

WORKSHOP REPORT

Sustainability of the Cruise and Recreational Boating Sector within the Pelagos Sanctuary

ADAPT-PELAGOS PROJECT

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Key takeaways

1. **Joint approach for the sustainability of the cruise and yachting sectors** – The workshop brought together around thirty public, private, associative, academic, and scientific representatives from the three countries that are signatories to the Pelagos Agreement, with the goal of co-developing a sustainability roadmap for the cruise and yachting sectors.
2. **Vulnerability of the Pelagos Sanctuary** – The high concentration of maritime activities increases pressure on marine biodiversity (pollution, noise, collisions, emissions), requiring swift and coordinated action.
3. **Biodiversity and pollution management prioritized among five key sustainability challenges** – Discussions were based on the guidelines for cruising and recreational boating in the Mediterranean, structured around five axes corresponding to the main challenges identified: (1) emission reduction, (2) ecosystem protection, (3) pollution and waste management, (4) innovation and knowledge, and (5) socio-economic impacts. Participants clearly emphasized that preserving biodiversity and ecosystems is the top priority, followed by pollution and waste management, and then emission reduction.
4. **Concrete action proposals** – Working groups identified flagship measures such as widespread shore power electrification, the creation of no-anchoring zones, implementation of visitor quotas in the most vulnerable areas, speed reduction, elimination of plastics on board, and the establishment of green funds dedicated to financing environmental and conservation projects within the Sanctuary.
5. **Strengthening governance and monitoring** – The establishment of a permanent technical committee was proposed to ensure follow-up, evaluation, and coordination of actions among States, ports, and operators.
6. **Existing tools and innovations** – The SEA Index, the NETCCOBAMS/VisiZone platform, and the High-Quality Whale Watching® label were identified as concrete levers to assess, prevent, and promote sustainable practices within the Sanctuary.
7. **Legal framework to be consolidated** – Experts highlighted the need to move from “soft law” to more binding and harmonized regulations among countries, while integrating local authorities and the private sector.
8. **Towards measurable sustainability indicators** – Participants identified an initial set of indicators using the RACER method, focused on climate, biodiversity, circular economy, and governance, to enable harmonized monitoring at the Pelagos scale.
9. **Pelagos as a laboratory for the blue transition** – The workshop reaffirmed the Sanctuary’s role as a pilot area for testing policies and indicators that can be replicated across the Mediterranean, balancing ecosystem protection with a sustainable blue economy.

1. Introduction

The **Adapt-Pelagos** project aims to promote the adoption of good practices and the acquisition of knowledge to strengthen **action capacities** and bring forth **concrete solutions** for a more sustainable blue economy within the Pelagos Sanctuary. Supported by a partnership between the three signatory countries of the Pelagos Agreement (France, Italy, Monaco), this project seeks to identify and promote measurable adaptation actions, relying on local specificities and existing dynamics in the relevant coastal areas.

The Pelagos Sanctuary is an **internationally significant marine protected area** dedicated to the protection of marine mammals in the Mediterranean. This territory, rich in biodiversity, faces multiple pressures, particularly those linked to the **intensification of human activities** such as recreational boating, cruises, as well as noise and chemical pollution. Added to this are the **growing effects of climate change**, which increase the vulnerability of marine ecosystems and threaten the ecological balance of the sanctuary. In this context, it has become urgent to **strengthen the resilience of the territory** and involve all stakeholders in ambitious and coordinated adaptation efforts. The governance of the Sanctuary relies on the **Pelagos Agreement**, which brings together the Contracting Parties, a scientific and technical committee, a permanent secretariat, and several working groups to ensure shared and transboundary management.

It is within this framework that the **Adapt-Pelagos** project takes place, offering a participatory and territorialized approach. A series of **thematic workshops** has been organized to encourage the co-construction of action priorities at various scales. The first workshop, held on September 16, 2025, in Monaco and the subject of this report, focused on the **sustainability of the cruise and recreational boating sector**. Its objectives were to:

- **Strengthen participants' knowledge and skills** on managing environmental impacts from recreational boating and cruises in the Pelagos Sanctuary;
- **Share tools and methodologies** for better consideration of traffic impacts on marine ecosystems and cetaceans in the Pelagos Sanctuary;

Encourage collective reflection around priority actions and indicators for the blue economy within the Pelagos Sanctuary.



The workshop was held at the Yacht Club of Monaco, bringing together nearly 30 participants from public, private, associative, and scientific sectors, representing the three signatory countries of the Pelagos Agreement (France, Monaco, Italy). However, it is important to note the absence of representatives from the cruise sector, despite invitations sent beforehand. This was identified as a major limitation given their key role in the area's maritime dynamics.

Through a participatory method, combining plenary sessions and sub-group work, the day allowed concrete proposals to emerge, local expertise to be shared, and the foundations for a series of sustainability indicators for the adaptation of the Pelagos Sanctuary to be laid.

2. Presentations of the speakers

The day opened with an institutional introduction given by **Chloé Martin** (Plan Bleu), **Léa Glâtre** (Prince Albert II of Monaco Foundation), and **Natalie Quévert** (Yacht Club de Monaco). This provided an opportunity to recall the project's context and present the main methodological outlines. An interactive mini-quiz, led by **Sophie Bayle** (Plan Bleu), was proposed to engage participants and provide factual benchmarks on the impacts of the maritime sector, such as atmospheric emissions, noise pollution, or biofouling.



Nathalie Quévert, Yacht Club de Monaco ©Plan Bleu

2.1 PRESENTATION OF GUIDELINES FOR THE SUSTAINABILITY OF CRUISES AND RECREATIONAL BOATING IN THE MEDITERRANEAN

Key points to remember:

- The Mediterranean faces exceptionally high maritime tourism pressure, making the Pelagos Sanctuary particularly vulnerable.
- The five sustainability challenges provide a structuring framework to prioritize action and bring stakeholders together.
- The catalog of 68 good practices offers a strong operational basis to accelerate the ecological transition of the sector.

The first session was devoted to presenting [the sustainability guidelines for the cruise and recreational boating sectors](#), produced by Plan Bleu in 2023 and presented by Arnaud Terrisse (Plan Bleu).

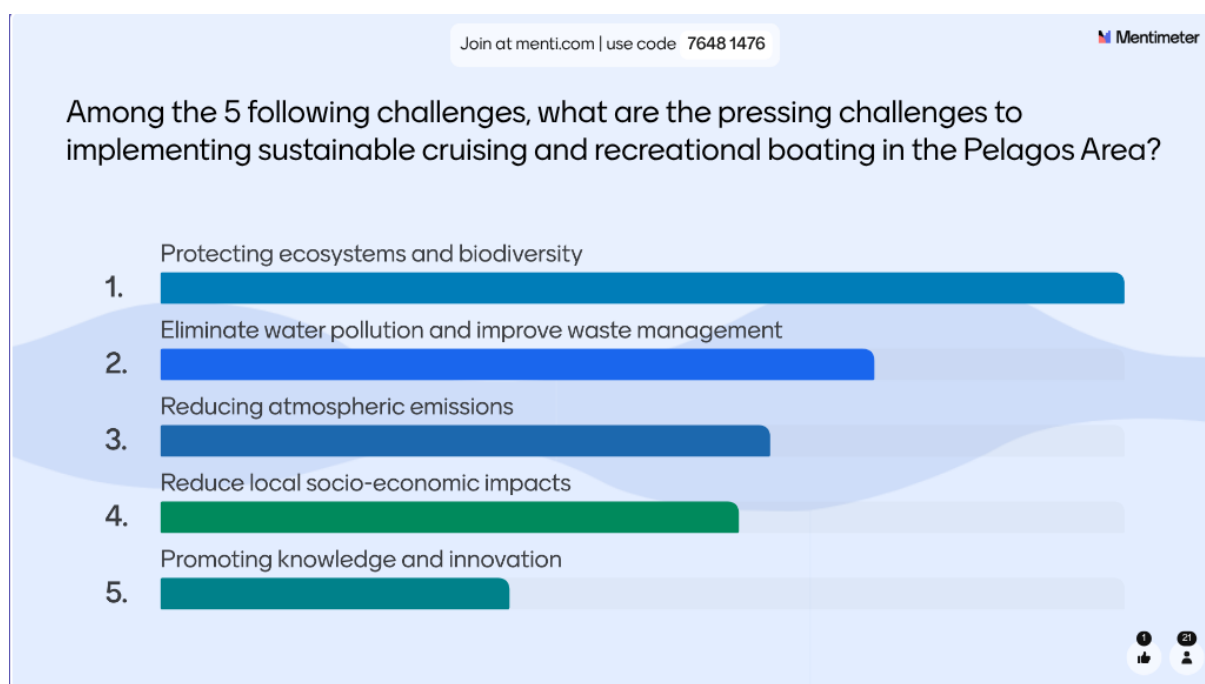
The Mediterranean, the world's second largest recreational boating area and Europe's leading cruise destination, places strong environmental pressure on fragile ecosystems. The impacts are multiple: atmospheric and chemical pollutant emissions, underwater noise, collisions with cetaceans, introduction of non-native species, and seabed degradation. These findings were structured around five major sustainability challenges:

