Management of Posidonia Beaches

Examples from Mediterranean Destinations

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A booklet showcasing beach management approaches and initiatives for ***Posidonia oceanica***, and to inspire stakeholders across the Mediterranean to take action in their destination

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List of Acronyms:

EMEA = Europe, Middle East and Africa
EU = European Union
HSPN = Hellenic Society for the Protection of Nature
IAS-CNR = Institute for the Study of Anthropic Impact and Sustainability in the Marine Environment, National Research Council
INSTM = Institut National des Sciences et Technologies de la Mer
IUCN = International Union for Conservation of Nature and Natural Resources
ISPRA = Italian Institute for Environmental Protection and Research
MNP = Marine National Park
MoU = Memorandum of Understanding
MPA = Marine Protected Area
NGO = Non-Governmental Organisation
NbS = Nature-based Solution
OEC = Corsica Environmental Office
PA = Protected Area
SPA = Special Protection Area

Contents

Posidonia banquettes on Sakarun Beach, Croatia (Photo credit: Natura-Jadera).

Introduction

The POSBEMED+ Project (2022-2023) builds upon the results and findings achieved in the Interreg-MED projects POSBEMED (2016-2018) and POSBEMED2 (2019-2022). The primary objective of the POSBEMED2 project was to promote nature-based management solutions and support planning strategies that recognize the value of Posidonia beach-dune environments to address the challenges of beach erosion, which are threatening many Mediterranean coastal communities.

POSBEMED+ focuses on enhancing and broadening the **engagement of stakeholders** across Mediterranean countries responsible for beach management and to foster long-term commitments that promote **the sustainable management of Posidonia beach-dune systems**. Therefore it is not limited to municipalities and environmental agencies, but also encourages the participation of public and private stakeholders who promote and use those spaces, especially those in the tourism sector that can shape behaviours and attitudes.

Feedback collected from coastal managers throughout the POSBEMED2 project has revealed the **need for inspirational examples** that can guide actions on the ground. These examples should provide insight into the challenges, opportunities, and impacts of practices in destinations where **nature-orientated approaches** are difficult to implement putting particular focus on beaches experiencing significant pressure from tourism and visitors.

This booklet has been developed to address this need by presenting examples of beach management in a diverse range of Mediterranean coastal areas with *Posidonia oceanica*. The intention is **to illustrate how beach managers can take action to improve their methods and practices**. These examples are presented in various contexts, capturing different stages of the **journey towards sustainable management**, and offering different perspectives from local authorities, Protected Areas, businesses, academia and civil society.

It is important to note that this set of examples does not aim to establish best practices, or to endorse the solutions presented. Instead, **the aim is to inspire stakeholders to embark on or continue their journey in sustainably managing Posidonia** beach-dune systems, a fundamental feature of Mediterranean coastal ecosystems and livelihoods.

Methodology

The methodology employed to create this booklet involved four key steps:

1

Identification of case studies

An internet-based keyword search using different search engines was carried out to identify documents and websites containing information on best practices and outcomes (positive or negative) related to Mediterranean Posidonia beaches with tourism and visitor presence. The beaches identified have implemented nature-orientated sustainable management practices related to Posidonia beach-dune systems.

2

Categorisation

A list of potential case studies was prepared and categorised according to a set of varying criteria. The most pertinent case studies were determined through careful consideration of factors such as location (country), type of beach, type of management body, availability of information and type of solution implemented.

3

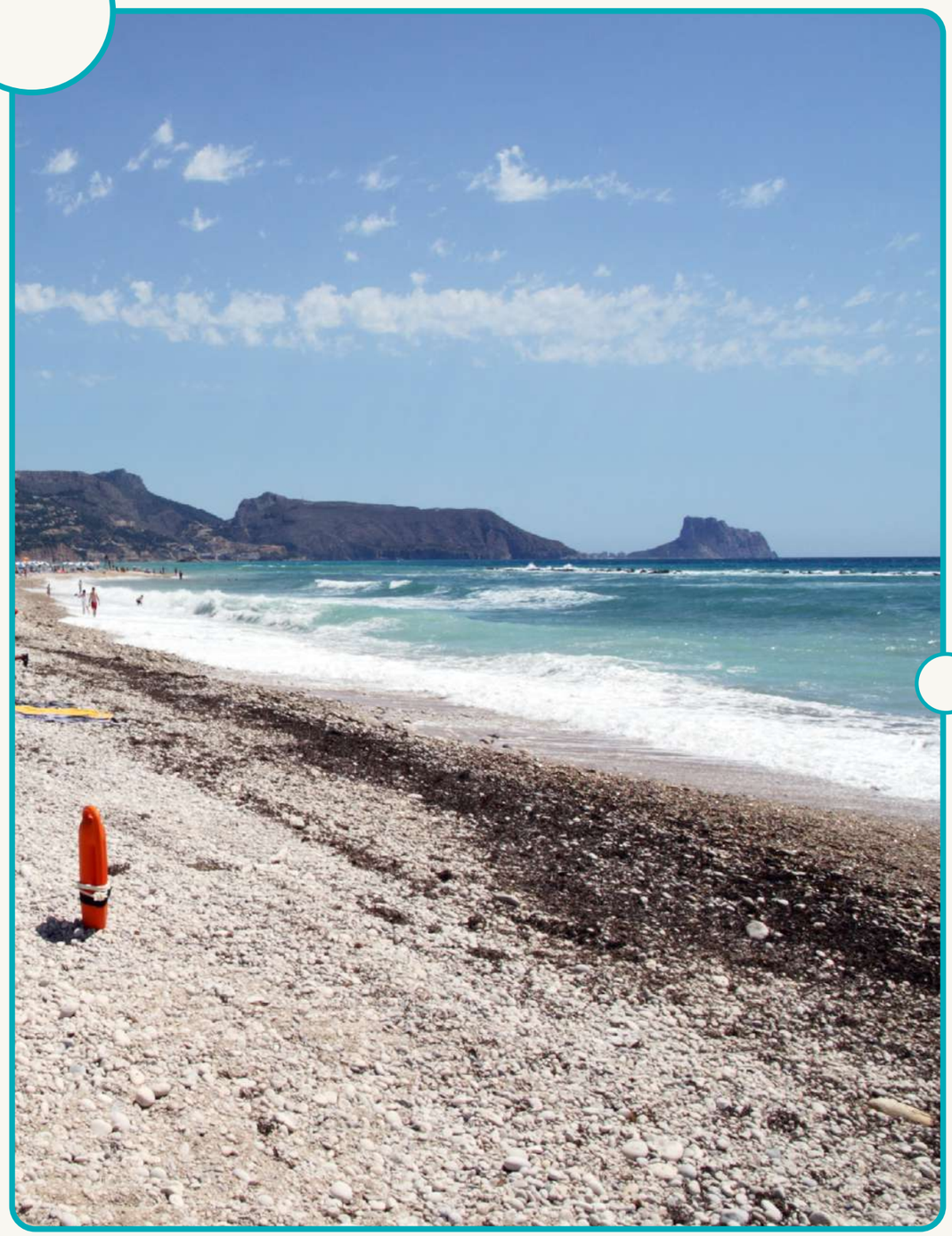
Data collection

In this stage, a deeper analysis via desk-based research supported by interviews with relevant beach managers was carried out. A set of 5-8 questions was sent to each interviewee beforehand to support preparation for the interview.

4

Summary of findings

All information gathered for the selected case studies was summarised in a case study sheet for each destination. This was then reviewed and approved by the key person interviewed. These case study sheets form the core of this booklet.



