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AND NATURAL HABITATS

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**Follow-up of Recommendation No. 9 (1987)
on the protection of *Caretta Caretta* in Laganas bay,
Zakynthos (Greece)**

- REPORT BY THE NGO -

*Document prepared by
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Conservation efforts during 2017 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

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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 2017 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 2017, as recorded by the field project of ARCHELON.

1. BACKGROUND

1.1 Location and the 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 average number of nests in Laganas Bay accounts for about 16% of the total documented nesting effort of loggerheads in the Mediterranean. 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 scheme 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 levels as well as associated conservation measures. ARCHELON's systematic beach 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, 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 formation, and 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) participate with one joint seat on the 11-member Board of the MA.

2. THE WORK OF ARCHELON DURING 2017

2.1 Monitoring of nesting beaches

In 2017 fieldwork commenced on 10 May (monitoring of the six nesting beaches started on 10 May at Gerakas, Daphni, Kalamaki, East Laganas and Sekania and on 5 June at Marathonissi) and

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

terminated on 10 October. As in previous seasons, nests laid in vulnerable sites were protected either in situ by placing wooden cages (Photo 1) 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 (Photo 2) in order to reduce or eliminate hatchling disorientation.

According to preliminary data, on all six monitored nesting beaches of the Bay approx. 650 nests were assessed which is the lowest recorded number of all time. It should be noted that statistical examination of the annual nest numbers over the last 24 years (1994-2017) shows a significant decline. The noted decline in nesting levels can be considered as caused by a combination of factors, like the long-standing and continuing anthropogenic disturbances and pressures on certain nesting beaches and at the marine area of the habitat.

2.2 Turtle Strandings

From the beginning of 2017 and until the ARCHELON field project inception, the MA staff and the Coast Guard of Zakynthos recorded 4 dead sea turtles. During the operation of the ARCHELON field project (7 May until 15 October), 29 more turtle strandings were recorded (27 loggerheads and 1 green turtle). Of these, 28 turtles were found dead while 1 was injured and transported to the ARCHELON Rescue Centre in Glyfada. Of the total number of strandings (33) during 2017, 14 strandings were located within the marine protected area of Laganas Bay (Illustration 2).

It is noteworthy that examination of the dead ones showed boat collision in 8 cases, i.e. turtles with injuries because of propeller or prow (Photo 3). As it will be explained below (see 4.2), this very high number indicates the poor enforcement of measures in the protected marine area of the NMPZ resulting in direct disturbances to the species.

2.3 Public Awareness

The public awareness (PA) programme of ARCHELON started on 8 May and ended on 14 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 PA 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 during excavations and sea turtle releases. In total ARCHELON carried out during 2017 more than 1,000 PA shifts, informing a total of 51,729 residents and visitors.

2.4 Monitoring of the protected marine area

In 2017, ARCHELON carried out systematic monitoring of the NMPZ protected marine area from 1 June until 29 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, as well as tour boats³, as independent on-board observers and also as part of the ARCHELON's 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 coordinates of turtle observations, (d) number and categories of vessels taking part in turtle observations, (e) the use of the Turtle-Spotting Zone⁴ (Illustration 3) and (f) behaviour of sea turtles during

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 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 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 is not 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”.

observation. In addition to boat-based observation, land-based surveillance of the protected marine area was carried out from a fixed point on West Laganas Beach (N: 37.72798, E: 020.87378) (Illustration 4).

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 2017

The financial and political instability in Greece exacerbated the inconsistent funding of the MA during 2017 and hindered the plans of the body for adequate protection of the habitat. The lack of funding led to severe operational problems of the MA and resulted in inadequate enforcement of the existing restrictions and therefore degradation of the habitat and harassment of sea turtles. It is noteworthy that since 2015 the existence of the NMPZ MA itself is not assured, as the operation of all MAs in Greece is extended annually for only 1 year (1st extension took place in December 2015 regarding year 2016 and 2nd extension took place in December 2016 regarding 2017). According to the commitments of the Ministry of Environment a new legislative act will be issued until the end of 2017, with which the long term existence of the MAs will be ensured from 2018.

Wardening is crucial for the protection of the nesting beaches as well as of the protected marine area in this mass tourism 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 2017 no seasonal wardens were employed due to the cut of funding, leaving the task of all wardening to the 19 permanent 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 wardening throughout the season, only 5 wardening 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 warden was present only one night per week. These 2 nesting beaches are directly bordering on tourist villages 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 (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 evening- and 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 (e.g. rental of beach furniture, turtle spotting or horse-riding).