1. Eliminate atmospheric emissions of pollutants and greenhouse gases;
2. Safeguard ecosystems and biodiversity;
3. Eliminate sources of water pollution, prevent waste generation, and improve waste management;
4. Stimulate knowledge and innovation;

5. Avoid impacts on local socio-economic systems.

To address these challenges, ten interconnected sustainability objectives were established, ranging from eliminating emissions to protecting biodiversity, reducing waste, and supporting innovation. A catalog of 68 good practices highlights priority actions such as speed reduction, on-board environmental monitoring, and zoning of marine protected areas. These recommendations aim to guide both maritime operators and public decision-makers in the sustainable transition of the sector. Based on these challenges, participants were then divided into sub-groups, using sustainability objectives and associated good practices for each theme to formulate proposals and action pathways tailored to the Sanctuary.

Figure 1. Live poll conducted on Menti.com ranking the priority challenges facing the Pelagos Sanctuary



During a live poll on Menti.com, participants were asked to rank the priority challenges for the Sanctuary. **Ecosystem and biodiversity protection** came first, reflecting participants' heightened awareness of immediate threats to the natural heritage of the Pelagos Sanctuary. This was closely followed by **pollution and waste management**, while the promotion of innovation and knowledge appeared as a secondary lever, though recognized as necessary to support the other challenges.

2.2 PRESENTATION OF THE LEGAL FRAMEWORKS

This sequence was dedicated to legal frameworks and their implementation challenges.

Mariantonia Lo Prete (Université du Littoral Côte d'Opale) highlighted the difficulty of legally framing the cruise sector, described as a "legal UFO," while stressing the strategic role of ports in moving toward more sustainable practices.

Anaïs Lagelle (Université Côte d'Azur) emphasized that maritime tourism (whether cruise or recreational boating) exerts increasing pressure on the Pelagos Sanctuary through intensified traffic, pollution, and disturbance to wildlife. Several mechanisms already exist: **prefectoral decrees in France**, which constitute binding measures, and the **Pelagos Charter**, which is based on voluntary commitment and contributes to ensuring the long-term presence of marine mammals within the Sanctuary.

However, the overall effectiveness of these instruments remains limited in the face of growing impacts, mainly due to **regulatory asymmetry** between strict national frameworks and voluntary initiatives. The International Maritime Organization is working on the implementation of maritime routing measures, but **governance remains fragmented** among the three concerned States.

A shift from “soft law” to binding standards is essential to ensure the protection of ecosystems. The success of such regulation will also depend on the involvement of local authorities, ports, and private operators within a truly ecosystem-based and participatory governance framework.

2.3 PRESENTATION OF EXISTING INITIATIVES AND TOOLS

Key takeaways:

- The **SEA Index** is a reference tool to assess and compare the carbon footprint of yachts, already adopted by some ports as a lever for energy transition. It is based on calculating greenhouse gas emissions according to energy consumption and technical characteristics of vessels, integrating propulsion, efficiency, and emission reduction innovations.
- The **NETCCOBAMS platform** and its VisiZone module allow cross-referencing maritime traffic data with cetacean presence data, to identify risk areas and alert ships in real time.
- The **High-Quality Whale Watching® label**, a flagship initiative of the Pelagos Agreement, regulates whale watching and strengthens marine conservation through training, a code of conduct, and an educational dimension.

Natalie Quévert presented the SEA Index, a tool developed by the Yacht Club de Monaco to assess and compare CO₂ emissions from yachts. It aims to encourage shipowners and marinas to adopt more sustainable practices by promoting environmental transparency. Already used by certain ports such as Port Vauban in Antibes, it provides a concrete lever to reduce the sector’s carbon footprint.

The SEA Index methodology is based on **calculating greenhouse gas emissions generated by yachts**, depending on their energy consumption and technical characteristics. It takes into account evaluation criteria such as type of propulsion, energy efficiency of onboard systems, and the use of innovative emission reduction solutions. The **model provides a normalized environmental performance rating**, enabling transparent comparisons between vessels.

The rating system is structured on a scale from 1 to 5, with each level corresponding to a degree of environmental performance. High-rated yachts stand out with a significantly reduced carbon footprint, while lower ratings indicate higher energy consumption and emissions. This tool provides shipowners with a **clear benchmark** and serves as a governance instrument for ports and maritime authorities to orient policies toward sustainable practices.

Simone Panigada (Tethys Research Institute / ACCOBAMS) presented tools to limit collisions between vessels and large cetaceans. **High-density whale areas overlap with intense maritime routes**, increasing mortality risks. In response, the IMO designated the northwestern Mediterranean as a Particularly Sensitive Sea Area in 2023, encouraging voluntary speed reductions between **10 and 13 knots**. This measure not only **halves the risk of collision** but also reduces **CO₂ emissions by 13%** and **underwater noise by 40%**. Initiatives such as the LIFE SeaDetect project reinforce these efforts, using automated detection and real-time alert systems. The **NETCCOBAMS platform with its VisiZone module** cross-references maritime traffic (AIS) with high-density cetacean areas in real time, identifying risk zones and alerting ships to reduce collisions in priority marine areas.

Finally, **Maria Betti** (Pelagos Agreement) recalled that the Agreement’s mission is to protect the Sanctuary’s marine mammals across a vast transboundary area of 87,500 km² covering France, Italy, and Monaco. Its governance relies on cooperation, communication, and awareness to ensure better coexistence between sea users and biodiversity.

One of its flagship initiatives is the **High-Quality Whale Watching® label**, the result of cooperation between scientists, NGOs, and operators. The label requires mandatory training, respect for a code of conduct, and integration of an educational component in excursions. It ensures sustainable whale watching and strengthens marine conservation.

