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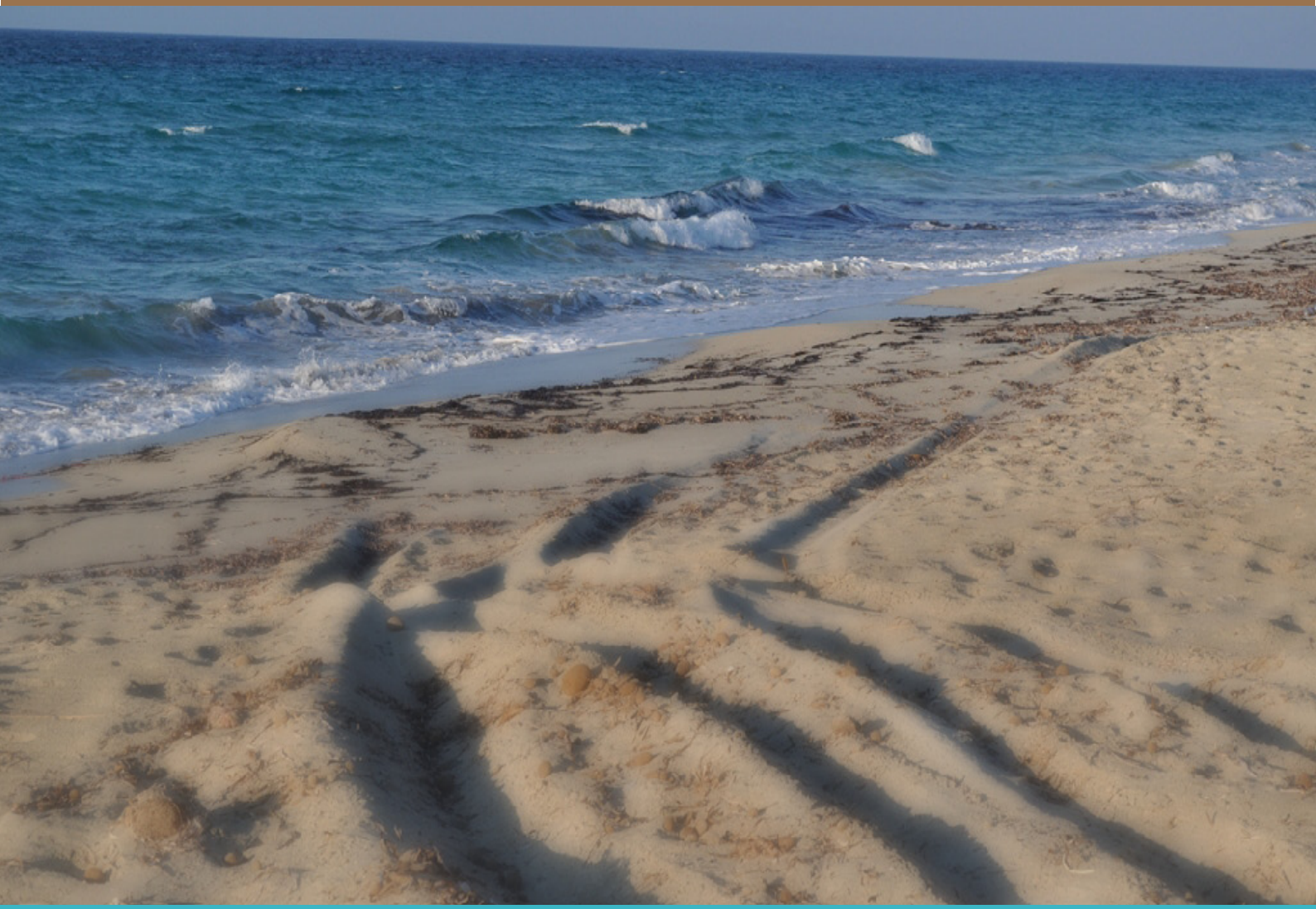
Guidelines for setting up and management of specially protected areas for marine turtles in the Mediterranean



