The Acquisition of Sekania: Securing a Loggerhead Nesting Site of Global Significance in Greece

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Nesting of loggerhead sea turtles in Laganas Bay, Zakynthos, Greece, was "discovered" in 1977 with preliminary observations conducted on the beaches of Daphni, Sekania and Gerakas (Margaritoulis 1982) (Fig. 1). From the first studies it was clear that Sekania held the largest number of nests in Zakynthos and had the highest nesting density of all the then known rookeries in the Mediterranean (Fig. 2). This discovery marked the identification of one of the Mediterranean's most crucial loggerhead nesting sites, whose protection would become a major conservation priority. As rightly guessed, the high concentration of nests in Sekania was a result of the reduced human disturbances in comparison to other beaches. Indeed, Sekania had no road access and some treacherous reefs in front of the beach prevented an easy approach from the sea. Further, steep hills surrounding the crescent-shaped beach did not allow lights from the then emerging tourist village of Laganas to reach it. Conversely, the nearby Daphni beach (Fig. 1) featured a makeshift hut which could provide basic meals and hence attracted a small number of free campers, despite a very rough road. Gerakas beach at the far end of the eastern peninsula of the bay (Fig. 1), with an asphalt road from Zakynthos town, attracted many bathers during the day, some of them remaining and camping overnight.

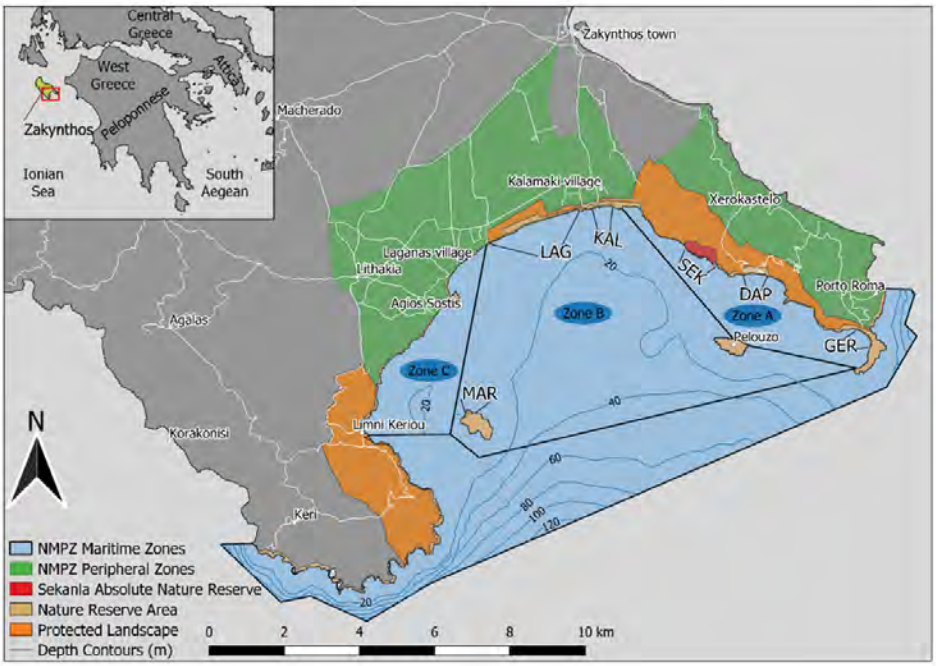

Figure 1. Sketch map showing the six nesting beaches in Laganas Bay, Zakynthos (MAR: Marathonissi, LAG: East Laganas, KAL: Kalamaki, SEK: Sekania, DAP: Daphni, GER: Gerakas) within the boundaries of the National Marine Park of Zakynthos (NMPZ). The marine area of the NMPZ includes three protection zones (A, B, C) featuring various boating regulations from 1 May through 31 October each year. Zone A: no boats allowed; Zone B: boats allowed under a speed limit of 6 knots, no anchoring; Zone C: same as B but with anchoring permitted. The acquired land behind Sekania beach is shown in red. Figure adapted, with permission, from Margaritoulis et al. (2022).

Figure 2. The high density of nests at Sekania provided a strong motivation to acquire the private land behind the beach (photo: D. Margaritoulis, 1979).

Figure 3. Partial view of Sekania beach showing the opened rough road accessing the beach (photo: D. Margaritoulis, 1982).

Information from other loggerhead nesting areas around the world provided evidence that the 600m-long Sekania beach, featuring in some years nest densities of more than 1,000 nests/km, was a global hot-spot (Charalambides & Katsoupas 1994). This extraordinary density made Sekania a critical target for conservation, promising a significant return on investment in protecting the species**.** Nevertheless, this was deemed not so simple because the land behind the beach was privately owned by a local family.

