PHAROS4MPAS

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY

Interreg Mediterranean PHAROS4MPAs

RECOMMENDATIONS FOR THE TOUR BOAT SECTOR

Front cover: Fran tour boat, Veli Lošinj, Croatia
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CONTENTS

EXECUTIVE SUMMARY

The Mediterranean is ringed by diverse natures, cultures and varying levels of development. It has been and still remains an attractive location for nautical tourism. Yet, many Mediterranean states do not have fully effective environmental monitoring and management systems in place for monitoring pollution from this maritime sector.

Nautical tourism is rapidly growing in the region, tour boats are part of it, varying in type, volume and ship size. Smaller vessels (tour boats: day trips, live-aboard tours) deliver smaller scale impacts as their size allows them access to smaller sites. On a regular basis, day after day, these impacts may collectively result in greater impacts on the host environment. Environmental pressures from tour boats often work in synergies with pressures from other forms of visits (yachts, sailing boats, speed boats) which may result in cumulative effects. This has implications at MPA level where sensitive species and habitats may be impacted at a local level. While this may appear to be a localised threat, the MPAs in question are often the centrepiece of conservation for the country involved which conversely has the impact of attracting more visitors to the region, thereby undermining the original conservation objectives of the site.

Data, policy and implementation gaps are to be dealt with on multiple scales. At the level of the MPAs not only managers are often lacking resources to manage and monitor (understaffed and underbudgeted), there also happen to be lacking the authority to take action. Moreover, it has been established that it is often the case that authorities which have the prerogative to enforce the existing legislation are not even present in the MPA areas. Formal coordination between authorities, as well as the role of MPAs in supervising this coordination to cope with the cumulative impacts of different sectors should be strengthened.

Nevertheless, tour boats and MPAs have been coexisting for a long time now in the Mediterranean. Various management approaches and mechanisms have been tested and some have proven efficient to steer the tour boat sector towards sustainable blue growth. New tools are being developed, and progress has been made, e.g. zoning wise. New technologies are now available and competitive which facilitates the development of the habit of relying on more environmentally sound vessels, e.g. new types of boats with hybrid propulsion. Activities geared at raising awareness and educating stakeholders on the impact of visitors on natural resources and ecosystems help foster the implementation of better practices, e.g. cetacean watch code of conduct. MPA managers are building evidence-based management measures tailor made for their MPA, improving the level of involvement of the local communities, marine users, decision makers, as participatory approaches gain ground. Beyond their role of animation and facilitation MPA managers are the ones that can point out the concrete conservation needs which require intervention at a higher level, whether through a national regulation or a stronger transnational commitment.

TOUR BOAT APPROACHING A MOORING ON LEVRNAKA ISLAND, KORNATI

INTRODUCTION

Sustainable tourism is a core pillar for the development of Blue Growth throughout Europe. The Mediterranean has been a top destination for travellers for centuries. With increasing recognition of its importance within the region, in recent years travellers, tourists and locals have all desired to 'get their feet wet'. Technological advances and economic stability have made this desire financially accessible through different means, from the purchase of individual pleasure crafts, rent-a-boat, day trips, live-aboard tours and cruising.

This report focuses on two main types of boating activities:

- Day trips, generally based locally, within or adjacent to an area of interest, in this case a marine protected area (MPA). Small-medium boats, generally less than 25 metres in length, are used, with a capacity ranging from 150 to 250 persons for the biggest. These vessels run trips lasting up to 9 hours and tend to visit locations of particular natural or culture importance. In some instances, these trips can be directed at a specific activity, such as dive tours, whale watching and sea turtle spotting. There is no onboard entertainment and the ticket price is often all-inclusive, including drinks and food.
- Live-aboard tour boats (domestic mini-cruising) are hybrid tours that tend to embark from regional centres within a short distance from the target location. They may also have multiple target locations including MPAs and other natural and cultural features. These vessels tend to be medium size, up to 50 metres in length, host up to 50 passengers and have facilities for their guests to stay overnight. Generally, there is no onboard entertainment, but there is a space to socialise and purchase refreshments.

Currently, there are no global data and general studies are available for the Mediterranean regarding this specific segment of the maritime and coastal tourism sector. Therefore, this study was based on local data, information gathered though interviews with MPA managers and local tour boats operators, as well as expert knowledge.

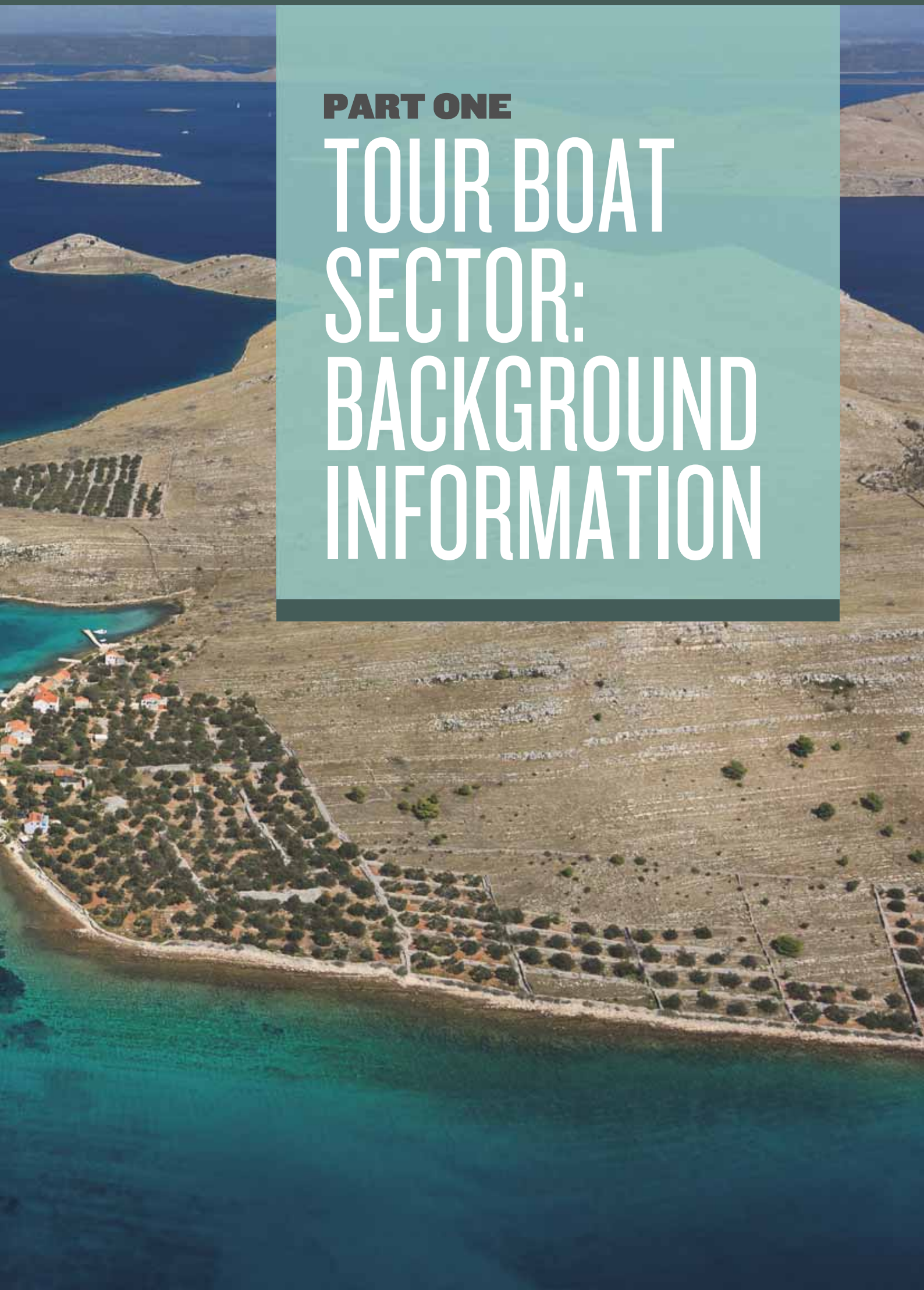
The analysis of the environmental impacts of tour & live-aboard boats, and possible solutions, was backed up by interviews with authorities in selected MPAs. MPAs were selected in a way to represent the variety of the Mediterranean protected areas in terms of geographical position, size, level of demand for visits and age. All of the interviewed European MPAs are also Natura 2000 sites.

Conclusions and recommendations presented in this report are built on feedback from the MPA managers interviewed. However, based on the experience of the experts involved in this study, it can be stated that these conclusions also reflect the overall situation in the majority of Mediterranean MPAs.

The PHAROS4MPAs project explores how Mediterranean MPAs are affected by activities in the growing Blue Economy, and provides a set of practical recommendations for regional stakeholders on how the environmental impacts of key sectors can be prevented or minimized. Encouraging international collaboration across MPA networks and cooperation between state, industry and other actors, PHAROS4MPAs aims to enhance MPA management effectiveness and improve the conservation of marine ecosystems across the whole of the Mediterranean. PHAROS4MPAs focuses on the following sectors of the Blue Economy:

- Maritime transport and industrial ports
- Cruise
- Tour boats
- Leisure boating
- Offshore wind farms
- Aquaculture
- Recreational fisheries

KORNATI NATIONAL PARK, CROATIA



PART ONE

TOUR BOAT SECTOR: BACKGROUND INFORMATION

The nature of the trips involving tour boats are mostly day trips employing the "hop on, hop off" approach. Visiting MPAs by tour boat is common for the majority of Mediterranean MPAs, with a varying number of tour boats and visitors depending on the MPA's size, geographical position and available tourist attractions. The percentage of tour boat visits in relation to other types of nautical tourism varies from MPA to MPA: in some protected area this is the only type of visit (Kuriat Island, Tunisia), whereas for some these represent a rather small percentage (National Park Mljet, Croatia).

Some MPAs have specialised tour boats present in their area, e.g. turtle spotting, whale watching. Live-aboard vessels also visit MPAs, usually as one stop in their itinerary, their presence is low, and in some MPAs they are absent. New forms of boat tourism have been noted recently in MPAs, these include water taxi services, hop on/hop off tours, party boats and mega yachts.

Nautical tourism in general is a popular activity across the EU. The European Boating Industry (EBI) estimates that 48 million EU citizens regularly participate in water sports, 36 million of whom are regular participants in boating activities [1]. The number of recreational craft in the EU is estimated at between 6 million and 6.5 million [1]. The portion of the sector represented by tour boats visiting MPAs remains unknown. The number of tour boats and visitors vary depending on the MPA size, geographical position and tourist attractions in the vicinity. The sector is definitively highly variable, but definitively growing.

Data is required in order to estimate the total pressure from tour boats on MPAs, such as the number of boats; the overall number of visitors; the most frequent travel periods; locations they visit. Indeed, some MPAs find it quite hard to obtain information on the true number of passengers aboard boats visiting the MPA and therefore rely on estimations based on the vessels' maximum capacity. Instead, those MPAs charging entrance fees and those that have introduced e-ticketing systems can easily collect data on tour boat pressure.

Tour boats and nautical tourism in general provide significant income for some MPAs through entrance fees or taxes. To what extend this type of tourism contributes to the economy of local communities and what is the level of their support in most of the cases is unknown. Some MPAs see great potential in tour boats for developing sustainable tourism activities and to gain more support from local communities for the protection of natural resources (Kuriat Island, Tunisia). Others are already experiencing significant pressures from this kind of tourism and are lacking the competences to coped with it, due to the complexity of the sector, the absence of authorities present in the area, their own lack of authority and/or means to enforce local conservation policy, and increasing trends in this kind of tourism (National Marine Park of Zakynthos, Greece; National Park Calanques, France).

As is the case with other nautical sectors, the tour boat sector:

- exerts focused time/location pressures on the most attractive/scenic environments
- focuses on profit maximization
- is not inclined to mitigate negative externalities it produces
- if a location is degraded and less attractive, tour boats move to the another one (i.e. potentially not interested in the long run).

