operators and the MA was signed. In 2003, official cooperation was initiated between the MA and “specialized professionals” and alongside this, an endorsement scheme was established to label and promote participating members of the cooperation. This endorsement scheme was related to both “Observation of the Sea Turtle in the Area of the NMPZ” (“endorsed Turtle-Spotting Boats” with carrying capacity <25 passengers) and “Eco-tourist Sea Tours in the area of the NMPZ” (“endorsed boats which are exclusively involved with sea tours lasting between 3 and 6 hours” with carrying capacity >25 passengers). Agreements between the MA and both categories of boat operators were signed on an annual basis and were related to the commitment to abide by the Turtle-Spotting Code of Conduct and to the avoidance of the “Turtle-Spotting Zone”. Failure to abide by the agreement would cause the member to lose its endorsement.

6. Conclusions and Recommendations

6.1. For the terrestrial habitat

Due to the influence of political and financial instability to the NMPZ MA's operation, the lack of wardening, the passive attitude of all competent authorities regarding illegal actions and the lack of specific Management Plan for the habitat of Laganas Bay, not only the majority of conservation issues remain unresolved for more than 18 years since the Park's establishment but also new illegal actions lead to further degradation of the habitat.

Recommendations:

- Adequate wardening on a 24-hour basis is absolutely essential to guarantee sufficient protection not only on the nesting beaches but also in the whole area of the NMPZ.
- In regard to the beach furniture allocation, the authority should be returned to the MA because of the direct impact in nesting and hatching procedures. Until the MA is authorized again, the competent authorities should inspect on a regular basis the compliance with the PD regulations.
- All competent authorities should ensure the law enforcement (including the PD).
- A permanent and sustainable solution for Daphni beach (point 1, Recommendation No. 9 of Bern Convention) needs to be found and agreed upon both by the MA and the locals currently residing on the beach (in order to not only prevent any further developments and return the beach as much as possible to its natural state, but also remove all the illegal constructions).
- The MA should become strict on the number of visitors foreseen by the PD for the beaches of Marathonissi, Daphni and Gerakas in order to ensure that the carrying capacity is not exceeded. Furthermore, the carrying capacity of the beaches of Kalamaki and East Laganas should be defined as well.
- Further studies should be carried out to minimize light and noise pollution at all nesting beaches of the Bay, especially on the East Laganas beach (point 7, Recommendation No. 9 of Bern Convention).
- The area of the illegal sanitary landfill must be restored as soon as possible.
- The elaboration of a Management Plan, which would include all the specific conservation measures, should be urgently resumed.

6.2. For the marine area

The results of marine area monitoring in 2018 highlight that boating does not at all follow turtle-friendly rules and that there is serious harassment of sea turtles in Lanagas Bay.

Recommendations:

- The existing legislation for vessels' licensing must be amended, taking into consideration the carrying capacity of the NMPZ marine area (zone Ia).
- The existing legislation (PD and the decision regarding the Turtle-Spotting Guidelines) must be successfully implemented and enforced by the MA and the local Coast Guard.
- The Turtle-Spotting zone needs to be clearly defined through a valid Management Plan to enable enforcement.
- Targeted daily wardening should be carried out specifically in the core zone of the Turtle-Spotting activity and in the hot-spots of speeding violations.
- The MA should reinforce the endorsement framework for Turtle-Spotting Boats as well as for Eco-tourist tour boats.

APPENDICES

Appendix 1: Brief description of the nesting beaches

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 due to its northern orientation and whitish sand colour. Low temperatures in Marathonissi produce predominantly male hatchlings and this makes this short beach an extremely important one at regional level, bearing in mind that most other beaches in Zakynthos and elsewhere in the Mediterranean produce mainly female hatchlings. Worldwide, the value of male-producing beaches is enhanced by global warming. The beach is a popular destination for day-visitors who arrive by boat from several locations in the Bay. Over the last years, nest numbers on Marathonissi have been much lower than the decade before (average 65 nests/year in the period 2005-2017 in contrast to 137 nests/year in 1995-2004). As this small island is highly significant for the survival of sea turtles at Mediterranean level, the reasons for the reduction of the nesting activity have to be urgently studied, taking into account disturbances on the beach as well as in the marine area.