Beachgoers on Mediterranean beach with Posidonia (Photo credit: Bernardo Varela - Dreamstime.com).

Examples

The purpose of the eleven case studies in this section is to **inspire beach managers and stakeholders to sustainably manage and preserve** Posidonia beach-dune systems.

Of the eleven case studies, four were pilot sites in the POSBEMED2 project and three were involved in other national or international projects focused on raising awareness on the sustainable management of Posidonia beaches. The remaining four case studies include ongoing management initiatives from Marine Protected Area (MPA) managers, local administrators and private sector stakeholders.

Each case study includes a description of the characteristics of the beach(es) in the destination, including:

- **The type of beach (sandy, gravel, etc.)**
- **The type of management (municipality, regional administration, etc.)**
- **The degree of urbanisation (natural, semi-urban and urban)**
- **Information on whether the beach is within a Protected Area or not**

Following this description, the activities carried out in each case are illustrated. This includes details about the main challenges and the actions being taken to overcome them, with a focus on the management of Posidonia accumulations or “banquettes”, as well as the outcomes of these actions. Finally, the ongoing challenges that each destination faces regarding the sustainable management of Posidonia are presented.

Mediterranean beach with Posidonia (Photo credit: IUCN).

Introduction Methodology Case studies Common issues Recommendations Glossary Resources

Map of the Mediterranean region with the sites reported here as case studies

Case studies

“Ready to restore a beautiful dune field?”

Check out the inspiring work done at Campulongu Beach.

“Want to promote a natural Mediterranean beach among tour operators?”

Discover how Sakarun Beach did it.

“Interested in learning about the benefits of not removing Posidonia?”

See Schinias Beach.

“Looking for ways to encourage municipalities to manage Posidonia beaches correctly?”

Get inspired by Olzu Beach.

“Want to learn more about the ‘Ecological Beach Model’?”

Read the example of Torre Flavia Beach.

“Wondering what actions a tourism business can take?”

Learn from the Iberostar Mehari Djerba Beach case study.

“Want to know how the Blue Flag Award fits with Posidonia management?”

Take a look at the Municipality of Le Lavandou.

…and many more interesting examples from the field in the following case studies spanning the Mediterranean basin.

Beach-dune system restoration

Campulongu Beach (Capo Carbonara MPA, Sardinia - Italy)

Type of beach:
SANDY

Managed by:
MUNICIPALITY

Degree of urbanisation:
URBAN

WITHIN a Protected Area

Nestled within the Capo Carbonara Marine Protected Area, Campulongu Beach is a sandy beach stretching over 700m.

The shoreline is surrounded by stabilized dunes dotted with residential buildings. In the summer, the beach attracts many swimmers and recreational boaters. The underwater area is home to a patchy Posidonia meadow.

Main issue

Historical aerial images show a significant decrease in the large dune area next to Campulongu Beach due to the development of urban and tourism infrastructure. There is also a noticeable retreat of the shoreline, particularly in the southernmost part of the beach managed by a private resort.

Actions taken

Over the past decade, the Management Authority of the MPA has implemented several restoration initiatives.

Safeguarding Posidonia meadows

To safeguard Posidonia meadows from damage caused by anchoring, a system of mooring buoys has been installed to control the number of boats in the area. Informational and educational activities were carried out to raise awareness on the significance of the Posidonia beach-dune system.

Managing Posidonia accumulations

In some cases, Posidonia banquettes can reach heights of one to two meters. Therefore, it is necessary to remove them to enable access to the water. The removal process occurs in May, using light machinery over two days in the early morning and evening to avoid disturbing tourists. The collected material is stored elsewhere and returned in October to protect the beach from erosion.

Restoring dune systems

Protective measures have been introduced to support the restoration of historic dune systems. These include fences to prevent trampling, walkways to regulate access to the beach and windbreakers to retain sand on the dunes, all of which have proven effective.

Communication, education, and awareness-raising

Activities for local schools and residents were conducted, involving technical discussions, interactive roundtables, demonstration events and awareness-raising activities for tourists, local operators and other stakeholders.

Outcomes

The Management Authority regularly the assesses of the dune system restoration efforts using surveillance cameras. These cameras have a dual role: They evaluate the changes in the shoreline throughout the seasons and monitor tourist activity in the area.

The Campulongu Beach access model has successfully been used on other beaches within the MPA, confirming its effectiveness as a successful management strategy. Additionally, the practice of installing more and longer walkways on all MPA beaches, along with an increased presence of video surveillance along the coast, has become a standard part of ongoing practices.

The findings from scientific studies highlight the positive environmental conditions of these beaches.

Ongoing challenges

The main ongoing challenge is ensuring that tourists adhere to the rules and recommendations to support the preservation of the beach. Historically, it has also been a challenge to communicate the value of these environments to the local community.

However, thanks to increased awareness at the local level, the community is now making an effort to ensure that tourists follow the rules. Residents have taken on the responsibility of notifying local law enforcement and forest rangers about any violations. This change in mindset reflects a marked shift.

Funding is also an ongoing challenge. However, participating in various collaborations for different projects is supporting the acquisition of small funds.

Most of the data and information reported here comes from POSBEMED2 project deliverables. Further, comments, input and recommendations were provided by Fabrizio Atzori, Director of Capo Carbonara MPA, during a video interview held in March 2023.

Morphological monitoring of Posidonia banquettes at Campolongu Beach in Capo Carbonara MPA, Sardinia, Italy (Photo credit: Giogio Massaro/Capo Carbonara MPA).

Rebranding the beach

Sakarun Beach (Zadar County, Dugi Otok Island - Croatia)

Type of beach:
SANDY

Managed by:
MUNICIPALITY

Degree of urbanisation:
NATURAL

WITHIN a Protected Area

Posidonia banquettes and beachgoers at Sakarun Beach, Croatia (Photo credit: Natura-Jadera).

Located on the northwest coast of Dugi Otok Island, Sakarun's sandy bay stretches approximately 50 m in length and 300 m in width.

In its shallow waters, there is a Posidonia meadow, the deposits of which are often found on the beach in the form of banquettes. The beach maintains a natural character, thanks to the small number of amenities for tourists including beach umbrellas and chairs as well as bars and restaurants. These amenities are exclusively available during the summer months.

Main issue

Sakarun Beach gained recognition from tour operators as a "white sandy tropical beach", fostering expectations of a certain aesthetic.

In response, local concessionaries advocated for the complete elimination of the Posidonia banquettes to meet visitor expectations. To address this demand, mechanical displacement of the banquettes was undertaken both before and during the summer months, resulting in the removal of a substantial amount of sediment (sand) from the beach.

Actions taken

The local administration has taken proactive steps to reshape the image of the beach, emphasizing the natural aspect of the bay.

Managing Posidonia accumulations on beaches

Following extensive consultations with local stakeholders held over two meetings, a compromise was reached that strikes a balance between nature conservation and the demands of local business owners. The decision was made to proceed with the seasonal removal of Posidonia banquettes in the central beach area for summer 2021, and to store the removed dead masses in an area less frequented by tourists. After the swimming season ended, the removed material is then returned to the beach to minimise erosion caused by storms in the winter.

Communication, education and awareness-raising

To promote awareness and understanding of the local administration's decision to keep the Posidonia banquettes on the beach, a comprehensive communication campaign was carried out, involving the local community, the municipality and the tourist board. Field trips were organized to explain the importance of having a natural beach for the overall well-being of Sakarun Bay. Information panels were placed, and a promotional video was created.

Outcomes

Before the campaign, about 80% of beach users were against the presence of Posidonia. However, after presenting scientific data highlighting the beach's susceptibility to erosion and the potential role of Posidonia in its preservation, perspectives began to shift. The realisation that the beach is a significant economic asset prompted increased attention and stewardship.