3. Interactive sessions

3.1 GROUP WORKSHOP 1 – IDENTIFICATION OF PRIORITY ACTION AREAS

CHALLENGE 1

Eliminate atmospheric emissions of pollutants and greenhouse gases

OD.1 Moving towards zero-pollution ships and ports

OD.2 Contribute to the transition to renewable energy sources with zero net carbon emissions

CHALLENGE 1

Éliminer les émissions atmosphériques de polluants et de gaz à effet de serre

PRATIQUE DURABLE	CRÉDÈRE	NAVIGATION DE PLAISANCE	PORTS	MARINAS
Une surveillance de la qualité de l'air dans les ports améliorée, étendue et rendue publique, introduire la surveillance de la qualité de l'air dans les ports de plaisance.			✓	✓
Utiliser le gaz naturel liquéfié - GNL (comme carburant de transition) et équiper les ports des infrastructures correspondantes	✓		✓	
Utiliser de nouveaux carburants alternatifs (y compris les biocarburants et l'hydrogène), se préparer à la future flexibilité des carburants et équiper les ports avec les infrastructures adaptées		✓	✓	✓
Électrification des navires, des ports et des marinas (y compris le courant qual pour les navires stationnés dans les ports)		✓	✓	✓
Utiliser des laveurs de gaz en circuit fermé pour réduire les émissions atmosphériques. Les résidus filtrés sont traités comme des déchets dangereux et gérés conformément aux normes européennes correspondantes	✓			
Promouvoir des systèmes de taxation ou incitatifs qui favorisent les systèmes électriques au lieu des combustibles fossiles			✓	✓
Utilisation de moteurs économes en carburant (y compris les moteurs à quatre temps), conception optimisée des coques et systèmes qui minimisent la résistance hydrodynamique	✓	✓		
Utiliser des systèmes hybrides de propulsion éolienne (par exemple, des voiles en forme d'ailes) pour limiter la consommation de carburant	✓			
Utiliser des panneaux solaires et/ou intégrer des systèmes photovoltaïques dans le réseau électrique des ports et des navires	✓	✓	✓	✓
Passer à un carburant moins polluant ou à un système électrique lorsque les navires entrent dans les ports et en sortent			✓	
Mettre en place un réseau intelligent pour les ports afin d'anticiper et d'optimiser la consommation d'électricité et, par exemple, favoriser l'utilisation de l'électricité produite localement			✓	✓

"Challenges and practices" sheets were provided to participants during the first interactive session.

The third part of the workshop took place in the form of two interactive sessions. The first, organized in rotating tables, aimed to **collectively identify priority actions** in response to the five major challenges outlined in the guidelines: atmospheric emissions, ecosystem preservation, pollution management, knowledge/innovation, and socio-economic impacts. For methodological coherence, **Challenges 4 and 5** were grouped together to ensure homogeneity among groups in terms of sustainability objectives and practices.

Figure 2. Subgroup session during the practice identification exercise



The **prioritization method**, based on a matrix crossing urgency and feasibility, made it possible to order the different proposals and identify a set of actions considered immediately actionable. This work also highlighted some divergences of perception between groups: for example, the challenge “stimulate knowledge and innovation,” initially ranked last, was eventually recognized by several participants as an essential lever for the future, potentially conditioning the success of other action areas.

The discussions led to several courses of action:

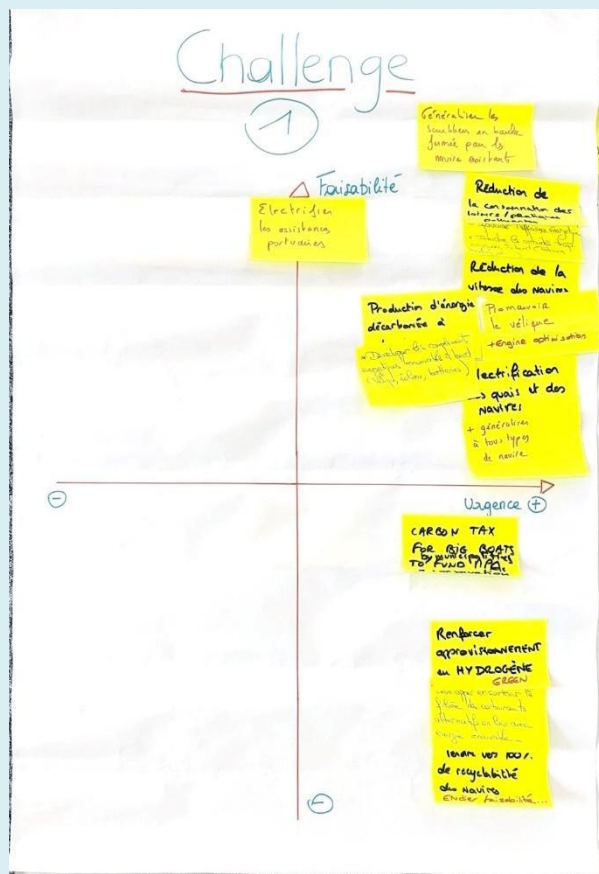
Challenge 1: Eliminate atmospheric emissions of pollutants and greenhouse gases

Identified actions and practices:

- **Generalize infrastructure for shore power** (electrification of docks), introducing financial incentives and subsidies for installation;
- **Develop supplies of decarbonized energy** such as green hydrogen, considering its life cycle;
- **Implement fiscal or incentive mechanisms such as a carbon tax** (as already introduced in the Portofino MPA);
- **Reduce polluting leisure practices;**
- **Reduce ship speeds;**
- **Develop renewable complementary energy sources onboard (sails, wind power, batteries);**
- **Enable onboard decarbonized energy production.**

Remarks:

- The use of closed-loop scrubbers for existing ships, though discussed, was strongly criticized due to risks of poor waste management onboard, pollution transfer to land, and low incentives to switch to cleaner fuels.
- While the carbon tax was ranked as urgent but difficult to implement, the Portofino MPA pointed out that it is already in place in their area, showing it is feasible in other contexts as well.



Challenge 2: Safeguard ecosystems and biodiversity

Identified actions and practices:

- **Improve knowledge of collision risk zones** (e.g., sperm whale feeding grounds) by reinforcing scientific data collection and real-time monitoring to map sensitive areas and adapt routes accordingly;
- **Establish quotas or monthly limits based on cities' or territories' carrying capacity to reduce pressure on ecosystems and residents;**
- **Provide environmental training and good practice codes for boating licenses;**
- **Establish no-anchoring zones;**
- **Develop organized mooring areas to avoid seabed damage and improve traffic management;**
- **Reduce ship speeds within the Sanctuary;**
- **Secure commitments from cruise companies and yacht owners in environmental initiatives;**
- **Encourage technological innovations** (e.g., quieter propeller designs to reduce acoustic disturbance).

Remarks: Measures such as better knowledge of risk zones, monthly carrying capacity quotas, and organized mooring areas stood out for their **preventive and operational scope**, with long-term impact potential on biodiversity conservation.



Identified actions and practices:

- **Ban untreated wastewater discharges in the Pelagos area (and beyond)** to preserve marine habitat quality;
- **Gradually phase out single-use plastics onboard**, promoting alternatives such as deposit-return systems and some biodegradable products;
- **Provide ships calling at ports with guides to local eco-responsible suppliers**, to encourage sustainable products and short supply chains;
- **Strengthen waste treatment infrastructure at ports**, since current facilities are insufficient (often regrouping separately collected waste into a single bin);
- **Equip marinas and ports with facilities for recycling separated onboard waste**;
- **Require monitoring plans for cruise ship hull maintenance** with antifouling paint;
- **Ban disposal of ground food waste in the Pelagos area**;
- **Extend the “Pelagos logic” to the Particularly Sensitive Sea Area (PSSA).**

Challenge

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Identified actions and practices:

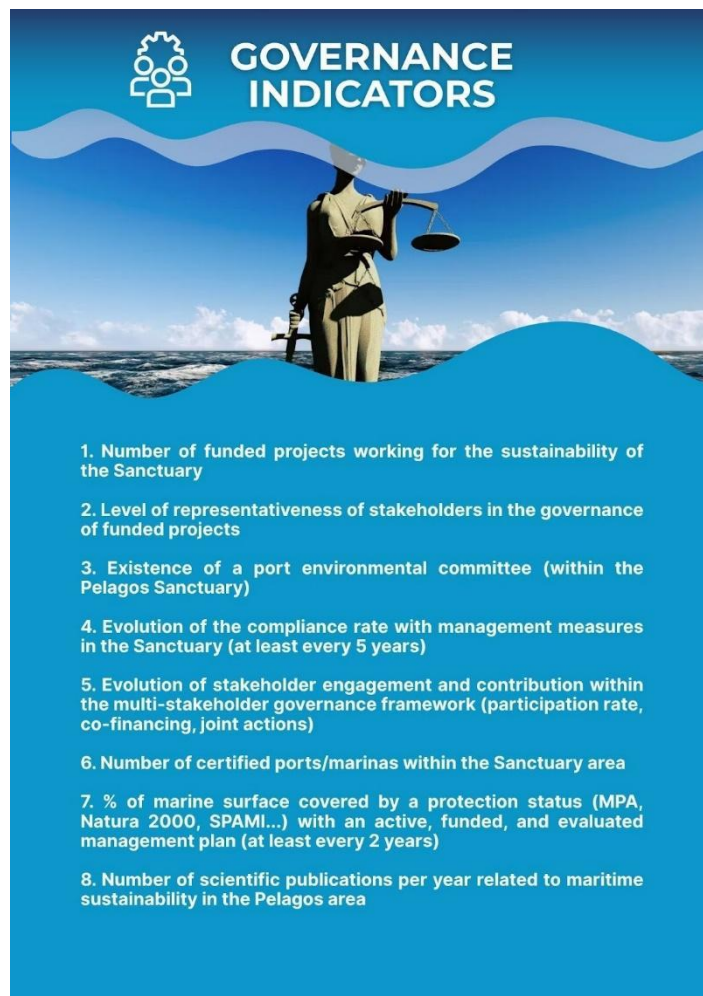
- **Require cruise companies to contribute to green funds** financing environmental and conservation projects within the Sanctuary;
- **Train crews and passengers in environmental practices** to promote responsible maritime behavior and awareness;
- **Create a permanent technical committee** to ensure action continuity, results monitoring, and stronger collaboration among scientists, managers, and decision-makers;
- **Assess carrying capacity of tourist sites and MPAs;**
- Based on this, **set a coherent daily passenger capacity per port;**
- **Regulate large yacht and cruise ship visits to the Sanctuary.**

Remarks: The **permanent technical committee** and **cruise company contributions to green funds** stood out particularly, as they ensure both structural and long-lasting impact.

A permanent committee would provide continuous governance, coordination, and monitoring, while green funds would secure financial support for conservation projects, reinforcing operator accountability in protecting the Sanctuary.



3.2 GROUP WORKSHOP 2 – INDICATORS: BUILDING A MEASURABLE SUSTAINABILITY TRAJECTORY



Document provided during the second interactive session

The second interactive session aimed at building sustainability indicators adapted to the sector. Facilitated by Constantin Tsakas (Plan Bleu), it drew on the scoping study conducted by Plan Bleu and the **RACER method** (Relevance, Acceptability, Credibility, Easy to monitor, Robustness), widely used in multi-stakeholder processes such as those of the European Commission.

Participants worked on a preliminary list of indicators projected in real time, which they discussed, reformulated, and prioritized. Two summary priority/feasibility matrices were developed: one dedicated to climate and biodiversity, the other to circular economy, socio-economic aspects, and governance.

This session was marked by numerous debates, highlighting both the interest and complexity of the exercise.

Beyond the initially proposed categories, participants emphasized the importance of **broadening the scope of indicators to better reflect the realities of the sector and the Pelagos territory**. Several new areas were mentioned, including **port-city integration** (the quality of the relationship between the port and its urban environment), **the connection between maritime and air transport**, and **the perception and level of awareness of visitors** regarding the Sanctuary and its challenges, with the aim of assessing whether this awareness translates into behavioral change. The importance of including shipyards was also highlighted, both for monitoring the vessel life cycle (construction, relocation, dismantling) and for their potential role in material recycling. In the same vein, **indicators related to waste recycling capacity were also proposed**.

Other contributions addressed **structural environmental themes**, such as ocean acidification (as an indicator of climate change impact), cetacean collisions, and refining indicators for sensitive marine habitats (seagrass meadows, Sanctuary monitoring).

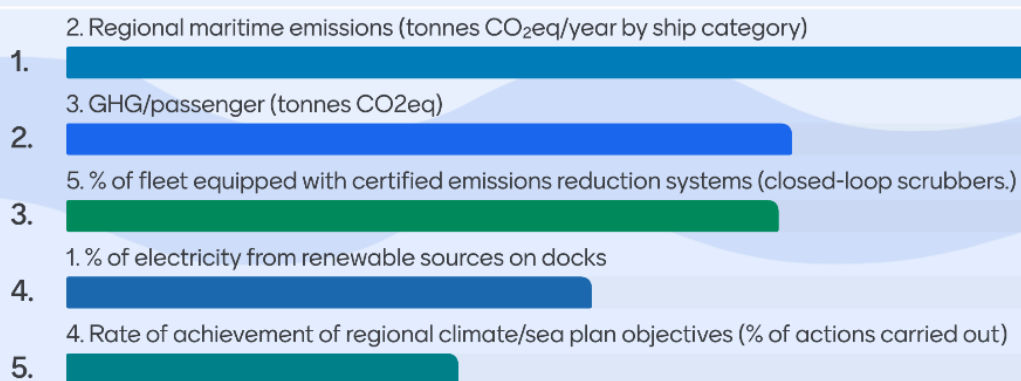
Several participants stressed aligning indicators with the **Sustainable Development Goals**, while ensuring compatibility with European and Mediterranean frameworks. The Pelagos Sanctuary was identified as a **laboratory** to test and refine indicators before possible expansion across the Mediterranean.

Climate indicators

Main indicators identified:

- **Regional maritime emissions (tons of CO₂ equivalent per year per ship category)** hailed as a good tool for measuring the overall trend toward deterioration or improvement in the situation.
- **GHG/passenger (tons of CO₂ equivalent);**
- **Percentage of fleet equipped with certified emission-reduction systems**

Among the 'Climate' indicators, which ones do you consider the most relevant to track progress on your challenge? - Please select 1 to 3 indicators



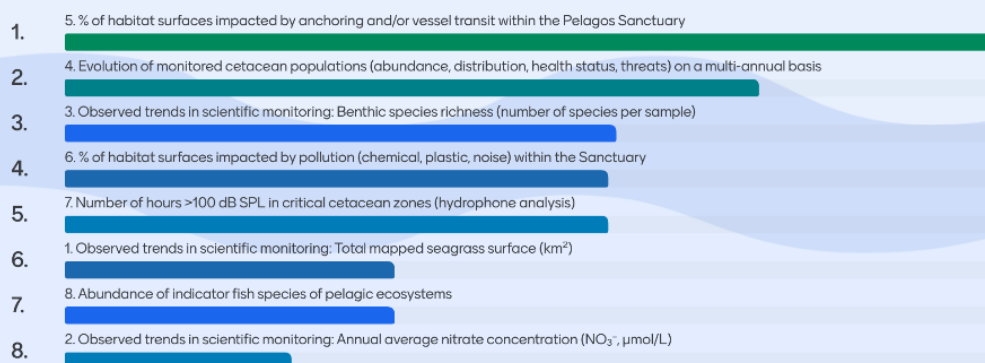
Axes for improvement: The calculation of greenhouse gas emissions per passenger was considered relevant but in need of rewording, particularly to include vessel tonnage and to better reflect reduction efforts rather than the mere maintenance of emission levels.

Biodiversity indicators

Main indicators identified:

- % of habitat surface affected by anchoring and/or vessel transit in the Sanctuary considered as relevant and easy to measure;
- Evolution of cetacean populations monitored (abundance, distribution, health, threats) over multiple years;
- Trends observed in scientific monitoring: benthic species richness (number of species per sample)

Among the 'Biodiversity' indicators, which do you consider the most relevant to track progress on your challenge? - Please select 1 to 3 indicators



Axes for improvement:

The indicator of benthic richness was deemed unsuitable, as it does not, by itself, reflect the health of an ecosystem. It should be refined to better capture ecosystem status and correlated with maritime traffic pressures.

→ Rewording: Proposal for a disaggregated composite indicator:

- Evolution of the composition and functional diversity of measured benthic communities
- Variables related to maritime traffic within the sampling area (traffic, anchoring, noise, turbidity)

The indicator on cetacean populations, being central, should be disaggregated by species and linked to identified threats in order to avoid interpretation biases.

→ Rewording: Multi-annual, species-specific monitoring of cetacean populations (abundance, distribution, health status) and their exposure to identified threats.