Several iconic MPAs in the Mediterranean are at the forefront of the sustainable management of coastal and marine ecosystems but they are also those that face the strongest pressures. Somehow, victims of their own success in terms of conservation of natural resources, they attract an increasing number of visitors in search of authenticity and preserved nature, landscapes, etc. Tour boats are key players in the discovery of these unique spaces between land and sea.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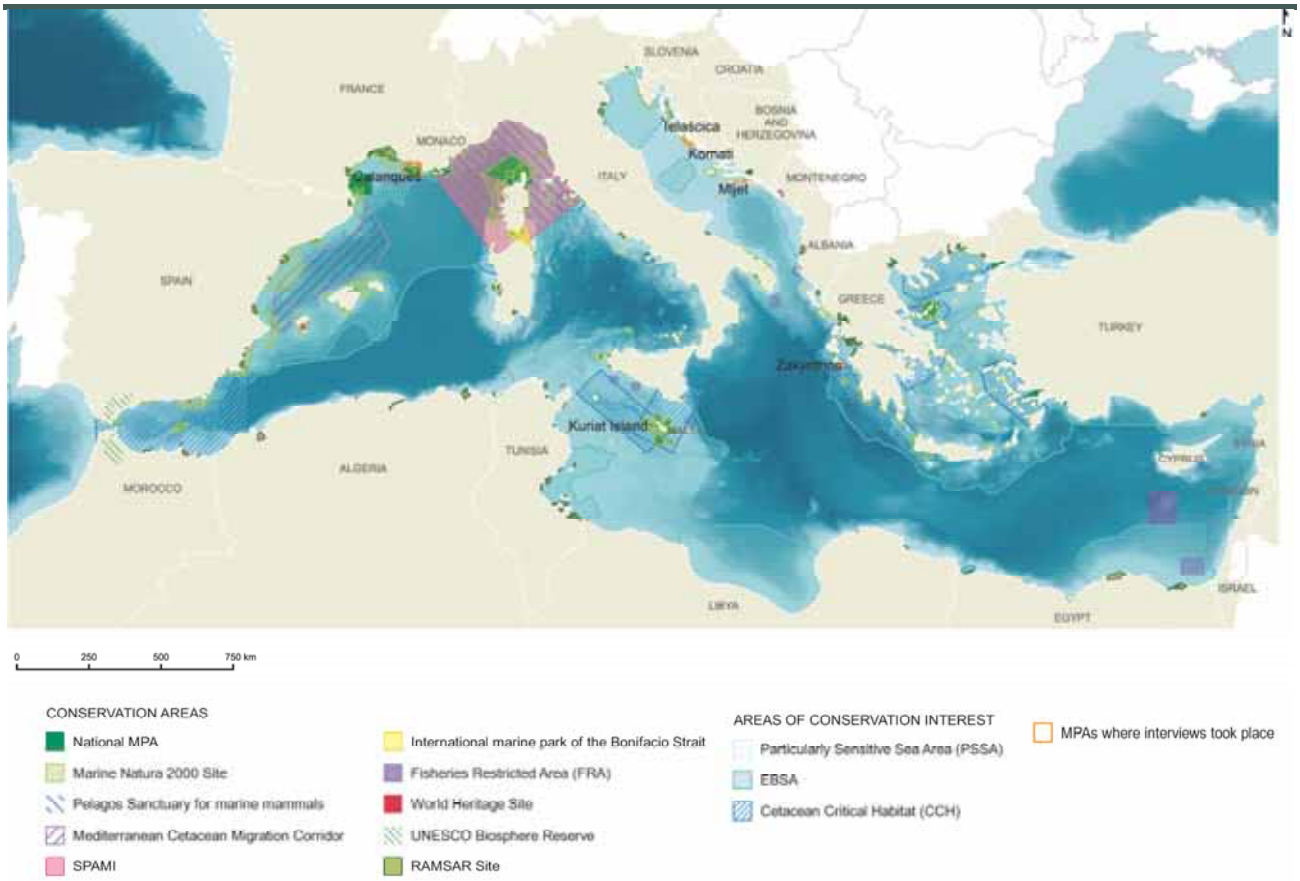


Figure I. Areas of conservation and areas of conservation interest and the pilot MPAs according to the Tour Boats Recommendations Report @ CNR, 2019

KEY FACTS

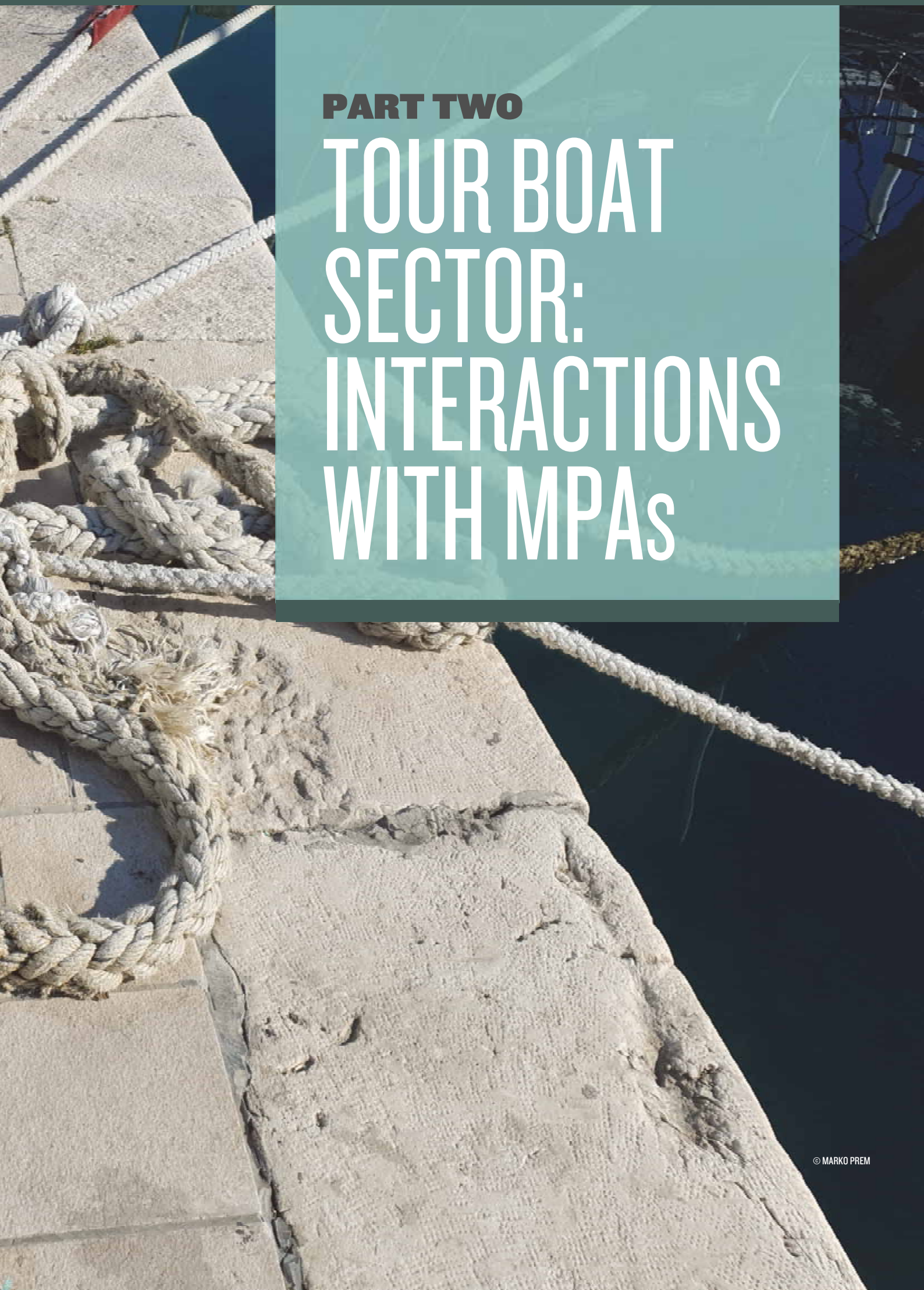
Visits to MPAs by tour boats are common for the majority of Mediterranean MPAs

The number of tour boats and visitors vary depending on the MPA size, geographical position and present tourist attractions

Tour boats provide a significant income for some MPAs through entrance fees or taxes

Tour boats are looking to enter, or at least to get as close as possible to, pristine areas and species, thus exposing them to disturbance and impact

Tour boats exert focused time/location pressures on the most attractive/scenic environments



PART TWO

TOUR BOAT SECTOR: INTERACTIONS WITH MPAs

2.1.
HOW TOUR BOAT ACTIVITIES AFFECT MPAs

Tour boats directly affect MPAs during their operational activities, when crossing and stopping in the protected area. Different types of activities imply a different degree and type of interaction: for example, when visitors are allowed to disembark, then ground interactions are generated with the bottom habitats along the coastline; when scuba-diving and/or snorkelling are permitted then interaction can involve the whole water column; in areas where anchoring is allowed, interactions also include marine bottom habitats.

On a larger scale, interactions also happen due to the presence of ports and mooring/docking points from/to where boats start their journeys as well as their destinations (outside or inside the MPA). Moreover, the existence of this type of tourist offer stimulates the development of reception facilities (hotels, campsites, restaurants, etc.) and related transport infrastructures, exerting influence on the overall area, (e.g. soils consumption to fulfil the need for facilities and infrastructures, traffic, energy and water/food consumption, waste generation, wastewater discharge, emissions, noise, etc.).

As with other types of nautical tourism, tour boats not only interfere directly with habitats and species, but also determine a given degree of impact on all the environmental matrices: air, water and soil, in addition to the biota.

In the past few decades, there has been a substantial growth in coastal ecotourism, as tourists have demanded access to wildlife in as non-destructive fashion as possible. Whale and dolphin watching, coastal estuarine/lagoon bird watching and glass-bottom boat are all increasingly common. Policed properly, much of such tourism is either inoffensive or has potentially beneficial effects exemplified by the preservation of large tracts of coastal wetland for bird watching. Problems are caused by exaggerated demand [2].

Finally, as stated above, the specificity of this segment of tourism relies on the fact that the boats will strive to reach the most remote and pristine areas within MPAs and to get as close as they can to, if not in touch with, sensitive habitats and species. This characteristic defines the peculiarity of the interactions generated by this sector and the types of impact they can have on certain MPAs.

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2.2.
IMPACTS OF THE TOUR BOAT SECTOR ON MARINE ECOSYSTEMS

Tour boats share several impacts with other types of vessels relevant to nautical tourism, but emissions and discharges, when present, are much less impactful when it comes to smaller passenger vessels. However, as MPAs and other sensitive habitats in the Mediterranean can be easily accessed by these smaller vessels, measuring the impact of recreational activities exerted by these MPA visitors would be key.

If small sailing vessels (sailing dinghies, sailboards, motor-less small yachts) appear to cause little or no environmental impact, larger sailing vessels with auxiliary engines, or motorboats with outboard or inboard motors have been implicated in several types of environmental degradation [2].

Impacts from tour boats on MPAs have not been widely documented, but a study [3] ran a literature review on recorded impacts from recreational activities in the Mediterranean Sea on key habitats and species. The results show impacts originating from the vessels themselves (i.e. during anchorage) or from the visitors once they've reached the MPA (i.e. scuba diving and trampling). A summary of the results is provided below.

Anchoring affects benthic habitats such as *Posidonia oceanica* meadows and *Cynodosea nodosa* meadows as well as coralligenous assemblages. Both mobile fauna and epi-fauna are negatively affected by the destruction of these habitats. Installing ecological mooring buoys can help ease these impacts.

On shore, trampling over rocky and sandy beaches, as well as over vermetid reefs and lithophyllum rims is proportionally increasing along with the number of visiting tourists. This has direct and indirect consequences on the marine environment's flora and fauna.

Scuba diving and snorkelling can often be associated with tour boating, as these activities are part of the tour activities proposed, which also affect coralligenous assemblages, both hard and soft corals, but also other natural communities residing in marine caves' sciaphilous assemblages. Impacts can even extend to altering fish behaviour.

IMPACT	KEY-SPECIES	KEY-HABITAT
ANCHORING	*Posidonia oceanica* *Cymodocea nodosa* *Cystoseira* spp.	*Posidonia oceanica* meadows *Cymodocea nodosa* meadows Infralittoral algal assemblages
	Cladocora caespitosa	–
	Paramuricaea clavata *Eunicella* spp. *Lophogorgia ceratophyta* *Pentapora fascialis*	Coralligenous assemblage
SCUBA DIVING	*Astroides calycularis* *Leptopsammia pruvoti* *Parazoanthus axinellae* *Myriapora truncata* *Sertella* spp. *Corallium rubrum*	Sciaphilous assemblages of marine caves
	Paramuricaea clavata *Eunicella* spp. *Lophogorgia ceratophyta* *Pentapora fascialis*	Coralligenous assemblage
TRAMPLING	*Lithophyllum* spp. *Cystoseira* spp. *Patella* spp. *Dendropoma petraeum*	*Lithophyllum* rims Rocky lower midlittoral Rocky upper infralittoral Vermetid reefs
	Small interstitial invertebrates	Sandy beaches of lower midlittoral and upper infralittoral

Table I. Turtle Key species and key habitats potentially threatened by human recreational activities in the Mediterranean Sea. (Source: [3])

Solid waste

Marine litter is a source of considerable and growing pressure in MPAs. Several past and ongoing regional EU projects are dealing with the marine litter issue in MPAs and at Natura 2000 sites (ACT4LITTER, DeFishGear, ML REPAIR). Monitoring results show that amount of marine litter in MPAs is often higher during the off-season months, indicating that the majority of marine litter is transported there by sea currents and wind, and that marine litter accumulates in the sea from various sources and locations, and is also churned up from below the thermocline when the autumn winds start to churn the water column.

MPAs are not the competent authorities for the solid waste management in their area, rather this is usually managed by the local utility companies. Where such companies do not exist (e.g. remote, uninhabited areas) or have very low capacities, MPA authorities participate in waste management, either individually or through cooperation with companies. Some MPAs financially contribute to the operation of local utility companies, depending on the number of visitors the MPA receives and whether they are charging entrance fees or taxes (e.g. Mljet National Park, Croatia). Clean-up activities – often organised through volunteer service – are sometimes the only way to collect the huge amounts of marine litter accumulated along the shoreline.

