monaco ocean week

20 | 26
MARCH 2023

monaco ocean week

"Monaco Ocean Week offers a unique opportunity for dialogue, networking, innovation and transparency."

HSH Prince Albert II of Monaco

Embracing the diversity of maritime issues, and to do so working with all the players involved in the sea: this is the ambition of the Monaco Blue Initiative. This informal think tank prides itself on bringing together various and complementary fields of expertise each year. It does so in a spirit of dialogue and responsibility, but more importantly, with the focus on finding effective solutions (…)

In this context, and this is something too rare not to be mentioned, this year gives us some grounds for satisfaction. I am of course referring to the adoption of the High Seas Treaty by the United Nations on 4th March. This Treaty finally opens up genuine prospects, not only in terms of protection, but also for the sustainable management and exploitation of the High Seas, which represent over 60% of the global ocean.

The same applies to another achievement over the last few months: the 30x30 commitment set by the global framework for biodiversity adopted in December 2022, and which at last sets the target of protecting one third of land and marine surfaces by 2030.

These two consecutive decisions are of course interconnected and illustrate a change in the overall attitude of our contemporaries in regard to maritime issues. This is the outcome of a very lengthy efforts, because many of us for years have been alerting to the need to better recognise the importance of the ocean in major world issues (…)

And this is the very challenge we need to focus on: to intensify, accelerate and generalise the ocean protection movement underway. To do so by involving all the stakeholders, in a coherent and coordinated fashion. And thus create, all together, a development paradigm finally capable of reconciling humankind with the sea."

Excerpt from the address by HSH Prince Albert II of Monaco, during the 14th edition of the Monaco Blue Initiative on 20 March 2023.

HSH Prince Albert II of Monaco


UNDER THE PRESIDENCY OF HSH PRINCE ALBERT II OF MONACO
monaco
blue initiative
19&20 MARCH 2023
14th edition - Monaco
ROLEX
BARCLAYS

SUMM

MARY

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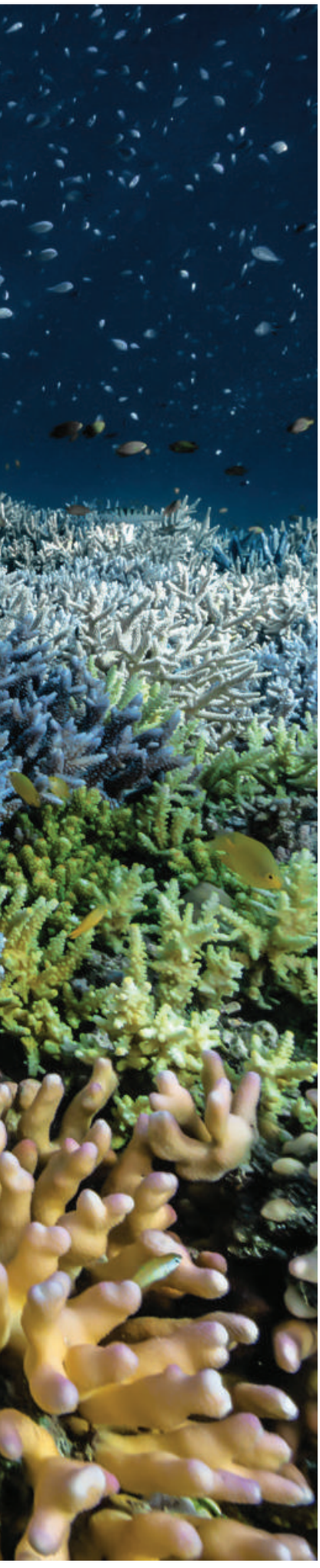


07

OCEAN GOVERNANCE

MONACO BLUE INITIATIVE

Improving the world ocean's governance

The 14th edition of the Monaco Blue Initiative, held under the patronage of HSH Prince Albert II of Monaco, took place in an exciting atmosphere following recent advances in international ocean governance.

On 20 March 2023, in the plenary room at the Oceanographic Museum of Monaco, leading research panellists, including high-ranking officials and political representatives, took part in the panel sessions throughout the day focused on ocean conservation and restoration, with an emphasis on the Mediterranean. The 14th Monaco Blue Initiative was structured around four themes and attracted a record number of participants, with over 180 attendees from every continent.

For the opening of the event, jointly organised by the Oceanographic Institute, Prince Albert I Foundation, and the Prince Albert II of Monaco Foundation, the Sovereign highlighted a significant development in ocean conservation: *"The adoption on 4 March 2023 of the High Seas Treaty, which covers more than 60% of the world's ocean, comes after two decades of intense negotiations, much lobbying efforts, moments of doubt too, and sometimes even pessimism.*

Thanks to this agreement, we will finally have legal backing to effectively protect international waters by creating marine protected areas on the high seas, which I have advocated for a long time, while also ensuring a fair distribution of products derived from biological resources." The Sovereign spoke of the efforts of the Monegasque community and other pioneering countries, such as Costa Rica and the Seychelles, in their support of the commitment to protect 30% of ecosystems by 2030. Encouraging decision makers to become closely involved in conservation objectives, HSH Prince Albert II of Monaco called upon us to *"inventing a development model capable of reconciling man and the ocean"*.

The President of the Republic of Costa Rica, HE Rodrigo Chaves Robles, declared "*I come from a small country, but one that is taking action*", pointing out that his country already protects over 30% of its maritime territory, spread across two oceans.

"*The ocean is a vital part of our history, culture, and our relationship with the world*", he continued, "*We must shoulder our historical responsibilities, passing them on to our children and the generations that follow.*" The President highlighted the critical issue of seabed mining, reiterating Costa Rica's commitments on the subject and calling for the precautionary approach: "*The only way to comply with Article 145 of the United Nations Convention on the Law of the Sea is not to exploit any part of the seabed without the sufficient scientific data needed to make informed decisions and effectively protect the marine environment.*"

"We should adhere to true multilateralism and firmly protect the ocean under international law".
***Huang Runqiu**, Minister of Ecology and the Environment, People's Republic of China*

In addition to the platform's four themed sessions, moderated by Yalda Hakim, chief presenter and international correspondent at *BBC World News*, the programme included speeches from government representatives from China, the Seychelles, the United States, Spain, and France.

The Monaco Blue Initiative, which brings together the expertise of leaders in ocean conservation and governance, as well as blue economy and blue finance, politics, and civil society, has once again provided a valuable forum for reflection and collaboration on priority directions in terms of sustainability and responsibility towards the ocean.

SESSION 1. SUSTAINABLE FISHING

While some 100 million tonnes of fish are caught every year, making fishing sustainable is an urgent priority for the future of ocean health. Although, there are still many obstacles in the way of further progress, from overfishing and illegal, unreported, and unregulated fishing to destructive practices such as bottom trawling. Climate change, the loss of biodiversity and pollution is increasing the pressure on fish stocks. However, to reform unsustainable fisheries, we need to strike a balance between ecological objectives and socio-economic, nutritional, geopolitical, and cultural aspects. This session explored these challenges and the means of overcoming them, illustrated by examples of fisheries governance, community conservation, blue economy, and blue finance.

Nina Jensen, President and CEO of the NGO REV Ocean, emphasised the need to put science at the heart of decision-making: "*If we had the current knowledge of the impact of bottom trawling on marine biodiversity and the atmosphere, it would never have been allowed*", said the Norwegian speaker, proposing a "*system of transparency for fishing practices at a global level.*" The management of fisheries resources requires agreements between states, as indicated by the critical case of herring stocks in the North Atlantic. For Miguel Bernal, from the General Fisheries Commission for the Mediterranean, the challenges of sustainable fishing cannot be dissociated from the sustainable development objectives concerning hunger, poverty, and malnutrition. On the other hand, taking the example of the Mediterranean, "*one of the few areas to have seen a reduction in overexploitation over the last decade*", – as the example of bluefin tuna has shown – it is possible to achieve sustainable management of fisheries, provided that the appropriate rules are respected. "*If fisheries were well managed, we could have fish forever,*" says Rashid Sumaila, Professor of Fisheries Economics at the University of British Columbia, and author of the recent book *Infinity Fish*.