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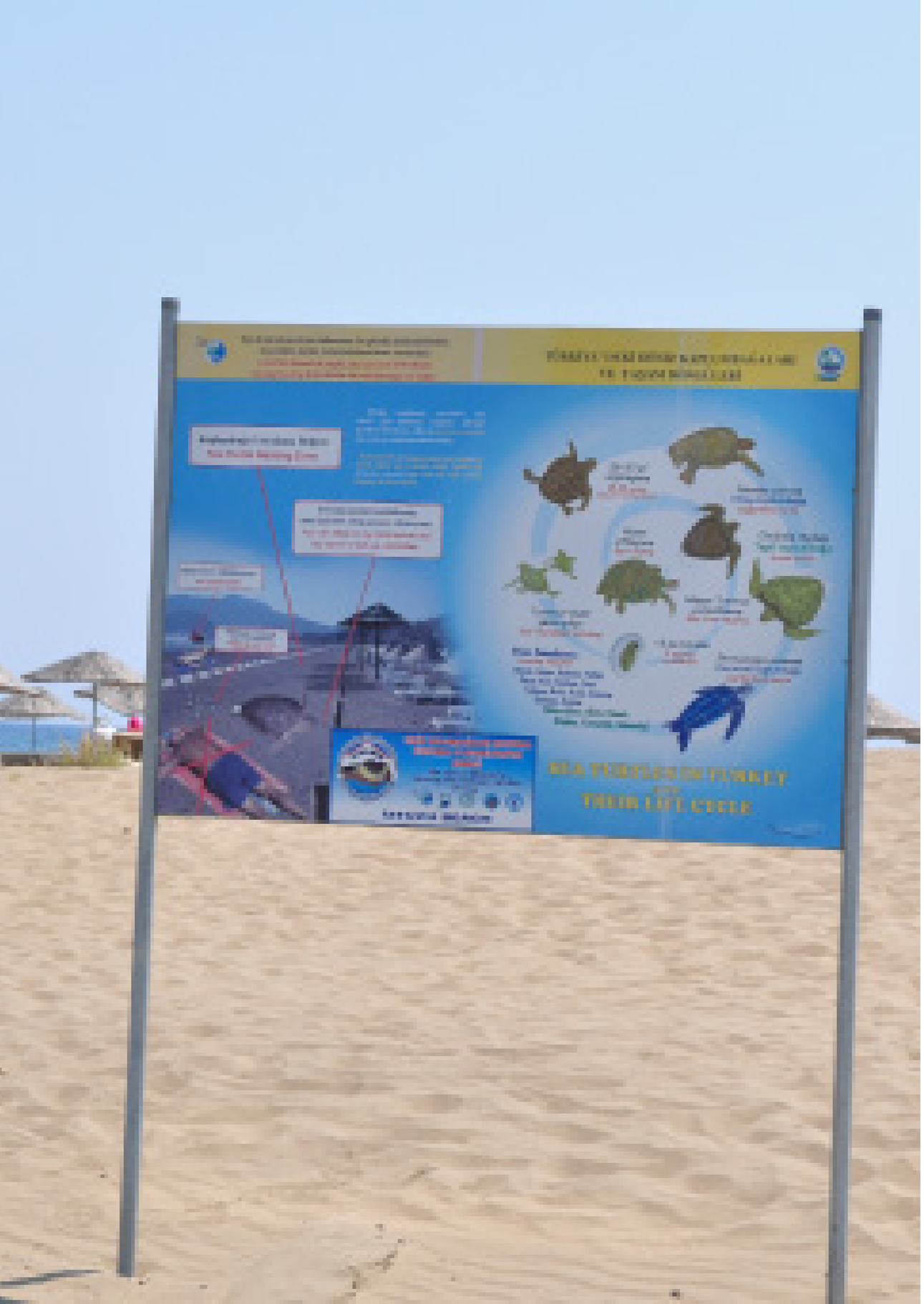

INTRODUCTION

1. Conserving adult female turtles and their nesting habitats merits top priority in any conservation strategy. In the wild, a mature female will lay over many years, producing several hundred eggs per nesting season, for many seasons. This means that in her lifetime she could lay many thousands of eggs. Most eggs and hatchlings will normally perish on the beaches, as a result of predation, inundation by the sea and human activities. The number of hatchlings that reach the sea will be small, often estimated at a small percentage of the eggs laid.

Many will perish during their first days at sea. Many young turtles will survive to a certain age but will perish before sexual maturity or soon afterwards. Many green turtle juveniles will die when they abandon the pelagic stage of their life and descend on their foraging grounds, when they are about 30-40 cm in length.

There they get caught in stationary fishing nets. Loggerhead juveniles and sub adults seem to suffer more from floating long line problems in the Central and Western Mediterranean. For these reasons, it is obvious that the larger a turtle gets the more precious she is and, therefore, mature turtles merit top priority in any conservation programme. Their protection needs to focus primarily on key areas, on and near their nesting beaches, on their foraging grounds and in key migration passages (RAC/SPA 2007).

2. However, and not withstanding anything said above, the protection of nesting beaches, in the Mediterranean in particular, where beaches are under pressure from tourism and recreation activities, is a priority issue. Obviously without nesting beaches turtles cannot survive.

The protection of nesting turtles on their nesting beaches and the protection of their eggs and hatchlings on the beaches provides a window of opportunity to help in a very practical way in the recovery of populations as, all things being equal, any significant increase in the number of hatchlings reaching the sea, through the control of predation etc will inevitably help in tipping the equation to the benefit of turtles. Many beaches have already been “lost” to the turtles.

3. Much of the conflict in turtle conservation is in fact related to protecting nesting beaches. This can be illustrated by the number of files that relate to nesting beach protection which have been opened by the Bern Convention (Fernadez-Galiano 2009).