East Laganas (zone II3: Nature Protection Site, maritime zone B)

This beach, partially backed by an extensive sand dune field, stretches for about 2.7km at the northernmost part of the Bay. A limited number of businesses (hotels and taverns), which were built before the establishment of the NMPZ, is found along the back of the beach. These businesses and some additional operators rent out the beach furniture, pedalos and canoes located on the beach. In a small distance behind the beach (2 km) is found the international airport of the island, which is supposed to remain closed during night hours for the period from May to October in order to prevent substantial light and noise pollution. In previous seasons wooden pillars were placed by the MA every 1 m along the back of the beach to discourage access to the beach by vehicles and riding horses from the sand dune area. Most of these pillars have been either destroyed or removed. Wooden pillars were placed for the same reason at the western entrance, which separates the protected beach from the West Laganas.

Kalamaki (zone II3: Nature Protection Site, maritime zone B)

Kalamaki is a 600m beach, which is located east of East Laganas at the northernmost part of the Bay. Access to the beach is gained through a single entrance. Nevertheless, three more points allow access at its western end and a path coming down the hill at the eastern part of the beach. At the back of this beach is found Crystal Beach hotel, which was built before the establishment of the NMPZ. This business and one additional operator rent the beach furniture, pedalos and canoes found on the beach.

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

Sekania beach is located at the centre of no-boating maritime zone A at the east side of the Bay. This beach hosts one of the highest nesting densities for *Caretta caretta* in the world and as a result is the most strictly protected nesting site of the habitat, where human presence is permitted only for scientific reasons. It is reminded that WWF-Greece in 1994 acquired the private land behind the beach preventing development. In contrast to previous years when a warden was in charge of this beach, Sekania is left unguarded since 2010. As a result, evidence of some unauthorized human activity is found throughout each nesting season.

Daphni (zone II1: Nature Protection Site, maritime zone A)

Daphni beach is located next to Sekania beach at the east side of Laganas Bay and until 2000

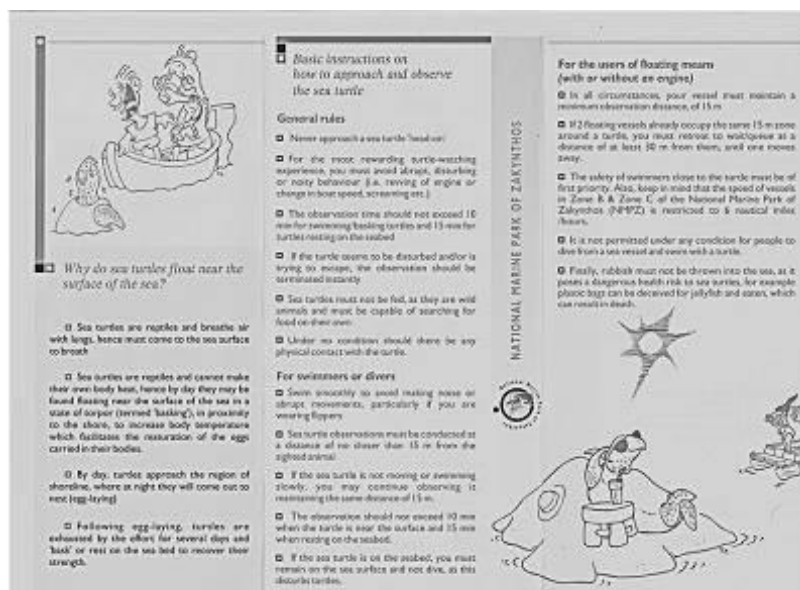
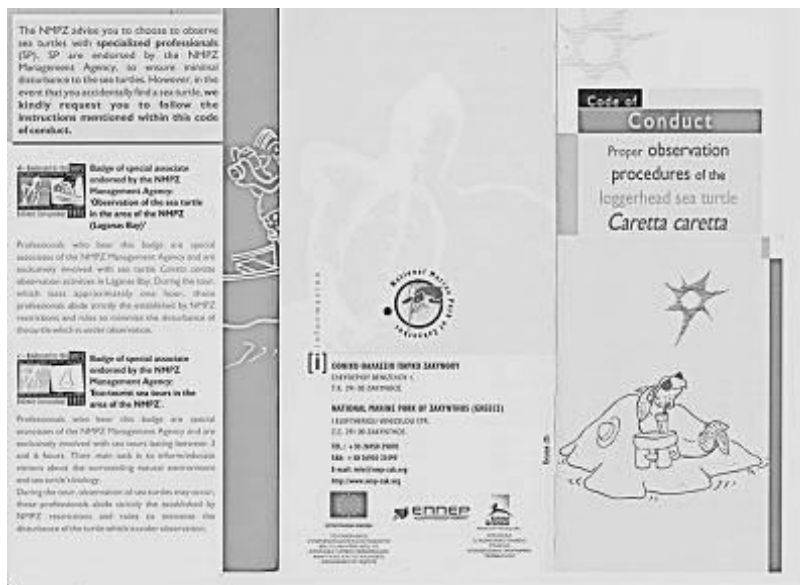
hosted the second largest number of nests on Zakynthos. Compared to the decline noted in the entire nesting area, the decline on Daphni is most acute. As already mentioned, this beach and specially the area behind the beach, where private properties are found, has been subject to many illegal activities such as building and road constructions, flattening of dunes, sand removal, planting of non-native vegetation. The PD foresees that the maximum numbers of beach users should not exceed 100 people at any time.