This is a major challenge, particularly for coastal communities, as pointed out by Stephen Kankam, co-founder and deputy director of Hen Mpoano in the Republic of Ghana, an NGO working for the sustainable governance of marine and coastal ecosystems along the Gulf of Guinea. "*Considering that over 70% of the fish caught is consumed locally, overfishing has a major impact on food security and livelihoods. The threat to resources also destabilises social cohesion and distorts culture because fishing is a way of life.*"

"We need to work together to ratify the High Seas Treaty". ***Razan Al Mubarak****, President of the International Union for Conservation of Nature*

SESSION 2. HIGHLY PROTECTED MARINE AREAS

The global coverage of marine protected areas (MPAs) is increasing rapidly in spatial terms, but many protected areas are not reaching their conservation targets. Only highly and fully protected areas are known to be effective. The recent global framework for biodiversity and the long-awaited draft agreement on the legally binding High Seas Treaty offer new opportunities to extend and improve the protection of the marine environment. On this panel, representatives from science, governance, conservation, and blue finance investigated bridging the gap between ambitious goals and effective action, addressing the role of local communities, civil society, governments, and the private sector and outlining geopolitical, socio-economic, and other challenges.

IN FIGURES

By 2023: 8% of the seas will be protected, with only 3% classified as highly protected areas.

As Heather Koldewey explains, "*Highly protected areas offer the best conservation benefits, but this must not be to the detriment of the local economy.*" The advisor for marine protected areas in Mozambique spoke of a time in her country when "*fishermen from the Philippines were invited to share their knowledge with local fishermen, which helped local people to see marine protected areas as restocking zones*". Using incentives as a tool for change requires a range of territorial approaches involving coastal communities and fishermen, who are vital contributors to managing MPAs. From Seychelles to Turkish waters, from the Panamanian waters to those of the 56 Commonwealth countries, this collaborative and cross-cutting approach emerged as fundamental during the panel. Ensuring that protection measures can be deployed effectively remains at the heart of the MPA statute, particularly in the context of the fight against illegal fishing and the ecological connectivity of protected areas.

"The global objective of protecting 30% of the world's ocean by 2030 remains a real challenge due to a lack of political support and financial, technical, scientific, and human resources".
Jean-François Ferrari, *Designated Minister of Fisheries and Blue Economy for the Republic of Seychelles*

SESSION 3. RESTORING MARINE ECOSYSTEMS

Restoring degraded marine ecosystems is a natural way of improving carbon sequestration, reversing the loss of biodiversity, and protecting coasts from the harmful effects of climate change. It is, therefore, a commitment made by the signatories of the new Kunming-Montreal Global Framework for Biodiversity in December 2022, which adopted a target to protect 30% of nature by 2030. However, as Marco Lambertini, WWF International's special envoy, points out, "*Destruction is much faster than restoration, which is why preventing the negative effects of our current economic model should be the priority.*" The panellist argues the need for several approaches to restoration (from free evolution to intensive or assisted restoration).

"The UN Decade on Restoration has enlisted 61 countries so far, and restored 23 marine and freshwater sites, proving that these ecosystems can recover. We know how to do it, but we need to intensify the efforts to achieve it," says Leticia Carvalho, Head of the Marine and Freshwater Branch of the United Nations Environment Programme in Kenya. Calling for a global systemic transformation, she used the example of the Global Fund for Coral Reefs: "*We may be the first generation to be able to safeguard an ecosystem in its entirety.*"

The panel explored the opportunities and challenges of restoring marine ecosystems, with contributions from governance, conservation, and oceanography. The exemplary restoration of a mangrove swamp in the Mekong Delta has highlighted the specific nature of the ecosystems to be restored, (plankton, Posidonia meadows, coral reefs, etc.), and the different strategies required. A degree of caution regarding blue carbon credits was shared during the session.

SESSION 4. TOWARDS A BETTER PRESERVED, MORE RESILIENT, AND SUSTAINABLE MEDITERRANEAN

Being an enclosed sea with great environmental, socio-economic, and cultural diversity, the Mediterranean presents particular challenges in terms of conservation and sustainable use. Building on the themes of previous panels, this session concluded the day's discussions by focusing on tools and strategies to enhance the protection and resilience of the Mediterranean Sea. Representatives from national, regional, and local governments and the private sector shared concrete examples and outlined their priorities for the next decade. The issue of funding was addressed by HE Bernard Fautrier, General Secretary of The Medfund, who covered the topic of innovative funding mechanisms, such as the trust fund that the Principality launched in 2015 with France and Tunisia, which provides increasing financial assistance to the Mediterranean Basin's, marine protected areas (currently 15 MPAs from 7 different countries benefit from this support). For the panellists, including Federico Cardona Pons, Director of Coastal Health Strategy Europe, Middle East, Africa, and Cuba for the Iberostar Group (Spain) and Renaud Muselier, President of the Provence-Alpes-Côte d'Azur Regional Council, sustainable tourism offers significant potential for boosting the blue economy in the Mediterranean. From Greece, Efstathia Liarou, mayor of Elafonisos, outlines the challenges of this kind of tourism around the submerged city of Pavlopetri, an archaeological site in the Peloponnese and a Natura 2000 site. Multilateralism has been identified as one of the vital factors in improving the preservation of the Mediterranean marine ecosystem. Karim Amellal, France's Ambassador for the Mediterranean, stressed "*the importance of coalitions such as the Union for the Mediterranean in boosting collective action at international, national and regional levels.*"

"The Mediterranean is a region with many conflicts, but when it comes to the environment and climate, there is a true regional consensus".
***Nasser Kamel**, Secretary General of the Union for the Mediterranean (Spain)*

"Beyond the major decisions made at an international level within these essential multilateral institutions, it is the actual implementation for citizens on the ground that counts. The global problem of rising sea levels is a clear indication that we are facing the end of the road".
***Renaud Muselier**, President of the Regional Council of Provence-Alpes-Côte d'Azur*

ZOOM ON

THE HIGH SEAS TREATY

Finalised in New York on 4 March 2023, this historic United Nations agreement aims to bridge a legal gap in the protection of marine areas beyond national jurisdiction. It builds on the efforts initiated in 2004 to provide a legal framework for the conservation and sustainable use of marine biological diversity beyond national jurisdictions, i.e., 200 nautical miles (370 km).

"France and Monaco contributed to the adoption, in early March, of the international treaty to protect biodiversity in the high seas. There are three reasons why this treaty is so vital; it requires environmental impact assessments for all new activities in the high seas, it enables the creation of marine protected areas in the high seas, and for the first time in the history of environmental negotiations, decisions will no longer be taken by consensus but by a majority vote, which will prevent any state from blocking the measures."

***Hervé Berville**, Secretary of State for the Sea (France)*

In conclusion, Robert Calcagno, Director General of the Oceanographic Institute - Albert I Foundation, believes that this 14th edition of the Monaco Blue Initiative has "*fulfilled its promise and demonstrated the considerable progress made in raising awareness on ocean issues since the initiative was launched in 2010.*" Intensified action appears to be a necessity if we are to achieve the objectives of the Global Biodiversity Framework, a position that Olivier Wenden, Vice-President, and CEO of the Prince Albert II of Monaco Foundation, fully endorses: "*Existing solutions to ocean challenges should be scaled up and accelerated, by adopting a cross-cutting and holistic approach and by transparently sharing data and scientific expertise.*" This approach is central to the Foundation's mission, particularly in the Mediterranean region. ■

CROSS-BORDER DYNAMICS

The Pelagos Initiative holds its first forum

The stakeholders of the Pelagos Sanctuary have come together for the first time to strengthen conservation efforts in the largest marine protected area in the Mediterranean.

Which strategies should be adopted to significantly strengthen the protection of the Mediterranean sanctuary and its marine mammals? Could the protected area, which covers three neighbouring countries, lead by example in terms of conservation? These issues are particularly relevant in the context of the climate upheavals affecting the Mediterranean basin, which is already subject to numerous environmental pressures. During the sixth Monaco Ocean Week, these concerns were the central focus of the first "Pelagos Forum" organised by the Pelagos Initiative. On 21 March 2023, more than 80 local representatives, managers of marine protected areas (MPAs), municipalities, civil society and the private sector, scientific bodies and representatives of international agreements gathered at the Monte-Carlo Bay Hotel to discuss and develop joint projects within the sanctuary, which contributes to increasing the level of protection in the Mediterranean, as Olivier Wenden, Vice-President and CEO of the Prince Albert II of Monaco Foundation, voiced in his opening statement: "*The Mediterranean has less than 9% of protected areas, of which the Pelagos Sanctuary accounts for more than a third. The stakes are high, and we are here today to address this challenge and explore avenues that could lead to collaborative projects to conserve this area.*"

PROFILE

The **Pelagos Sanctuary** was created in 1999 to protect cetaceans in a vulnerable, high-traffic area, and is the subject of an international agreement signed by France, Italy, and the Principality of Monaco. The Pelagos Agreement came into force in 2002, the year in which the Sanctuary was included in the list of Specially Protected Areas of Mediterranean Importance (SPAMIs) recognised by the Barcelona Convention. The Agreement aims to improve the conservation of cetaceans, by guaranteeing a periodic assessment of the status of the species and their habitats, and by agreeing on tripartite management of human activities that exert pressure on the area.
In 2021, the Prince Albert II of Monaco Foundation, WWF, IUCN and MedPAN decided to coordinate their efforts by creating the **Pelagos Initiative** with the aim of funding activities that protect, conserve, and promote the sanctuary, in support of the implementation of the Pelagos Agreement Management Plan.