4. The fact that turtles often migrate long distances between their natal beaches and their foraging grounds means that it is unlikely that any single protected area can protect turtles at all stages of their life.

Protected areas therefore need to be set up in different areas in different countries, according to what area is important to turtles in that country.

5. Protected areas for marine turtles, as a result of their biology, need to cover habitats both on land and at sea. On land, protected areas need to cover the nesting beaches themselves and the hinterland behind the beaches, to the extent that this impacts nesting etc. Closely associated to the land area, is the sea adjacent to the beaches, where the turtles spend much of their time between laying. This sea area needs to be protected accordingly, to avoid disturbance and damage to turtles from any activities that can impact nesting turtles and hatchlings (fishing, water sports etc). Nesting beaches and the adjacent sea area and often the mating area are usually covered by the same legal regime and form a single coastal/marine protected area. Marine protected areas are needed to protect turtles on important foraging grounds. These primarily require protection from fishing activities. The foraging grounds are usually different for green and for loggerhead turtles, as their feeding habits are different. Green turtles usually graze in Posidonia oceanica and Cymodocea nodosa meadows, mostly in the Levantine Basin, feeding on these two sea-grass species, (Demetropoulos and Hadjichristophorou 1995) but stretching, on a smaller scale, as far as the central Mediterranean, off Greece and Libya (Margaritoulis and Teneketzis 2003).

Posidonia beds are mostly found from about 5m depth to a maximum of about 45m which is the deepest they are found in the Mediterranean (off Cyprus). The usual depth limit is 30-35m. Cymodocea is a shallow water seagrass found from a few cm depth to about 10m. Loggerheads feed mainly on a diversity of benthic animals and they often go west to the richer grounds of the central and western Mediterranean, including the Adriatic.

BACKGROUND INFORMATION

Protection of Nesting Beaches

6. Mature female turtles cannot reproduce without nesting beaches - this much is obvious. What is not so obvious, but well known by now, is the fact that these females (and perhaps more so female green turtles), will not nest on any beach - they will only nest on their natal beaches, i.e., on the beaches where on which they incubated as eggs and where they hatched. So the existence of “suitable” beaches and the existence of mature female turtles in the Mediterranean does not mean that nesting will take place. The mature females need to be able to return to the specific beaches on which they originated so they can lay their eggs. This also implies that the Mediterranean stock of turtles is not a single stock but that each rookery has its own stock of turtles, i.e., that each rookery is demographically distinct and independent. Therefore, conserving turtles in one rookery will not save turtles from another rookery. If a rookery is to survive, therefore, it needs to be protected individually and separately (Bowen, 1992. Meylan 1990).

7. It also needs to be noted, that the beaches the turtles "choose" to lay their eggs on, are the result of the suitability of these beaches, as nesting grounds. It makes good biological sense, from an evolutionary point of view, to nest on a beach that proved good for the parent. In other words it is the result of a kind of "natural selection" that has approved suitable beaches and rejected unsuitable ones. Many factors play a role in this - one of them is temperature. Nesting beaches have the right temperature regime - otherwise they would not sustain populations. Of course it is not so simple. Coarse sand beaches have higher incubation temperatures than fine sand beaches in the same geographical area. So, some beaches have a tendency to produce more females and others more males. But a rookery as a whole has beaches with the right temperature regimes for sustaining a population. Inevitably sex ratios on the same beach vary with the time the eggs are laid, with more males at the beginning of the season and more females later on. There is a need,therefore, to protect the beaches throughout the nesting and hatching season, starting from the first nests laid in the season. In setting up protected areas for turtle nesting it is important, in view of all that has been said above, to select and protect not only “successful” nesting beaches but also all the beaches on which a rookery depends.

8. There are many reasons why a beach may not have regular nesting. Sparse nesting on a beach, that looks very suitable for nesting, may be the result, not of the suitability of the beach itself, but of the adjacent sea. Predominant low sea surface temperatures off a beach, or an area, are caused by upwelling, i.e., cold water coming to the surface from lower down. Upwelling is caused by currents and winds. Fluctuations in climate may affect sea currents and this may explain large annual or shorter term, fluctuations in nesting on some beaches. Examples of this are some south and south-western beaches in Cyprus (Demetropoulos and Hadjichristophorou 2008).

Recognizing this fact is important in selecting areas to protect, and in setting up hatcheries in such areas.

9. In selecting the boundaries of the area to protect, the various threats to the nesting, incubation and descent of the hatchlings to the sea need to be kept in mind. Lights are a key issue as is disturbance by people at night. These can impact both nesting females and hatchlings in particular.

Protecting the beach itself and any (often limited) sand-dune zone behind it may be very useful, but in many areas the threats come also from the adjacent hinterland and protecting the beaches alone has proven to be insufficient to protect reproduction. The width of the area that needs to be taken into consideration inevitably will depend on the morphology of the area and the existing or likely pressures.