Tour boats mainly have the practice of taking solid waste back to the port of origin or leaving it at waste disposal areas in MPAs, thus they contribute to the amount of solid waste in the sea mainly through occasionally littering from vessels, either by individual passengers who throw litter overboard, leave it at inappropriate sites within the MPA or by accidental littering from vessels due both to wind and the boat rocking in bad weather.

Hazardous emissions

Also, even though MPAs do not recognise this as a significant threat, tour boats may have impact through bilge water discharge. Bilge water may have significant impact on the environment due to the fact that they contain oils and lubricants from the engine. Boats usually discharge bilge water at open sea or in ports, when the infrastructure is available. Whether discharge occurs at open sea within MPA borders is unknown, since most MPAs do not have capacities or tools to monitor this aspect. Some MPAs have natural sources of petrol discharging into the sea, which makes it even harder to identify the source of pollution (National Marine Park of Zakynthos, Greece). In most of the cases MPAs are not the competent authorities to charge fines for discharging bilge water, and they need to collaborate with other institutions (inspections, port authorities etc.) which are sorely lacking in some MPAs, especially remote ones.

The majority of boats have automatic pumps that discharge when bilge water containers are full, which can happen at any time and in any place. These pumps can also switch to a manual operating system, but boat owners tend not to do this as it may be hazardous for the boat if bilge water isn't discharged on time, which they would have to monitor additionally (source: personal communication by some boat operators).

Some MPAs are starting to promote electric boats that have lower environmental impact in terms of pollution from bilge water, air pollution, noise pollution and CO_2 emissions (National Park Calanques, France; Mljet National Park, Croatia) (see Recommendation section below).

Gaseous emissions

MPAs do not recognise gaseous emissions from tour boats as a significant threat, except in regards to the visitors' olfactory experience in some cases. The number of tour boats present in MPAs still isn't high enough to visually record air pollution. However, MPAs are not competent authorities to regulate or monitor this impact, so there is no precise data on this source of pressure.

Wastewaters

MPAs recognise discharge of wastewaters from tour boats as a significant threat to the protected area. In addition, visitors from these boats use local restaurants or MPA infrastructure toilets (visitor centres, info points etc.) which in many cases discharge directly into the sea or through porous septic tanks and therefore indirectly contribute to the wastewater problem (Kornati National Park & Telascica Nature Park in Croatia).

Usually MPAs are not competent authorities to regulate wastewater management or to charge fines, they need to collaborate with other institutions (inspections, port authorities etc.) which, again, are not present in the field in some MPA areas. This becomes critical especially when it comes to entering private properties to inspect potential discharge (e.g. restaurants, bars).

Regarding tour boats, MPAs find it difficult to prove that a specific boat discharged and not another boat, as we are dealing with the marine environment (sea water, winds, currents) and moving objects (boats).

Non-indigenous species (NIS) transfer

MPAs are recording the presence of non-indigenous and invasive species in their protected areas. *Caulerpa cylindracea* (*Caulerpa racemosa*, previous name) has become the most widely distributed and recognised marine invasive species. The further development of *Caulerpa cylindracea* populations in MPAs is unclear, but through existing monitoring it has been noted that this species progresses quickly in damaged habitats (e.g. posidonia beds damaged by anchoring) whereas it has stabile populations in healthy habitats, with limited impact on other habitats and species (e.g. Zakynthos National Marine Park, Greece). The majority of MPAs gave up controlling *C. cylindracea* populations since they recover rapidly. Some MPAs have attempted targeted control of populations in specific areas with important biodiversity features. (*Cladocora caespitosa* reef in Mljet National Park, Croatia). Although present, other marine invasive species are rarely recognised or monitored by MPAs.

Small leisure vessels have been shown to have a significant role in NIS transmission [4], [5], [6], particularly in the rapid secondary spreading of organisms that have already transported from port to port by large commercial vessels.

Regarding the day-to-day impact of tour boats – they most probably do not transfer invasive species through anchoring since they rarely anchor in MPAs, rather they moor on pontoons, buoys and other coastal facilities. Whether they transfer invasive species on boat surface or in some other way is unknown. Boats in the majority of MPAs do not use ballast waters.

Another problem is the transfer of species from onboard the vessels, that are indigenous to a wider area but not in local specific sites, such as rats, cats and rabbits. These species can pose a significant threat to populations at specific species such as sea birds and marine turtles, as they prey on eggs and young animals, as well as on local flora and vegetation in general (rabbits). Controlling the populations of these species can be quite challenging but is achievable, especially on smaller and uninhabited islands (Kuriat Island, Tunisia).

Biocides

MPAs are aware of this threat but have no information whether the tour boats visiting MPAs use antifouling biocides. Due to international conventions and EU legislation, a large number of biocidal active substances have been regulated or banned over the past two decades [7]. However, it remains unclear how well this legislation is implemented, especially where older boats are concerned. In general, tour boats spend a limited time in MPAs so even if present, it is a question how much of these chemicals is actually released during their stay.

TURTLE SPOTTING TOUR BOATS
IN NATIONAL MARINE PARK ZAKYNTHOS, GREECE

Physical disturbance and collisions

Physical disturbance and collisions are recognised as a significant threat in MPAs that host species sensitive to interactions with boats and humans in general, such as monk seals, cetaceans and sea turtles. In the majority of MPAs collisions involving boats and animals are rarely recorded while disturbances feature regularly. When estimating impact, it is important to bear in mind the migratory character of these species and the wide distances they might cover, as well as the fact that the majority of MPAs and Natura 2000 sites in the Mediterranean are rather small in size. For example, tour boats on the way to MPAs pass near fish farms where dolphins go to feed (outside MPAs), here dolphins are often harassed by the boats that want to get as close to them as possible.

Tour boats tend to disturb animals by approaching them in an inappropriate way (speed, direction, duration of stay, entering caves with monk seals) and by increasing the number of people in the MPA who disturb the animals (swimming, snorkelling, walking on sand dunes, digging nests etc.). This is especially problematic during feeding, breeding and nesting activities, which often overlap with tourist season. In some MPAs there are tour boats specialised for turtle spotting and dolphin/whale watching tourism activities (National Marine Park Zakynthos, Greece; Kuriat Island, Tunisia; Blue World Institute, Veli Losinj Natura 2000 site, Croatia).

Intensive whale and dolphin watching activities by boats and swimmers can disturb marine mammal behaviour and acoustic activity [8], [9]. In the early 2000's a report [10] showed that the numbers of incidents of ship strike by whale watching boats in the US (second only to the US navy in importance) were major cause of death and injury to whales.

Even if good legal frameworks for the protection of an endangered/protected species/habitat exist (at international level under the Convention for Biological Diversity, at EU level under the Habitat and Bird directives, at national level by national laws, MPA specific rulebooks etc.) it is usually very hard to define disturbances and harassment of protected species in the field. Consequently, it is hard to prove this at court and to charge fines. Also, MPAs are rarely competent authorities for controlling the boats' speed and the routes they take, nor for charging fines. So, it is very important to develop cooperation with competent authorities (port authorities, inspections) and tour boat owners in the implementation of conservation measures, control and raising awareness among visitors.

Physical disturbance from tour boats and/or visitors from tour boats is also related to degradation of sea bottom habitats by anchoring and degradation of particular habitats by the visitors present at a certain space and time (e.g. swimming in lake Mir at Telascica Natural Park: case-coliforms, urine, etc.; trampling of sand dunes in Kuriat Island, Tunisia). Tour boats usually have fixed itineraries, these are one day visits with limited duration, so they all tend to visit the same sites in MPAs at the same time resulting in crowding (Telascica Natural Park, Croatia). It is important to note that tour boats rarely anchor in MPAs, rather they use existing coastal facilities for mooring, which significantly reduces this aspect of impact. However, growth in the tour boat industry can lead to an increase in demand for coastal mooring infrastructure and pressure to construct new marinas, ports, moorings in and around MPAs which leads to further degradation of coastal and marine habitats, and a general increase in environmental pressures in the MPA.

Besides causing anchor damage in seagrass beds, motor-boats also cause damage to seagrass meadows by propeller action in shallow water. This phenomenon has been particularly well studied in the coastal waters of Florida where an aerial survey in the early 1990s showed that some 70,000 ha of 1.1 million ha of seagrass beds was damaged by propellers [11].

Noise

Noise pollution in the marine environment is a significant problem often neglected by reviews of marine pollution, yet low frequency noise has doubled every decade since 1950 [12]. The sources of submarine noise are numerous, ranging from natural to anthropogenic such as, ship traffic, seismic surveys and low-frequency navy sonars [13]. Sea ambient noise affects many marine species for which sound is the basis of survival; in particular, those marine animals which use hearing as their primary foraging and communication sense. Long-term exposure to intensive sound results in modification of behaviour and use of habitat in some fish species [14], [15].

Research in the Cres–Losinj archipelago (northern Adriatic Sea, Croatia), has shown that the resident population of bottlenose dolphins (*Tursiops truncatus*) avoids areas with frequent nautical vessel traffic, which result from more intense traffic in tourist season [16]; spend less time on feeding and


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resting activities, and more time on activities of avoiding contact [17].

MPAs recognise noise and underwater noise as a potential threat but have very limited information on the noise levels, distribution and main sources, especially for underwater noise. However, available data indicates that underwater noise is present and that nautical tourism in general can produce significant noise (e.g. research around Kornati, National Park, Croatia; in National Marine Park Zakynthos, Greece; Blue World Institute, Veli Losinj, Natura 2000 site, Croatia). It is unclear how much tour boats contribute to underwater noise pollution compared to speedboats, yachts, mega yachts, sailing boats etc. In general, it is perceived by MPAs that speedboats and in general boats with stronger engines have higher contribution to this form of pollution. However, some research indicates that the cumulative impact of the noise generated by a large number of small boats should not be underestimated (National Marine Park of Zakynthos, Greece).

Tour boats may also produce a significant amount of "terrestrial" noise, this is mainly through megaphones and loud speakers used to inform visitors and for parties on boats either during the overnight stay or cruising within or around the MPA. In addition to environmental impacts, this kind of noise may result in conflicts between different users of the area (e.g. tour boats-guests in nearby resorts, tour boats-individual nautical tourists). Some MPAs have managed to introduce regulation that for example prohibits usage of megaphones in sensitive areas (e.g. coves in the Calanques National Park, France). However, most MPAs do not have the legal tools nor the authority to regulate this impact.

Light

Tour boats do not provide accommodation so tourists visit MPAs during the day and they return to the port at evening. If the port is in the MPA, then it is usually in a village or a town where light pollution is already present. Tour boats therefore do not contribute significantly to light pollution. Live aboard vessels sometimes stay in the MPAs over night, but the number of these boats and visits is still considered very low in MPAs. Additionally, in relation to tour boating, one can consider the influence of coastal restaurants and marinas that use underwater artificial light for decorative purposes. The impacts of light pollution in MPAs hasn't been well researched, monitored or regulated.

KEY FACTS

Waste: Tour boats mainly have the practice of taking solid waste back to the port of origin or leaving it at waste disposal areas in MPAs, thus they contribute to the amount of solid waste in the sea mainly through occasionally littering from vessels, by individual passengers who throw litter overboard or leave it at inappropriate sites within the MPA, or by accidental littering from vessels due to the wind and the boat rocking in bad weather.

Hazardous emissions: Tour boats visiting MPAs may have impact through bilge water discharge, however MPAs fail to recognise this as a significant threat.

Gaseous emissions: MPAs do not recognise gaseous emissions from tour boats as a significant threat, except in regards to the visitors ' olfactory experience in some cases.

Wastewaters: MPAs recognise discharge of wastewaters from tour boats as a threat to the protected area. In addition, visitors from these boats use local restaurants or MPA infrastructure toilets (visitor centres, info points etc.) which in many cases discharge directly into the sea or through porous septic tanks, and therefore indirectly contribute to the wastewater problem.

Physical disturbance and collisions: Physical disturbance and collisions are recognised as a significant threat in MPAs that host species sensitive to interactions with boats and humans in general, such as monk seals, cetaceans and sea turtles. Physical disturbance from tour boats and/or visitors from tour boats is also related to degradation of sea bottom habitats by anchoring, as well as degradation of particular habitats by exposure to a high volume of visitors present in a certain space and time (swimming, snorkelling, walking on sand dunes, digging nests etc.).

Noise: MPAs recognise noise and underwater noise as a potential threat but have very limited information on noise levels, distribution and main sources, especially for underwater noise. It is unclear how much tour boats contribute to underwater noise pollution compared to speedboats, yachts, mega yachts, sailing boats etc. However, some researches indicate that also cumulative impact of large number of small boats should not be underestimated. Tour boats may also produce a significant amount of "terrestrial" noise, this is mainly through megaphones and loud speakers (visits, parties, etc.)

Light: Tour boats do not provide accommodation so tourists visit MPAs during the day and return to the port during the night. Tour boats therefore do not contribute significantly to light pollution. Live aboard vessels sometimes stay in the MPAs over night, but the number of these boats and visits is still considered very low in MPAs.

General consideration about impact management: MPAs are not competent authorities for navigation and environmental controls (waste, wastewaters, etc.) therefore cooperation with competent public authorities is key.