The first session, moderated by Philippe Mondielli, Scientific Director of the Prince Albert II of Monaco Foundation, reflected on the history and objectives behind the creation of the Pelagos Sanctuary, a genuine "*precursor of policies and measures linked to maritime spatial planning*", according to Marco Lambertini, long-time Director of *WWF International*. How can we transform the cross-border geography and the complex management of the area into an asset? How can we manage the issues arising from the overlap between cetacean habitats and biodiversity hotspots on one hand, and areas with high levels of development and economic activities on the other hand? Purificació Canals, President of MedPAN, the network of managers of marine protected areas in the Mediterranean, spoke of the major challenges and highlighted one of the specific characteristics of this area, which encompasses a wide range of sites subject to different levels of protection and jurisdiction. In the face of these challenges, "*dialogue and the collective effort of a broad community of stakeholders are proving to be important assets*", says Mercedes Munoz Canas of the IUCN Centre for Mediterranean Cooperation, a view echoed by Costanza Favilli of the Pelagos Agreement secretariat. The French ambassador to Monaco, HE Laurent Stefanini, highlighted the importance of the sanctuary for the conservation of cetaceans, as well as international efforts to protect the area.

Geoffroy Chatelard, Marketing Director of UBS, and Olivier Wenden, Vice-President, and CEO of the Prince Albert II of Monaco Foundation, have announced new financial opportunities and launched a call for proposals to strengthen this commitment (see box).

The forum then focused on three key issues, with panellists presenting the perspectives of local experts. Invited to find solutions, the cross-border stakeholders provided with concrete proposals, stemming from collaborative working groups throughout the day.

IN FIGURES

- **87 500 km²,**
- **27 national marine protected areas are included in the zone,**
- **84 Natura 2000 sites.**

THE CONTEXT

With its deep submarine canyons, fed by the North Mediterranean current, this biotope harbours a high level of biological productivity favourable to the equilibrium of around ten species of large marine mammals. This area sees the highest density of human activity in the Mediterranean.

PANEL DISCUSSION 1

A SHARED AMBITION TO MOVE TOWARDS A SUSTAINABLE BLUE ECONOMY AND CLIMATE RESILIENCE

At the start of the panel discussion, Gloria Lázaro Climent outlined the latest data from the Plan Bleu, which indicates that the Mediterranean basin is "*considered to be a hot spot for climate change*" resulting from the high density of human activity and global environmental problems. The environmental balance is being disturbed, leading to increased risks for cetaceans. How can the region's high economic value and biodiversity conservation be safeguarded?

The panellists proposed courses of action that featured collaboration and cooperation as a common denominator. These two areas are essential for mitigating the effects of climate change and promoting a sustainable blue economy. Valentina Cappanera, from the Portofino MPA (Italy), recognises the importance of cooperation between marine protected areas, as well as active collaboration with those who use the natural area (fishermen, divers, etc.). "*Efficient data collection and minimising the impact of human activity on the area cannot be achieved without a network approach,*" says David Gamba (Monegasque Federation of Sport Fishing and Sustainable Whale Watching Monaco), emphasising the role of participatory science.

It's also a matter of slow, low-carbon tourism, aligned with shared ethical codes, such as the High Quality Whale-Watching® certification label developed by ACCOBAMS in collaboration with the Pelagos Agreement for the quality management of cetacean-watching activities.

The creation of joint research and monitoring protocols, the establishment of a shared vision and the difficulties of governing cross-border areas were then addressed by the focus groups, along with the issues of reducing the impact on cetaceans from human activities (particularly recreational activities) and plastic pollution.

PANEL DISCUSSION 2

STRENGTHENING ACTIONS TO ACHIEVE THE 30X30 OBJECTIVE IN THE MEDITERRANEAN

The panellists focused on the need for wider implementation of marine spatial planning, which could significantly improve the effectiveness of protection measures in the sanctuary, with the goal to protect 30% of Mediterranean waters by 2030. Carole Martinez, MedPAN's Policy Manager, addressed the Roadmap for Marine Protected Areas in the Mediterranean. Pelagos is also about leading by example. Representing the National Park of the Tuscan Archipelago, which is also a UNESCO Biosphere Reserve, Francesca Gianini set out the sustainable socio-ecosystem of the island of Capraia as a model: it combines strict protection measures for the marine environment, focusing on the conservation and study of marine mammals, with responsible artisanal fishing and other sustainable activities that benefit local communities.

Thomas Binet, who specialises in the management of natural marine resources at BlueSeeds, gave an overview of the negotiation process used to define zones with different levels of protection, considering the interests of all stakeholders.

The discussions revolves around minimizing apparent conflicts in the area and improving spatial management of issues involving the coexistence of cetacean peace and military exercises, biodiversity and inshore or deep-sea fishing activities. The active support of local communities, who are the co-creators of conservation proposals, has been identified as one of the crucial factors for the Pelagos initiative, along with the gradual approach to achieving the 30x30 objective, the emphatize on communication between stakeholders in the area, and the sustainability of protection measures (particularly in the event of a change of administration or government).

The "Pelagos Charter", aimed at increasing the responsibility of stakeholders, was cited as one of the tools for improving the area.

IN SIGHT

"The identification of critical cetacean habitats, assessed by ACCOBAMS scientists, shows that certain areas, or certain maritime corridors, will need to be avoided, particularly during specific seasons. Perhaps there will be international decisions to this effect."
Susana Salvador,
Executive Secretary of ACCOBAMS

PANEL DISCUSSION 3

SCIENCE AND TECHNOLOGY'S CONTRIBUTION TO PROTECTIVE MEASURES.

The third panel discussion provided an overview of the impacts of maritime traffic and tourism development in the Pelagos area. As Dania Abdul Malak *(Mediterranean Biodiversity Protection Community)* explained, collisions with marine mammals and noise pollution appear to be the most significant environmental impacts of maritime transport in the northwestern Mediterranean region. From *low-tech* initiatives to solutions based on artificial intelligence, the tools and resources created to facilitate the development and implementation of effective mitigation measures were highlighted.

As stated by Alain Barcelo, Head of the Knowledge Department for Biodiversity Management at the Port-Cros National Park, these include speed reductions and the creation of shipping lanes and no-go zones, with the potential to identify shipping companies that comply with these regulations. Increasing awareness among those involved in the maritime sector has also been recognised as a priority. Susana Salvador, executive secretary of ACCOBAMS, presented the results of the Mediterranean cetacean monitoring study and the NETCCOBAMS digital platform, which centralises real-time maritime traffic data and cetacean distribution data.

How can we switch from reactive to preventive management of the impact of maritime traffic? What solutions can digital technologies offer for collaborative monitoring of cetacean populations? These are just some of the issues debated by the working groups who shared their contributions, looking at photo-identification algorithms for cetaceans and experiments with noise monitoring buoys. ■

IN FIGURES

- **Less than 9% of the Mediterranean is covered by protected status; the Pelagos Sanctuary alone accounts for more than 1/3 of this area. Less than 0.2% of the Mediterranean is heavily protected**
- **220,000 merchant ships pass through the sanctuary each year.**

To coincide with the forum, the Pelagos Initiative launched a **call for projects** to strengthen the sanctuary's protection, thanks to a partnership between the UBS Optimus Foundation, UBS Monaco, and the Prince Albert II of Monaco Foundation. The expected projects will focus on biodiversity conservation, community engagement and climate change mitigation.
As part of this partnership, the UBS Optimus Foundation and the Prince Albert II of Monaco Foundation are each contributing one million euros to strengthen climate action in this emblematic part of the Mediterranean.