Subsequently, the tourism board started promoting the bay and its beautiful natural beach on their website. Shifting the focus from protecting Posidonia to conserving the beach and the bay was the right action to succeed in changing the attitude of business owners and residents.

Ongoing challenges

Addressing the financial requirements associated with executing beach management activities requires exploring additional funding through different channels, including sources like EU programmes.

The absence of a formal agreement with the local management authorities could potentially give rise to critical challenges, especially if concessions are authorised that run contrary to the overarching conservation goals.

Establishing a closer collaboration with local authorities is therefore critical. This collaboration should begin by cultivating a shared comprehension of conservation priorities to ensure alignment and coordinated efforts.

All data reported here comes from POSBEMED2 deliverables. Further comments, inputs and recommendations were provided by Morana Bačić, Conservation Manager, Natura Jadera Public Institution for Management of Protected Areas in the County of Zadar, during a video interview held in March 2023.

The positive benefits of non-action

Schinias Beach (Schinias-Marathon National Park - Greece)

Type of beach:
SANDY

Managed by:
MUNICIPALITY

Degree of urbanisation:
SEMI URBAN

WITHIN a Protected Area

Extensive, year-round Posidonia banquettes can be found in the easternmost part of Schinias Beach, located in Attica, just 40 km northeast of Athens and with a total shoreline of less than 4 km.

Despite the intense agricultural and tourism activities in the wider region of Attica, the coastal ecosystem of the Schinias-Marathon National Park, within which Schinias Beach is located, maintains its crucial ecological quality, acknowledged by its inclusion in the list of Natura 2000 sites.

Main issue

Due to the widespread misconception that Posidonia banquettes detract from a beach's appeal, local businesses requested the seasonal removal of Posidonia banquettes until 2018. The use of heavy machinery contributed to the degradation of this coastal ecosystem.

In response, the Management Unit passed a regulation in 2018 prohibiting the mechanical removal of banquettes within the boundaries of the National Park.

Actions taken

Managing Posidonia accumulations on beaches

The current recommended practice is to not remove the Posidonia banquettes. It is expected that this approach will soon be legally formalised, making it a mandatory regulation for Municipalities. Collaborative efforts to conserve the Posidonia banquettes along the entire coastal front of the National Park thrive through a productive partnership with the Municipality. Discussions with the Municipality can explore methods for seasonal manual removal if the height of the banquette poses an obstacle for beach access.

Communication, education, and awareness-raising

The Hellenic Society for the Protection of Nature (HSPN), in collaboration with the Management Unit of the National Park, organized two events and several meetings with the local authorities. This involved conducting awareness-raising activities among tourists and beachgoers. Additionally, a short video was created and an informative beach panel was set up to underline the importance of Posidonia as a natural resource.

Leveraging scientific support and monitoring

A scientific study was launched to investigate sedimentology, beach dynamics and the extent of the Posidonia banquettes.

The results highlighted a general erosion of the beach over the years. Conversely, shoreline was recovered after the adoption of the strategy for the non-removal of Posidonia banquettes, demonstrating the crucial role that banquettes play in the conservation of the coastal area.

Restoring dune systems

Efforts to stabilize the dune system are currently underway. These activities include mapping the area to set up protective fences and planting seedlings to restore the umbrella pine forest. With support from volunteers, regular efforts are also being made to remove plastic litter from the banquettes.

Outcomes

Reliable scientific studies have demonstrated positive environmental outcomes, such as increased beach area, following the implementation of the no-removal policy.

Since the municipality put a stop to the costly practice of using heavy machinery to 'clean' the beach of Posidonia and the last remainng beach restaurant was removed in 2018, the local community has made significant economic savings.

The strong communication efforts and the lack of pressure from business owners convinced the municipality to adopt the practice of leaving the banquettes on the beach, not only within the Protected Area but also on other beaches in the region.

Beachgoers no longer express concerns about the presence of Posidonia, reflecting a positive change in perception and awareness resulting from these combined actions.

Ongoing challenges

Encountering challenges with the Municipality's acceptance of beach management recommendations and guidelines is a common occurrence. In such cases, it's advisable to seek scientific evidence that highlights the importance of adhering to the guidelines.

Most of the data and information reported here comes from POSBEMED2 deliverables and the scientific paper of Kourliaftis et al. (2022). Further information, comments and suggestions were provided by Chara Agaoglou (HSPN) and Maria Trivourea and Jamie Giannaka (Management Unit of Parnitha and Schinias National Parks and Protected Areas of Saronikos Gulf operating under N.E.C.C.A.'s Protected Areas Management Directorate, Sector B), during a video interview held in March 2023.

Aerial view of Schinias-Marathon National Park, Greece (Photo credit: Management Unit of Parnitha and Schinias National Parks and Protected Areas of Saronikos Gulf).

Reviving nature

Es Trenc-Salobrar de Campos Maritime-Terrestrial Natural Park (Mallorca, Balearic Islands - Spain)

Type of beach:
SANDY

Managed by:
REGIONAL ADMIN

Degree of urbanisation:
SEMI-URBAN

WITHIN a Protected Area

Posidonia banquettes in Es Trenc-Salobrar de Campos Maritime-Terrestrial National Park, Mallorca, Spain (Photo credit: Es Trenc-Salobrar de Campos Maritime-Terrestrial National Park).

Es Trenc-Salobrar de Campos is a Natural Park established in 2017, located on the southeastern coast of the island of Mallorca, Spain. In addition to its remarkable ecological significance, the park boasts important landscape qualities and attracts significant tourism during the summer season.

It is home to rich biodiversity and various habitats, which are of EU community interest, including Posidonia meadows, wetlands, pine and juniper forests, agricultural fields, and livestock.

Main issue

The entire coastal area of the Natural Park has experienced significant beach regression, as evident from the analysis of aerial images spanning the last 65 years. Before the establishment of the Natural Park in 2017, the removal of Posidonia banquettes was a common practice, both for agriculture and livestock purposes and, in more recent years, tourism demand.

High visitor numbers, the use of heavy machinery for beach management, and winter storms have all been identified as major contributors to erosion.

Actions taken

The Park's newly approved Natural Resource Management Plan clearly defines measures to protect and restore the beach-dune system, including the maintenance of the banquettes on-site, restoring the dunes, and preserving Posidonia meadows.

Managing Posidonia accumulations

In line with the Park's Management Plan and the Balearic Islands Posidonia Decree, dead Posidonia leaves must stay on the sand throughout the year on the most eroded beaches. This measure has been implemented to stop coastal regression and enhance the resilience of the dune system. The removal of Posidonia accumulations is allowed only on one specific area of the beach, following the operational regulations set by the Management Authority.

In November 2020 and March 2021, two pilot campaigns were conducted with the aim of reintroducing previous Posidonia deposits to the swash zone to restore lost sediments and replenish organic matter.

Safeguarding Posidonia meadows

A controlled mooring system has also been set up to protect the good status of the submerged Posidonia meadows.

Communication, education and awareness-raising

Awareness-raising activities with everyone in the community, from children to adults, have proven to be very important to educating and communicating the value of Posidonia and other sustainable beach management practices. For example, a dune restoration project has engaged local schools in environmental education activities, raising awareness on the beach ecosystem and the essential role of the Posidonia meadows and banquettes.

Outcomes

Positive results indicate that reintroducing deposits to the swash zone enhances Posidonia banquette formation and integrated sediment return processes. For example, Es Peregons Grans Beach has experienced a linear growth of 69 m. This assessment was made possible by comparing photographs taken from the same site over three consecutive winters from 2020 to 2022.