2.3. TOUR BOATS IN MPAs: WHERE ARE THEY PERMITTED?

The IUCN divides MPAs into six categories depending on their primary conservation objectives [18].

Tourism is allowed in five of these categories if exerted in the form of "large scale low intensity tourism":

- **Category II**, large natural or near natural areas aimed to protect large-scale ecological processes
- **Category III**, aimed to protect a specific natural monument
- **Category IV**, aimed at **protection of particular species or habitats** (e.g. sanctuaries for marine mammals), often including active management to limit the impacts of human activities
- **Category V**, aimed at **seascape protection**, typically in coastal areas with a focus on the interaction of people and nature
- **Category VI**, aimed at **sustainable use of natural resources**, where social and economic benefits for local communities are included among secondary objectives.

Whether tour boats can be considered a "large scale low intensity tourism" activity is a matter for balance between the MPA size, the number of visitors, the intensity of presence during the year. This balance, corresponding to the carrying capacity of the MPA, represents the key management issue and should be achieved by also taking into consideration the cumulative impact the MPA is subject to, taking into account other segments of maritime tourism and other maritime activities eventually present in the area.

Tour boats are definitely not appropriate for Category I MPAs, as strictly protected areas or relatively undisturbed seascapes are to be left free of human disturbance.

Management and enforcement, however, are challenging. MPAs have multiple access points, and it's difficult to patrol remote areas.

Categories	Ia	Ib	II	III	IV	V	VI
Description	Strict nature reserve	Wilderness area	National park	Natural monument or feature	Habitat/ species manageme nt area	Protected landscape/ seascape	Sustainable use of natural resources
Large scale low intensity tourism	✘	✘	✔	✔	✔	✔	✔

Table 2. MPA categories and appropriate tourism activities (Source: [18])

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PART THREE

PREVENT OR MINIMIZE IMPACTS OF THE TOUR BOAT SECTOR ON MPAs: RECOMMENDATIONS FOR MEDITERRANEAN STAKEHOLDERS

An efficient legal framework is required to prevent, or at least, to minimize the impacts of tour boats on MPAs. This framework should include national legislation, site specific rulebooks, spatial plans and management plans. Legislation dealing with the management of tour boats is rarely directly related to nature conservation but is dedicated to other sectors instead, such as maritime transport, waste management, health, safety, etc. Defining carrying capacities, usage zones, and limiting boats size and number are seen as potential management strategies to deal with pressures. Since tour boats operate under national flags and are entered into national registries, pressures can be effectively managed if the authorities so wish and can afford to do.

Implementation of solutions requires overcoming some limitations and constraints. Firstly, MPAs are rarely the competent authority for managing maritime activities in the protected area. This is usually under the competence of the port authority, maritime police or other bodies exerting control. Moreover, in the majority of cases, rangers can only give a warning to the boat owner/captain/visitor, but have limited legal tools to actually prescribe fines and encounter difficulties in collecting proves acceptable on court.

Close cooperation of MPAs with competent authorities, strong political will, stakeholder's engagement and raising awareness are, therefore, crucial for an efficient control of this type of maritime activity and for managing this type and scope of pressure.

Experiences and potential management solutions in general can be transferred from MPA to MPA, but in the majority of cases they have to be adapted to local circumstances since every MPA is quite unique in terms of biodiversity features, geographical position and size, legal framework and local culture.

The following sections address examples of good practices and derived recommendations to 3 key target groups:

- MPA managers
- Public authorities
- Tour boat operators/companies

Recommendations have been divided into three types:

- Preventing impacts on ecosystems: these preventative measures involve regulation of vessel transit (e.g. forbidden areas, speed limits) and operations (e.g. anchoring, manoeuvring).
- Minimizing impacts on ecosystems: some impacts cannot be entirely avoided, but can be reduced (e.g. waste, noise and pollution emissions, distribution and intensity of pressure over time).

VIEW OF THE PALM ISLAND NATURE RESERVE FORM THE DECK OF A TOUR BOAT, LEBANON

TOUR BOAT IN THE LA MADDALENA NATIONAL PARK, ITALY

© SARDEGNA TURISMO

3.1. MPA MANAGERS

MPA managers can play a very important role in improving the environmental sustainability of tour boat activities. Since tour boats are essentially managed locally, generally by individual or small size companies, MPA managers can undertake or stimulate actions at local level, like e.g. introducing sustainable planning and management measures in their MPAs, building dialogue with the tour boat sector, engaging local stakeholders and communities in co-developing sustainable tour boat practices. These types of activities can help prevent and mitigate impacts from the sector. Other important activities are related to improving knowledge levels (e.g. better understanding of environmental impacts, experimenting with innovative technical solutions) and raising awareness (e.g. informing tourists about the importance of respecting rules). Mediterranean and worldwide examples of good practices are available and can be well employed in other MPAs across the basin.

3.1.1. PREVENTING IMPACT ON MARINE ECOSYSTEMS

ZONING MARINE ACTIVITIES

OBJECTIVE:
Identify areas where tour boats cannot transit and/or anchor

The Calanques National Park (France) is quite representative of the threats facing MPAs regarding tour boat activities. Particularly, threats involving anchorage impacting on Posidonia meadows; waste and waste water dumping issues; noise and air pollution. The pressures are higher in the marine area, especially at the top of the cove, with high concentration of boats in the most fragile sites. The importance of the overall cumulative impacts of smaller boats is as of yet unknown.

As a means of coping with these threats, the Park has undertaken to define the Global scheme of uses in the area of the Park (2019), to plan and organize, in the best possible way, the uses regarding biodiversity and frequenting certain areas. The implementation of structures for anchoring bigger tour boats in the vicinity of the Park will be planned and the carrying capacity will be set by the number of moorings available. Indeed, this reveals many other options and questions, such as the option of prohibiting mooring in areas deeper than 30 m (like in the Marine Park Cote Bleu).

Figure 2. Zoning in the Calanques MPA (Source: www.calanques-parcnational.fr)

REGULATING WILDLIFE WATCHING ACTIVITIES

OBJECTIVE:
Prevent harnessing bioresources of wildlife

The increasing interest in developing wildlife watching tours, as a base for wildlife watching, in the Mediterranean has implications both within and beyond MPA boundaries. The Pelagos Sanctuary for Mediterranean Marine Mammals is a transboundary marine protected area between France, Monaco and Italy, covering an area of around 87,500 km^2 and was established in 1999. It was also added to the Specially Protected Areas of Mediterranean Importance (SPAMI) list of the Barcelona Convention. In the Sanctuary, a **code of conduct specific for whale watching activities** has been established, whereby acoustic disturbance and fuel discharge is mitigated so as to protect the marine mammals it hosts. Moreover, whale watching is prohibited within 5 nm from the coast, where as speed limits for whale watching vessels (10 knots) were set within 1,000 m from the coast. Additionally, an area of vigilance of 300 m of the animal is established once the whale is spotted in the sea, while within 100 m the vessels are prohibited from approaching. Finally, the direction of the vessel is also set, as the whale shouldn't be approached from the front nor from the back.

Additional, non-Mediterranean examples of developing code of conduct for wildlife watching are available [20].

Grey nurse shark (Eastern Australia). Detailed guidelines/codes of conduct together with the almost complete compliance from divers, led to the gradual development of tourism interactions with the critically endangered grey nurse shark (*Carcharias taurus*) in Eastern Australia [21]. Monitoring studies have reported the absence of significant changes in behaviour or occurrence/density of grey nurse sharks, despite the regular and frequent encounters with divers [22]. The integration of scientific data on the ecology of these sharks with information gathered on participants' perception and behaviour has allowed to improve shark-divers interactions through the development of an adaptive management framework [23] with strict regulations aimed at protecting the sharks from being disturbed while allowing tourist activities.

Minke whale (Northern Australia). In the Northern sections of the Great Barrier Reef (GBR) Marine Park, Australia, whale-watching organizations have developed an effective system for swimming with dwarf minke whales (*Balaenoptera acutorostrata*) with minimum or no observed negative impact on the presence and behaviour of the cetaceans [24], [25]. The animals were found to voluntarily approach slow moving/stationary vessels and swimmers, which would indicate a lack of disturbance from this tourism activity and even interest or curiosity on behalf of the cetaceans involved [26]. Limited vessel presence (a maximum of 6 permits per year are released), highly managed swimmer behavior and strict regulations concerning the duration of the encounters as well as speed, direction and distance from the whales, allow for the animals to carry on with their activities and dictate the terms of the interaction. Despite the lack of information about the biology and ecology of these animals, the measures introduced and the prevention principle employed at the early stages of development of this particular activity have allowed for the development of a popular and successful tourism activity that does not appear to negatively affect the health of the animals involved.

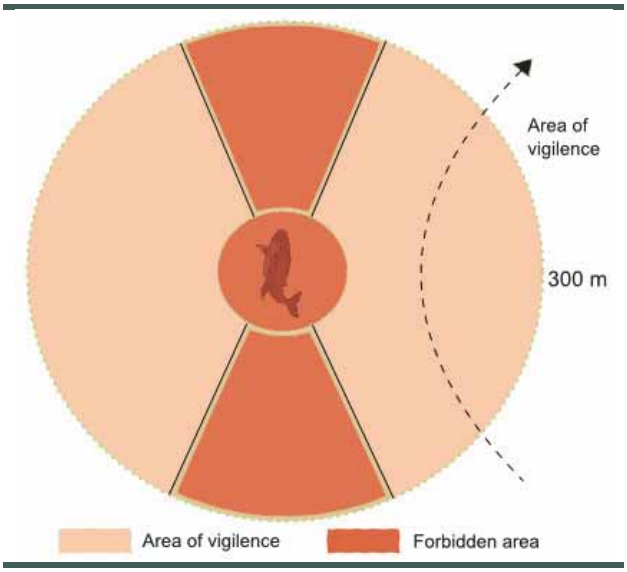

Figure 3. Distances to be respected and areas of approach to a cetacean (Source: PAP/RAC, adapted from Code of Good Conduct for whale watching in the Mediterranean Sea, Pelagos 2018 [19])

Sea turtles (Costa Rica; Australia). The highest volumes of people interacting with sea turtles normally occur at nesting beaches, where tourists observe female turtles laying eggs. This activity is practiced in several locations around the globe with regulations developed and enforced to ensure the safety and wellbeing of the turtles and the eggs, e.g. Tortuguero in Costa Rica [27] and Mon Repos in Australia [28]. Because of the existence of strict guidelines and codes of conduct based on scientific information and adjusted on direct observations from operators, this form of tourism has been refined over time to minimize impact on the behavior and health of the animals involved. Although there is not much information published in the literature, many sea turtle tourism ventures employ similar codes of conduct.

RECOMMENDATIONS TO **MPA MANAGERS**

- Make use of zoning as a tool to separate incompatible activities at sea and to protect species and habitats
- Develop zoning to reflect identifying areas with restriction to tour boats access, regulate mooring and anchoring, and provide adequate infrastructure to avoid impacts to benthic habitats
- Engage with relevant public authorities to promote enforcement of regulations that give legal power to zoning
- Promote joint surveillance of MPA by rangers and competent authorities for efficient law enforcement
- Adopt practical measures such as installing boardwalks and monitoring to reduce direct physical contact between visiting tourists and the land itself, thus reducing tourist impact on rocky/soft bottom communities
- Develop codes of conduct to regulate wildlife watching activities, including capping the number of boats licensed to access the area.

AERIAL VIEW OF NATURE PARK TELASCICA, CROATIA

© NP TELASCICA

3.1.2. MINIMIZE IMPACT ON MARINE ECOSYSTEMS

TOUR BOATS ACTIVITIES TAKEN ONBOARD IN MPA MANAGEMENT PLAN

OBJECTIVE:
To plan, control and sustainably manage tour boat activity

To develop ecologically sustainable tourism in MPAs, tourist activity management should be planned as part of the management plan implemented within the framework of marine protected areas. This applies also to tour boats, being this sector exerts a relevant pressure in many MPAs.

Telascica Nature Park in Croatia has developed, though a participatory approach, a **sustainable tourism management plan** and a spatial plan with various measures to mitigate impacts of visits. Concession approvals, contracts with boat owners and entrance tickets are applied. Also, although no easy task, effort is made to redistribute visitors, in space and time, from the core attractions of the park to other less visited locations (visitor centre, underwater trail, adrenaline park). At present, implementation of the Plan is still limited due to the lack of legal framework at national level that leaves management uncertainties.

In the National Park Kornati (Croatia) monitoring of the number of visitors and some degree of control are obtained through **management measures** like entrance fees, electronic entrance fee payment system, on-line booking and development of visitor centres. Dialogue with and control of the tour boat sector is formalized through contracts with tour boat owners. Mitigation of impact from anchoring is done by installing pontoons to accommodate tour boats and moorings for yachts and sailboats. Also, in this case, implementation of the Plan is still limited due to the lack of legal framework at national level that leaves many management uncertainties.