10. The sea adjacent to nesting beaches is also very important for the protection of the turtles coming to the area to reproduce and management measures are needed to protect them from fishing and other nautical activities.

11. Climate change is of course likely to impact, at some stage and no doubt progressively, turtle nesting and distribution. Turtles themselves will also no doubt shift their nesting season to start nesting earlier, compensating by themselves for male/female ratios. Increased nest numbers are also likely, with changes in currents, with winds affecting surface currents and bringing warmer water into shallow waters etc. This has already been noted in Cyprus (Demetropoulos and Hadjichristophorou 2008). It is also likely that we will see a spread in nesting further west and with nest number increases in fringe areas in the central Mediterranean (Demetropoulos 2003a). The above need to be kept in mind in setting up protected areas as fringe area beaches, in the central Mediterranean in particular, with limited nesting at present, could become important in the future. Of course, as turtles are long living animals, populations and spatial shifts in nesting will take many decades if not centuries.

Legislation and enforcement

12. Legislation is necessary for the setting up of protected areas. The legislative vehicle for such measures may well vary from country to country. The legislative/administrative gaps existing, due to the fact that in this case marine species have to be protected on land, are often highlighted.

Countries have resolved this in different ways, with varying degrees of success. It is obviously better to have an overlap than a «no mans land», though overlaps can also lead to inaction and sometimes conflicts. It is prudent to keep in mind that any “discounts” in the area to be protected may well be paid for by radically increased costs in actually managing the area.

13. For EU Countries (and counties aspiring to EU membership) the Habitats Directive provides for habitat protection of all species in Annex II. Both loggerheads and green turtles have been classed as Priority Species for conservation and are included in both Annex II (Animal and Plant Species of Community Interest whose Conservation Requires the Designation of Special Areas of Conservation SACs/pSCIs) and Annex IV (Animal and Plant Species of Community Interest in Need of Strict Protection). Guidelines are available for setting up Natura 2000 sites as well as Criteria for assessing the sufficiency of any proposals for habitats and species under this Directive ('Criteria for assessing national lists of pSCI at bio-geographical level (Hab. 97/2 rev. 4 18/11/97)).

14. The general provisions are that, for priority habitats and species, more than 60% of the area of the habitat or population in the country needs to be covered by SACs for a Member State to fulfil its obligations under the provisions of the Habitats Directive. Additional guidelines for assessing sufficiency of Natura 2000 proposals (SCIs) for marine habitats and species are now being elaborated. However it needs to be kept in mind that there are limitations in what the Habitats Directive can do in protecting habitats and species.

15. Both the Bern and Barcelona Conventions have provisions for conserving turtles and their habitats, without perhaps the mandatory nature of an EU Directive. The files opened by the Bern Convention for contraventions of the Convention are also relevant.

16. In setting up a Protected Area for turtles it is highly desirable that, even before the setting up the Protected Area, decisions are taken, where possible, for the management authority to be the same as the law enforcement authority or, at least, work very closely with it. More effective implementation of regulations and management measures can in this way be achieved, than if nature conservation issues depend on a more general law enforcement body, like the police, with many diverse duties and, often, with different priorities and more pressing work and responsibilities.

17. Setting up a Protected Area may be a relatively easy task, in some cases at least, but the setting up needs to be accompanied by a set of basic management regulations to start with, to be included in the law, if setting up the protected area it is to be useful in its main target, which is to protect turtles. (The remaining more detailed management measures can follow the setting up of the protected area). It also needs to be kept in mind that wardens will be needed and that law enforcement needs to be undertaken directly by wardens/rangers of the national management authority (this needs to be reflected in the legislation) and not be relegated to indirect enforcement (warnings) by volunteers working in turtle conservation projects. Wardens/rangers of the management authority need to be professionally trained in all aspects of their work in law enforcement. Volunteers, however dedicated and well meaning they may be, cannot be as effective as a properly trained, uniformed law enforcement agent. Nonetheless valuable work is often undertaken by volunteers in the absence of national agents on the scene. In order to provide decision-makers and lawyers with the relevant basic information and practical advice about elaborating and implementing effective legal measures for the conservation of Mediterranean marine turtles, bearing in mind the existing international legislation, RAC/SPA has elaborated Guidelines to design legislations and regulations to the conservation and management of marine turtles populations and their habitats and already adopted (Catania, 2003).

Setting up Marine Protected Areas for turtles

18. Apart from the protection of the marine areas adjacent to nesting beaches, which aim at protecting turtles during the nesting season and occasionally just before it, during mating in April/May, there is little or no experience in protecting turtles on their foraging grounds. (Mating areas are often a little further out to sea than the area needed for the protection of nesting turtles). Inevitably protection of turtles on their foraging grounds will aim at protecting turtles from fishing activities and from occasional boat strikes. To justify the declaration of such an area as a Protected Area and to introduce at the same time the basic management measures, which will impact fishermen primarily, the importance of that particular foraging area for turtles needs to be substantiated. This needs to cover inter alia the justification of its boundaries and the reasons for selecting this area and not other nearby areas. This will help decision makers justify their decisions. Closed areas to fishing are obviously the most effective, but the most difficult to have accepted.