In terms of user perception, there has been a noticeable increase in acceptance and awareness over the past two years.

Ongoing challenges

Pressures from concessionaires persist, despite increased awareness of significant erosion and beach retreat that result from loss of the Posidonia banquettes. There have also been instances where beachgoers have complained about the Posidonia.

Challenges stem from a lack of political determination and regulations supporting the recommendations and guidance on beach-dune system management. In the case of Es Trenc-Salobrar de Campos, various stakeholders also hold negative views on Posidonia management actions which adds to the challenge.

One way that tourism boards can support conservation efforts is to ensure their promotional activities align with established best practices. This can be done, for example, by showcasing images of Balearic beaches with Posidonia on them and thus communicating the message that Posidonia is an indicator of a healthy beach in the region.

Sand loss is also a challenge to consider. According to research findings, an individual user removes about 20 g of sand from the beach daily. Considering an average of 2000 users per day, the beach system loses approximately 40 kg of sand every day.

All the data and information reported here comes from POSBEMED2 deliverables. Further comments, inputs and recommendations were provided by Joan Carles Salom, Director of Es Trenc-Salobrar de Campos Maritime-Terrestrial Natural Park, during a video interview held in May 2023.

Stakeholder involvement

Mahdia Beach (Mahdia Region - Tunisia)

Type of beach:
SANDY

Managed by:
MUNICIPALITY

Degree of urbanisation:
URBAN

FAR from a Protected Area

Mahdia Beach is a sandy beach near the city of Mahdia, enjoying year-round popularity among residents and attracting a substantial influx of local, national and international tourists during the summer season.

Main issue

Mahdia Beach is situated within a highly urbanized environment. To cater to the preferences of beach-goers and tourists, the Posidonia accumulation is permanently removed every year using heavy machinery.

In Tunisia, there is currently no specific law in place to protect the Posidonia banquette. Instead, the accumulations are considered as waste to be cleared, and the management of public beaches falls under the responsibility of local municipalities.

Actions taken

Managing Posidonia accumulations

The current recommendation is to leave the Posidonia banquettes where they are or, if temporary removal is necessary, to only move a small part or use the dead Posidonia for a sustainable activity. For example, dead Posidonia leaves were used to fill beach cushions during the summer and at the end of the season, the cushions were emptied and the leaves were put back on the beach.

Communication, education, and awareness-raising

A bottom-up approach, using a participatory methodology involving managers, local administrators, and civil society is being employed to collectively endorse guidelines for the management of Posidonia meadows, beach clean-up to remove plastic debris and the valorisation of the banquettes. These efforts aim to create a Memorandum of Understanding (MoU) to be signed by all actors for a formal commitment.

The Tunisian Ministry of Environment is actively engaged in promoting the development of a specific law aimed at preventing Posidonia from being considered as waste. Their efforts also extend to encouraging the maintenance of the banquette, even on tourist beaches. Simultaneously, awareness-raising actions will take place to explain the importance of the preservation of Posidonia wrack and banquettes.

The establishment of an online platform called Mediterranean Forum facilitates collaboration among scientific researchers, beach managers, local administrators and civil society. This space is dedicated to the development and exchange of methodologies and innovative models.

Leveraging scientific support and monitoring

The National Institute of Science and Technology (INSTM) initiated a project to support the coexistence of natural and anthropic elements on the beach through a win-win approach. This involves conserving the Posidonia banquettes to support counter erosion and raising awareness among beachgoers about the value of the seagrass.

Outcomes

Effective participation was achieved through a citizen science project that tested the use of a smartphone app. Tourists and beach-goers were encouraged to contribute by sending photos to researchers to collect useful data on beach evolution throughout the year. This data was then compared with the scientific results obtained by applying innovative tools, such as drones and aerial photography, to investigate the state of the banquettes and the presence of macro litter.

Two workshops brought together project partners, public authorities and decision-makerswith the aim of providing a platform to pinpoint successful interventions and exchange innovative ideas. The participants prepared a shared roadmap and committed to implementing next steps.

Ongoing challenges

Engaging the Ministry of Environment and decision-makers is a challenging and time-consuming endeavour that demands substantial effort.

All information, comments and suggestions reported here were provided by Monia El Bour, Senior Researcher at Institut National des Sciences et Technologies de la Mer (INSTM), during a video interview held in February 2023. Detailed information on MED De.Co.U.Plages project can be found at: www.med-decouplages.eu.

Posidonia leaves on the shore of Mahdia Beach, Tunisia (Photo credit: INSTM).

The didactic beach

Paloma Beach (Cap-Ferrat Côte d'Azur Alpes-Maritimes - France)

Type of beach:
GRAVEL

Managed by:
MUNICIPALITY

Degree of urbanisation:
SEMI-URBAN

FAR from a Protected Area

Posidonia meadows just a few meters from the shoreline in Paloma Beach, France (Photo credit: Johannes Onnes Dreamstime).

Paloma Beach is a small beach, only approximately 60 m long and 10 m wide, located roughly 10 km from Nice, in southern France. It is surrounded by rocky shores and some artificial structures, and access to the beach is only possible on foot and by stairs. Posidonia meadows start in patches at a depth of about 3 m, just a few meters from the shore. Patches of dead Posidonia leaves are visible between the meadow and the beach, and Posidonia accumulates on the beach through the autumn and winter. There are no dunes are present.

Main issue

Paloma Beach faces a high level of tourist activity during the summer, with large amounts of beachgoers and several yachts usually moored in front of the beach. In Easter and throughout the summer, the Posidonia accumulations are usually moved to the western end of the beach. Over the years, this relocation has created a characteristic one meter high banquette, serving educational purposes despite its small size.

The remaining part of the beach includes a private area with a restaurant that operates exclusively in the summer season.

Actions taken

Leveraging scientific support and monitoring

A study on the accumulation of Posidonia wrack as a Nature-based Solution (NbS) for coastal erosion was conducted by researchers from the French National Research Centre (CNRS) - Université Côte d'Azur as part of the MARINE ECOMED Project. This research aimed not only to investigate the scientific aspect but also to enhance acceptability, educate young people, and improve scientific knowledge.

Managing Posidonia accumulations

The area around Paloma Beach is densely urbanized, and in all six beaches that were part of the ECOMED Project, the Posidonia banquettes are consistently removed to meet the demands of the tourism sector. However, in contrast to the other beaches, at Paloma Beach, this removal process is carried out manually by workers from the local municipality. The harvested Posidonia leaves are then discreetly accumulated at a hidden location.

Communication, education and awareness-raising

To improve ocean literacy for younger generations, specific educational activities were designed for middle and high school students. These activities were followed by discussions in the classroom to foster greater acceptance of the use of Posidonia wrack in coastal management.

Additionally, a comic book designed for children was produced as an awareness-raising tool. This booklet describes field activities with schools and highlights the ecological role of Posidonia banquettes and their ecosystem services. It is available in French and English.

The project also involved collaboration with local schoolteachers and professional educators from local NGOs. Their input was instrumental in preparing educational modules and tools that were effective and tailored to the varying ages and knowledge levels of the students involved.

Outcomes

The success of the educational activities has sparked interest from many other schools looking to include this teaching module in their curriculum. To address this increasing demand, a fundraising campaign has been launched to cover the costs of researchers and external operators who lead these activities.

This fundraising initiative highlights the crucial importance of raising awareness and improving knowledge among younger generations. By fostering a better understanding of the benefits of Posidonia wrack, the goal is to encourage broader acceptance of its role in coastal management.