In the Calanques National Park (France) quite a large array of **management measures** has been identified that are aimed at limiting the overall presence of tourists and minimizing the impacts (e.g. physical disturbance, noise emission):

SPILL OVER EFFECT OF GOOD MANAGEMENT PRACTICES

The creation of the Calanque National Park led to the establishment of new regulations. Their enforcement has led to the transfer of some pressures, and related negative impacts (e.g. illegal boating and fishing practices, or just the increase of users) to neighbouring areas. This phenomenon is named "spill over effect". The Calanques National Park authorities are actively involved in the definition of management plans for the protected areas in the vicinity of the Calanque National Park, such as the Natura 2000 site of the Ciotat Bay (maritime adjacent area) and the Marine Nature Park “Cote Bleu”.

- The number of authorized boats is limited;
- For the safety of the less visible and vulnerable users, such as bathers or kayakers, but also for the respect of the tranquillity of the premises (noise reduction, waves, etc.), the speed is limited to 5 knots in the band of 300 m;
- No messages broadcasted by loudspeakers on tour boats is allowed to respect the quiet in the most sensitive areas
- No passengers are allowed on land
- The Barnier tax in France establishes that all the passengers of maritime transport vehicles embarking to protected natural areas finance the protection of these spaces.

The Dry Tortugas National Park in USA, suffering from congestion due to nautical tourism pressures, the park adopts 5 different adaptive management scenarios to adapt to seasonal changes and modification in tourism pressure on its natural resources (namely sea turtles and corals, as well as sea grass and nesting birds). The strictness of the measures increases with the level of protection. Boat permits are required for all vessels in the park, including within the Research Natural Area (RNA), where higher fees apply for all users [29]. The only vessels exempt from this rule are those transiting the area without stopping. Vessels may only anchor overnight on sandy bottom within one nautical mile of the Garden Key Harbour Light. Within the RNA, vessels may use one of seven recreational mooring buoys for day use only.

UBERIZATION OF NAUTICAL TOURISM – NEW PRACTICES AND RISING ISSUE

In the **Calanques National Park**, like in other French National Parks, entrance is free of charge for individual visitors. In order to avoid paying an entrance fee, more and more visitors are renting leisure boats and a skipper, and then visit the park as individuals. In this case, in common law you are not under the regulation of commercial boating. This is a loophole that allows visitors to enter the Park without specific authorization and without having to pay taxes. Either a ban or a regulation is needed to tackle this rising issue.

Figure 4. Dry Tortugas National Park boundaries (Source: Dry Tortugas National Park)

ARRIVAL OF TOUR BOATS IN THE NATURE PARK TELASCICA, CROATIA

© NP TELASCICA

DEVELOP MULTI-ACTOR'S GOVERNANCE AND CO-MANAGEMENT TO STEER GOOD ENVIRONMENTAL PRACTICES

OBJECTIVE:
Promote environmentally sustainable tour boat practices in collaboration with stakeholders and local communities

MPAs tend to work with the tour boat companies to implement codes of conduct during their stay in the MPA and to increase visitor awareness on proper behaviour during interaction with marine animals. This is often done through contracts, charters and quality labels and participatory management. For success it is crucial that MPAs have both the experience and motivation to implement participatory processes and to ensure the continuity of this work. Also, it is important to have legal tools to implement regulation and to end contracts with those boat owners that do not follow the rules. (National Marine Park Zakynthos, Greece).

In the Calanques National Park the managing authority developed, in consultation with the authorities, researchers, managers and users, charters of good environmental practices. These include specific regulation for tour boats aiming to register with the National Park. The new boats have to comply with strict ecological specifics regarding their engine: electric and hybrid boats are encouraged through the "Rule of Categorized Usage" where mandatory and optional criteria have been defined [30].

The Marine and Coastal Protected Area of Kuriat Island (AMCP of Kuriat Island), Tunisia, is a unique and the first example a co-management body, between the State and civil society, established to this date in Tunisia: Public Institution "Agence de Protection et d'aménagement du Littoral – APAL" & NGO Notre Grand Bleu (NGB). Boat owners have signed a charter with the Park authority. The co-management of the MPA allows for continuous monitoring of the tour boat activity and impacts, and informs decisions on future management measures. The joint approach established in Kuriat helps to balance the improvement of tour boat operators' environmental practices of and raises awareness among visitors mostly through the dialogue and information provided by the local NGO, and the implementation of measures by the competent authorities. The cooperation between the civil society, competent authorities and users as led to the limitation of the number of tour boats allowed to commercially operate in the MPA, as well as the installation of ecological anchoring buoys for tour boats.

PROVIDING INCENTIVES TO VESSELS WITH ENVIRONMENTALLY COMPATIBLE TECHNICAL INSTALLATIONS ON BOARD

OBJECTIVE:
Reducing sewage-related pollution from tour boats and live-aboard tour boats

In La Maddalena Archipelago National Park, Italy – while navigating, stopping, mooring and anchoring is prohibited in full reserve areas, mooring is allowed in specific fields, between sunrise and sunset from June 1st to October 30th. Speed limits are also set in the Park whereby vessels cannot exceed 7 knots within 300 m of the coast, and 15 knots beyond 300 m. In addition to that, environmentally compatible technical practices are encouraged by providing anchorage and mooring benefits to boats equipped with sewage tanks.

ESTABLISHING A CARRYING CAPACITY FOR SENSITIVE ENVIRONMENTS

OBJECTIVE:
Minimize impacts from tour boats activities

The Galapagos Marine Reserve (Equador) covers an area the size of half of terrestrial Ecuador's surface, 133,000 km^2, and is one of the biggest of the world. A unique UNESCO World Heritage site, the Galapagos islands are considered to be a "melting pot" of marine species. However, following the global trend in the increased tourism, particularly that of boats travelling between the islands, the relevant authorities looked to establish a tool that aims to limit and monitor both the number of tourists arriving to the islands and the number of ship calls allowed. Therefore, the

Galápagos conservation agencies, (GNP (Galápagos National Park), INGALA (Instituto Nacional Galápagos / National Institute for Galápagos) and SESA (Servicio Ecuatoriano de Sanidad Agropecuaria – Ecuadorian Animal and Plant Inspection Service) have developed a carrying capacity study to set the optimal number of tourist operations on every island.

The first step was to set an entrance fee for foreign visitors consisting of 100 USD. Then, additional regulations regarding excursions were applied. Private boats are not allowed to remain within the territory for more than 21 days. Regarding visitor numbers, private boats are not allowed to carry more than 100 passengers per vessel, while on trips, groups cannot exceed 16 persons per guide. These measures aimed to reduce the impacts of congestion on the islands' fragile ecosystems (Ricaurte et al. 2016).

When developing maximum capacity estimation for a particular habitat, the tolerance limits of the species involved and the long-term impacts of a touristic activity can sometimes be overlooked (intentionally or not) during the development of the management frame, sometimes simply to give priority to socio-economic goals [31], [32], [33]. This has to be accounted for and precautionary principle should be adopted.

RECOMMENDATIONS TO **MPA MANAGERS**

- Include tour boats activities in MPA management plans
- Limit and monitor number and distribution of tour boat visitors in space and time by rulebooks, concessions, e-ticketing, periodical closures of a location or a site, visitors flow planning, marketing different areas, raising visitor awareness
- Engage tour boat sector in dialogue and cooperation
- Develop contracts and charters with boat owners and tour-boat agencies
- Apply a participatory approach in tour boat planning and management within MPAs to create realistic plans supported by key stakeholders and local communities: stimulate development of sustainable and long-term durable activities
- Develop cooperation with competent authorities (port authorities, inspections) and tour boat owners in the implementation of conservation measures, control and raising visitor awareness
- Adopt practical measures to minimize impacts from waste (e.g. developing specific waste management plan like in Kornati National Park, Croatia; in Kuriat Island, Tunisia), wastewaters, noise
- Develop carrying capacities studies in order to assess the maximum sustainable tourist presence in the MPA, including tour boats
- Make sure the MPA and its staff are the example of positive changes you wish to see in the protected area (electric boats, waste waters purification systems, no anchoring on Posidonia, zero waste concepts in MPA facilities etc.).

3.1.3. KNOWLEDGE, TRAINING AND RAISING AWARENESS

EDUCATIONAL ACTIVITIES FOR PARTICIPANTS INTO WILDLIFE WATCHING TOURS

OBJECTIVE:
Preventing harassment of cetaceans

In the Cres-Losinj Site of Community Importance (Croatia; Natura 2000 site code: HR3000161), an area identified as important for the conservation of bottlenose dolphins, dolphin watching tours provide a well-rounded educational element to provide deeper knowledge than the usual boat tour would normally provide. Before embarking on the tour watchers are required to attend a 30-minute briefing where they are given details and interesting facts about the animals they will see at sea. An important part of that briefing is the description of the detailed code-of-conduct observed by the boat crew.

This code was developed in cooperation with dolphin researchers from the Blue World Institute and based on the international guidelines provided by ACCOBAMS. The code-of-conduct explains how boats can be both an acoustic and physical disturbance to the dolphins, particularly when they are in the company of their young. This explanation is reinforced by the educator onboard at sea, when the watchers experience an encounter with wild dolphins. The educator helps to explain the behaviour of the animals in relation to the physical presence of the dolphin watching boat and other boats in the area.

Upon return from the tour, the Blue World Institute researchers provide a questionnaire to the watchers to identify the educational effect of the tour. One aspect that has arisen is the importance of the explanations given during the tour. Watchers identify themselves as being better educated on the threats to these species and are more likely to act accordingly when in the presence of these species in the future. In addition, visiting the dolphins through an organised professional tour often means that these watchers have fulfilled one of the goals of their holiday, and therefore do not then 'need' to hire a boat themselves and go on the sea to find the dolphins themselves.

This has a knock-on effect that also applies to friends and family of watchers, who are often 'educated' vicariously through holiday stories and postings on social media. Hence a well-designed tour may firstly reduce the amount of boat rentals undertaken by uninformed tourists, and secondly encourage 'normal' boat tours, undertaken by uninformed tour boat operators, to behave more responsibly due to pressure from the watchers (Blue World Institute, unpublished data).

RAISING AWARENESS AMONG VISITORS ON TOUR BOATS AND IMPROVING THEIR KNOWLEDGE

OBJECTIVE:
Increase respect for rules and good practices to minimize impacts

In La Maddalena Archipelago National Park the income deriving from issuing permits for boats is one of the most important self-financing sources for the Park Authority. Thanks to this income, the Park invests in knowledge activities, environmental education and awareness raising activities. Also, controlling access to the waters of the Archipelago and other services and facilities is funded through the boat permits income. Despite the fact that in La Maddalena most of the boats are sail boats and yachts, the mechanism for generating self-financing is interesting and can be suggested for implementation in MPAs also in relation to the tour boat sector. In La Maddalena the main services organized with the income from the permits are:

- placement of free buoy fields
- control and safety of water stretches for swimming
- recovery of environmental degraded areas and delimitation of some dune systems
- monitoring of the dolphin population living in the Archipelago
- opening of museum structures on the premises of the CEA, the Environmental Education Center in Stagnali, in the island of Caprera
- the management of the "doggie beach" in the island of Caprera, one of the few beaches for canine pets in Sardinia.

EXPERIMENT WITH INNOVATIVE SUSTAINABLE TECHNICAL SOLUTIONS AND PRACTICES

OBJECTIVE:
Minimize impacts from tour boats activity

The National Park of Mljet in Croatia has purchased electric boats for visitor transport to reduce the environmental impacts of traffic on the lakes. The boats operate mainly for visits to the small island of St. Mary on Veliko Jezero. Electric cars are also used for transporting visitors on land. The electric powered boat is not suited for open sea navigation. So, they operate only on the marine lake, as this is an enclosed and sheltered area.

ELECTRIC BOATS IN THE NATIONAL PARK OF MLJET, CROATIA

The boats are constructed in Croatia, which is funder under the UNDP-GEF project "Strengthening the Institutional and Financial Sustainability of the National Protected Area System – PARCS project", The Environmental Protection and Energy Efficiency Fund and Public Institution National Park Mljet.

The technical specifications for the boats:

- Length: 15 m, width: 5.11 m, height: 3.45 m
- Engine power: 2x12 kW, draught: 0.65 m
- Engine autonomy: 7 h, charging time: 8-10 h
- Passengers maximum capacity: 56
- Construction year: 2018
- Price per boat: 2,660,000 HRK (ca. 358,000 €)

RECOMMENDATIONS TO **MPA MANAGERS**

- Work on setting up systems that will allow you to collect statistical information on tour boats and visitors, necessary to set up monitoring and develop efficient conservation measures (number, profile, ports of origin, itineraries etc.)
- Make sure the revenue that the MPA obtains from tour boats goes back to improving park management and that this is communicated to stakeholders and to the general public
- Set up specific educational and information activities to instruct participants in wildlife watching tours; engage cooperation on this with research centers
- Use income from entrance fees to strengthen monitoring and control of tour boats and their impacts
- Test new technologies and approaches that lead to lowering environmental impacts from tour boats: waste waters and waste management, boats, transportation to embankment place, use of energy, etc.)
- In collaboration with research institutions, promote studies to understand, quantify and map the impacts from boat tourism on coastal and marine environments and this particular MPA
- Conduct specific awareness raising and educational activities targeting tour boat owners and visitors (particular attention must be paid to raise visitors' awareness on marine litter impacts to the environment and promoting the practice of avoiding single use plastic on tour boats.