INTERVIEW

Marco Lambertini

currently Special Envoy and former Director General of the World Wide Fund for Nature (WWF International), founding member of the Pelagos initiative

What are the major challenges in managing the Pelagos Sanctuary?

We didn't understand the importance of this marine mammal hotspot until the 1990s. More than 20 years ago, Prince Rainier III was the visionary behind the creation of the Pelagos Sanctuary, and the Prince Albert II of Monaco Foundation was the catalyst for this highly ambitious vision, advocated by the Member States: the protection of a large and economically important marine area, which comprises several marine protected areas. A major challenge for each country is the coordination and establishment of rules to govern the pressures linked to human activities which impact the ecosystem. It is then necessary to ensure the application of these regulations and to tackle the global problems which affect this Mediterranean sanctuary.

We are moving in the right direction, but we need to accelerate our progress towards the global objectives of carbon neutrality and nature positivity.

What are the latest developments in terms of sanctuary regulations?

An encouraging development is the European Union's regulation of driftnets, which are one of the main threats to marine mammals and turtles.

Concerning the risk of collision with marine mammals there is currently a project to regulate the speed of maritime traffic in the sanctuary (which accounts for almost ¼ of the world's maritime traffic), particularly that of cruise ships.

How is this area affected by the degradation of the planet's ecology?

The Pelagos area, like most of the Mediterranean and the world's oceans, is affected by overfishing, which is detrimental to the entire ecosystem, including the marine mammals at the top of the food chain. This is a long-term threat that must be tackled to ensure the sustainability of the fishing industry itself and food security. By protecting, regulating, and encouraging sustainable practices, we can reverse the trend, as witnessed with bluefin tuna populations in the Mediterranean.

Among the many sources of pollution affecting the Pelagos area, oil and plastic pollution are particularly threatening for marine mammals and turtles, as plastic is mistaken for food. Trillions of plastic fragments are already floating in the Mediterranean.

Another major problem is, of course, global warming, which is leading to rising sea temperatures and causing acidification and deoxygenation of the waters. This is yet another reason to speed up the reduction of emissions and the protection of natural carbon sinks (ocean ecosystems absorb ¼ of human CO_2 emissions).

Is there a comparable marine sanctuary anywhere in the world?

There are few transboundary marine protected areas in the world, but countries are becoming increasingly aware that their marine resources depend not just on their territorial waters but on wider regions. Protecting these areas allows species to move freely and migrate through habitats that are essential to their life cycle.

A larger-scale effort similar to that of the Pelagos area is the Eastern Tropical Pacific Marine Corridor: a marine protected area coordinated by 4 countries in South America (Ecuador, Panama, Costa Rica, and Colombia) which connects an immense ecological corridor from the Galapagos Islands to the island of Malpelo, covering 500,000 km^2. The establishment of such a sanctuary is a clear sign of the drive for large-scale, cross-border protection of the oceans.

What does this sanctuary represent for current and future generations?

It's important to remember that an ocean in crisis is a crisis for humanity. Conserving the Pelagos area, and the ocean in general is not just a moral duty - it's a matter of coexisting with the incredible animals we share the planet with, such as whales. Today, the stability of our climate, the oxygen we breathe and the food we gather from the ocean hold the key to the future of humanity, which is currently at stake. Moral reasoning has, so far, failed to have any real influence on the economic system. It is now clear that if we do not take care of our ecosystems, our civilisation will pay a high price. Therefore, by helping to preserve the health of the oceans through initiatives such as Pelagos, we are ensuring a safer, fairer future for the following generations.

Does this forum give hope for increased protection measures for the sanctuary?

The forum united a very wide range of stakeholders in the Pelagos Sanctuary, and that is a fantastic contribution: all sectors need to work together to deliver a carbon-neutral and nature-positive future. The forum demonstrated the consensus of views on ocean conservation, a very encouraging step which is gathering momentum. No longer just a feature on maps, the ocean is now firmly on the political agenda, and a real priority for many people. At the beginning of the 2000s, less than 1% of the ocean was protected; today, more than 8% of the ocean is protected, and we're aiming for 30% protection by 2030. We, therefore, need to focus on this objective and accelerate measures to ensure effective, sustainable protection of ecosystems. It's possible and, above all, necessary. ■

"It's important to remember that an ocean in crisis is a crisis for humanity".

A BIG IDEA IN CONSERVATION

Developing Highly Protected Areas in the Mediterranean

How can we protect one of the world's biodiversity hotspots more effectively? This workshop, organised by *Together for the Med*, invited leading experts to discuss the achievements and priorities of the Mediterranean cross-border dynamic.

While the Mediterranean is endowed with a vast system of marine protected areas (MPAs), representing 6% of its surface area - a percentage equivalent to the coverage of MPAs in the world's oceans - are conservation efforts delivering real ecological benefits for species and societies alike? A team of researchers has addressed this vital question. Among them, the Head of Science at *BlueSeeds*, Timothée Cook, presented the situation in the Mediterranean at the start of the afternoon session on March 22, 2023, in the Oceanographic Museum Hall. Are marine protected areas (MPAs), the pillars of marine conservation and social equilibrium, effective enough? The scientist outlined a classification of levels of protection, the highest of which should be pursued to deliver a real social or ecological gain, in turn meeting the targets set for 2030 by the various international agreements. He explains: "*High-level protection, combined with regulation and enforcement, produces the greatest socio-ecological benefits.*" The opposite approach produces "*an illusion of protection.*" However, as Susan Gallon, MedPAN's scientific manager, points out, "*There has been no significant increase in fully protected areas in the Mediterranean over the last ten years.*"

ZOOM ON

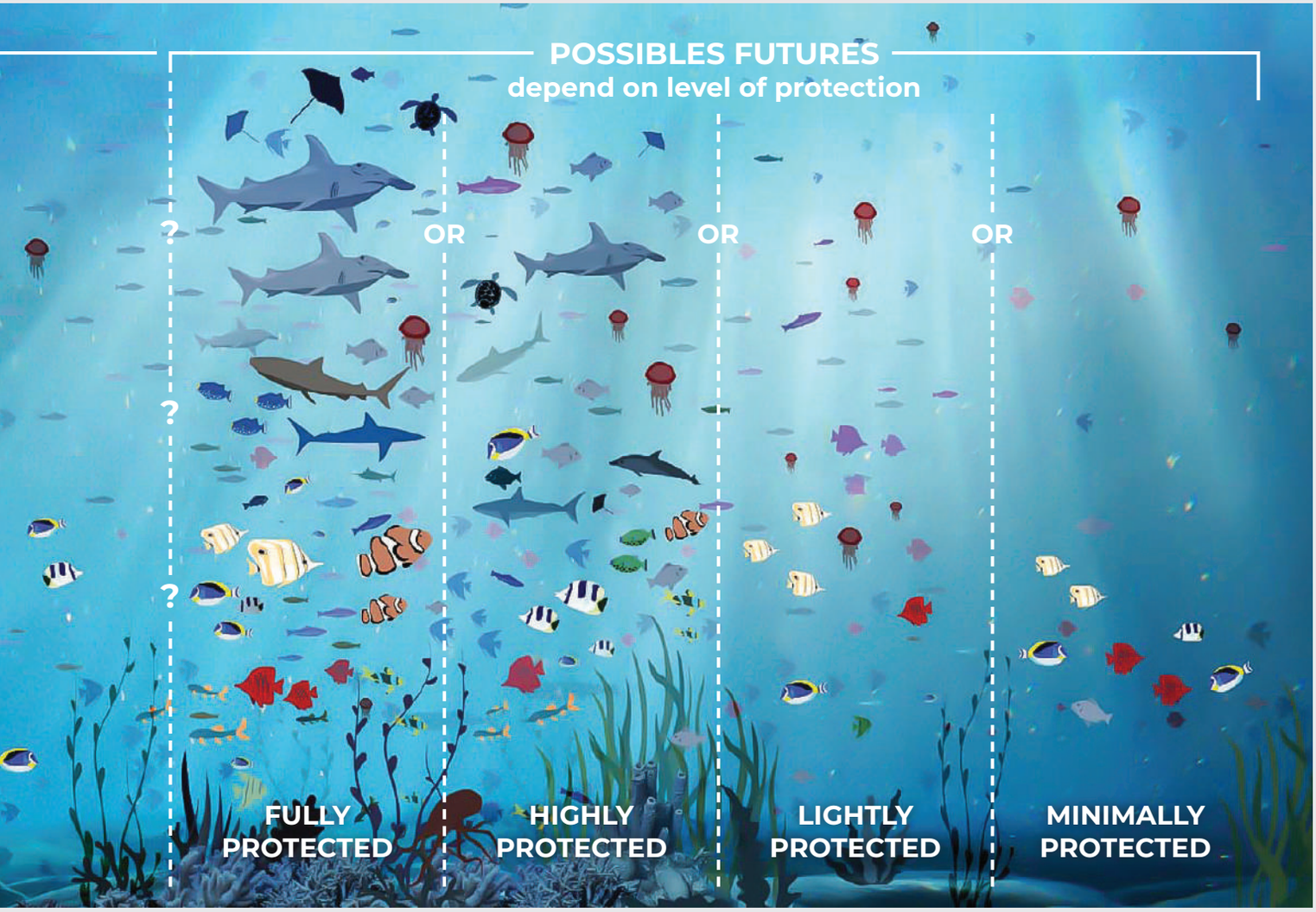
THE CREATION OF A HIGH-PROTECTION ZONE WITHIN THE CAP D'AGDE MPA.