Circular economy indicators

Main indicators identified:

- Number of local circular treatment chains established and recovery rates (composting, recycling...);
- Number of jobs created in the maritime circular economy;
- Rate of maintenance, repair, and reconditioning in the blue economy.

Among the 'Circular economy' indicators, which do you consider the most relevant to track progress on your challenge? Please select 1 to 3 indicators



Axes for improvement:

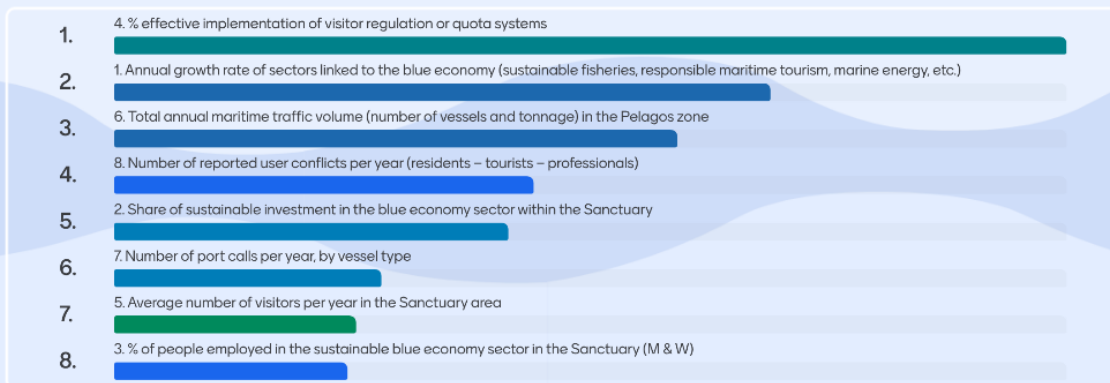
- Enhance or replace the indicator on jobs created within the maritime circular economy value chains with a measure of the quality and sustainability of those jobs, in order to better reflect their real impact.
→ Rewording: Number and quality of sustainable jobs created within the maritime circular economy value chains.
- Remove indicators considered less relevant (e.g., ballast water, scrubbers).

Socio-economic indicators

Main indicators identified:

- % effective implementation of visitor regulations or quota systems;
- Annual growth rate of sustainable blue economy sectors (sustainable fisheries, responsible tourism, marine energy...);
- Total annual maritime traffic in Pelagos (number of ships and tonnage).

Among the 'Socio-Eco' indicators, which do you consider the most relevant to track progress on your challenge? Please select 1 to 3 indicators



Axes for improvement:

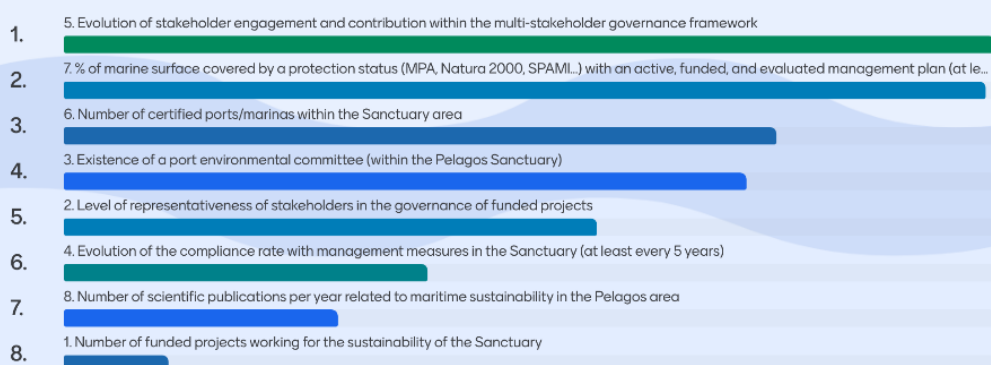
Strengthen the feasibility of socio-economic indicators by relying on existing references, such as the user-conflict indicator developed by Green Marine Europe, to facilitate their implementation by ports.

Governance indicators

Main indicators identified:

- Level of stakeholder engagement and diversity in governance;
- % of marine surface with active, financed, and evaluated management plans;
- Number of certified ports/marinas in the Sanctuary.

Among the 'Governance' indicators, which do you consider the most relevant to track progress on your challenge? Please select 1 to 3 indicators



Axes for improvement:

- Review the wording of the first indicator so that it better reflects the inclusiveness and diversity of the stakeholders involved.
→ Rewording: Level of engagement and diversity of stakeholders involved in multilateral governance.
- The second indicator appears outdated in the context of the Sanctuary, which already holds the SPAMI status. It has been recommended to replace it with a more operational indicator, for example focusing on the effectiveness of management measures.
→ Rewording: Rate of effectiveness of the management measures implemented in the Sanctuary's marine protected area, assessed through the implementation, funding, and monitoring of management plans.

4. Key Points and Lessons Learned

4.1 LESSONS AND OPERATIONAL RECOMMENDATIONS

The day's discussions helped identify several priority issues for the sustainability of the Sanctuary. **Limiting vessel speed and prohibiting anchoring in sensitive areas emerged as essential and high-priority measures** to reduce impacts on marine mammals and fragile ecosystems. **Waste management and pollution reduction** (particularly regarding plastics) are also key priorities, along with the electrification of docks and the promotion of low-carbon energy sources on board vessels.

The workshop fostered **numerous synergies** among stakeholders; however, certain limitations were noted, notably the absence of cruise line representatives, whose involvement is considered crucial. The lack of consideration for ferries was also mentioned, even though they account for significant traffic - nearly 2,000 calls per year. It should be noted that ferries were outside the scope of this workshop, which was based exclusively on the guidelines related to cruise and recreational boating activities. Nevertheless, the comment raised on this point has been taken into account for future work.

In terms of governance, several challenges remain: **the difficulty of moving from voluntary commitments to harmonized and binding regulations between countries** continues to be a major obstacle.

The identified needs concern strengthening the training of users and professionals, **providing reliable tools and data**, offering technical support for implementing solutions, and **developing scientifically robust indicators** applicable at the scale of the Sanctuary.

Finally, the operational recommendations focus on promoting and supporting existing good practices (dock electrification, clean port certification, dissemination and adoption of the Sea Index for yachts) as well as strengthening regulatory and certification measures: banning anchoring in sensitive habitats, limiting vessel speed, enforcing stricter controls on pollutant discharges, and promoting initiatives such as the *High-Quality Whale Watching* label.

4.2 SATISFACTION SURVEY / FEEDBACK

The satisfaction survey showed an overall positive outcome: participants appreciated the richness of the discussions and the diversity of perspectives. However, several areas for improvement were identified. The afternoon workshop could have benefited from creating more opportunities for open discussions to further cross viewpoints, as a strong dynamic had already been established in the morning and many topics had been explored.

It was suggested to place greater emphasis on developing indicators specifically tailored to the Sanctuary, in addition to those proposed by Plan Bleu, in order to respond more directly to the territory's specific challenges and to make faster progress. Several improvement avenues were thus identified, including fostering more interaction between groups to enrich exchanges during the indicator session.

5. Conclusion and Next Steps

To ensure the effective implementation of the recommendations emerging from this first workshop, it is essential to target the relevant stakeholders as a priority and support them in establishing concrete and monitored measures. Local authorities must be assisted in their roles of regulation, spatial planning, and awareness-raising among users. Port managers, as key actors in the transition, should receive technical and financial support to progressively integrate more sustainable practices, whether in waste management, quay electrification, or traffic regulation. Private stakeholders (particularly cruise companies, shipowners, and recreational boaters) must be more systematically involved and held accountable through incentive-based or regulatory mechanisms.

Beyond this mobilization, emphasis should be placed on training and awareness-raising in order to foster stakeholder ownership of the rules and to build a genuine shared culture of sustainability within the Pelagos Sanctuary. In-depth work on indicators also remains essential. Their refinement and expansion will allow for better integration of cross-cutting dimensions addressed in future workshops and ensure overall coherence in assessing the sustainability of the blue economy.