ELECTRIC BOAT OPERATING IN VELIKO JEZERO, MLJET, CROATIA

© MLJET NATIONAL PARK

AN EXAMPLE OF SUSTAINABLE MANAGEMENT OF TOUR BOATS ACTIVITIES INTEGRATING DIFFERENT TYPES OF GOOD PRACTICES: THE NATIONAL MARINE PARK OF ZAKYNTHOS, GREECE

NMPZ in Greece (1999) is a landmark in the history of environmental protection in Greece as it is the very first institutionally established National Park area administered by a Management Agency. The management measures in place in the Park encompass zoning, limited access, speed limits and many other types of actions aimed at avoiding or minimizing impacts from tour boats, but also measures aimed at increasing knowledge and raising awareness.

- Contracts with tour boat owners, capping the number of rented boats
- Quality labels for tour boats
- Zoning for multiple users, including no-go/no-take zones
- One beach completely closed for public use and access
- Ecological anchoring buoys, no free anchoring
- Vehicle use is not allowed on the beaches and the number of visitors and sunbeds is to be limited in nesting season with strict curfews in place between 7 pm-7 am (19.00-7.00) to allow the sea turtles to nest during the night
- Speed limits for boats, speed boats are prohibited
- Night flights are prohibited at the nearby airport as the take-off and landing of aircraft disturbs nesting sea turtles and hatchlings
- Tourism activities in the marine area of the NMPZ are not allowed during the night, including boat tours
- Only two Sea turtle spotting boats are allowed out at the same time, staying 15 meters away from the animal for no longer than 10 minutes, overcrowding the animal is to be avoided, a speed limit of 2 knots is enforced and no physical contact with the animal is allowed
- Joined surveillance with Port Authority (rangers and Port Authority representatives are together on the surveillance boat)
- No new port infrastructure within and near the MPA, no new infrastructure development on beaches
- Extensive monitoring of resources and impacts
- Awareness rising campaigns.

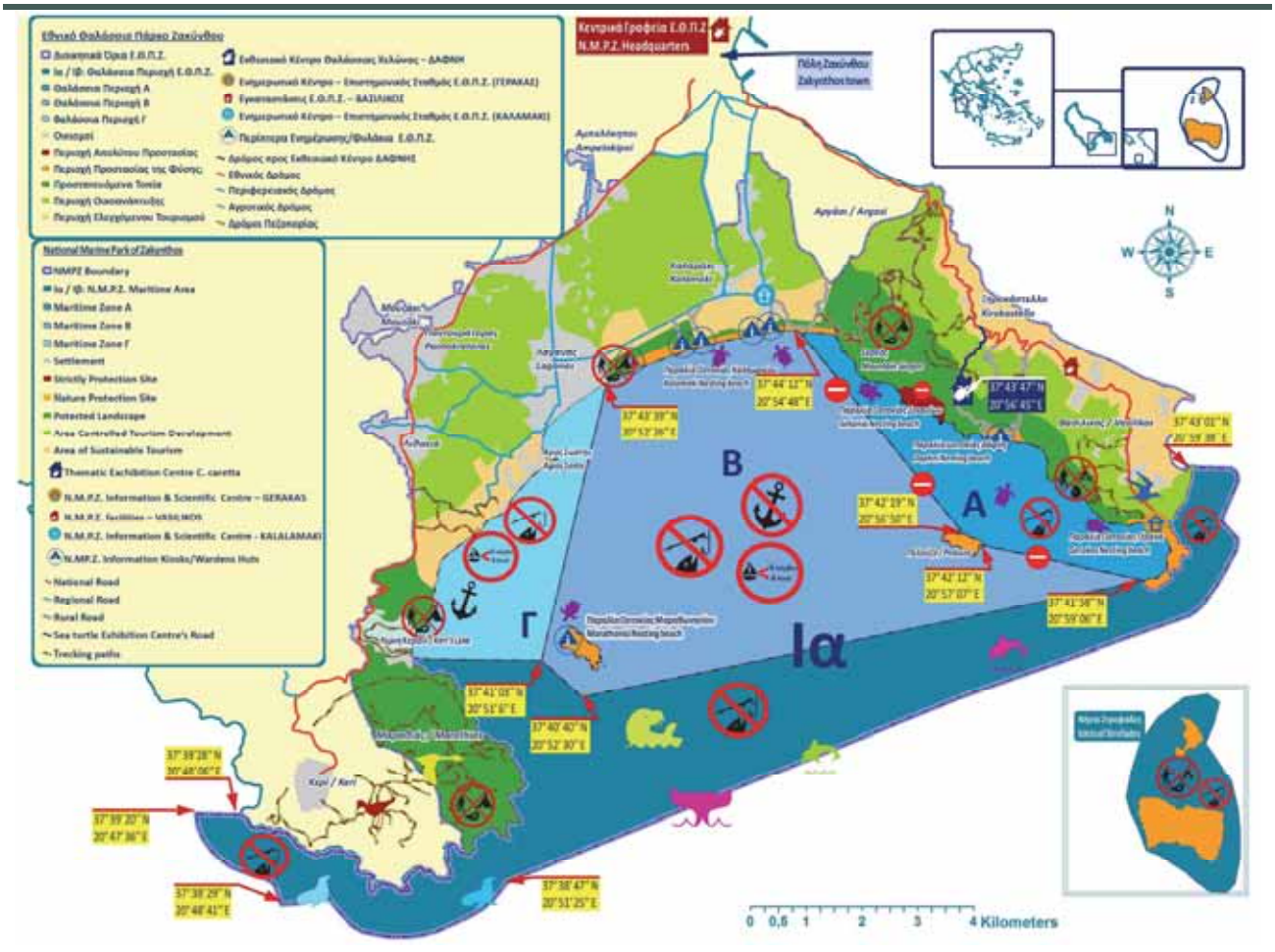

Figure 5. Zoning in the Zakynthos MPA (Source: National Marine Park of Zakynthos)

3.2. PUBLIC AUTHORITIES

Public authorities can have a key role in preventing and minimizing impact from tour boats on MPAs. Their action is complementary to the one of MPA managers: public authorities can ensure means of enforcement for regulation and practices recognised at MPA level. They can also deal with issues falling outside of MPA competence, like for example navigation rules. Cooperation with MPA managers is the fields of control and surveillance and awareness raising is also fundamental.

TOUR BOAT LE PACHA LIVING MONASTIR TO VISIT THE KURIAT ISLANDS, TUNISIA

KRSKO TOUR BOAT PASSENGERS LOOKING AT BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) FROM A DISTANCE, VELI LOSINJ, CROATIA

3.2.1. PREVENT IMPACTS ON MARINE ECOSYSTEMS

REGULATION FRAMEWORK FOR WILDLIFE WATCHING TOURS

OBJECTIVE:
Preventing harassment of cetaceans in the Mediterranean

The rising interest in developing wildlife watching tours in the Mediterranean has implications both within and beyond MPA boundaries. Within the Mediterranean, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) concluded under the Convention on Migratory Species is the relevant instrument to regulate cetacean watching at the regional scale.

At national level, for example in France, the Ministerial Decree of July 1, 2011 makes the intentional disturbance of marine mammals in French territorial waters a punishable offense. Cetaceans are also protected by international agreements: the Barcelona, Bern and Bonn Conventions and ACCOBAMS.

HARASSMENT DEFINITION BY ACCOBAMS

ACCOBAMS considers harassment to begin when a vessel is voluntarily closer that the minimum distance (100 metres) in the common rules for commercial cetacean watching (ACCOBAMS-MOP4/2010/Res.4.7). Any commercial cetacean-watching activity should be carried out under permit granted by the competent national authority. However, in actuality, very few Party States have a formal process of training, certification or permit allocation and less still have any impact assessment frameworks in place to monitor the industry. While ACCOBAMS provides at least a framework of the reduction of harassment of cetaceans in the Mediterranean, for other valuable species, such as sea turtles, there is no framework despite increasing pressures on these animals from tourism activities. Yet there is evidence that human interaction may have a negative impact on that species [34], [35].

IMPROVING SURVEILLANCE IN MPAs: ENFORCING/INSTALLING TRACKING SYSTEMS FOR VESSELS

OBJECTIVE:
Preventing infringement of navigation rules

The surveillance of MPAs represents a challenge due to their remoteness, conditions at sea and specific equipment and skills needed. An additional problem is enforcement due to the overlapping competences of several authorities which is a common situation in MPAs. This is especially problematic for controlling smaller, private vessels. On the other hand, tour boats are usually larger commercial vessels with quite predictable routes, which makes surveillance and enforcement easier to a certain extent. The development of GPS systems, the world wide web and mobile phone software facilitates both more efficient communication between authorities and the adoption of new technologies.

In the Galapagos islands marine reserve all tourist and fishing vessels entering the reserve are required to carry a tracking system. Vessels over 20 tons use VMS (Vessel Monitoring Systems) while those below 20 tons use AIS (Automatic Identification System). These technologies help the park's central compliance station monitor the vessel activity within the World Heritage Site.

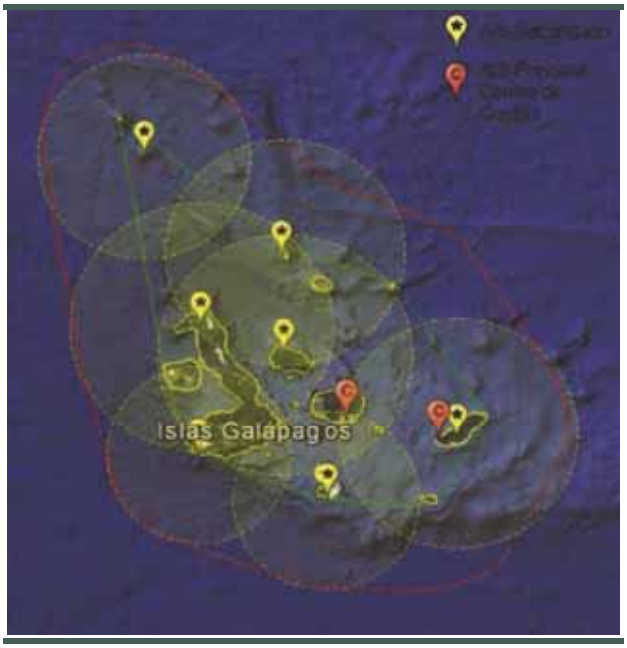

Figure 6. Coverage of the AIS system Galapagos Islands World Heritage area (Source: Galapagos National Park, Wilson Aracil, 2013)

RECOMMENDATIONS TO **PUBLIC AUTHORITIES**

- Authorities at national level: favor and facilitate establishment of specific regulations and processes in MPAs, including those related with tour boat regulation, providing that there are means for their enforcement
- Authorities at national level: ensure enough capacity of competent authorities (e.g. port authorities, inspections, maritime police) for efficient surveillance and control of maritime activities in MPAs.
- Authorities at local level: ensure and strengthen surveillance and controls on tour boats in all the areas of competence (regulations concerning e.g. navigation, environment, wildlife) in collaboration with MPA managers and rangers
- Authorities at local level: ensure those failing to follow environmental laws and regulations shall be charged fines strict enough to discourage such behavior
- MSP authorities at local level: when developing local spatial plans make use of zoning to ensure restricted areas as well as those of limited access, including for tour boats.

3.2.2. MINIMIZE IMPACT ON MARINE ECOSYSTEMS

IMPROVE SEWAGE SYSTEMS IN TOUR BOAT FACILITIES ON LAND

OBJECTIVE:
Minimize impacts on water quality from tour boat visitors

Small passenger vessels designed for trips in French national waters are not required to install sanitation systems for wastewater aboard, unless their tonnage exceeds 300 UMS [36]. Controls of equipped ships at sea are almost non-existent. Controls on land occur annually during the on-site checks by inspection bodies. The issue of wastewater discharge on part of commercial ships is commonly brought to the forefront by State authorities to draft new coercive texts. Protected area managers also have a role to play in speeding up these procedures by providing continuous feedback to decision makers on these issues.

In order to tackle these problems, some MPAs have installed compost toilets on their premises (Mljet National Park, Croatia; Kuriat Island, Tunisia). Unfortunately, visitors rarely find them appealing and/or functional and tend to avoid them. Some MPAs and private restaurant/bar owners (e.g. restaurant near Kornati National Park, Croatia) have invested in more advanced wastewater separation and/or purification systems in their facilities (Telascica Nature Park, Croatia). However, these investments can be quite expensive, so project-based financing may be required.

The bay of Mir, in the Telascica Nature Park, in Croatia, is a main destination for many tour boats during the tourist season. Visitors coming off the boats stop for lunch, refreshment, and to use the toilets at local restaurants in the bay. The sewage and drainage system were inadequate to satisfy the site's needs, was outdated and inefficient (i.e. no high-quality system for the biological treatment of wastewater). Reconstruction was carried out through the PARCS project (UNDP/Ministry in charge of the environment, amount: approx. 100.000,00€).

CREATE BRANDS TO LEAD SUSTAINABLE TOUR BOATING

OBJECTIVE:
Promote sustainable tour boating

Guided by the values that the French national parks have represented for more than 50 years: commitment: authenticity, respect, sharing, and vitality, French national parks created the *Esprit parc national* brand [37] (National Park Spirit) – a promotional line of products and services designed and created to safeguard and advertise the exceptional territories of the French national parks.