The wide publicity of turtle nesting in Zakynthos, pronouncing the need to protect principally the nesting beaches, as

well as the first governmental measures imposing building restrictions in the wider area (originating in 1982), alarmed the Sekania owners who opened a rough road accessing the beach and started to cultivate the hillsides, in an effort to confirm land use of their property and to attract tourists to visit the beach (Fig. 3).

The national legislation of the time did not allow the expropriation of private lands for nature-conservation purposes. A detailed description of the then legislation and governmental intentions can be found in Spyropoulou & Dimopoulos (1999). So, we started to think of other avenues that would unblock this particular situation. In the summers of 1983 and 1984, we talked with a member of the land-owning family, the teacher Stefanos Kolokotsas, about possible means that could compensate the family for non-developing their land. These included (a) transferring their building rights to other properties, (b) exchanging Sekania with a public land of similar value, and (c) receiving an annual compensation, in the form of rent or tax waiver. Eventually, we brought up the possibility of selling their land to an international organization. We emphasized the "international status" of the acquiring entity because at the time rumours were spread in Zakynthos that the Sea Turtle Protection Society (STPS), the then name of ARCHELON, overstated on purpose the need to protect turtle nesting in order to devalue undeveloped lands and acquire them at a low price for the Society's members! This idea of international involvement proved crucial, dispelling local rumours and establishing a sense of global importance to the conservation effort.

Our continued talks with the owners' family provided a mutually trusted relation with a gradual acceptance on their part of the possibility to sell their land to an appropriate entity for the sole scope of conserving it. Of note, the need to acquire the land behind Sekania beach was emphasized in written recommendations to the government, in the Society's annual reports to international organizations, and in presentations to international conferences (see Dimopoulos 1990, 1992, 1995).

In July 1987 the co-founder of WWF International, and then its Vice-President, Dr Luc Hoffmann visited Greece and met us in Athens. Dr Hoffmann was familiar with our work and asked us if he could visit the project in Zakynthos. We readily invited him and in a couple of days Thomas (then President of STPS) guided Dr Hoffmann to Sekania, getting there in our small inflatable dinghy from the Laganas settlement. This visit, facilitated by the challenging access, the concentration of so many nests, and the simple conditions of the ARCHELON team stationed there, underscored the remoteness and pristine nature of Sekania, leaving a powerful impression on Dr Hoffmann. Thomas presented him our idea that if WWF would acquire the lands behind the beach, it would automatically save >50% of nests in Zakynthos. As a humorous aside, when Thomas drove him around in Zakynthos in a very old car, that our low budget could afford hiring, Dr Hoffmann noting a large hole in the floor of the vehicle, through which you could see the road beneath, observed "I think you may need a better car". This materialized the following year when WWF International accepted our proposal for a conservation project in Zakynthos (WWF Project No 3825) which included the purchase of a new car!

Dr Hoffmann's visit to Zakynthos and especially to Sekania was crucial in furthering progress of matters. He asked persistently for our previous reports where the value of Sekania as a turtle nesting area was scientifically documented. We also informed him of the government's measures, and on our (and other NGOs) continuing efforts and actions to press the government in creating a National Marine Park in Laganas Bay that would embrace Sekania as its core area (Dimopoulos et al. 2003).

The well-known name of WWF International played a major role in our discussions with the owners for the

possible acquisition of Sekania. We understood that the family was in turmoil, as not all its members wanted to sell their land. Eventually, one evening in summer 1989, the family member with whom we primarily talked asked Thomas to visit their house in Xerokastelo village, behind the Sekania hills (Fig. 1). There, the family announced, "We agree to sell, if an amount of money be deposited in our bank account within a week!" Thomas immediately went on foot, he actually ran, to the telephone company in Zakynthos town (no mobile phones then!) and called Dr Hoffmann in Switzerland telling him the owners' request. The news was readily accepted by Dr Hoffmann and next day the requested sum was transferred to the family's bank account. This dramatic demand, met with immediate action, marked a pivotal moment in the conservation effort, transforming years of negotiation into a concrete commitment. Eventually, on 1 July 1993, after the founding of WWF's national office in Greece, a draft contract was signed with the family, who agreed to sell their land, of about 33 ha, to WWF Greece for 600 million drachmas (then about 2.5 million USD).

WWF's first director in Greece, Georgia Valaoras, was fully aware of the developments and one of her first assignments was the inclusion of Sekania's acquisition in a broader project (named Ionian Project), partly funded by the European Commission. The matching funds for the land acquisition were collected through a successful international campaign, organized by WWF (Charalambides & Katsoupas 1994). On 19 December 1994 the final contract was signed and the private land behind Sekania beach came under the ownership of WWF Greece, who fenced the area and employed a couple of locals as guards to discourage trespassing and other harmful activities.