19. Such protection of foraging areas for the green turtles may be a little easier to pass into law, in the European Union countries at least, as such protection goes hand in hand with the protection of the Posidonia beds, which are a priority habitat in Annex I of the Habitats Directive. The same is applicable, to a degree, to the protection of the Sand Banks which are also a habitat in Annex I, which requires protection under the Habitats Directive. Cymodocea nodosa is often related to Sand Bank habitats. This species is the main seagrass species on which juvenile and sub-adult green turtles and to a degree, adult green turtles feed on in the Mediterranean. Again, in this case, and where quantitative data on habitat coverage are available, it is possible to apply the arbitrary sufficiency levels 20-60% for non-priority habitats and >60% for priority habitats (e.g., Posidonia beds) as suggested in the 'Criteria for assessing national lists of pSCIs at the biogeographical level' (Hab. 97/2 rev. 4 18/11/97). In this case also the "Additional guidelines for assessing sufficiency of Natura 2000 proposals (SCIs) for marine habitats and species" which are now being elaborated are relevant.

20. Again here it needs to be mentioned that both the Bern and Barcelona Conventions have provisions to protect turtles and their habitats, without perhaps the mandatory nature of an EU Directive.

GUIDELINES FOR SETTING UP PROTECTED AREAS FOR MARINE TURTLES AND BASIC MANAGEMENT MEASURES

These guidelines should be read in conjunction with the background information given above

A. NESTING BEACHES AND ADJACENT SEA

A. 1. Selecting areas to protect

1. Most of the important nesting beaches in the Mediterranean are already known and many have been monitored for several years. Much has been said already on the significance of saving existing nesting beaches. The biology of turtles is such that leaves little leeway in the selection process for beaches and also predetermines, to a large degree, the extent of the area needed and the basic management measures that need to be implemented. In setting up a protected area it is strongly advised that all the beaches the rookery depends on are included as they may have different physical/geological characteristics which can impact sex ratios of hatchlings The area to be protected needs to include not only the beaches and immediate coastline but also a zone behind the beaches so that threats, such as lights, can be avoided, or if this is not feasible due to existing development, at least controlled and minimized. The extent of this zone will need to be judged case by case, depending on the morphology of the area, the stage of any development etc.

2. In setting up Protected Areas, it may be unrealistic to endeavour to declare as a protected area the total length of very extensive beaches with only sparse nesting. In such cases, selecting adequate stretches of coastline in the areas with the densest nesting is indicated (keeping in mind of course what has already been said about the characteristics of beaches in relation to sex ratios).

The rest can be covered as much as possible by management measures, such as no driving on beaches, regulating the hours of mechanical cleaning, if this is taking place, and a hatchery programme endeavouring to concentrate future nesting in protected areas. This is the current strategy in Israel (Kuller, 1999) and the one most likely to be effective also in other areas with extensive beaches and sparse nesting, where in situ protection of nests may not be feasible for a variety of reasons.

3. In the adjacent waters it is desirable to cover the sea to a certain distance from the shore. This will depend on the slope of the seabed. It better to foresee for a depth limit instead of a distance from the shore as this is more practical to implement on the ground as fishermen and many boat owners cannot judge the distance for the shore but can measure depth with echosounders or by a dropping a line. Implementation will also of necessity be undertaken from the patrol boats of the law-enforcing authority which are invariably equipped with echosounders. In Cyprus the depth limit off the Lara/Toxeftra Reserve is the 20m isobath, which is about 1 - 1.5 km from the shore, which is adequate for this area.

4. It is recommended that, if a seasonal applicability of the Protected Area is envisaged, this covers the period between the 1 May and mid October. This will cover both green and loggerhead turtles.

Green turtles do not start nesting until early June while hatching finishes in October. Loggerhead start and finish earlier. It needs to be kept in mind that some measures, like driving on the beaches, are best implemented throughout the year.

A. 2. Legislation

5. In setting up a Protected Area there is a need to pass legislation. This legislation should be clear as to what it covers in terms of:

- Spatial cover, both on the coast and in the sea. The terrestrial area to be covered will of necessity depend on such factors as the morphology of the area (hinterland slopes etc). The social set up and the acceptability of the protected area will no doubt mean that compromises may have to be made, not only in the spatial coverage of the protected area, but also in the management measures themselves. Obviously it easier to set up protected areas in areas where there is as yet no development or development aspirations. Once development starts setting up protected areas is more difficult and also likely to be more expensive, not only initially but also in managing the area later on.
- The period of the year during which this legislation, or part of it, is applicable (see para A.4 above)
- The key management measures (see below). These may have a bearing also on the extent of the area to be protected.