4. CONSERVATION STATUS OF THE REPRODUCTIVE HABITAT DURING 2017

4.1 The terrestrial habitat

4.1.1 Anthropogenic disturbances on nesting beaches during 2017

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 2017 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, 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 2017, 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, while the relevant contracts with the beach furniture businesses were signed in August 2017, i.e. at the end of the nesting season.

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 4), while the removal of beach furniture at sundown was implemented either not at all or incorrectly (Photo 5). Throughout the season, ARCHELON recorded 68,047 violations regarding the removal of sunbeds (either being completely left out overnight or folded on their side) in Gerakas, Kalamaki and Laganas (comparing to 2016, when 29,040 violations were recorded the recorded increase was 234%)! This fact made those parts of the beaches non accessible for turtles and caused them to abandon nesting attempts (Photo 6). Moreover, regarding the maximum numbers, ARCHELON project members recorded in late August 262 sunbeds in Gerakas (while the foreseen by the PD number is 120). In late September 722 sunbeds were recorded 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, 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.

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 2017 pedalos were recorded to be stored on the beachfront in Kalamaki and East Laganas, blocking the access for turtles (Photo 7).

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 2017 flights were reported after 10 p.m. during the high tourist season (July-August).

In Kalamaki beach light pollution was observed during 2017 because of the ongoing operation of the 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 2017, 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 2017 the lack of wardening (see 3), combined with the

mass tourism, resulted in a high number of violations regarding human presence (Photo 8). ARCHELON project members recorded 4,368 violations, with the majority of those being recorded on the beaches of Kalamaki and East Laganas (comparing to 2016, when 2,012 violations were recorded the recorded increase was 217%)!

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 a relevant decisions of either the NMPZA MA⁵ or the Zakyntos Prefect⁶ dictate 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 2017 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 9) 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 2017 nesting season a large number of 4x4 vehicle tracks and quad bikes was observed on the beach. In total 246 vehicles were recorded mainly on East Laganas and Kalamaki (comparing to 2016, when 134 violations were recorded, the increase was 84%)! 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 (Photos 10a, 10b). 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 – Photos 11a, 11b), but also the businesses' owners, following the recent legislation of illegal buildings' legalization, applied during 2016 for building permits.

⁵ Decision No. 34/2006.

⁶ Decision No. 748/3-8-2006.

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 3m wide and 1km long, connecting the main road to Vasilikos with a small beach next to Gerakas (Photo 12). Although all competent authorities ordered the restoration of the habitat, no restoration works took place until now.

4.1.2 The landfill site

Within the boundaries of the NMPZ (behind Vrodonero beach, between Kalamaki and Sekania) exists an overused but still active landfill site, which is a permanent toxic pollution threat to both the nesting beaches and the marine area. The Head of Ionian Islands' Region issued on 4 February 2014 Decision for immediate closure⁷ 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). Moreover, in late October 2016 the local community reacted against the continued operation of the landfill site and blocked the access to it. This resulted in suspension of waste collection in the whole island. Since late November 2016 and until the end of May 2017 Zakynthos was declared in a state of emergency, due to the huge amount of uncollected waste in the island. All the competent authorities (Municipality, Prefecture and Ministry of Environment) have been claiming the immediate launch of the Mobile integrated waste management unit outside the NMPZ (area of Livas), but so far this unit has not been operating. As a result, the landfill site not only was operating during the whole summer season 2017 and until today, but also all the accumulated amounts of litter of the previous months (November 2016- May 2017) were transferred to it (Photo 13).

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 2017 (1 June – 29 September), 653 violations of legislation were recorded by ARCHELON in the marine area, during 261 hours of observation. Of these, 486 incidents were boats breaching the speed limit of 6 knots, which is in place to prevent lethal collisions with sea turtles. This very high number of speed limit violations combined with the number of dead turtles due to boat collision (8 cases, see 2.2) 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, 58 incidents were recorded, while 48 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 Lack of legal framework for 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-Spotting, which are required to be implemented by all boat operators⁸, 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

⁷ Decision No. 10917/2569/4-2-2014.

⁸ 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.

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” 9. This zone, hosting a high density of turtles, was supposed to be exclusive for “endorsed Turtle-Spotting Boats” with carrying capacity <25 passengers.

Currently, neither the guidelines nor the zone for the Turtle-Spotting activity are supported by legislation and, therefore, enforced. As per PD, Article 7, a set of special regulations about operation and management of the NMPZ (commonly referred to as a “Management Plan”) should be issued. Article 7, paragraph 2 refers particularly to activities in the Marine Area that will be specified in a Management Plan (MP). However, a valid Management Plan for the NMPZ does not exist and therefore protection measures which are not mentioned in the PD itself cannot be enforced by the authorities.