Small-scale fishermen express concerns about the decline in fish stocks and the degradation of coralligenous habitats in this MPA in the Occitan region, resulting from human activity (anchoring, overfishing, diving, etc.). How can we protect this precious reef and the marine resources in the area?

At the end of 2019, after a period of analysis and consultation with local stakeholders (30 small-scale fishermen, 8 diving companies, and recreational fishermen), the Roc de Brescou Marine Reserve was established. 310 hectares (5% of the MPA) are now under strict protection (no fishing, diving, anchoring, or dredging), with a boat dedicated to surveillance and scientific monitoring. This is a major step forward for the full protection of 45% of the MPA's coralligenous reefs. The decision is subject to review every 6 years.

IN SIGHT

"Protection levels are a good indicator of the effectiveness of marine protected areas".
Joachim Claudet et al.,
One Earth, April 2020



© Kirsten Grorud-Colvert and al., The MPA guide, Science, sept. 2021

The second half of the Monaco Ocean Week workshop focused on initiatives to increase the effectiveness of highly protected areas. By 2023, the MedFund environmental trust is supporting 15 MPAs and 4 new priority areas, particularly in the southern part of the basin. With the support of the MAVA Foundation, the Trust has created an office for high-protection zones. It is also developing management indicators for funded MPAs. The *Pew Bertarelli Ocean Legacy* project is committed to creating large-scale, highly protected MPAs, including a Mediterranean network, by increasing the level of protection of existing marine areas within the region. The *Med Sea Alliance* unites NGOs around strategic priorities to restore the health of the Mediterranean, working in particular on the enforcement of regulations. A study carried out by *BlueSeeds*, and *Blue Pangolin Consulting* has identified areas of opportunity for high, comprehensive protection in the Mediterranean, taking into account socio-economic factors, biological threats and connectivity, and political issues. The *Together for the Med* program promotes sustainable fishing, the involvement of the Mediterranean community, the improvement of the legal and political framework, and the financing of the transition to sustainable fishing.

All these initiatives, the progress of which was reported at the event, are intended to help bring about effective marine conservation in the Mediterranean, generating significant benefits for the ecosystems and communities that depend on them, both directly and indirectly. ■

IN FIGURES

- **8,33%: surface area covered by protected status in the Mediterranean)**
  (sources : MedPAN, 2020),
- **72% of the 1,062 marine protected areas in the Mediterranean lack regulations to reduce human impact on biodiversity,**
- **only 0,23% of the Mediterranean is effectively protected and provides ecological benefits.**

(sources : Claudet et al, One Earth 2, april 2020)

ZOOM ON

THE CASE OF THE TURKISH GÖKOVA MPA

The level of protection and the benefits achieved from this vast Aegean MPA has created a benchmark. Declared one of the world's top 16 marine protected areas at the United Nations World Ocean Conference in New York in June 2017, it stands out for its holistic approach and results in monitoring Mediterranean grey sharks and monk seals and rehabilitating Posidonia meadows. The benefits of its level of protection have been listed, from increased catches and income for fishermen to the flourishing native macro-algae, from climate change mitigation through carbon capture by seagrass to the revival of threatened species.

COMPANY SELECTION

Integrated conservation: the right choice

Organised by Côte d'Azur University in partnership with *BlueSeeds* and *Coral Guardian*, the conference combined the scientific, social, and economic aspects of integrated conservation of the marine environment

Faced with the challenges of a rapidly changing climate and ocean environment, how can we preserve biodiversity and maintain the ecosystem functions that support coastal populations? This question was already being raised in the 1960s by the American economist Kenneth Boulding, a pioneer of sustainable development who compared the Earth to a "spaceship" with limited resources. In this respect, integrated marine conservation embraces two mutually reinforcing objectives: the health of marine ecosystems and the well-being of the people who depend on them. This was the theme of the conference held on 24 March 2023 at the Monaco Yacht Club.

SCIENCE IS CENTRAL TO THE PROCESS

The panel opened with a discussion on the role of science in marine conservation. "*Scientific research provides the data needed to understand and protect marine ecosystems, and to develop effective conservation strategies,*" says Professor Cécile Sabourault, Vice-President of International Affairs at the Côte d'Azur University, and Director of the ECOSEAS laboratory, emphasising the role of universities in providing solutions to current socio-environmental crises. Among the programmes for monitoring the effects of marine protected areas (MPAs) on the ecosystem and fisheries, the RECIF and FishMPABlue academic approaches were presented.

IMPROVING EFFICIENCY

How can we improve the efficacy of conservation? *"It has to be a global effort, with long-term involvement from communities,"* says Timothée Cook, Head of Science at *BlueSeeds*. This fledgling organisation, which focuses on training MPA managers and staff in financial strategy, introduced a guide for MPA managers and presented research projects, in particular on blue carbon in the Mediterranean and West Africa.

COLLABORATIVE APPROACHES

The theme of the societal acceptance of conservation measures was also addressed, by drawing a land-based comparison between the reintroduction of the wolf in France and the clash between different parties. Independent consultant, Florent Favier, emphasised the importance of listening to all stakeholders, working together, and providing support. Faced with the "triangle of inaction", the panellist proposes improving the involvement of the private sector in efforts to protect the environment, through a roadmap enabling informed choices to be made.

IN SIGHT

"If we want to create sustainable solutions, we need to reach a common understanding, which means breaking down the barriers between the natural sciences and the social sciences."
***Christophe Mocquet**,*
Director of the MARRES programme at Côte d'Azur University

AN INTERDISCIPLINARY APPROACH TO CREATING SUSTAINABLE SOLUTIONS

Far from being a one-way street, ocean conservation is based on an interdisciplinary approach which, according to marine biologist Christophe Mocquet, director of the MARRES programme on marine resources at the Côte d'Azur University, should be encouraged in teaching programmes, particularly at university level.

"My experience as a botanist in the Chihuahuan desert had a major impact on the way I see intersectionality in conservation." was an enlightening account highlighting the context of environmental crises, shared by Nikita Rose, an environmental science graduate from New York, who joined the MSc MARRES to become involved in protecting the ocean. *"As I had to preserve native plants in this extreme environment, I had to take the time to listen to the advice of the locals and their traditional stories about their ecological heritage. That's how I was able to establish a solid relationship with the community and preserve the desert's indigenous flora."*

Also demonstrating the importance of interdisciplinarity, two former MSc MARRES students founded the start-up *BlueLeaf* with the mission to protect Posidonia meadows in the Mediterranean. They are working on both aspects of integrated conservation, with scientists to better understand the carbon storage process and with economists to find ways of financing protection measures using the concept of ecosystem functions. ■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ZOOM ON

A SUCCESSFUL INTEGRATED CONSERVATION PROJECT IN INDONESIA

The project launched by Coral Guardian in 2015 on Hatamin Island, a tiny island in the Coral Triangle, supports the local community in restoring and protecting reefs damaged by dynamite fishing: *"At the very start, the villagers had little confidence in us, due to previous projects that they were excluded from. However, with the approval of the local chief, our Franco-Indonesian team launched the project to restore the reef and secure local livelihoods, ensuring that the villagers were fully involved in the project and that their voices were heard throughout the process,"* says Florina Jacob, *Coral Guardian's* scientific and field manager. This process ultimately led, 4 years later, to the creation of an MPA managed by members of the local community, with appropriate social and biological monitoring protocols.