The above are also applicable to a degree to the marine component of the area.

A.3. Management of nesting beaches and adjacent sea

6. The setting up of a Protected Area needs to include the basic regulations/restrictions which will be applicable in it. For example it is necessary to include at least the basic beach management measures during the nesting, incubation and hatching period, while some of the measures (like driving on the beaches) are needed throughout the year. These are in addition to any spatial planning aspects of the protection of the area from physical development or to its status as a National Park, Marine/Coastal Reserve etc. Seasonal management measures should restrict or control and properly channel, public access in the nesting areas. These measures need to include the sea area adjacent to the beaches to a depth limit (or distance from the shore) that may vary from place to place depending on a number of local factors.

7. The basic management measures for any area may vary somewhat depending on circumstances, existing or pending threats etc. Only some need to be examined at the stage of setting up a protected area. Others can come later (for example methods to deal with predation). The following recommendations are broadly based on the legal measures that are implemented in the Lara/Toxeftra Turtle Reserve in Cyprus, which was set up in 1989. This is an area in which there is, as yet, no physical development.

For the period starting on the 15 May (or 1st May) and until the 15 October the following measures are needed:

The public should not be allowed on the beaches or near the beaches at night, i.e. starting one hour before sunset (or at sunset) and finishing at sunrise. This is a critical issue. [The extent of the land area to be covered inevitably depends on local circumstances (such as land morphology in the hinterland) but should aim at a zone which will result in the minimum disturbance to nesting turtles and emerging hatchlings (e.g., from movement of people on the beach, from stationary or moving lights (cars, torches etc), bonfires etc). See A3 above.]

Driving of vehicles on the beaches should be forbidden.

Sunbeds, umbrellas, camping etc. should be forbidden on the beaches.

Boats of all kinds and fishing of any kind (except with a rod and line) should be banned from the sea area adjoining the beaches to a specified depth (at least to the 20m. isobath, and deeper if the mating areas are to be covered) or to a set distance from the shore (1.5 km or more, depending on the location). The depth limit is more practical to implement as this is what fishermen understand and can implement and this is what can be measured in practical terms in terms of proof for court cases.

Some key management measures in the Lara/Toxeftra Turtle Reserve and elsewhere in Cyprus are not mentioned in the legislation, as this is not necessary. The main one is the control of predation from foxes. This is done by the use of special protective cages placed on all nests in situ.

The public should be suitably warned with appropriate notices at the periphery of the protected area and in the vicinity of the beaches.

Infrastructure in protected areas should include, where appropriate, well placed information/visitor centres and well demarcated access paths with provisions for the protection of sand dunes and the reduction erosion and disturbance. Walkways over the sand dunes may be needed in places. (These are common in Florida and South Carolina in similar circumstances).

9. In cases where there is already some development in the area, the measures to be taken are of necessity more mitigatory in nature (with varying degrees of success) and what realistically can be implemented will depend on the nature and degree of development. Such mitigating measures are more likely to help in the case of Loggerhead turtles, but are less likely to be effective with Green turtles, which are more sensitive to disturbance (movement, lights etc). The management measures of the beaches and adjacent sea area, already mentioned above (A.3.7) are applicable here also.

10. Where development has progressed too far or is foreseen to continue, it is desirable to restrict as much as possible interference from existing or new installations and activities by several measures that, in many cases, need to be implemented concurrently:

1. Restricting the operation of isolated restaurants, cafes, etc. to daylight hours of work.

2. Setting a minimum distance between any new buildings and the beach. The distance will inevitably vary depending on many factors, such as the morphology of the area, the height of the buildings etc

3. Adopting regulations regarding lights directly visible from the beach or for lights near the beach. Shading and control of lights by various methods is possible and effective to a degree. [The State of Florida developed a Model Lighting Ordinance for Marine Turtle Protection, Chapter 62B-55, which is intended to guide its own counties in creating their own lighting ordinances. This is annexed to this paper as it gives very valuable detailed information and insight into the problems faced and the solutions given. It is underlined here, again, however, that this model ordinance as well as the report mentioned lower down in this paragraph, is applicable basically to Florida and the USA and that the situation of administrative control and law enforcement etc in the Mediterranean is such as to make the effective implementation of such measures, at best, highly questionable. The model ordinance is annexed to this report as a target to aim for and should not be accepted at face value as «justification» for applications aiming at obtaining permits for development in or near sensitive areas. More information on the control of lighting is available at the web site of the Bureau of Protected Species Management (BPSM, 2000). The Florida Marine Research Institute has also produced a Technical Report titled «Understanding, Assessing, and Resolving Light Pollution Problems on Sea Turtle Nesting Beaches» (Witherington and Martin, 1996). This gives background information and discusses solutions to lighting problems]. Realistically however the degree of success in implementing such measures in the Mediterranean needs to be carefully assessed. (Demetropoulos 2003b)

4. Restricting traffic at night on certain roads which have a direct eye-contact with the beaches or by taking measures to hide the lights from cars, e.g. by setting up fences, hedges etc.