Ongoing challenges

In France, *Posidonia oceanica* is legally protected, covering both the submerged living meadows and, by extension, the wrack that washes ashore. However, the management of dead leaves and the formation of banquettes on public beaches are left to the discretion of local municipalities.

Funding is constantly being sought after to cover expenses related to educational activities that are conducted both in the field and within classroom settings in schools.

The combination of scientific evidence, educational programs and support for the development of proper management protocols can play a crucial role in persuading policymakers, local stakeholders, and tourists alike. It is important to convey that the presence of Posidonia wrack along the beaches and in the surf zone is entirely natural and carries significant benefits, particularly in terms of beach protection against erosion and the preservation of associated biodiversity.

All data and information reported here comes from the scientific paper of Bussotti et al. (2022). Further comments, inputs and recommendations were provided by Francesca Rossi, Senior Scientist at Statzione Zoologica A. Dorhn and CNRS, during a video interview held in February 2023. Detailed information on the ECOMED project can be found at: http://ecoseas.unice.fr/index.php/research/en-cours/194-2021-06-11-07-42-49.

The ‘Ecological Beach Model’

Torre Flavia Beach (Lazio region - Italy)

Type of beach:
SANDY

Managed by:
MUNICIPALITY

Degree of urbanisation:
SEMI-URBAN

WITHIN a Protected Area

Torre Flavia Beach is a Special Protection Area (SPA) covering 40 ha, housing embryonic shifting dunes and serving as a habitat for plover birds of conservation concern. Despite its small size, the sandy beach is open to the public, subject to simple rules to prevent conflicts with conservation objectives.

Main issue

In the Lazio Region, the current practice of using beaches for tourism involves the permanent removal of Posidonia deposits, causing concerns among various stakeholders. The accumulations are typically mechanically collected and then disposed of in landfills.

In 2020, the Italian Institute for Environmental Protection and Research (ISPRA) initiated the BARGAIN project, aiming to create a pilot model of an ecological beach. This model seeks to harmonize tourist activities on beaches with the protection of coastal ecosystems. Notably, the management approach proposed by this project eliminates the removal of Posidonia beachcasts and banquettes, as well as its associated disposal in landfills.

Actions taken

Managing Posidonia accumulations

In Torre Flavia Beach the dead Posidonia leaves are left on the beach as recommended by the guidelines of the Ecological Beach Model. A continuous collaboration with regional and local administrations is underway, with the objective of pursuing a regional law that incorporates the guidelines of best practices. These guidelines are intended to become the standard reference for implementation by municipalities.

Communication, education and awareness-raising

Communication and environmental education activities have been suggested in local schools to introduce students to the ecological significance of the Posidonia residues left on the beach. The aim is to encourage responsible behaviour among younger generations.

Information panels have also been installed, and awareness campaigns have been launched to promote a shift in public perception regarding the presence of the Posidonia banquettes. These efforts also seek to re-evaluate the concept of a natural beach and advocate for environmentally friendly management practices among beach managers and users.

Outcomes

To promote the correct management of stranded seagrass biomass through the Ecological Beach Model, a report was drawn up with regional guidelines. Unfortunately, the guidelines were not officially adopted by the Lazio Region during the project, but the work to convince the decision-makers is continuing as adoption is a long-term process.

Introduction Methodology Case studies Common issues Recommendations Glossary Resources

The project involved close collaboration with Protected Area managers and local schoolteachers, whose support proved invaluable in outreach activities. As a result, these educational initiatives will continue to ensure the message of the positive value of the beach banquette is consistently shared.

Ongoing challenges

A key challenge was translating ecological beach guidelines into regional laws that local coastal municipalities could enforce.

Dedicated people are essential to implement the Ecological Beach Model and its associated awareness-raising activities. Unfortunately, the chronic shortage of human resources, even in Protected Areas, continues to be a significant barrier to adopting sound management practices.

The success of the ecological beach concept hinges on raising awareness about the value and vulnerability of coastal ecosystems, transforming the perception of the banquettes from a problem into a valuable resource.

Ensuring the continuity of good management practices for an ecological beach is challenging. Therefore, it’s crucial to engage local communities, citizen associations, schools and other local organisations in this effort.

All data and information reported here comes from the scientific paper of Rotini et al. (2020) and ISPRA 2020. Further comments, inputs and recommendations were provided by Alice Rotini, Stefania Chiesa and Alfonso Scarpato, Senior Researchers at ISPRA, during a video interview held in February 2023. For detailed information on the BARGAIN project can be found at: https://www.isprambiente.gov.it/it/progetti/cartella-progetti-in-corso/progetti-mare/bargain.

Posidonia wrack on Torre Flavia Beach, Italy (Photo credit: ISPRA).

Collaborative management: Municipality, Park and Region

Olzu Beach, Cap Corse Agriate Natural Marine Park (Corsica - France)

Type of beach:
SANDY

Managed by:
MUNICIPALITY

Degree of urbanisation:
NATURAL

WITHIN a Protected Area

Extensive Posidonia banquettes along the shore of Olzu Beach, Corsica, France (Photo credit: Parc Naturel Marin du Cap Corse et de l'Agriate).

Olzu Beach, stretching about 200 m wide within the Cap Corse Agriate Marine Natural Park in northeast Corsica, is a beloved destination for locals and tourists alike, especially during the summer months. This natural beach undergoes significant changes in its Posidonia beds throughout the year.

Main issue

Following a severe storm, the beach experienced erosion but is now gradually recovering naturally. Managing the Posidonia banquettes in this situation is crucial.

Due to strong currents, there are substantial accumulations of dead leaves, creating conflicts between conservation efforts and tourism activities. It's essential to keep the banquettes in place to protect the beach from further erosion, facilitate the exchange of organic matter, and support the species in this habitat. However, ensuring safety for beach access and catering to the need of tourists is also vital as it is a key pillar for the economic well-being of coastal municipalities within the Park.

Actions taken

Leveraging scientific support and monitoring

The Municipality, in collaboration with the Management Body of the Natural Marine Park, has adopted a scientifically guided approach for the rational and sustainable management of the Posidonia banquettes. These guidelines, developed by the Corsica Environment Office (OEC), involve a two-step solution based on the annual volume of dead Posidonia leaves on the beach.

Communication, education and awareness-raising

Fostering acceptance of the presence of banquettes on the beach involves public awareness and communication campaigns. Information panels are available in four languages and aim to educate visitors on the ecological and socio-economic significance of Posidonia.

Managing Posidonia accumulations

The Posidonia banquettes are mechanically removed in preparation for the tourist season, and are usually stored in a designated area within close proximity to the shoreline. In this designated area, the dead leaves naturally dry up and mix with the beach sediments. If there's an excessive amount of biomass, it can be moved to another section within the inner part of the beach after being separated from the sand.

During the autumn, the stored Posidonia remains are not re-introduced into to the beach. This decision is based on the understanding that such an action could stress the beach, potentially causing issues with the functioning of machinery. Furthermore, by the time autumn arrives, most of the dead leaves have already naturally integrated back into the beach system.

Outcomes

The accumulation and non-removal of dead Posidonia leaves proves to be an effective Nature-based Solution (NbS) for making the beach more compact and reshaping the beachline.

Promoting a positive attitude among local administrations and persuading them to adopt sustainable Posidonia beach management practices is crucial. This has been achieved through regular meetings and close collaboration with local stakeholders, where the positive value of proper management and striking a balance between conservation and tourism, is thoroughly explained.