Gerakas (zone II2: Nature Protection Site, maritime zone A)

Gerakas beach is found in the most southeast part of Laganas Bay and is accessed via a single entrance, with a barrier restricting vehicular access. The back of the beach is free from development and light pollution, while one group of operators rent the beach furniture found on the beach. The PD foresees that the maximum numbers of beach users should not exceed 350 people at any time.

Appendix 2: Turtle-Spotting Code of Conduct

Code of Conduct – Proper observation procedures of the loggerhead sea turtle *Caretta caretta*



Illustrations



Illustration 1: Map of Laganas Bay and location of the six distinct nesting beaches.

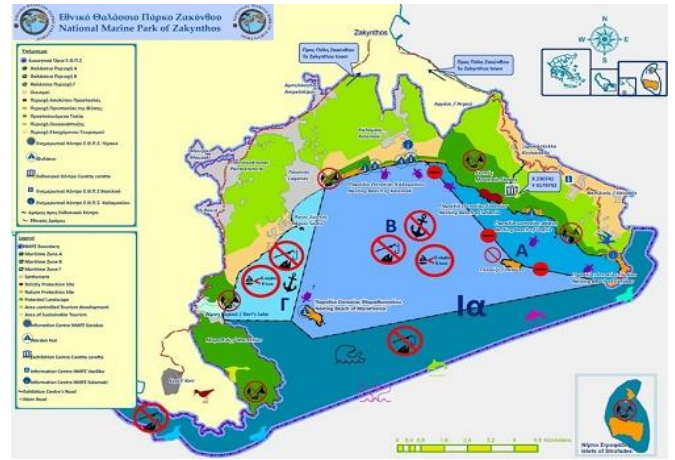


Illustration 2: Zonation scheme of the protected marine area of the NMPZ



Illustration 3: Locations of the 71.88% (due to lack of GPS coordinates for the rest of the data) of the strandings during 2018.



Illustration 4: Location and boundaries of the Turtle-Spotting

Photos



Photo 1: The provisions of the PD regarding maximum numbers, density and distances from the back of the beach were not enforced.



Photo 2: Not removal of beach furniture at sundown.



Photo 3: Abandoned sea turtle nesting attempt as the nesting-zone was blocked by sunbeds.



Photo 4: Beach furniture that are not removed constitute obstacle for hatchlings on their way to the sea.



Photo 5: Pedalos and canoes blocking the access to sea turtles.



\ **Photo 6:** Human presence on the beach during night time.



Photo 7: Placement of rope in Gerakas Beach aiming to prevent visitors from the back of the beach.



Photo 8: Horse riding in the sand dune area behind East Laganas beach.



Photo 9: Illegal businesses at the back of Daphni beach.



Photos 10a, 10b: The illegal road construction in the area between Daphni and Gerakas during 2015 and during 2018.



Photos 11a, 11b: Two new illegal buildings behind Gerakas beach.



Photo 12: Destruction of sand dunes in East Laganas.



Photo 13: The landfill site.



Photo 14a: Violation of approach distance.



Photo 14b: Violation of approach angle.