This has increased the number of fishermen around the marine reserve, and a greater abundance of fish, with a considerable boost to biodiversity. *"The success of the project is not an endpoint but an ongoing process that requires close and honest communication with the local team,"* continues Coco Tamlyn, Director of *Coral Guardian*. This venture is inspiring other conservation projects around the world, such as DeepCORE launched in Spain in 2020.

THE EUROPEAN UNION

The progress of the ocean governance project

The European project took an active part in Monaco Ocean Week 2023, with two events devoted to the management of marine protected areas and the new Global Alliance for the Protection of the Marine Environment.

How can we help managers of marine protected areas (MPAs) to establish partnerships throughout the world? This theme underpinned the event organised by the European Union's Ocean Governance Project. During the morning session on 22 March, the speakers revisited the four major components of the project, which is characterised by its cooperative approach and its scope, embracing multiple levels of governance.

PROFILE

The Ocean Governance Project, funded by the European Union, is based on 4 interconnected pillars covering different levels of governance (from local to global): restoration of coral reefs and mangroves, support for cross-border cooperation in the Coral Triangle, exchanges of experience between South-East Asia and the Atlantic, and the establishment of networks and communities of practice among marine protected area professionals.

THE PILLARS OF THE PROJECT

Purificacio Canals, coordinator of the project and president of the Mediterranean Marine Protected Area Network (MedPAN) deemed 2022 a year of great progress for the ocean governance project. Marie Romani, Executive Secretary of MedPAN and partner in the MPA twinning project spoke about the origins of this European-funded project, which is a continuation of the transatlantic network of marine protected areas.

Strengthening links between more than 20 countries, from the Atlantic to the Coral Triangle, and creating global alliances so that the best decisions can have a significant impact on our shared ocean, are the key objectives of this project. These goals make the European Union a major force in international ocean governance. Cooperation is at the heart of this initiative, as Purificacio Canals points out: "*The aim is to encourage regional and international cooperation in the protection and restoration of marine and coastal ecosystems. Although each is unique, their managers face similar challenges. By working together, we can help to improve the management of the world's major marine areas, whether it's restoring coral reefs and mangroves, protecting vulnerable animals or working with coastal communities.*"

A TOOLKIT FOR PROTECTING MARINE MAMMALS

Francis Staub, coordinator of *Marine Mammal Twinning* as part of the European Union's Ocean Governance project, presented an overview of the toolkit developed by *Marine Mammal Twinning* to improve the management of marine mammals in marine protected areas (self-assessment tool, best practices, community of practice). It has been available to MPA managers, political decision makers, marine practitioners, and people involved in the conservation of these sensitive species for two years now. "*Very few MPA assessment tools take marine mammals or migratory species into account, which is a major shortcoming for managers. Therefore, at* Monaco Ocean Week*, the opportunity to present the toolkit to a wide range of Mediterranean stakeholders in a critical region for marine mammals is invaluable in supporting its implementation,*" says Francis Staub, adding that the toolkit is already in use in 17 MPAs. The Stellwagen Bank National Marine Sanctuary in the Atlantic uses it to assess its management plans, it is included in the five-year monitoring plan for the Agoa sanctuary in the West Indies, it is used to structure MPA projects in Croatia and to help develop the first sanctuary for marine mammals in Bermuda.

"*The key element in the implementation of this toolkit is the launch of the community of practice,*" explains expert Tom Dallison. It is a "*forum that brings MPA managers and stakeholders together to promote important opportunities for collaboration and exchanging knowledge*". This community of practice also provides an opportunity to share success stories and lessons learned in marine mammal management.

SHARING THE EFFORT FOR COASTAL RESILIENCE

Jean-Jacques Goussard, coordinator of the twinning project on coastal resilience, discussed the management of MPAs from the angle of building resilience to the rapid changes affecting coasts (climatic, urban, territorial, etc.). The focus on good practices in this area (risk anticipation, planning and management, institutional resilience, spatial planning, etc.) concerns all partners. In 2022, 41 assessments across 15 countries in the network were carried out on this subject. ■

ZOOM ON

THE NEW GLOBAL ALLIANCE FOR THE PROTECTION OF THE MARINE ENVIRONMENT

How can we reverse the ongoing deterioration of ocean ecosystems? In line with the new post-2020 biodiversity objectives, the importance of ensuring the effective management of MPAs and providing them with adequate and sustainable funding is paramount. Although a range of policies, legal and technical measures and financial investments are being implemented by key partners and institutions to support the sustainable and effective management of MPAs, there are still many gaps in effective management and funding.

Led by MedPAN and dedicated to the ocean governance project, the afternoon session presented the new Global Marine Alliance, an initiative of national and regional conservation trust funds aimed at creating a global community to support effectively managed and sustainably funded MPAs.

LEGAL PANEL DISCUSSION

Spotlight on the Law to improve ocean governance

The First legal panel discussion during the Monaco Ocean Week highlighted the specific features of the Law of the Sea, the implications of adapting it to new climate challenges and its actual impact on protecting the marine environment.

On 24 March 2023, the Prince Albert II of Monaco Foundation invited several specialists in environmental and maritime law, as well as indigenous peoples, to discuss the complex legal framework governing the ocean and its specific characteristics. Legal experts, lawyers and university professors spent a whole day debating three major topics relating to the latest significant advances in law, in particular the High Seas Treaty.

"*This meeting is essential to us because all too often, thinking about legal issues relating to the ocean takes place in silos,*" said Olivier Wenden, Vice-Chairman and Managing Director of the Prince Albert II of Monaco Foundation, at the opening of the event. "*The need for an open and holistic dialogue is central to this first edition of the legal panel discussion on ocean conservation. It will provide an opportunity to benefit from highly complementary perspectives combining public and private law, and taking into account extremely diverse frameworks and realities, ranging from international treaties to the customs of indigenous peoples, to the variety of national legislations and regional agreements. It is within these frameworks and situations that we need to reconcile ourselves, at a time when we need to collectively create a new form of governance for the oceans.*"

COASTAL RESILIENCE AND INDIGENOUS RIGHTS

Moderated by Daniel Wildcat, Professor at Haskell Indian Nations University and Senior Researcher at the *National Science Foundation*'s Coastal Indigenous Peoples Centre, the first panel brought together speakers renowned for their work highlighting certain specificities and issues relating to their cultures and regions. Therefore, Jennifer Santos, Academic Chair of the Postgraduate Certificate Programme in Disaster Prevention Planning at the University of Puerto Rico, followed by Lesley Iaukea, Professor at the University of Hawaii at Manoa, who is also Director of the Convergent Science Programme on Indigenous Knowledge, Land, and the Environment in Hawaii, highlighted the major legal issues surrounding coastal resilience and indigenous law. "*We're all akin, we use the same global resources from one end of the ocean to the other*", concludes Daniel Wildcat.

BIODIVERSITY AND THE PRECAUTIONARY APPROACH IN THE MEDITERRANEAN

The second panel began with a presentation by Virginie Tassin-Campanella, lawyer, founder of VTA Tassin and Vice-Chair of the INDEMER Scientific Advisory Board, who spoke about the very essence of law, "*a tool for conflict prevention*", and the unique context of the Mediterranean basin, with its rich history of navigation, trade, exchanges, conflicts, and cultural contributions. The lawyer also stressed the importance of the precautionary approach, a principle that emerged with the Stockholm Declaration (1972), when the preservation of the planet's resources was enshrined for the first time in law. "*Ecological issues started to become an international concern in a highly complex geopolitical context when states agree to regulate the use of science and technology. Following this, the Mediterranean coastal states created a governance mechanism under the name of the Barcelona Convention, the cornerstone convention adopted in 1976, which has been replicated in different regions of the world.*"

The panellists focused on marine protected areas and the assessment of their impact on the Mediterranean environment. Live from Tunisia and Morocco, Montassar Ben Salem, Doctor of Law and Assistant Professor at the Faculty of Legal, Political and Social Sciences in Tunis, and Sarra Sefrioui, Associate Professor at the Faculty of Legal, Economic and Social Sciences in Tangier, delved into the subject of biodiversity and the precautionary approach in the Mediterranean. Vasco Becker-Weinberg, Professor of Law at the Lusophone University and the *NOVA School of Law*, President of the Portuguese Institute for the Law of the Sea in Lisbon, explained the differences between the precautionary approach and the precautionary principle, which has a legal aspect. He used the example of the very first case in the world, in Portugal, where the creation of a marine protected area on the high seas was focused on "*very strong challenges for a very advanced environmental law.*"

ZOOM ON

PROTECTING THE MEDITERRANEAN SEABED

Lawyer, Virginie Tassin-Campanella, explains:

"The United Nations Convention on the Law of the Sea does not make any specific mention of seabed exploration activities. In the Mediterranean, this legal void has been filled by the Offshore Protocol, which covers the seabed and the water column. Despite being passed in Madrid in 1994, this protocol has been the least ratified of the Barcelona Convention, resulting in the protection of the seabed continuing to receive little consideration.