Attributing brand aims to value boat tour services that contribute to implement respectful practices, using clean propulsion means, and contribute to the preservation and promotion of heritage (natural, cultural, landscape) and provides them with distinction against the global offer. Both the economic added value to the territory and participation in the life of the local community are targeted. Respectful practices concern limiting impacts on natural, cultural, or landscape heritage, and reducing energy consumption as well as visual, olfactory, noise and light pollution, respectful behaviour of visitors and their use of natural resources on the territory.

To be allowed to use the brand, tour boat operators have to prove that they've respected the inclusion criteria (e.g. by providing invoices). Mandatory and optional criteria have been set up. The mandatory criteria are unavoidable, no derogation is possible. The optional criteria are counted as points per item. In the case that one criterion is not applicable, weighting will be applied to the remaining criteria. If only 3 optional criteria are left, at least one of them has to be fulfilled. The criteria are reported in the following pages.

CRITERIA THAT THE PRODUCT OR SERVICE HAS TO FULFIL

General criteria

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Criteria 1: a person at reception at the ticket counter provides a physical and personal greeting to the passengers informing them of the boat trip service and the national park territory	M		Evidence of an established welcome approach Greeting tools are organized Proof of the training carried out by the receptionists
Criteria 2: up-to-date regulatory declarations regarding the shipowner and the boat, the equipment and safety rules consistent with the practice of the profession	O		Declaration with the DDTM of the vessel(s) and of the sailor(s) (registered with commerce or NUC) Declaration with the customs service
Criteria 3: the operator is a signatory of a charter of good practices of its activity with the national park, when it is available	O		Signature on the chart
Criteria 4: vessel propulsion is generated entirely or partly by renewable energy sources of hybrid or alternative type (solar photovoltaic, solar thermal, electrical batteries). Or, if the boat is wind powered, it has to be classified as historical monument or as a vessel of patrimonial interest (according to the directive 2007-1262, 21 august 2007) Or, for the national Park of Guadeloupe, the traditional vessels of type "canot saintois", sailing canoes, or rowing canoes, made in Guadeloupe and respecting the traditional processes of assembly and using local wood species (pear, pine, courbaril, mahogany, bamboo, ...)	O		Technical Expertise report, stated during the visit

M or O = Mandatory or Optional; A or N/A = Applicable or Not Applicable

Item 1: Develop an eco-responsible approach

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Waste			
Criteria 5: the operator sets up all the necessary tools to exclude the discharge of solid or liquid waste into the natural environment (black water, tank emptying), depending on its size and equipment (toilet, shower, bar...)	O		Exterior technical expertise to check correct operation of: • Decanter for greasy waters (bilge water) • Grey water tanks (dishes, shower) • Receptacle for black waters (toilet) Storage of tank emptying oils and used motor filters
Criteria 6: the operator takes care of the recovery of grey and black waters	O		External technical expertise (verification of grey and black water treatment) Bills for services of gathering grey and black water on shore Justification of usage of harbour equipment Bill or contract for external services

Item 1: Develop an eco-responsible approach (continued)

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Criteria 7: the operator organizes the recovery of waste and pollutant products	O		External technical expertise for the verification of oils, filters, ... Justification of usage of harbour equipment Bill or contract of exterior services
Criteria 8: the operator takes care of the selective sorting of waste generated by the boats' staff and by the clients	O		Selective sorting recipients for waste Waste management process on shore Evaluation based on the descriptive form of the offer
Criteria 9: the operator requires that cigarette waste (generated by employees and clients) be disposed of in the ashtrays on board, or there is a total prohibition of smoking on board	O		Presence of ashtray and notification is present on-board on the occasion of the visit

Optional criteria:
at least 50% of the points in the following suggestions have to be validated if they are applicable

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Criteria 10: the hull of the vessel is protected with biological or ecological antifouling paints	M		Invoices
Criteria 11: the vessel is equipped with a depollution kit (for example dispersant or flocculant products and hydrophobic barriers)	M		Presence validated during the visit
Criteria 12: the bar service or beverage distributor is equipped with single-use dishes made out of recyclable cardboard (cups, and so on...) or they are washed on the shore	M		Presence validated Invoices
Criteria 13: the vomitory bags made available to passengers are made of bio degradable materials	M		Invoices +/- technical notice if non specified on the invoices
Energy			
Criteria 14: the vessel owner establishes the ratio of energy consumption of the vessel with respect to the number of passengers and defines the minimum filling threshold applied according to the season	O		Verification of the internal regulation or the charter internal to the company
Water			
Criteria 15: the products used to clean the vessel toilets are eco labelled	O		Presence registered during visit Invoices
Criteria 16: the products used to clean the ship deck are eco labelled	O		Presence registered during visit Invoices
Criteria 17: the vessel is equipped with water-saving devices on-board. Flux reduction on taps and dual flush toilet	O		Presence registered during visit

M or O = Mandatory or Optional; A or N/A = Applicable or Not Applicable

Item 2: Raise awareness on the environment and territory

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Criteria 18: the user sensitizes its clients to the need to protect and discover the wealth of natural heritage and to behave responsibly in the natural environment	O		Evaluation based on the service's descriptive form attached to the RUC
Criteria 19: communication tools are made in an ecologically responsible manner or dematerialized (digital screens, information terminals)	O		Presence validated during the visit (printed brochures and communication documents printed on recycled paper or eco certified with ecological inks, visual audio information terminal) invoice
Criteria 20: the user adapts its communication to the language of its clients	O		Evaluation based on the service's descriptive form attached to the RUC
Criteria 21: the operators inform the clients in advance of their media communication, for access to the platform (relay parking if offered), eco mobility systems, public transportation, mobility means alternative to cars)	O		Evaluation based on the service's descriptive form attached to the RUC
Criteria 22: the operator clearly informs the clients before or after ticket sale of the regulations in force, in particular in the case of regulations on pets or the disembarking of passengers in spaces subject to the risk of fire, as well as on the appropriate behaviour to adopt in a protected natural environment)	O		Evaluation based on the service's descriptive form attached to the RUC

Optional criteria:
at least 50% of the points in the following suggestions have to be validated if they are applicable

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Criteria 23: awareness tools which take disability into account	M		Evaluation based on the service's descriptive form attached to the RUC (braille tools, large characters, at least one adapted version is available
Criteria 24: the operator has communication tools on the service brand designed in line with the national park's policies on communication and recording images (where the document is available)	M		Evaluation based on the service's descriptive form attached to the RUC Verification during the visit
Criteria 25: the operator informs its clients that they are participating in marine census operations conducted with the national park (where this is the case and when the operator is involved in these activities)	M		Evaluation based on the service's descriptive form attached to the RUC Verification of this information on the communication tools
Criteria 26: the operator raises awareness of landscape challenges and where appropriate, provides elements of landscape that are useful for discovering the environments covered	M		Evaluation based on the service's descriptive form attached to the RUC. Verification of this information on the communication tools

M or O = Mandatory or Optional; A or N/A = Applicable or Not Applicable

Item 3: Participate to the economic and social politic

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Criteria 27: the operator defines the rules of operation that contribute to monitoring attendance	O		Evaluation based on the service's descriptive form attached to the RUC Verification of internal regulation or the company's internal charter regarding: • selection of itinerary according to the season and the weather • number of maxi rotations during the tourist season • minimum filling rate for the boat for any departure

Optional criteria:
at least 50% of the points in the following suggestions have to be validated if they are applicable

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Criteria 28: the operator selects French or European boat manufacturers or enterprises in the acquisition of equipment for the boat	O		Invoice
Criteria 29: the user is involved in particular in a local network or in a collective dynamic	O		Justification of membership to an OTSI, to the professional group
Criteria 30: the enterprise has a socially responsible pricing policy	O		Presence of a differentiated pricing policy toward the public (youth, family fares...) and/or the user accepts holiday vouchers. Verification during the visit
Criteria 31: the boat is equipped to be accessible to people with disabilities	O		At least one piece of equipment adapted to one type of disability/ Verification during the visit
Criteria 32: the enterprise trains its permanent staff or any staff	O		Providing the list of the training done for each member of the staff

M or O = Mandatory or Optional; A or N/A = Applicable or Not Applicable

ITEM 4: Be "in the spirit of the place" and contribute to the preservation of heritage

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Criteria 33: the service does not use light diffusion for purposes other than safety (no illumination of rock walls or seabed	O		Verification during the visit
Criteria 34: the operator does not feed the wildlife fauna and feeding on part of boat passengers is prohibited and prevented during the whole duration of the service from departure to the arrival	O		Verification of interior regulation or on line with internal chart of the enterprise
Criteria 35: in case of mooring during the course of the service, the pilot must opt for the fixed anchoring system when it exists or anchor on the sandy areas in order to reduce the risk of impact on sensitive environments	O		Verification of interior regulation or on line with internal chart of the enterprise

Optional criteria:
at least 50% of the points in the following suggestions have to be validated if they are applicable

CRITERIA	M or O	A or N/A	INDICATORS AND MODALITY OF CONTROL
Noise Pollution			
Criteria 36: subject to weather and safety conditions: • hybrid propulsion boats use the electric engine while they approach the shore or sensitive sites defined within the park • wind powered boats limit the use of the engine to as little as possible	O		Verification of interior regulation or chart internal to the enterprise
Criteria 37: the boat is equipped with materials offering an alternative to sound diffusion outside the boat (individual headphones, interior screens, smartphone application, information on paper or a sound diffusion only perceptible on the boat (location and selection of models of speakers)	O		Verification during the visit
Criteria 38: The size of the boat and the number of passengers allows delivery of commentary without the use of loud speakers	O		Verification during the visit

M or O = Mandatory or Optional; A or N/A = Applicable or Not Applicable

RECOMMENDATIONS TO **PUBLIC AUTHORITIES**

Authorities at national level:

- provide efficient national and site-specific legal frameworks for regulating environmental impacts related to tour boat visits to MPAs, supporting adaptive management and quick response to environmental threats
- define roles and responsibilities for patrolling and encourage cooperation and joint surveillance of MPA staff and competent authorities
- support monitoring of environmental impacts in MPAs
- encourage quality stakeholder consultation processes in MPAs management
- provide incentives for environmentally friendly business, technical solutions and processes
- strengthen the legislation regarding waste water discharges from tour boats

Authorities at national level responsible for regional coordination:

- develop a regional background study on tour boat activities and interactions with marine and coastal ecosystems and MPAs, to be used as a base to build on in developing a regional policy for the sector

Authorities at national and local level:

- promote the development of brands for sustainable tour boat activities

Authorities at local level:

- engage in dialogue with MPAs to understand their needs on the matter of environmental controls in relation with tour boat activities, where MPAs are not competent (e.g. waste and wastewater management)
- engage in partnership with MPAs to create infrastructures to minimize environmental impacts from tour boats (e.g. moorings, pontoons, sewage systems)

3.3.
TOUR BOAT SECTOR

Awareness, collaboration and will from the sector are essential in order to improve environmental sustainability and compatibility of the activities within MPAs. The relationship between the sector and the MPAs is often vital: for many MPAs tour boats represent a relevant source of income which is used to put essential management measures into practice.

TOUR BOAT MORSKI GALEB
ZADAR, CROATIA

3.3.1. MINIMIZE IMPACT ON MARINE ECOSYSTEMS

BUILD NETWORKS OF SUSTAINABLE TOUR BOAT OPERATORS

OBJECTIVE:
Strengthen the sector of sustainable boat tour operators

The EcoNav network brings together a network of actors – companies, research and training organisations, communities, associations and individuals – involved in the sustainable development of maritime and river activities. The network is committed to promoting technical and social innovations and good practices, advising stakeholders and piloting activities to promote eco-navigation as the paradigm for future navigation, focusing on the three following general themes:

- Boat construction: choice of materials, products and equipment, alternatives to fossil fuels
- Maritime and land uses: low energy consumption, waste management and co-use of marine materials, equipment and territories
- Port services and infrastructure as well as deconstruction: upgrading through recycling and reuse

INVEST IN INNOVATIVE TECHNOLOGIES

OBJECTIVE:
Marketing eco-products in tourism by improving the environmental sustainability of the tour boat sector

The company Icard Maritime launched the Helios hybrid boat in 2012. The boat is 22 m long, weighs 65 t, can accommodate 170 passengers onboard, and can travel at 16 knots using thermic propulsion and 8 knots using electric. The boats operate in Calanque National Park, France. After 7 years of activity lots of maintenance was needed on the thermic engine, whereas none was required on the electric one. The financial balance is that there are no real savings compared to a classic thermic propulsion boat, as the savings made on gasoil consumption were deferred on the cost of charging the batteries. The boat was quite satisfactory as per its manoeuvring in the electric mode, which allowed for sharp turns and fast stops. Finally, the feedback from guests was very positive.