The Park's administration provides municipalities with an economic incentive to encourage them to adopt the beach management guidelines developed by the OEC. This financial support helps cover the costs associated with personnel and machinery provided by external companies engaged in the intervention. Since covering the costs of the external company responsible for sustainable Posidonia banquette removal can potentially deter Municipalities, the financial assistance provided by the park administration is greatly appreciated and helps alleviate this concern.

It's worth noting that the Park has consistently reached agreements with the Municipalities regarding the choice of actions and the most suitable methodologies for managing significant accumulations of dead Posidonia on the beaches. This collaborative approach has proven successful.

Over the years of implementing these guidelines, the staff of the contracted company has had the opportunity to improve their skills and tools used, resulting in increased efficiency and minimized environmental impact. This progress benefits not only the Municipalities within the Park but also serves as a positive example for neighbouring municipalities, demonstrating the feasibility of more sustainable management practices.

Ongoing challenges

In France, regulations concerning Posidonia are not yet well-defined. As a result, the approach at Olzu Beach is based on recommendations for banquette management, rather than stringent directives for coastal Municipalities. While this allows for a necessary level of flexibility in promoting responsible and sustainable practices, it also means that stakeholders are not legally obliged to take action.

All information, comments and suggestions reported here were provided by Gianluigi Cancemi, Office de l'Environnement de la Corse and Madeleine Cancemi, Deputy Director and the Managers of the Parc Naturel Marin du Cap Corse et de l'Agriate, during a video interview held in March 2023. The detailed management methodology of Posidonia banquettes is described in the scientific paper of Fontaine et al., 2020.

Making incremental improvements in a high-pressure destination

Municipality of Calvia of Beaches (Mallorca, Balearic Islands - Spain)

Type of beach:
SANDY

Managed by:
MUNICIPALITY

Degree of urbanisation:
URBAN

WITHIN and OUTSIDE a Protected Area

Posidonia stockpiles returned to the shoreline after the summer season in Calvia Municipality, Spain (Photo credit: IUCN).

The Municipality of Calvia, situated in the southwest the island of Mallorca, attracts the highest number of tourists of the entire island, mainly during the summer season and with a focus on the so-called 'sun and beach' tourism. Through a public enterprise, the Municipality oversees the management of numerous urban and semi-urban beaches of varying sizes along its coastline.

As a leading coastal tourist destination, the Municipality of Calvia actively implements environmental management initiatives, primarily centred on enforcing tourism regulations to conserve coastal and marine environments.

Main issue

Until 2019, the Municipality removed Posidonia banquettes from the beaches and repurposed it for traditional uses, including agricultural practices. The dead Posidonia leaves were collected using heavy machinery and transported to local farms in open trucks.

Despite taking precautions, it became evident that a significant amount of sand was unintentionally removed along with the dead leaves, contributing to erosion.

Actions taken

Managing Posidonia accumulations

Every beach is different in terms of the quantity and quality of the banquettes, as well as their use. However, the dead Posidonia leaves are usually mechanically collected from each beach from mid-March to the end of October.

In 2022, a pilot project aimed to temporarily remove Posidonia banquettes during the summer tourist season for beach cleanliness. These stored banquettes were reintroduced in autumn to replenish the beaches and protect them from winter storms.

To remove only the leaves and prevent the loss of the sand trapped within them, the leaves are initially thrown into the sea and subsequently collected again. This process allows for natural cleaning of the leaves, removing any remaining sand in the seawater. The cleaned wracks are then stockpiled in a municipal lot throughout the summer season and are later returned to the beach in the autumn, specifically to the swash zone, and to serve as protection against erosion.

Leveraging scientific support and monitoring

The banquette removal method was adjusted to align with the Balearic Islands Posidonia Decree and recommendations from a previous scientific project. The adaptation focused on preventing sand dispersion during Posidonia banquette management actions.

The evolution of the management actions is monitored, documented and reviewed annually by both the Municipality and the public enterprise overseeing the management actions on the beach. The monitoring protocol includes comprehensive details about the methodology, usage of machinery, timing for removal, assigned responsibilities and other relevant aspects. These operational guidelines also undergo validation by the Regional Government, aligning with the Posidonia Decree.

Outcomes

The seasonal and temporary removal strategy was implemented across all of the Municipality's beaches in 2020.

Although no scientific data is currently available due to the absence of commissioned studies, there is anecdotal evidence from the past over three years that suggests the beaches are recovering. This can be observed by comparing images of the coastline from before 2020 with those taken today.

Ongoing challenges

The transition to the new strategy faced relatively few challenges, mainly due to strong local political support and a well-defined regulatory framework provided by the regional Environmental Regional Authority. The Municipality possessed the necessary technical expertise to implement these changes, and from a cost perspective, the approach proved to be more cost-effective than the previous disposal of the Posidonia leaves in various local farms.

However, there was some opposition encountered during the transition. Environmental associations advocated for retaining the Posidonia banquettes on-site, while some residents were puzzled by the initial removal and subsequent re-collection of Posidonia remains. In all such cases, effective communication proved to be the most beneficial approach, whether through in-person discussions or email exchanges.

Remarkably, there was no opposition from local farmers once the problem of sand removal associated with the banquettes and the resulting beach erosion was explained. This highlights the importance of clear communication in addressing concerns and fostering cooperation.

All information, comments and suggestions reported here were provided by Juan Llorca, Calvia Municipality and Pedro García Rubio, Public Enterprise Calvia 2000 during a video interview held in March 2023.

Adopting a natural approach

Municipality of Le Lavandou (France)

Type of beach:
SANDY

Managed by:
MUNICIPALITY

Degree of urbanisation:
URBAN AND NATURAL

OUTSIDE of a Protected Area

The Municipality of Le Lavandou is well known for its 12 km coastline home to 12 fine sandy beaches. Differing in size and degree of urbanization, all the beaches fall under the management of the Municipality, which is dedicated to protecting them from erosion in a natural and sustainable manner. Thanks to its environmental policies and management initiatives, Le Lavandou sets an example of a natural approach that aligns with quality standards for beach usage. Consequently, it has consistently received the Blue Flag Award annually since 1997.

Main issue

To safeguard the coastline from erosion and support the natural dynamics of the beaches, the Municipality undertakes various actions to preserve the Posidonia seagrass banquettes throughout the year.

Previous practices of mechanical cleaning and the removal of Posidonia accumulations over the years had contributed to beach regression. This led to the adoption of an improved strategy for the careful management of sand. Manual cleaning is now the preferred method for all Posidonia banquettes, with mechanical cleaning reserved for larger, heavily frequented tourist beaches. This mechanical cleaning is carried out without touching the Posidonia and other natural elements deposited by the sea.

Actions taken

The Municipality of Le Lavandou is dedicated to maintaining Posidonia banquettes on the beach (on-site) and raising awareness about the importance of Posidonia.

Communication, education and awareness-raising

To support the Municipality's commitment, various communication tools are in place, including information boards at beach entrances, stands for raising awareness among tourists and locals and campaigns targeting boaters. Competitions focused on Posidonia are also run to engage young people, contributing to educational efforts.

Municipality staff responsible for beach maintenance have also received training on Posidonia and the beach ecosystem, showcasing a proactive approach to knowledge and skill development in the pursuit of ecological preservation.

Managing Posidonia accumulations

The Municipality's comprehensive strategy aims to keep the banquettes on all beaches throughout the year, which means dead leaves arriving in autumn result in accumulations that remain on the beach. In an unusual situation in the summer of 2023, a significant amount of Posidonia residuals washed up on a popular beach prone to erosion. Following discussions with users, the decision was made to let these accumulations remain in their location and cover them with sand.

Safeguarding Posidonia meadows

The delineation of an anchoring prohibition area using ecological buoys further demonstrates a commitment to managing Posidonia meadows.