This lack of regard is also linked to the fact that scientific studies on the seabed are limited, either because they are confined to mineral-rich areas, or because they are hampered by conflicts or disputed grey areas where no data collection is possible. How can we apply a precautionary approach without scientific data?"

The panel noted the cumulative contributions of the United Nations Convention on the Law of the Sea, the Barcelona Convention and its protocols, the Fish Stocks Agreement, the OSPAR Convention and the new High Seas Treaty (BBNJ). The difficulties associated with implementing this treaty, such as high seas pockets, maritime disputes, oceanographic data collection and marine scientific research, were also discussed. Highlighting the varying applications of legal tools in different parts of the world, the moderator referred to a legal case in New Zealand: in the case of a disputed project to exploit sand from the seabed, the Supreme Court based its decision on existing law and recognised the prevalence of the customary law of the people. "*We must not wait for conflict to happen. The purpose of the law is not to repair but to prevent conflict and promote peace.*", concludes Virginie Tassin-Campanella.

ADAPTING INTERNATIONAL AND NATIONAL LAW TO INNOVATIVE SOLUTIONS

The final panel of the day, moderated by Andrew Heinrich, PhD from Harvard Law School and MPhil from Oxford University, brought out the emerging nature of the issue of adaptation, bringing the subject into the realm of the law of the sea. The panellists, Carlos Mata, Professor of International Public Law at the University of the Eastern Republic of Uruguay, and Liam Weber, Head of Grants at *the Seychelles Conservations and Climate Adaptation Trust*, tackled the central and new issue of adapting international law to innovative solutions, through concrete experiences in the Seychelles (the Blue Funds) and Uruguay. The discussion centred on the sharing of responsibilities by several countries, the consideration of customary international law and the suitability of regional laboratories. Romany Webb, Deputy Director of the *Sabin Center for Climate Change Law* at Columbia University, highlighted new legal practices to combat climate change in the ocean context: "*It's important that we have legal structures to govern the industry that is developing on the ocean.*" The panel underlined both the opportunity and the difficulty in the process of adapting and translating the international legal system, which can be hindered by the overlap of legislative standards. ■

AI'S CONTRIBUTION

Michal Nachmany, director and founder of *Climate Policy Radar*, then presented an artificial intelligence-based solution, similar to a search engine, which maps and analyses the global climate legislation and policy landscape in order to support informed, evidence-based decision-making: "*Our mission is to organise, analyse and democratise access to knowledge about climate laws and policies. The ability to understand what's going on in this very confusing black box of climate legislation and policies is really limiting our progress, and the ability to develop better laws, to hold policy-makers to account, to integrate political risks into decision-making, including the mobilisation of private and public funding.*"

INTER VIEW

Andrew Heinrich
PhD from Harvard Law School and MPhil from Oxford University

How can the law be adapted, but also created from scratch, for the changing circumstances and innovations in the world of marine conservation?

Whenever there is technical innovation, we must question whether the law can adapt or whether a new legal framework is needed. This is in fact, a very old legal issue! Initially, the law must adapt, but there comes a time when adaptation is not enough. It is therefore necessary to determine the precise point at which new legal concepts need to be developed.

I think that to improve the way we protect the seas, innovations in the national sphere need to be exported more often at an international level, as seen with the unique situation of blue bonds in the Seychelles, which are themselves inspired by a dozen other initiatives around the world.

Does indigenous law have a particular role to play?

Apart from the fact that they are the first to be affected by changes in the marine environment and the decline in fish stocks, indigenous peoples have real expertise in the seas, based on centuries of experience in their territory. And we need to apply it as if it were scientific expertise.

If we consult indigenous peoples and map out local expertise, our decisions will be more in line with the local and global situation. Through this approach, we can create a shared history that connects indigenous communities and the global community. This is an essential step in improving our understanding of the ocean.

What can be done to speed up the process of adapting the Law of the Sea?

From a domestic point of view, we have some particularly interesting laboratories. We need to allow laboratories to continue increasing experiments and provide them with financial means to enable countries to experiment more in their domestic sphere.

From an international standpoint, the High Seas Treaty has solved a very difficult problem, namely cross-border legislation. This represents a huge opportunity for further steps. We need to continue with these international adaptations, such as the idea of sharing responsibility for the sea between several countries, as is the case for Argentina and Uruguay, Mauritius, and the Seychelles, or in the Arctic, where new treaties involving the indigenous peoples are being negotiated.

Is there a way of creating a law of the sea that can adapt to future innovations?

There will always be a delay between the development of new technology and the law that governs it. Was aircraft regulated before it was made? The question of creating legal structures in new fields is an area of great interest to me. We all live in a post-covid world: preparing for something that seems impossible is a realistic prospect.

However, this raises the question of how the law can be used to spark innovation. We know that the ocean requires a certain level of carbon sequestration, a reduction in pH. The law can be an asset to achieve this.


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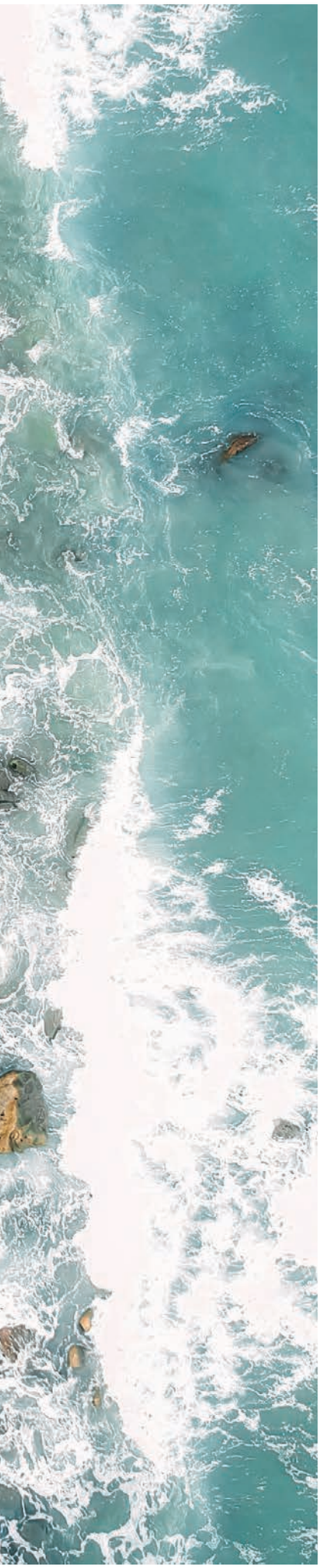

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BLUE ECONOMY & BLUE FINANCE

FISHING

Challenges and opportunities for a sustainable ocean

Invited by the Monaco Scientific Center, experts in the blue economy are preparing a report on the conditions for sustainable use of the ocean to meet the social and environmental challenges of our time.

During the Monaco Ocean Week, the two-day panel discussion co-organised by Nathalie Hilmi, economist in charge of the "environmental economics" section at the Monaco Scientific Center, in partnership with the MERI Foundation, brought together experts in natural and social sciences, representatives from industry and finance, decision makers and members of senior government technical bodies. From current findings to policy recommendations, five issues were examined, providing the basis for the future report, which will be presented at international conferences such as COP28 on climate change, COP16 on biodiversity and the Intergovernmental Conference on Marine Biodiversity beyond Areas of National Jurisdiction (BBNJ).

1. THE LITTLE-KNOWN EFFECTS OF OVERFISHING

How can we feed a rapidly growing population in the context of climate change, ecosystem degradation, economic uncertainty, and growing competition for natural resources? Specialists have identified three effects of overexploitation of fish stocks: it hinders the resilience and recovery capacity of a species and poses a considerable threat to the sustainable provision of crucial ecosystem functions and the proper functioning of the biological carbon pump.