Helios hybrid boat specifics:

- Main motor: 2*375 KW SCANIA V8
- Electric motor: Two three-phase synchronous motors of 55 KW
- Batteries: 2.8 T, pure lead technology, waterproof; 576 V, 100 kwh, 40 kwh available; 8 chargers:12 kw each
- Generator: 150 KVA that can run both motors continuously
- The system is patented (April 18, 2014:2990683)

Other examples of hybrid tour boats:

- Tourist Porto – Scandola Reserve 100 passengers up to 20 knots in diesel in connection and 7 in electric in the reserve
- Eco boat Bus, Toulon Bay, 100 passengers; 7 knots approaching-12 knots in open water. Diesel fuel reduction: 30%

Adoption of innovative boats can significantly reduce environmental impacts on the visited sites. The technologies involved are mature and proven for professional use, have a competitive overall cost but require a higher initial investment. For such reason, a collective approach should be adopted with the aim of lightening the burden of investment.

TRANSITION TO ECO-TOUR BOATS: A CHALLENGING NAVIGATION

Electric and hybrid tours do not generate noise, do not release any discharge in the water, have reduced CO_2 emissions (taking into account the battery production balance), have no emissions fumes from fine particulate matter, nitrogen oxide or sulphur. Nevertheless, there are still some critical issues that need to be addressed, from the economic and environmental aspects.

Economy:

- Additional cost of purchase: 15% to 30% off battery according to service and electrical coverage
- Batteries: 5% to 15% of the price of the boat, life 5 to 10 years according to service
- Lower Maintenance cost than thermal
- Return on investment on battery by fuel economy and maintenance if sufficiently used (> 1500 h/yr)
- Battery prices drop steadily (50% in 5 years) and their life expectancy increases (up to 10 years).

Ecology, batteries are still a critical subject:

- 150 kgs CO_2 equivalent and 150 kWh energy is used in manufacturing Lithium battery 1kWh
- The grey energy of the battery represents the consumption of the boat for 2000 hours of travel
- New dependence on some rare or extremely rare metals: tantalum, cobalt, gallium, tungsten, rare earths, lithium, etc. and severe uncertainties over supply costs (e.g. Cobalt: 60% of cobalt is from DR Congo)
- Uncertainty regarding the existence of a battery recycling chain
- An environmental impact moved upstream: highly pollutant extraction and refining processes (open pit mines, toxic discharge in rivers, for example in Inner Mongolia, etc.).

Alternatives are still open for applied research, such as hydrogen propulsion.

Hydrogen is the solution of the future?

- Lighter and less cumbersome storage
- Quick Refill
- Regulatory constraint
- Security is more important
- Not limited by resources, less grey energy
- But higher energy consumption in operation (up to 4 times more than battery storage)
- Possibility of using electricity from renewables (locally generated) to generate hydrogen
- Grip on and high cost of supply and refill infrastructure.

HYBRID TOUR BOAT
AT GIROLATA ANCHORAGE, FRANCE

© ISTOCKPHOTO

RECOMMENDATIONS TO **THE TOUR BOAT SECTOR**

- Inform yourself on how your business can contribute to lowering environmental impacts in MPAs
- Follow MPAs regulation for the sustainable future of both the MPA and your business.
- Engage actively with MPAs in co-planning and co-managing tour boat activity
- Develop initiatives to inform tourists and increase their awareness of the need to respect rules and protocols
- Invest in innovative technical solutions and practices to target reduction of the impacts generated by the sector
- Promote marketing initiatives (campaigns, certifications, logos, etc.) to showcase the excellence of the service offered
- Engage the sector in collective action aimed at lowering the investment needed to adopt innovative, environmentally sustainable technologies
- Collaborate with MPAs and research institutions in monitoring campaigns regarding the tourist presence (pressure) and the state of the species and their habitats
- Work with MPA staff in informing your guests of what is proper behavior in nature, especially in MPAs, and what impact their presence and their actions have on nature.

BIBLIOGRAPHY

[1] Deloitte , Directorate-General for Maritime Affairs and Fisheries (European Commission) , ICF, IEEP, Marine South East, Sea Teach 2017. Assessment of the impact of business development improvements around nautical tourism. https://publications.europa.eu/en/publication-detail/-/publication/473c0b82-18f9-11e7-808e-01aa75ed71a1

[2] Davenport J. & Davenport J. L 2006. The impact of tourism and personal leisure transport on coastal environments: A review Estuarine. Coastal and Shelf Science 67: 280-292.

[3] Milazzo, M., Chemello, R., Badalamenti, F., Camarda, R. and Riggio, S., 2002. The impact of human recreational activities in marine protected areas: what lessons should be learnt in the Mediterranean sea?. Marine ecology, 23, pp.280-290.

[4] James P., Hayden B.J. 2000. The Potential for the Introduction of Exotic Species by Vessel Hull Fouling: A Preliminary Study National Institute of Water and Atmospheric Research, Wellington 61 pp.

[5] Floerl O., Pool T.K., Inglis G.J. 2004. Positive interactions between non-indigenous species facilitate transport by human vectors. Ecological Applications, 14: 1724-1736.

[6] Minchin D., Floerl O., Savini D., Occhipinti-Ambrogi A. 2006. Small craft and the spread of exotic species. In: Davenport J., Davenport J.L. (eds) The Ecology of Transportation: Managing Mobility for the Environment. Environmental Pollution, vol 10. Springer, Dordrecht.

[7] https://echa.europa.eu/legislation

[8] Constantine R. 2001. Increased avoidance of swimmers by wild bottlenose dolphins (Tursiops truncatus) due to long-term exposure to swim-with-dolphin tourism. Marine Mammal Science 17, 689.702.

[9] Van Parijs S.M., Corkeron P. 2001. Boat traffic affects the acoustic behaviour of Pacific humpback dolphins Sousa chinensis. Journal of the Marine Biological Association of the United Kingdom 81, 533-538.

[10] Laist D.W., Knowlton A.R., Mead J.G., Collet A.S., Podesta M. 2001. Collisions between ships and whales. Marine Mammal Science, 17 (1), 35-75.

[11] Sargent F.J., Leary T.J., Crewz D.W., Kruer C.R. 1994. Scarring of Florida's Seagrasses: Assessment and Management. Technical Report FMRI 1h/94. Florida Marine Research Institute, St Petersburg, Florida 62 pp.

[12] ASCOBANS – Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas, (2009). Noise Pollution. 16th ASCOBANS Advisory Committee Meeting. Brugge, Belgium, 20-24 April 2009. Document AC16/Doc.47 (O). Dist. 25 March 2009

[13] Bass, A.H., McKibben, J.R. (2003). Neural mechanisms and behaviors for acoustic communication in teleost fish. Progress in Neurobiology, Vol 69, pp 1-26.

[14] Slabbekoorn, H., Bouton, N., van Opzeeland, I., Coers, A., ten Cate, C., Popper, A. (2010). A noisy spring: the impact of globally rising underwater sound levels on fish. Trends in Ecology & Evolution, Vol 25, pp 419-427.

[15] Wysocki, L.E., Codarin, A., Ladich, F., Picciulin, M. (2009). Sound pressure and particle acceleration audiograms in three marine fish species from the Adriatic Journal of the Acoustical Society of America, Vol 126, pp 2100-2107.

[16] Rako, N., Picciulin, M., Fortuna, C.M., Nimak-Wood, M., Mackelworth, P., Pleslic, G., Holcer, D., Wiemann, A., Sebastianutto, L., Vilibic, I. (2013). Leisure boating noise as a trigger for the displacement of the bottlenose dolphins of the Cres-Losinj archipelago (northern Adriatic Sea, Croatia). Marine Pollution Bulletin, Vol 68, N°1-2, pp 77-84.

[17] Nimak, M., Croft, P.D., Wood, T.D., Wiemann, A., Rako, N., Mackelworth, C.P., Fortuna, M.C., (2007). Behavioural responses of bottlenose dolphins, to boat traffic in the Kvarneric, north-eastern Adriatic. Book of Abstracts, In: The 21st Annual Conference of the European Cetacean Society, Donostia-San Sebastian, Spain, from April 23rd e 25th, 2007. European Cetacean Society.

[18] Day, J., Doudley, N., Hockings, M., Holmes, C., Laffoley, D., Stolton, S., Wells, S. 2012. Guidelines for applying the IUCN Protected Area Management Categories to Marine Protected Area. UICN, Gland, Switzerland.

[19] https://s3-eu-west-1.amazonaws.com/wwhandbook/guideline-documents/Pelagos-Code-of-Conduct-for-whale-watching.pdf

[20] Trave C., Brunnschweiler J., Sheaves M., Diedrich A., Barnett A. 2017. Are we killing them with kindness? Evaluation of sustainable marine wildlife tourism. Biological Conservation, 209: 211-222.

[21] Smith, K.R., Scarpaci, C., Scarr,M.J., Otway, N.M., 2014. Scuba diving tourism with critically endangered grey nurse sharks (Carcharias taurus) off eastern Australia: tourist demographics,shark behavior and diver compliance. Tour. Manag. 45, 211–225.

[22] Barker, S.M., Peddemors, V.M.,Williamson, J.E., 2011. A video and photographic study of aggregation, swimming and respiratory behavior changes in the grey nurse shark (Carcharias taurus) in response to the presence of SCUBA divers. Mar. Freshw. Behav. Physiol. 44, 75–92.

[23] Apps, K., Lloyd, D., Dimmock, K., 2015. Scuba diving with the grey nurse shark (Carcharias taurus): an application of the theory of planned behaviour to identify divers beliefs. Aquat. Conserv. Mar. Freshwat. Ecosyst. 25 (2), 201–211.

[24] Birtles, R.A., Arnold, P.W., Dunstan, A., 2002. Commercial swim programs with dwarf minke whales on the northern Great Barrier Reef, Australia: some characteristics of the encounters with management implications. Aust. Mammal. 24, 23–38.

[25] Birtles, A., Mangott, A., 2013. Highly interactive behavior of inquisitive dwarf minke whales. Whales and Dolphins: Cognition, Culture, Conservation and Human Perceptions, p. 140.

[26] Birtles, A., et al., 2014. Report to the Great Barrier Reef Marine Park Authority on the Dwarf Minke Whale Tourism Monitoring Program (2003–2008), Research Publication 112. GBRMPA, Townsville.

[27] Meletis, Z.A., Harrison, E.C., 2010. Tourists and turtles: searching for a balance in Tortuguero, Costa Rica. Conserv. Soc. 8 (1), 26.

[28] Wilson, J., 2003. Planning policy issues for marine ecotourism. In: Garrod, B., Wilson, J.C. (Eds.), Marine Ecotourism: Issues and Experiences. Channel View Publications, Clevedon, pp. 48–66.

[29] https://www.nps.gov/drto/planyourvisit/upload/Boat-Permits-and-Mooring-BallsFullBleed.pdf

[30] Rule of Categorized Usage. National Parks of France. 2018.

[31] Bearzi, G., 2007. Marine conservation on paper. Conserv. Biol. 21 (1), 1–3.

[32] Steckenreuter, A., Möller, L., Harcourt, R., 2012. How does Australia's largest dolphin watching industry affect the behaviour of a small and resident population of Indo-Pacific bottlenose dolphins? J. Environ. Manag. 97, 14–21.

[33] VanWaerebeek, K., Baker, A.N., Félix, F., Gedamke, J., Iñiguez, M., Sanino, G.P., Wang, Y., 2007. Vessel collisions with small cetaceans worldwide and with large whales in the Southern Hemisphere, an initial assessment. Lat. Am. J. Aquat. Mamm. 6 (1), 43–69.

[34] Archelon (2018). Conservation efforts during 2018 at the nesting habitat of *Caretta caretta* in Laganas Bay, Zakynthos, Greece. Short report submitted to the European Commission, and the Standing Committee of the Bern Convention. pp. 21.

[35] Hayes, C.T., Baumbach, D.S., Juma, D. and Dunbar, S.G., 2017. Impacts of recreational diving on hawksbill sea turtle (Eretmochelys imbricata) behaviour in a marine protected area. Journal of Sustainable Tourism, 25 (1), pp.79-95.

[36] www.aires-marines.fr/Concilier/Econavigation

[37] https://www.espritparcnational.com/parcs-nationaux/parc-national-des-calanques

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THE PHAROS4MPAs PROJECT IN NUMBERS

7.14% of the Mediterranean Sea is under some form of protection, 1,231 MPAs and OECMs covering **179,798** km²

With **€395** bn Gross Marine Product (GMP) the Mediterranean Sea economy is the **5th** largest in the region

7
MARITIME SECTORS

17 PARTNERS / **10** COUNTRIES

- MARITIME TRANSPORT
- LEISURE BOATING
- RECREATIONAL FISHERIES
- CRUISE
- OFFSHORE WIND FARMS
- AQUACULTURE
- SMALL SCALE FISHERIES

PHAROS4MPAs' core partners

WWF
PAP/RAC
REGIONAL DEVELOPMENT FUNDS of the N. AEGEAN REGION
AKZM NATIONAL AGENCY OF PROTECTED AREAS
INSTITUTE OF THE REPUBLIC OF SLOVENIA FOR NATURE CONSERVATION
CNR Consiglio Nazionale delle Ricerche
ISMAR Istituto di Scienze Marine
Universitat de Girona

PHAROS4MPAs' associated partners

WWF
MedPAN
France Energie Eolienne
UN environment
SPA/RAC
REMPEC
EUROPEAN BOATING INDUSTRY
AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT
GFCM INTERMEDITERRANEAN COMMISSION

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