Restoring dune systems

The Municipality's strategy of keeping banquettes on all beaches throughout the year also indicates a commitment to dune system preservation and restoration.

Outcomes

While there haven't been specific studies conducted, photos of the beaches demonstrate the positive effects of keeping the banquettes. These images reveal the accumulation of sand, stabilizing the banquette and acting as a natural barrier that fosters the thriving of dune vegetation.

A survey was undertaken among tourists and locals after the change in beach management, shifting from mechanical cleaning to manually removing waste and preserving natural elements. The findings indicated that beachgoers found the natural state more enjoyable.

Leaving the banquettes on the beach is not just economically sensible but it also makes more sense environmentally, as the banquettes help to protect the beach from erosion.

Ongoing challenges

Despite communication campaigns conducted not only at the municipal level but also on a national scale, many residents and beachgoers still perceive Posidonia accumulations as waste.

All information, comments and suggestions reported here were provided by Clélia Moussay, Municipality of Le Lavandou, during a video interview held in July 2023.

Posidonia beach wrack in the Municipality of Le Lavandou, France (Photo credit: Sylvie Pinto, Le Lavandou City Hall).

A private sector approach

Iberostar Mehari Djerba Beach (Djerba - Tunisia)

Type of beach:
SANDY

Managed by:
PRIVATE COMPANY

Degree of urbanisation:
URBAN

FAR from a
Protected Area

Posidonia wrack on Mehari Beach, Tunisia (Photo credit: Iberostar Mehari Djerba).

The Iberostar Mehari Djerba Hotel is situated on the edge of Sidi Akkour Beach, providing a 400 m long stretch of sandy beach with soft white sand dunes, resilient palm trees adapted to the dry regional climate, and Posidonia meadows along the shoreline. The beach tends to get busy, especially in the summer, and provides various facilities and services.

The Iberostar Mehari Djerba Hotel is responsible for all cleaning and maintenance of the Sidi Akkour Beach.

Main issue

Erosion poses a significant challenge in Djerba and other Tunisian coastlines, as it can reduce the appeal of popular beaches. Unfortunately, the prevailing practice in the region involves mechanically removing Posidonia accumulations from the beaches. Regrettably, this process also takes away a substantial amount of sand, worsening coastal erosion.

In contrast, the hotel's managed beach area employs a set of Nature-based Solutions (NbS). These initiatives, implemented by the hotel's internal staff, target both the dune system and the Posidonia accumulations.

Actions taken

In 2018, Iberostar introduced the Wave of Change Initiative, a pioneering effort in responsible tourism.

Private sector support and engagement

This initiative guides various protective and restorative activities around the hotel, all informed by scientific information. Hotel staff members undergo training to educate tourists about the importance of safeguarding fragile coastal ecosystems. Additionally, the hotel staff organizes activities to raise awareness among children regarding Posidonia, marine ecosystems, and the issue of marine debris.

Leveraging scientific support and monitoring

The protective and restorative activities implemented around the hotel are grounded in scientific guidance, ensuring a well-informed approach to ecological preservation.

Restoring dune systems

To enhance dune stability, palm tree leaves are strategically placed to act as sand catchers, preventing sand loss due to wind. Simultaneously, the hotel generously plants local flora, contributing to the overall stabilization of the dune system.

Managing Posidonia accumulations

Posidonia banquettes are integral to the beach, featuring narrow manually created passages to facilitate access for guests avoiding dead leaves. The on-site maintenance of the Posidonia banquette includes the manual removal of dead leaves by hotel gardeners to create the passages. Additionally, the staff carries out various cleaning tasks to ensure a waste-free beach and banquettes.

Outcomes

Additional data is needed to assess the effectiveness of the measures taken to prevent coastal erosion in front of the Iberostar Mehari Djerba Hotel. Currently, data is being collected on the length and width of the beach, as well as the conservation status of the Posidonia meadow in front of the hotel. Periodic monitoring of the coastline will be conducted to properly evaluate the success of the measures applied.

Attitudes towards banquettes are improving among both clients and employees. After explaining the ecological importance of the Posidonia leaves and the benefits of Posidonia, they have become more accepting, respectful, and fond of it.

Most guests actively participate in the weekly beach cleaning activities.

Ongoing challenges

Guests tend to react negatively to the presence of Posidonia banquettes and aegagropiles when they are not adequately informed. To raise awareness and change the mindset, the hotel staff is been encouraged to explain the significance of Posidonia.

It is necessary to keep the accumulations clean and find natural solutions in case they emit unpleasant odours or create impediments in using the beach and reaching the sea.

Regarding governance, the complexity of the laws and overlapping competences in the public sector can be challenging. Therefore, a public-private partnership would be a good start to work alongside public authorities for the betterment of the destination.

A collective approach is needed among all hotels in the area to adopt a common policy of maintaining the Posidonia accumulations on the beach. This approach can have a positive impact on the coasts and prevent guests from comparing hotels with Posidonia beaches versus those where the Posidonia has been removed.

It is essential to continue to raise awareness about the importance of Posidonia among not only young people but also adults, especially decision-makers and local authorities is a key action for supporting change.

All information, comments and suggestions reported here were provided by Manel Ben Ismail, Sustainability Manager, Tunisia & Morocco Sustainability Department and Anis Chemli general manager of the Iberostar Mehari Djerba Hotel during a video interview held in April 2023, and reviewed by Federico Cardona, Coastal Health Strategy Manager, EMEA, Iberostar.

Detailed information on Iberostar Wave of Change project can be found at: http://waveofchange.com.

Common Issues

After reviewing examples and conducting interviews with stakeholders responsible for different aspects of Posidonia beach-dune system management, as well as those implementing actions, several common issues were identified:

Managing Posidonia accumulations

Managing Posidonia accumulations is a common challenge across all the examples in this handbook. In cases such as **Schinias (Greece)** and **Es Trenc (Balearic Islands, Spain)**, where retaining accumulations is not feasible, temporary removal using lightweight machinery is a common practice. These methods are adapted to local needs, accounting for the volume of dead leaves, coastal configuration, tourism pressures and the need to find a balance between conservation efforts and the demands of the visitor economy.

Restoring dune systems

Addressing the need for restoring dune systems, especially in areas heavily affected by urban development and mass tourism, is demonstrated in the **Capo Carbonara MPA (Italy)** and **Schinias – Marathon National Park (Greece)** examples. Both destinations have used strategies including controlled access through well-marked entrances, paths guided by ropes, and structures made from natural materials. They have also both added protective fencing to avoid trampling as well as windbreakers to keep sand on the dunes.

Navigating collaboration challenges with different administrations

While establishing and modifying regulations for Posidonia banquettes is an ongoing challenge, significant progress is being made. As demonstrated in the examples, entities like ISPRA in Italy, INSTM in Tunisia, and N.E.C.C.A.'s Protected Areas Management Directorate in Greece are taking action, fuelled by optimism for future laws.

Cooperation with local administrations, as seen in examples such as **Olzu Beach (Corsica, France), Sakarun Beach (Croatia), Campulongu Beach (Sardinia, Italy), Schinias beach (Greece), Mahdia Beach (Tunisia)**, and the beaches within **Calvia Municipality (Balearic Islands, Spain)**.

Leveraging scientific support

Scientific institutions have played a pivotal role in defining the best ways to manage Posidonia beaches. This is evident in places such as **Sakarun Beach (Croatia)** by the Public Institution Natura Jadera, the **Natural Marine Park of Cap Corse and Agriate (Corsica, France)** by the Corsica Environment Office, **Capo Carbonara MPA (Italy)** by IAS-CNR, and **Schinias Beach (Greece)** by the Hellenic Centre for Marine Research.