In particular, the Turtle-Spotting Zone is not delineated in any way and any boat can currently enter this zone without consequences. During 386 turtle observations in 2017, ARCHELON recorded 303 boats with a carrying capacity >25 passengers (the largest boat regularly recorded with a carrying capacity of 200 passengers), 354 rental boats (motorized as well as non-motorized, i.e. pedalos and canoes) and 427 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, ARCHELON recorded 2,090 incidents of non-compliance (Photos 14a, 14b, 14c). Of these, in 802 incidents the approach distance was violated, in 270 incidents the approach angle was violated, in 374 incidents more than 2 boats were present, in 252 incidents the boats observed the turtle more than 10 minutes, in 152 incidents the observation was not terminated even if the turtle was disturbed, in 187 incidents the boats demonstrated disturbing behavior and in 53 incidents the practice of feeding vegetables or fruit to sea turtles was observed.

The NMPZ MA tried during 2017 to deal with this uncontrolled situation by establishing a “Marine Area Committee” 10, in which ARCHELON participates. Within the meeting of this Committee emphasis was given in the non-compliance with the Turtle-Spotting guidelines and especially in the phenomenon of sea turtles’ feeding, due to the significant disturbance to the species.

4.2.3 Uncontrolled growth of boating activity

Non-enforcement of either the restrictions of the PD (see 4.2.1) or the voluntary Turtle-Spotting zone and guidelines (see 4.2.2) combined with the problematic legislation regarding vessels’ licensing¹¹, which allows the massive issue of licenses requiring neither notification of the boats’ seat nor estimation of the carrying capacity for protected areas, has resulted in rapid and uncontrolled increase of boating in recent years. In 2017, it is estimated that over 400 vessels were able to 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 EUR (data according to ARCHELON study during 2015).

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 a disservice 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 agreement¹².

9 Decision No. 20/2006.

10 Decision No. 43/2016.

11 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).

12 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

The above described uncontrolled growth of boating 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, 20 years after the Recommendation and 17 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 (Photos 11a, 11b).
- 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.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 For the terrestrial habitat

Unfortunately, the foreseen by the PD Management Plan, in which specific conservation measures were to be included, was never drafted. Consequently, the majority of management requirements are not yet legally demarcated and vital conservation issues remain unresolved for more than 17 years since the Park's establishment. This legal deficiency compounded with lack of wardening result in inadequate enforcement of the existing restrictions, which lead to further degradation of the habitat.

Recommendations:

- The elaboration of a Management Plan, which would include all the specific conservation measures, should be urgently resumed.
- 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 beach furniture numbers, their exact locations and their rental operator's obligation for removal at night are directly impacting 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.

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.

- 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 illegal sanitary landfill must be removed from the NMPZ area as soon as possible.

6.2 For the marine area

The results of marine area monitoring in 2017 highlight that boating does not at all follow sustainable principles 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 Turtle-Spotting zone and guidelines need to be clearly defined through a valid Management Plan to enable enforcement.
- The existing legislation (PD) must be successfully implemented and enforced by the MA and the local Coast Guard.
- 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 68 nests/year in the period 2005-2016 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 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 III: Nature Protection Site, maritime zone A)

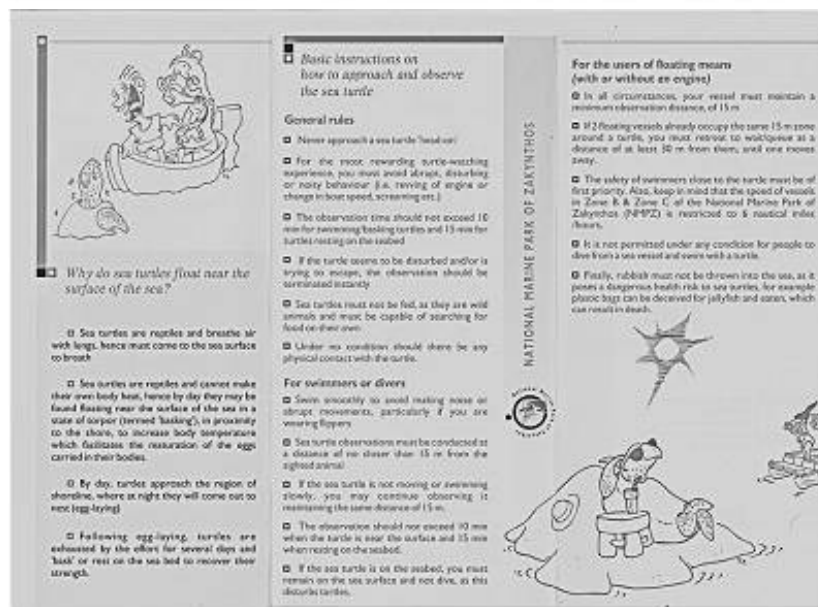
Daphni beach is located next to Sekania beach at the east side of Laganas Bay and until 2000 hosted the second largest number of nests on Zakynthos. Compared to the decline noted in the entire nesting area, the decline on Daphni is most acute. As already mentioned, this beach and specially the area behind 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.