The next steps of the Adapt-Pelagos project will revolve around three additional thematic workshops scheduled for 2026 and 2027. The second workshop, planned for February/March 2026, will focus on sustainable tourism, climate change adaptation, and integrated coastal zone management. The third, scheduled for September 2027, will concentrate on carrying capacity and the role of marine protected areas. Finally, a concluding workshop in February 2027 will be dedicated to presenting the outcomes and harmonizing the sustainability indicators of the blue economy developed across the three thematic workshops.

This first workshop has laid the foundation for a collective and ambitious approach to strengthening the sustainability of the cruise and recreational boating sectors within the Pelagos Sanctuary. The upcoming steps will deepen this work by broadening the scope to other dimensions of sustainable development and by consolidating the creation of a shared framework for ecosystem-based and transboundary governance of the Mediterranean blue economy.

6. Annexes

6.1 ANNEX 1: LIST OF PARTICIPANTS

ORGANIZATION	NAME	SURNAME	POSITION
Portofino MPA	Valentina	Cappanera	Project Manager
Accords RAMOGE	Florent	Champion	Executive Secretary
Accords RAMOGE	Clara	Fricano	Deputy Executive Secretary
Consortium Pelagos	Simone	Panigada	Président Tethys Research Institute
Beyond Plastic Med	Claire	Richard	Coordinatrice
Direction des affaires maritimes (Monaco)	Roudaut-Lafor	Armelle	Director
Direction des affaires maritimes (Monaco)	Gianforte	Estelle	Division chief
DIRM MED	Benoît	Rodrigues	Governance and consultation officer
DIRM MED	Stéphan	Rousseau	Deputy Director
DIRM MED	Violaine	Talleu	Project Officer for Marine and Coastal Coordination
Fondation Prince Albert II de Monaco	Léa	Glâtre	Coordinatrice Initiative Pelagos
Fondation Prince Albert II de Monaco	Philippe	Mondielli	Scientific Director
Green Marine Europe	Antidia	Citores	Chief Executive Officer
MedPan	Susan	Gallon	Responsable Scientifique
Métropole Nice Côte d'Azur	Soledad	Tolosa	Pelagos Project Manager
Miraceti	Laurène	Trudelle	Project Manager
Parc national de Port-Cros	Alexandra	Gigou	Marine Environment and Pelagos Coordinator
Parc national de Port-Cros	Ingrid	Neveu	Coordinator of the French Part of the Pelagos Sanctuary
Parc national de Port-Cros	Fanny	Poirier	Service civique Pelagos
Ponant	Thomas	Mc Candless	Captain
Port de Gênes	Alberto	Cappato	Directeur Innovation Développement et Durabilité - Vice-Président
Secrétariat Pelagos	Maria	Betti	Executive Secretary
Secrétariat Pelagos	Milena	Tempesta	Consultante
Université de Nice	Anais	Lagelle	University Lecturer

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Port de Gênes	Alberto	Cappato	Directeur Innovation Développement et Durabilité - Vice-Président
Université de Toulon	Milena	Penalba	Coordinator of the Public Innovation Lab "Lab'Homère"
Yacht Club de Monaco	Nathalie	Quévert	General Secretary du SEA Index
Yacht Club de Monaco	Rachel	Ercole	SEA Index development manager Superyacht Eco Association