In the Presidential Decree (PD) of 1999 that founded the National Marine Park of Zakynthos (NMPZ), Sekania beach and the surrounding area were granted the status of "Absolute Protection", according to in-the-meantime issued legislation, and this status forbids human presence in the area for any reason besides scientific research (Dimopoulos 2001). Further, Sekania is included in the Zone A of maritime protection which does not allow boating (Fig. 1).

WWF Greece received some criticism for acquiring land for nature-conservation mainly from people who had the opinion that humans should not be excluded from conservation areas. Some criticism came also from ill-intentioned locals who spread rumours that WWF bought the land to build a luxury hotel for "ecologists"' vacations! Nevertheless, WWF safeguarded the area successfully by establishing infrastructure against wildfires, and by taking measures against erosion of the hillsides to avoid silt runoff deposited on the beach; a deadly trap for hatchlings (Fig. 4).

Figure 4. Silt, with a high concentration of clay, coming down from hillsides during a rainfall, dries on top of beach sand creating a hard layer inhibiting hatchlings to emerge from nests underneath (photo: D. Dimopoulos, 1994).

Turtle nesting at Sekania continued to be closely monitored by ARCHELON through daily counts of tracks and nests, excavation of hatched nests, and tagging of nesting turtles (Fig. 5). Measures for *in situ* protection of nests were not generally taken as human presence was minimal and nest predation, by rats and martens, negligible. A recently emerging threat, i.e. the appearance of ghost crabs (*Ocypode* sp.), for the time being has only a minor effect on eggs and hatchlings. A few of the

Figure 5. In the first years of ARCHELON monitoring program, field researchers in Sekania camped behind those trees and bushes to avoid disturbing nesting turtles (photo: ARCHELON, 1994).

nests deposited close to the water were occasionally relocated at the high beach, although excavation to create an artificial egg-chamber would possibly disturb existing nests, due to the high nest density.

Some overall results from the 40-year (1984-2023) program of ARCHELON at Sekania are given below:

- Total number of laid nests: 24,427
- Mean annual number of nests: 611 (range: 276 - 1,046 nests/year)
- Estimated total number of eggs deposited: 2,702,089
- Mean contribution of Sekania to total nests in the bay: 49.7% (annual range: 33.5 – 62.3%)
- Overall mean nesting density: 1,018 nests/km/year (mean annual range: 460 – 1,743 nests/km/year)
- Mean hatchling emergence success: 67.2% (annual range: 55.0 – 80.7%)
- Estimated number of emerged hatchlings (minimum): 1,509,915.

There is no doubt that the acquisition of Sekania beach, seen as investment for nature conservation, has been very successful and cost effective, considering the uninhibited production of about 37,700 hatchlings per year on average. This unique beach, secured against possible threats, stands out as the core nesting area of the NMPZ. The other five beaches, hosting the other half of nests in the bay, feature a variety of physical characteristics and anthropogenic interactions. Turtles in Laganas Bay use different beaches for nesting in the same or subsequent seasons, and hence the entire bay is considered as a single nesting habitat (Katselidis et al. 2005). A major characteristic is sand temperature, which controls the hatchling's sex. Sand temperature at Sekania is one of the highest in the bay, producing mostly female hatchlings, while temperatures at Marathonissi beach are the lowest, providing almost exclusively male hatchlings (Zbinden et al. 2007). Therefore, the uniqueness of Sekania should be assessed within the context of the entire nesting habitat. In other words,

Figure 6. The eastern section of Sekania beach in Laganas Bay, Zakynthos, at the start of the nesting season (photo: Anna Lamaj/ARCHELON).

the value of Sekania depends on the continuity of conservation measures at the other nesting beaches in the bay, and especially of those at Marathonissi beach which provides the great majority of male hatchlings to Zakynthos turtle population.

The future however may reveal a weakness, in the face of climate change. The steep hills behind Sekania will block a landward shift of the beach, and a scenario of a 60 cm sea level rise may reduce the nesting zone to about 30% of its present area (Katselidis et al. 2014). If this happens, it may be doubtful whether the "squeezed" Sekania beach will be enough to accommodate all nests currently deposited there. Nevertheless, in the course of our multidecadal monitoring work we noticed that after the full operation of the Park, the contribution of Sekania is gradually decreasing because turtles tend to nest in higher numbers on some other beaches of the bay due to favourable management measures (Margaritoulis et al. 2022). If this trend continues, proportionally less turtles will select Sekania and the imminent "squeezed" beach –due to climate change– may eventually accommodate fewer nests. Other beaches in the bay seem more resilient to sea level rise, for instance the 2.7 km-long East Laganas beach, backed by an extensive low-dune field and few constructions, may undertake a landward expansion (Katselidis et al. 2014) which could absorb many more nests.

Despite these shortcomings, stated with a considerable degree of uncertainty, Sekania beach will always be the gemstone of rookeries in Greece and in the Mediterranean (Fig. 6), signalling that difficulties in conservation matters can be surpassed through persistence, dedication and good will.

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