Need for communication, education and awareness-raising

The examples demonstrate that information panels aimed at beachgoers and educational projects for local schools are effective tools for raising awareness on the value of Posidonia banquettes and coastal dune systems.

This is clear from the successful communications campaign to promote the value of Posidonia launched by **Sakarun Beach (Croatia)** which involved the local community, the municipality, and the tourism board. Other effective actions include education programmes, information boards, and promotional videos, such as those prepared in Paloma Beach (France) by CNRS and Torre Flavia Beach (Italy) by ISPRA.

The role of the private sector

The nature-based management approaches that the private sector can adopt, even when dealing with the presence of Posidonia, are very encouraging. This is evident in the beach management practices of the **Iberostar Mehari Djerba Hotel in Djerba, Tunisia**. This perspective emphasises that taking care of the environment is connected to the sustainability of businesses, stressing that nature conservation should be a collective effort.

Photo credit: Es Trenc Salobrar de Campos Maritime-Terrestrial National Park.

Recommendations

The following recommendations are a summary of lessons learnt based on the interviews with individuals who were involved in managing the beach sites featured in the examples.

Community engagement

Engage the community, citizens, and economic operators through a bottom-up approach.

Consistent approach

Maintain consistency, tenacity, and adaptability in approaches.

Scientific awareness

Raise awareness using scientific data to demonstrate the value of Posidonia beaches.

Collaborative outreach

Collaborate with local communities, associations, municipalities, and administrations, actively sharing ongoing actions and results.

On-site collaboration

Work directly on the beach (meetings and discussions) to enhance awareness and promote collaboration between public institutions and the local community.

Policy Advocacy

Engage at a governmental level and persuade policymakers to adopt specific regulations for managing Posidonia accumulations, recognising them as both an ecological and economic asset.

Effective communication

Identify and engage the right communicators for policymakers, acknowledging that contacts may change over time.

Ongoing understanding

Foster an ongoing understanding of the value of protecting the environment.

Sustainable education

Promote awareness, education and information dissemination to convey that Posidonia is integral to a natural beach.

Nature-based Solutions

Inform policymakers about Nature-based Solutions (NbS) for safeguarding the coastal ecosystem, emphasizing the pivotal role of preserving Posidonia in attracting tourists.

Some tips to get started

The ‘Manual for conserving Mediterranean Posidonia Beaches and assessing progress of management actions’ provides a detailed account of how to plan your beach management actions step by step. The examples included in this booklet highlight the following suggestions for getting started:

1. Begin by defining the problem you aim to address, whether it’s beach restoration, managing sustainable tourism pressure, fostering acceptance of the Posidonia banquettes, or the adoption of binding regulations.
2. Create a list of stakeholders to engage in the process, considering the available time and resources (both financial and available human).
3. Ensure local associations, schools, cooperatives, and volunteers are part of the effort, as they can assist in carrying out activities alongside dedicated and professional personnel.
4. Seek support from research institutions and universities to access robust scientific data that can underpin your initiatives, encompassing both scientific and educational activities.
3. Collaborate on various projects to secure even modest funding that can contribute to covering the costs of your actions.

Glossary

AEGAGROPILE

Aegagropiles are round-shaped conglomerations of *Posidonia oceanica* debris commonly found along the coasts of the Mediterranean Sea.

BEACH WRACK AND BEACH-CAST

Beach wrack or beach-cast wrack is the accumulation of organic material that is washed up onto the beach by the tides, wind and waves that eventually breaks down and is recycled back into the system.

MACROPLASTICS

Large plastic debris such as bottles, that are >20 mm.

POSIDONIA OCEANICA

Posidonia oceanica is a marine plant endemic to the Mediterranean Sea, forming large underwater meadows that are an important part of marine ecosystems.

POSIDONIA BANQUETTES

Seagrass wrack deposits on the shoreline that form extensive piles several meters thick, making wedgeshaped structures.

SEAGRASS BIOMASS

Seagrass biomass refers to the total weight or mass of seagrass plants in a particular area or ecosystem.

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ADDITIONAL RESOURCES

- Interreg-MED POSBEMED & POSBEMED2
- POSBEMED2 project pilot site presentation
  - Capo Carbonara & Sinis Mal di Ventre MPAs
  - Es Trenc-Salobrar de Campos Maritime-Terrestrial National Park
  - Sakarun Beach
  - Schinias-Marathon National Park
- **Ecoseas**
- **MED Dé.Co.U.Plages Project**
- ISPRA
  - Bargain Project
  - Ecological Beach Model

EDUCATIONAL RESOURCES

- **Comics**
  - "En route! Les secrets de la plage avec Sidonie" http://ecoseas.unice.fr/images/_01_articles/_05_link/BD_Finale_french_reduite4.pdf.
  - Cartoon animation on the importance of Posidonia and its risks https://posbemed2.interreg-med.eu/what-we-achieve/deliverables-database/detail/?tx_elibrary_pi1%5Blivrable%5D=15567&tx_elibrary_pi1%5Baction%5D=show&tx_elibrary_pi1%5Bcontroller%5D=Frontend%5CLivrable&cHash=6460324ef9dddbc724f01a0ab2d907a1.
  - Mini-guide on the protection of Posidonia meadows along the Occitanie coast https://fne-ocmed.fr/wp-content/uploads/2023/06/FNE-LR-Guide-Posidonie-web-2023.pdf.
- **Videos**
  - *Posidonia oceanica* banquettes as a protective shield of Mediterranean beaches youtube.chttps://www.youtube.com/watch?v=s8kYXNI-Z9com.
  - How to naturalize the image of Mediterranean Posidonia beaches? youtubhttps://www.youtube.com/watch?v=g7qAiRvkvUAe.com.
  - *Posidonia oceanica* - The Sakarun Bay Guardian youtube.https://www.youtube.com/watch?v=hjGOMVFXoWEcom.
  - Posidonia Team - 10-episode miniseries https://www.youtube.com/playlist?list=PLgrRx6npVaKKYFyFIWKTqNbQ8dAbNn2a6ube.
  - Short documentary on *Posidonia oceanica* https://www.youtube.com/watch?v=_I_wFvqxxbYon Posidonia nel Mediterraneo - YouTube.
  - "Banquette alla Riscossa" https://www.youtube.com/embed/smFITiqdS18ube
- **Further resources**
  - Poseidon's Grievance - Children's book on the importance of Posidonia beach systems https://posbemed2.interreg-med.eu/what-we-achieve/deliverables-database/detail/?tx_elibrary_pi1%5Blivrable%5D=15453&tx_elibrary_pi1%5Baction%5D=show&tx_elibrary_pi1%5Bcontroller%5D=Frontend%5CLivrable&cHash=1fa72727d18734ab58b26ad295faa60fed.eu).
  - Card game on Posidonia (in Italian) "Banquette in gioco" https://www.isprambiente.gov.it/files2021/progetti/banquette-in-gioco-bargain.pdf.
  - Discover Posidonia audiobook https://posbemed2.interreg-med.eu/what-we-achieve/deliverables-database/detail/?tx_elibrary_pi1%5Blivrable%5D=15562&tx_elibrary_pi1%5Baction%5D=show&tx_elibrary_pi1%5Bcontroller%5D=Frontend%5CLivrable&cHash=ebe2dd2611e3dc34f8d151544c61d6c7.

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Photo credit: Sylvie Pinto, Le Lavandou City Hall.

Management of Posidonia Beaches

Examples from Mediterranean Destinations

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