5. v. Restricting or controlling or banning the presence of people on the beaches at night during the nesting season, is critical. Stopping mechanical beach cleaning or, at worse, regulating the hours of any mechanical beach cleaning, so that time can be given for the location, protection or relocation of nests.

6. A hatchery may be needed. This will depend on the degree of development, threats etc. and

7. each case needs to be assessed on its own merits after a careful assessment of the situation. Care should be taken so that the setting up of a hatchery does not provide an excuse for further development. It should also not be used as an excuse to downgrade other, perhaps more significant turtle conservation activities such as minimizing disturbance to nesting females or in situ protection of nests (see A.4. below "Selecting areas for setting up hatcheries")

8. If the passage of boats in the coastal zone of the protected area cannot be prohibited completely, which is highly desirable, then restrictions need to be applied. Inevitably they will be mitigatory in nature. Speed limits (less than 6 knots) may be foreseen for example, though enforcement will probably be problematic in such cases. Prohibiting fishing in that zone in the nesting season is necessary.

11. In managing protected areas, capacity building in any team managing a protected area is critical. Protected areas are areas in which conservation is the primary aim. Research activities may of course be necessary, but these should not be at the expense of conservation.

12. Following the setting up of a protected area, well thought out conservation practices to be used need to be followed (Demetropoulos and Hadjichristophorou 1995 and 2008). Priority needs to be given to protecting nests in situ, from predation etc, wherever possible. Relocation of nests needs to be kept to the minimum as this is a complex issue with many pitfalls, though no doubt necessary in some cases. Relocation up the same beach is necessitated in cases of nests laid low down on the beach, which are likely to be swamped by high seas. Relocation to a hatchery is necessary for nests laid on very touristy beaches, where turtles have no future, and/or from areas where the nests cannot be adequately protected in situ from people (driving, steeling of eggs etc)

13. The basic aim is to keep any intervention with nests and hatchlings, at any stage, to the minimum. Let nature take its course if possible (except in the case of predation, as the state of turtle stocks is such that predation needs to be curbed). More comprehensive guidelines regarding actual conservation practices are given in the Manual for Marine Turtle Conservation in the Mediterranean

and its Addendum 1 (Demetropoulos and Hadjichristophorou 1995 and 2008).

A. 4. Selecting areas for setting up hatcheries

14. If a "hatchery", is needed to be set up in a Protected Area, as a result of the need to relocate nests, it needs to be kept in mind that the hatchlings will imprint on the area of the hatchery and will, in time, return there to lay their own eggs. It is, therefore, necessary to select an area that will be safe for them to return to, 30 years or so later, when they mature. (Do not set up hatcheries and do not relocate nests to beaches that are already "developed" or are likely to be "developed" for tourism etc.) It is therefore best to have hatcheries in protected areas. "Hatchery" means an area on a beach to which eggs are relocated to and reburied in the sand.

15. It is best to set up hatcheries on known nesting beaches as these fulfil all the parameters needed for successful incubation, hatching etc. This is proven by the existence of a nesting population there (but keep in mind what has been said in para 7 and in para A.1.1).

16. If large scale relocation needs to be undertaken, as in the case of sparse nesting on long beaches, where nests are difficult to protect, or in the case of areas where eggs may be stolen or destroyed, make sure that the beach chosen to have the hatchery on, will produce a good balance of both males and females. This may be derived from the temperature regimes of nests in that particular rookery. Keep in mind that in nature the female/male ratios are largely unknown and may not necessarily be 1:1. Putting all your eggs in any one basket (one hatchery) is not wise. Setting up hatcheries on different beaches in such cases (of large scale relocations) may be more prudent.

B. SETTING UP MARINE PROTECTED AREAS FOR TURTLES

17. In this case what is first needed is the substantiation of the claim that any sea area (areas)
proposed as a protected area for turtles in fact needs protection. It also needs to be substantiated that that particular area (areas) is more important than other similar areas in the same country. This implies the collection of appropriate data over several seasons and probably over some years. Some such data are already available of course in some cases but it is questionable if the information available is enough except for a few cases. Setting up marine protected areas on inadequate data may backfire and result in difficulties in the future in setting up such areas as suspicions will arise.

18. The process for setting up a marine protected area, after such substantiation, is similar to that mentioned already for nesting beaches and adjacent waters, as far as legislation etc is concerned.

19. What needs to be covered in setting up such a protected area are again the boundaries of the area and the basic management measures (primarily the restrictions to pertinent activities) in that area. These will mainly relate to fishing and the passage of boats.