6. 2 ANNEX 2: TABLE OF INDICATORS

Indicator Type	Relevant Indicator	Indicator Definition	Precautionary Note (Unaccounted Aspects)	Source
Governance Indicators	Number of funded projects working towards Sanctuary sustainability	Total number of projects partially funded by public/private funds for sustainability actions (biodiversity, waste, governance...), carried out in collaboration with local stakeholders	The relative share of funding (equity between funders) is not measured, nor the technical quality or actual effectiveness of projects in the field; No guarantee that funded projects are more effective or better accepted by civil society.	Report: ESPO Environmental Report 2023: https://www.espo.be/media/ESPO%20Environmental%20Report%202023.pdf
	Level of stakeholder representation in the governance of funded projects	Measures the diversity and balance of stakeholders involved in governance bodies of projects related to maritime sustainability	Does not measure the quality of dialogue, actual capacity to influence decisions, or balance between stakeholders, or equitable access to information and resources; Does not distinguish whether certain vulnerable groups (artisanal fishing, coastal residents, etc.) are symbolically present or genuinely included; May mask over-representation of institutional actors at the expense of local actors, or imbalance between countries/regions of the Sanctuary.	
	Presence of a port environmental committee (in the Pelagos Sanctuary)	Binary indicator aimed at assessing whether, in ports located within or bordering the Pelagos Sanctuary, there exists a formalized coordination and consultation body between port actors (port authorities, users, local authorities, NGOs, State services) dedicated to managing environmental issues.	Does not provide information on the committee's actual effectiveness (frequency of meetings, level of member participation, etc.); Representativeness is not specified (balance between economic and environmental interests); Does not show concrete results (measurable improvement in water quality, noise reduction, etc.); Differences in context between ports (size, type of activities, traffic, human and financial resources) that influence the existence and operation of such committees.	Specific indicator: ESPO Environmental Report 2023: https://www.espo.be/media/ESPO%20Environmental%20Report%202023.pdf
	Evolution of the compliance rate with management measures in the Sanctuary (at least every 5 years)	Variation in the level of users' compliance (fishing, tourism, anchoring, etc.) with rules established in marine protected areas, measured over a given period using quantitative indicators (e.g., proportion of users fully complying with measures, number of violations observed, average score on a predefined compliance scale), to monitor the evolution of regulatory compliance	Does not directly assess ecological results or ecosystem health, only the degree of action implementation; Does not account for the relevance or sufficiency of measures.	Reference: Barcelona Convention – SPAMI Protocol
	Evolution of the level of engagement and contribution of stakeholders within the multi-stakeholder governance mechanism (participation rate, co-financing, joint actions)	Monitoring of meeting participation rates, number of jointly conducted actions or projects, and co-financing provided by stakeholders (local authorities, NGOs, private sector, etc.)	Does not measure the quality of dialogues or the impact of contributions; Does not identify potential power imbalances or participation barriers (language, competence, access to information).	Methodology: UNDP Governance Indicators Handbook: https://www.undp.org/sites/g/files/zskgke326/files/publications/LG%20Guide.pdf
	Number of certified ports/marinas in the area covered by the Sanctuary	Number of port infrastructures that have received certification attesting to their environmental management or quality (ISO 14001, SPAMI, Clean Ports, etc.)	Does not reflect the actual level of environmental performance: certification attests to a system or one-time audit but not to concrete results (emissions reduction, discharge quality, biodiversity impacts).	ISO 14001 (environmental management)/Clean Ports (European label)/Blue Flag
	% of marine surface covered by protected status (MPA, Natura 2000, SPAMI...) with an active management plan, funded and evaluated at least every 2 years	Proportion of the marine protected area having a management plan: active (currently being implemented), funded, and regularly evaluated (≥ every 2 years)	Does not provide information on the actual effectiveness of management measures or funding quality (adequacy, sustainability); Excludes protected areas without formal plans or unfunded plans.	General indicators: Eurostat – SDG 14 "Life below water" – Marine protected areas: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=SDG_14_-_Life_below_water#Main_indicators
	Number of scientific publications/year related to maritime sustainability in the Pelagos area	Number of scientific articles or works published each year related to the ecological, social or economic sustainability of the Pelagos area	Does not reflect the quality, impact or dissemination of scientific results.	Pelagos Sanctuary - scientific news; Tethys/CSR reports & OBIS/GBIF databases (Pelagos series)
Biodiversity Indicators	Trends observed in scientific monitoring: Total mapped seagrass area (km²)	Total area occupied by marine seagrasses (mainly Posidonia oceanica and Cymodocea nodosa) measured in square kilometers, determined from mapping campaigns (diving, sonar, remote sensing, drones, or GIS).	Does not provide information on the health status of seagrasses (density, shoot vitality, regeneration); May mask local dynamics (decline in one area compensated by expansion elsewhere); Heavily dependent on mapping method (spatial resolution, campaign homogeneity, survey frequency); Does not account for factors of point degradation (anchoring, diseases, pollution) that can affect functionality without significantly changing total area; "Stock" indicator → not very sensitive to rapid changes, risk of late detection.	Monitoring + mapping: MedTRIX – Mediterranean seagrass monitoring platform (TEMPO project): https://medtrix.fr/portfolio_page/tempo-2/
	Trends observed in scientific monitoring: Annual average nitrate concentration (NO ₃ ⁻ , µmol/L)	Annual average concentration of dissolved nitrates (NO ₃ ⁻) in the water column, expressed in micromoles per liter (µmol/L). This indicator allows monitoring the trophic state of marine waters and detecting excessive nutrient inputs related to urban, agricultural or industrial discharges.	Annual average may mask critical seasonal peaks (spring algal blooms, pollution episodes); Does not account for other nutrients (phosphates, ammonium, silicates) that interact with nitrates; Does not directly reflect ecological effects (eutrophication, hypoxia, algal proliferations), only potential pressure; Concentrations can be strongly influenced by hydrodynamic conditions (mixing, circulation), biasing interpretation; Does not integrate diffuse sources (agricultural runoff, atmospheric inputs) that are difficult to trace.	Mapping: EMODnet Chemistry (nutrient data in Mediterranean): https://emodnet.ec.europa.eu/geonetwork/srv/api/records/fc21522e-d87e-4ec2-84a1-8b5d82233273
	Trends observed in scientific monitoring: Benthic species richness (number of species per sample)	Total number of benthic species identified in a standardized sample (e.g., grab or core sampling, diving quadrat). This is a measure of benthos taxonomic diversity, reflecting the ecological quality of seabeds and their capacity to maintain ecosystem functions.	Does not reflect community structure (dominance of tolerant vs. sensitive species); Does not account for biomass or ecological function of species (filtering role, nutrient recycling, habitat engineering); Highly dependent on sampling methodology (substrate type, equipment used, season); Species richness may remain stable even if the community changes qualitatively (e.g., replacement of sensitive species by opportunistic species); Does not indicate fine temporal trends if monitoring is spaced out or not comparable.	Old report: MEDITS (Mediterranean benthic trawl surveys): https://archimer.ifremer.fr/doc/00000/3938/3461.pdf
	Evolution of monitored cetacean populations (abundance, distribution, health status, threats) on a multi-year basis	Multi-year analysis of data on cetaceans in the Pelagos Sanctuary: number of individuals, presence areas, health indicators (lesions, thinness, stress), and exposure to threats (collisions, noise, pollutants)	Data often incomplete or indirect, especially for health status; Discreet or migratory species difficult to monitor/does not always capture long-term effects; Difficult for migratory species; Need to harmonize protocols.	Mapping: OBIS – Cetacean occurrence data: https://mapper.obis.org/?areaid=34279,34280
	% of habitat surfaces impacted by anchoring and/or vessel passage in the Pelagos Sanctuary	Proportion of marine habitats (often sensitive such as Posidonia oceanica meadows) directly or indirectly affected by temporary or regular anchoring activities of vessels.	Estimation based on vessel presence data and not on direct observation of physical impacts; Does not distinguish the level of intensity or severity of degradation (heavily damaged vs. slightly affected areas).	Posidonia studies & anchoring prohibition orders (PACA); scientific syntheses (anchoring impacts)
	% of habitat surfaces impacted by pollution (chemical, plastic, noise) in the Sanctuary	Proportion of marine habitats significantly exposed to at least one type of pollution (chemical, plastic, noise), according to identified thresholds or zones	Difficult to precisely map pollutant dispersion (especially noise or chemicals) => may overestimate or underestimate depending on methodology; Does not account for cumulative or synergistic effects.	Mapping: EMODnet Chemistry – contaminants; EMODnet Marine Litter (beach/seafloor/floating): https://emodnet.ec.europa.eu/geoviewer/#!/
	Number of hours >100 dB SPL in critical zones for cetaceans (hydrophone analysis)	Total number of hours where sound level exceeds 100 dB SPL in areas identified as sensitive for cetaceans, which can disrupt their behavior, communication or navigation	Does not measure specific frequencies; Actual impact depends on species, context and exposure duration; Few sensors = partial view of the sanctuary.	MSFD Descriptor 11: https://environment.ec.europa.eu/topics/marine-environment/descriptors-under-marine-strategy-framework-directive_en ACCOBAMS Guidelines: https://accobams.org/wp-content/uploads/2019/04/MOP7.Doc31_Guide-methodologique-bruit.pdf
	Abundance of fish species indicative of pelagic ecosystems	Total mass (in kilograms or tonnes per unit area or volume) of fish species selected as representative of the ecological state of pelagic ecosystems, measured regularly from scientific monitoring campaigns (trawls, acoustics, observations).	Does not provide information on their size, age or total biomass → a large number of small individuals may mask a loss of mature reproducers; Risk of wrongly attributing a "natural" variation to a management measure (or vice versa); Selected species may not represent the entire pelagic ecosystem; Measured abundance depends on methods (trawl, acoustics, observations); Results may vary according to protocols, seasons, areas covered; Abundance does not directly identify causes (overfishing, noise, pollution, climate); An increase in abundance of one species may hide a trophic imbalance (e.g., overfishing of predators).	NOAA - USA https://ecowatch.noaa.gov/thematic/forage-fish-and-small-pelagics
Climate	% of electricity from renewable sources on quays	Proportion of electricity consumed on port quays (by vessels at berth or port infrastructures) that comes from renewable sources (solar, wind, hydraulic...) compared to all electricity used on site	Does not distinguish local production vs. purchase of guarantees of origin; Does not account for total fossil fuel consumption related to other port uses; Does not reflect interruptions or renewable supply failures.	Inventory: Port authorities (Genoa): https://www.portofgenoa.com/en/sustainability/energy-transition/onshore-power-supply.html
	Maritime emissions in the Sanctuary area (tonnes CO ₂ eq/year by vessel category)	Total annual quantity of greenhouse gases (expressed in tonnes CO ₂ equivalent) emitted in the region by vessels, broken down by categories (ferries, container ships, cruises, fishing, yachts, etc.), integrating CO ₂ , CH ₄ , N ₂ O according to their global warming potential	Only captures measured or modeled emissions, not always precise by zone; Often excludes indirect emissions (e.g., fuel production); Bias if vessels transit without stopover; Integrate modeling uncertainties, distinguish transit/stopover, include indirect emissions (fuel).	Key figures: IMO: Fourth GHG study: https://www.imo.org/en/ourwork/environment/pages/fourth-imo-greenhouse-gas-study-2020.aspx