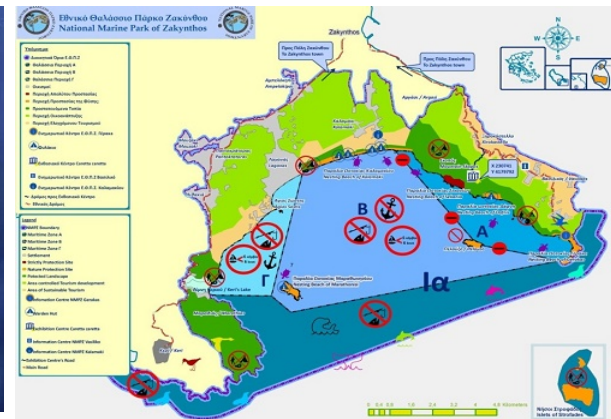


Illustration 2: Zonation scheme of the protected marine area



Illustration 3: Location and boundaries of the Turtle-Spotting

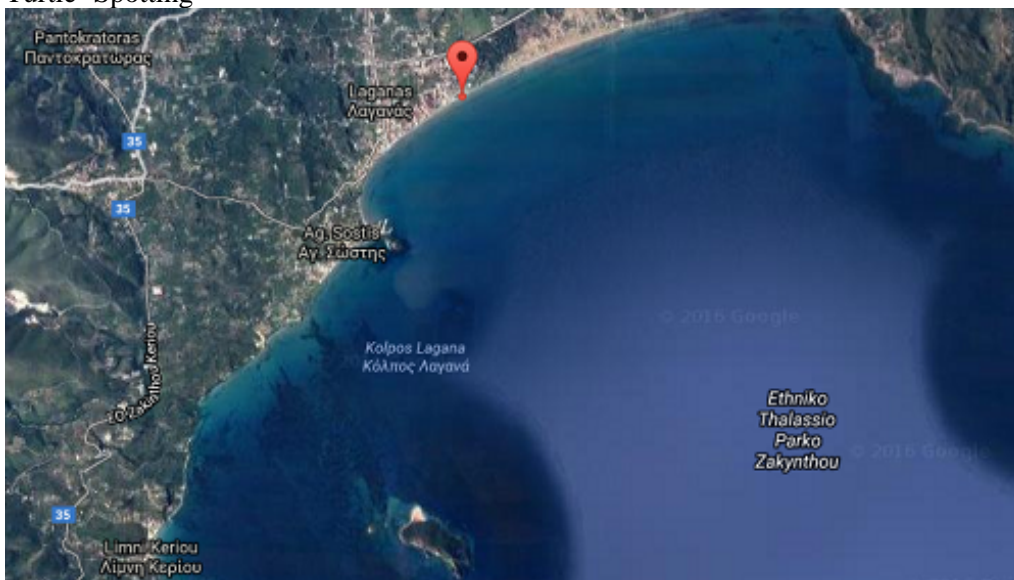


Illustration 4: Fixed point on West Laganas, from which land-based observation was carried out.

Photos



Photo 1: Protection method of nests.



Photo 2: Shading method to protect hatching nests from light pollution.



Photo 3: Sea turtle killed by a speedboat within the NMPZ marine area boundaries.



Photo 4: The recorded number of beach furniture exceeds the provisions of the PD.



Photo 5: Beach furniture removal was implemented either incorrectly or not at all



Photo 6: Abandoned sea turtle nesting attempt as the nesting-zone was blocked by sunbeds.



Photo 7: Pedaloes and canoes blocking the access to sea turtles.



Photo 8: Human presence at the beach during night time.



Photo 9: Placement of rope in Marathonissi Beach aiming to prevent visitors from the back of the beach.



Photo 10a: Horse riding in the sand dunes behind East Laganas beach



Photo 10b: Horse riding on the beachfront



Photo 11a: Illegal constructions at the back of Daphni beach



Photo 11b: The businesses behind Daphni beach expand through the years. New fence was built during 2017.



Photo 12: The illegal road construction in the area between Daphni and Gerakas.



Photo 14b: Rental boat approaching sea turtle in distance less than 15m, not implementing the guidelines for sea turtle watching



Photo 14c: Sea turtle feeding from visitors inside the Turtle-Spotting zone