20. Closed areas are one option, but these are unlikely to be extensive, as they may jeopardise the livelihood in many cases of artisan fishermen. This needs to be kept in mind in any proposals for such protected areas, if they are to be accepted. Fishing restrictions may be more feasible and these relate to the gear, the use of which is to be allowed, the timing of fishing activities (for example the time of setting and hauling of stationary nets). Restrictions also need to apply to trawling (again restricting the duration of hauls so that turtles can be brought up alive). Surface long-lining is not so spatially restricted and will probably not need to be covered, unless very large areas are to be protected, which under the present socioeconomic climate is unlikely to be realistic.

21. Protecting key migration passages, in the spirit of the Action Plan for the Conservation of Marine Turtles in the Mediterranean (RAC/SPA 2007), may be premature at present, for most areas. In most cases, more information is needed to substantiate what is a key migration passage. The passage of a very small number of satellite tracked turtles through an area is unlikely to be accepted as solid evidence of a key migration passage. Jumping to conclusions on too few data may jeopardise the wider credibility of turtle conservation activities. Migrations are temporal in nature and any restrictions to fishing etc in such areas will need to be only in the periods of such migrations to and from the nesting beaches.

22. What has already been said for the marine areas adjacent to nesting beaches is largely applicable also to Marine Protected Areas for foraging grounds and key migratory passages.

REFERENCES

Bowen, B.W., A.B. Meylan, J.P. Ross, C.J. Limpus, G.H. Balazs and J.C. Avise. 1992. Global population structure and natural history of the green turtle (Chelonia mydas) in terms of matriarchal phylogeny. Evolution 46: 865-881.

Demetropoulos, A. and Hadjichristophorou, M., 1995. Manual on Marine Turtle Conservation in the Mediterranean. UNEP(MAP/SPA) IUCN/CWS/Fish. Dept. MANRE (Cyprus).

Demetropoulos, A. 2003a. On Marine and Coastal Ecological Corridors for Turtles. In Colloquy on "Marine and coastal ecological corridors" (Llandudno, Wales, 20-21 June 2002) Environmental encounters 55. Council of Europe

Demetropoulos, A., 2003b. Impact of Tourism Development on Marine Turtle Nesting: Strategies and Actions to Minimise Impact – A Summary. Key-note Presentation, in: Proceedings, First Mediterranean Conference on Marine Turtles (Rome 2001). Margaritoulis, D. and A. Demetropoulos (Editors). Barcelona Convention, Bern Convention /Council of Europe, Bonn Convention (CMS). Nicosia, Cyprus. 27-36

Demetropoulos A. and M. Hadjichristophorou, M. 2004. Turtles and Turtle Conservation in Cyprus. Information leaflet on the Cyprus Turtle Conservation Project. Department of Fisheries and Marine Research. Ministry of Agriculture Natural Resources and Environment. Cyprus. http://www.moa.gov.cy/moa/dfmr/dfmr.nsf/DMLSea_en/DMLSea_en?OpenDocument

Demetropoulos, A. and M. Hadjichristophorou. 2009. The Cyprus Turtle Conservation Project – 29 years on. In: Demetropoulos, A. and O. Turkozan (editors): Proceedings. Second Mediterranean Conference on Marine Turtles (Kemer, Turkey 2005). Barcelona Convention, Bern Convention /Council of Europe, Bonn Convention (CMS).

Demetropoulos A. and M. Hadjichristophorou. 2008. Conservation Practices. Addendum 1 to the Manual on Marine Turtle Conservation in the Mediterranean. UNEP(MAP/SPA) IUCN/CWS/Fish. Dept. MANRE (Cyprus) (1995). 15pp

Fernandez-Galiano, E. 2009. The Bern Convention and the Protection off Marine Turtles in the Mediterranean. Introductory Speech. In: Demetropoulos, A. and O. Turkozan (editors): Proceedings. Second Mediterranean Conference on Marine Turtles (Kemer, Turkey 2005). Barcelona Convention, Bern Convention /Council of Europe, Bonn Convention (CMS).

Kuller Z. 1999. Current Status and Conservation of Marine Turtles on the Mediterranean Coast of Israel. Marine Turtle Newsletter 86:3-5

Margaritoulis D. and K. Teneketzis., 2003. Identification of a developmental habitat of the green turtle in Lakonikos Bay, Greece. Pages 170-175 in Margaritoulis, D. and A. Demetropoulos (editors). 2003. Proceedings of the First Mediterranean Conference on Marine Turtles. Barcelona Convention - Bern Convention - Bonn Convention (CMS). Nicosia, Cyprus. 270 pp

Meylan, A.B., B.W. Bowen and J.C. Avise. 1990. A genetic test of the natal homing versus social facilitation models for green turtle migration. Science 248:724-727.

RAC/SPA (UNEP/MAP). 2007. Action Plan for the conservation of Mediterranean marine turtles. Mediterranean Action Plan. RAC/SPA (UNEP/MAP) Tunis, Tunisia.

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