Indicators	GHG/passenger (tonnes CO2eq)	Average quantity of greenhouse gases emitted (in tonnes CO ₂ equivalent) per passenger transported on a given maritime journey, calculated by relating total vessel emissions to the number of passengers transported over the considered period	Data very sensitive to vessel occupancy rate; Does not account for cumulative trip impact (pre/post land transportation, onboard accommodation, etc.); Not always available by vessel type.	Methodology: ICCT20: https://theicct.org/marine-cruising-flying-may22/
	% achievement of climate/sea plan objectives within the 3 maritime regions of Sanctuary countries (% of actions completed)	Share of actions planned in a regional climate/sea plan that have been effectively implemented or finalized, expressed as a percentage of the total number of actions listed in the plan	Measures implementation, not results; Does not reflect ambition or impact of actions; "Completed" actions may be minimal or delayed without showing it; Risk of political overestimation.	
	% of fleet operating in the Sanctuary area equipped with certified emission reduction systems (closed-loop scrubbers, alternative fuels like LNG, hybrid/electric propulsion, particulate filters)	Proportion of vessels operating in the considered area that have certified equipment to reduce atmospheric emissions, such as closed-loop scrubbers, hybrid or electric propulsion, alternative fuels, or particulate filters, relative to the total number of vessels in the fleet	Does not account for actual use or field effectiveness of equipment; May include inactive or rarely used vessels; Some systems (e.g., scrubbers) transfer pollution to the sea (especially open-loop).	General data collection: IMO Data Collection System: https://www.imo.org/en/ourwork/environment/pages/data-collection-system.aspx
Socio-economic Indicators	Annual growth rate of blue economy sectors (sustainable fishing, responsible maritime tourism, marine energies, etc.)	Year-on-year percentage variation in gross value added or turnover of blue economy sectors considered sustainable in the studied area	Does not account for effects of exceptional events (crises, natural disasters); Does not reflect actual environmental impact of growth	OECD Ocean Economy Database: https://www.oecd.org/
	Share of sustainable investment in the blue economy sector in the Sanctuary	Ratio between investments identified as sustainable (i.e., compliant with environmental, social and governance criteria promoting preservation of marine and coastal ecosystems) and total investments made in the Sanctuary's blue economy over a given period.	Only investments directly related to blue economy activities (fishing, aquaculture, renewable marine energies, sustainable tourism, low-carbon maritime transport, marine ecosystem restoration, etc.) are considered; Announcements of intent, unallocated subsidies or unfunded projects are not counted; Covers a defined period (e.g., annual), deferred effects or past investments outside the period are not included; Secondary economic benefits (jobs created, supply chain impacts) are not included in the calculation, only direct financial flows.	General indicators: https://donnees.banquemondiale.org/indicateur
	% of people employed in the sustainable blue economy sector in the Sanctuary (M & F)	Proportion of jobs related to sustainable maritime and coastal activities (responsible fishing, sustainable tourism, marine energies, low-carbon maritime transport, etc.) compared to all blue economy jobs in the Pelagos Sanctuary area.	Measures application but not social acceptance; ignores external effects (activity transfer to other areas); Does not qualify actual ecological effectiveness.	European Commission Social Sustainability Framework Stat Italy: https://www.istat.it/en/ Stat Monaco: file:///C:/Users/sophi/Downloads/Focus%20Maritime-Yachting%202022.pdf
	% of effective implementation of visitor quota or regulation mechanisms	Proportion of planned mechanisms to regulate visitor numbers (quotas, reservations, zoning) that are actually applied and functional, with evaluation of their effectiveness on impact reduction and/or better flow distribution	Does not measure social acceptability or sustainability; External effects not measured.	General indicators: UNWTO Sustainable Tourism Indicators: https://www.untourism.int/
	Average number of visitors/year in the Sanctuary area	Annual average number of visitors in a given area, measured using reliable counting devices (sensors, ticketing, access records)	Does not distinguish unique visitors vs. multiple visits; Does not measure footprint per visitor (emissions, waste, pressure on biodiversity); Heterogeneous data depending on counting methods (sensors, ticketing, records).	General indicators: UNWTO Sustainable Tourism Indicators: https://www.untourism.int/
	Total annual maritime traffic volume (number of vessels and tonnage) in the Pelagos area	Annual total of maritime movements in the considered area, expressed in number of vessels and gross tonnage, all categories combined	Does not distinguish type of call (simple transit vs. extended stop); Does not qualify impact intensity (e.g., small cargo vs. large cruise ship); AIS data sometimes incomplete (blank zones).	Database by country: UNCTAD Maritime Transport Statistics and AIS data: https://unctadstat.unctad.org/datacentre/
	Number of calls per year, by vessel type	Annual total of calls made in the area or adjacent ports, broken down by vessel category	Sensitive to variations in port classification (cruise ship vs. ferry); Does not account for call duration.	Database: UNCTAD: https://unctadstat.unctad.org/insights/theme/107/ Eurostat – Maritime Transport Statistics: https://ec.europa.eu/eurostat/web/transport/information-data/maritime-transport
	Number of reported use conflicts/year (residents – tourists – professionals)	Total number of incidents or disagreements reported in the year between different categories of users of maritime or coastal areas	Does not qualify the level of conflict severity (simple disagreement vs. serious dispute); Heavily dependent on reporting mechanisms (many unreported conflicts).	
Circular Economy Indicators	% of wastewater, ballast water and scrubber wash water treated in accordance with current standards aboard vessels	Proportion of total volume of wastewater, ballast and scrubber wash water that is treated according to MARPOL standards (Annexes IV and V) and national regulations before discharge at sea	Does not account for: illegal unreported discharges, actual performance of onboard systems, or residual pollution after treatment	IMO Ballast Water Management Convention/ MARPOL IV & V
	Number of local circular treatment chains established and recovery rate (composting, recycling...)	Number of local facilities (ports, municipalities) treating maritime waste with recovery (recycling, composting), and performance measured by the rate of waste recovered out of total collected	Does not account for: recycling quality, actual sustainability of processes (e.g., carbon footprint, secondary pollution) and transport distance for treatment.	EU Circular Economy Framework + Ellen MacArthur Foundation Circular Indicators
	Waste collected in the Sanctuary area (tonnes/year)	Total mass of marine litter collected in Marine Protected Areas, via land or sea cleanup operations	Does not distinguish waste origin (local or external), or uncollected microplastics; May also be influenced by variations in collection effort or one-time events (storms, cleanup campaigns).	UNEP/MAP – Marine Litter Regional Plan (Mediterranean)
	Total quantity of raw materials consumed by blue economy actors (tonnes/year)	Total volume or mass of raw materials used in maritime sectors (shipbuilding, fishing, nautical tourism)	Hidden flows or material incorporated in import/export not measured; Flows not "used" or losses in extraction; Absence of sectoral breakdown or distinctions by material type; Data often annual, which may mask seasonal variations or consumption peaks related to certain activities (maritime tourism, seasonal fishing, shipbuilding...); Incomplete data or lack of geographic coverage; Does not measure environmental impacts or externalities.	Specific indicator: Eurostat - EU Resource Efficiency Indicators: https://ec.europa.eu/eurostat/documents/2995521/5168098/8-06122013-BP-FR.PDF.pdf/328f05c7-787f-479e-b56e-f6a3ede6a612?t=1414685831000
	Material productivity index in maritime sectors	Ratio between economic value produced and quantity of raw materials used in the maritime sector	Does not reflect indirect environmental impacts (pollution, carbon footprint); May overestimate "productivity" if added value increases through price effect rather than actual improvement; Does not distinguish quality or toxicity of materials used.	Eurostat – Resource Productivity Indicator: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Resource_productivity_statistics
	Number of patents (or innovations) filed in the field of recycling (or recovery) of secondary materials	Number of patent filings or technical innovations related to recycling/recovery in the maritime sector	Does not include non-patented innovations (local processes, open-source, artisanal solutions); Measures innovation intent, not effective adoption or actual impact; May be geographically biased (countries with strong patent culture vs. unprotected innovation elsewhere).	General indicators: WIPO Patent Statistics: https://www.wipo.int/web-publications/world-intellectual-property-indicators-2024-highlights/assets/69723/941EN_WIPI_2024_WEB2.pdf
	Rate of maintenance, repair and refurbishment activities in blue economy sectors	Proportion of maritime sector economic activities dedicated to extending the lifespan of vessels, equipment or infrastructures	Does not provide information on intervention quality (repair to extend lifespan vs. temporary repair); May ignore environmental impacts associated with repairs (e.g., solvents, hazardous waste); Aggregated statistics do not distinguish routine maintenance vs. deep refurbishment.	General indicators: OECD Sustainable Manufacturing Indicators: https://susdi.org/doc/CE/OECD%20sustainable%20manufacturing%20indicators%20-%20OECD.pdf
	Number of jobs generated in maritime circular economy sectors	Total number of direct and indirect jobs created by circular economy activities in the maritime sector (repair, recycling, reuse, waste treatment)	Does not distinguish between temporary/seasonal and permanent jobs; Does not qualify job quality (precariousness, safety, remuneration); Risk of double counting (jobs shared between circular economy and other maritime sectors).	European Commission Social Sustainability Framework + Eurostat Employment in Environmental Goods and Services Sector (EGSS)