They also highlighted the role of mesopelagic fish, which make daily vertical migrations at depths of between 200 and 1,000 metres, and the constant sequestration of carbon (at a rate of 300 to 2,700 thousand tonnes of carbon per year[1]). A little-known insight into the impact of ocean fisheries and overfishing.

Noting that 35% of fisheries are overfished[2], the experts are calling for a new attitude towards the ocean, centred on a "blue farming revolution" that could launch integrated multi-trophic aquaculture, focus on seaweed farming, or endorse a ban on the use of wild fish as feed for farmed fish...

In addition, the promotion of zoning and active management of marine protected areas, the establishment of no-bottom trawling zones and the standardisation of traceability of seafood products are recommended. Finally, raising public awareness (local populations, fishermen, decision makers, etc.) of the importance of good fishing practices goes hand in hand with these objectives.

1. Saba et al., 2021.
2. FAO, 2019.


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2. GENUINE CONSIDERATION OF MARINE ECOSYSTEM SERVICES

The benefits provided to human societies by ecosystems can be monetarily assessed to raise awareness in economic and policy discourses. In addition to increasing the number of marine protected areas, the evaluation of Ecosystem Services that are not generally taken into account in economic models (water quality, fish supply, protection against storms, etc.) is considered essential. The working group encourages the application of universal guidelines based on scientific data to ensure the long-term monitoring of ecosystems and services they provide. Various solutions have been documented for increasing the carbon sequestration potential of marine ecosystems (combining aquaculture and oyster farming, restoring marine biodiversity, choosing renewable energies, etc.)

"*It is no longer acceptable to consider the ocean solely as a source of raw materials. While it is an essential contributor to global GDP, it has been shown that its economic value in terms of the ecosystem services is much greater*", explains Patricia Morales Errázuriz, Director of Philanthropy Cortés Solari, the group belonging to the MERI Foundation. It has become apparent that, along with food security, blue carbon should be a crucial element in boosting blue growth and achieving sustainable development goals.

IN FIGURES

- 7th world GDP **(2.5 trillion dollars) if we consider the blue economy as a country,**
- **livelihoods for over 820 million people,**
- **more than 13 sectors of activity of crucial economic interest.**

3. MPAS: A POWERFUL TOOL

Only 30% of Marine Protected Area (MPA) coverage - a crucial protection tool - is managed effectively for food security, biodiversity, and climate[3]. However, as Laure Thierry de Ville d'Avray, Sea Academy Project Manager at Sulubaaï Environmental Foundation, pointed out after listing the many social and ecological benefits of these areas, "*the greater the protection of a marine protected area, the greater the benefits. Total protection delivers the best ecological and social results.*" A higher level of protection for existing and future areas is therefore essential to guarantee effectiveness.

In addition, the MPA system should be included in climate policies, according to the experts, who are drawing attention to this key lever for tackling the challenge of food security and carbon mitigation. Furthermore, an emerging solution is being promoted which involves making MPAs investable through innovative financial mechanisms, such as an effective partnership between the public and private sectors and scientifically supervised investment in blue carbon credits.

3. Arneth et al., 2023.

IN SIGHT

"The Blue Economy Strategy emphasises the need for sustainable use of the ocean by industries to promote economic growth, improve livelihoods and create jobs while preserving the health of the ocean ecosystem".
***Nathalie Hilmi**, economist in charge of the "environmental economics" section at the Monaco Scientific Centre and lead author of the IPCC*

4. THE OCEAN, A COMMON LANGUAGE

In a world full of misinformation and greenwashing, how can we build a common language that can unite different generations and social and professional backgrounds? This question, raised by Pernille Schnoor, professor at the World Maritime University, relates not only to the integration of scientific knowledge into the educational framework but also to the emergence of intergenerational dialogue and the co-construction of representations. Agustina Lo Bianco, from the MERI Foundation, recommends that "*ocean literacy needs to be more inclusive and accessible, whether to young children, teachers, journalists or political decision makers, to raise global awareness and take action to ensure the sustainability of our oceans.*" Improving the media strategy and communication plans is, therefore, an important part of the process, and is a prerequisite for coordinated action at an international level, which raises the question of a common language and standardisation of concepts.

5. FINANCIAL MARKETS AND BLUE INVESTMENTS

How can we make the financial markets a key lever for the blue economy? The panellists identified a need for "financial literacy". How can we ignore the fact that disruption to economic activity causes loss of biodiversity, which has an impact on financial indicators? For example, disruption of the marine food chain has an impact on fish stocks. The fact remains that "*the European Union's sustainable transition agenda focuses on climate change but pays little attention to the loss of biodiversity. As a result, sustainable funds face a regulatory hurdle when they invest in preserving biodiversity,*" explains Thorsten Thiele, founder of the *Global Ocean Trust*.

The target sectors of the blue economy are outlined, with a focus on the pitfalls of greenwashing and the development of a nature market similar to the carbon market. The introduction of a "carbon credit" or "nature credit" would provide companies with a financial incentive to invest in the conservation or restoration of biodiversity. Other solutions, such as the creation of a sustainability label, the promotion of nature-based solutions, support for sustainable businesses and opportunities for long-term alternative investors via impact funds were highlighted during the two days of work. ■

DID YOU KNOW?

The Elafonisos Eco association **has demonstrated that the lionfish is an invasive species in the Mediterranean as a result of imbalances in ecosystems affected by climate change. In the interests of regulation, they provide recipes to encourage people to fish for it and enjoy it.**

COASTAL COMMUNITIES

Unlocking Blue Finance

Leaders from coastal communities, investors and coral reef specialists discussed this theme, as a counterpoint to a case study in collaborative reef management, presented live from Kenya.

How can we ensure the resilience of coastal communities and coral reefs on the front line of climate change? The need to unlock transformative blue finance for coastal resilience and elevate local solutions to a level of global impact clearly emerged during the session organised by the US NGO Wildlife Conservation Society (WCS) and the Global Coral Reef Fund (GFCR), held on 24 March 2023 at the Oceanographic Museum.

IN SIGHT

"We want communities to come together in collaborative management, calling on different stakeholders to share solutions that take into account local conservation methods and the vision of a beautiful and sustainable world".
***Remmy Safari**, Kuruwitu Conservation and Welfare Association*

CATALYSING TRANSFORMATIONS

Opening remarks by Sylvie Goyet, Advisor to the Vice-President of the Prince Albert II of Monaco Foundation, and Leticia Carvalho, Coordinator of the Marine and Freshwater Branch of the United Nations Environment Programme (UNEP), showed that philanthropy alone is not enough to achieve the necessary transitions towards sustainability and that the private sector is called upon to play a key role. These comments urge the acceleration of creative solutions that include local communities in decision-making, as well as the proliferation of solutions that focus on the causes of coral reef degradation and support a new sustainable blue economy in this area. Biologist Emily Darling, director of coral reef conservation at the WCS, highlights "*the urgent need to catalyse fair transformations, to rely on the latest scientific data and to better consider the threat of the 'triple exposure' of communities when they are not involved in actions, whether in terms of combating climate change, blue growth or accelerating on-site conservation measures.*"

CO-MANAGEMENT AND BLUE FINANCE

Five panellists shared their thoughts on the Kenyan experience. Fahd Al-Guthmy (*Miamba Yetu*, WCS) comments on the unique opportunities for sustainable finance to support coastal communities. Safiya Sawney (GFCR) recommends government involvement to identify strategic and policy actions that support communities in achieving global biodiversity targets. James Lindsay *(Builders Initiative Investment Team)* talks about the emerging space for private capital in the ocean sector (innovative technologies, restorative aquaculture, fisheries management, etc.). Briony Coulson (DEFRA, *Blue Planet Fund)* highlights the support provided by multilateral funds that encourage new partnerships between governments and communities.

Finally, Hoyt Peckham, director of small-scale fisheries at the WCS, discusses the main pillars of community rights, ownership, and co-management, supported by the WCS's new community fisheries strategy.

The participants shared a desire for communities to be at the core of the design of programmes capable of reaching each of their members and improving reef conservation policies. And, as UNEP's Leticia Carvalho points out, using the Kenyan mobile banking application MPESA as an example, "*communities have lessons to share with the world, including in the field of microfinance.*" ■


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ZOOM ON

TENGEFU, A MODEL DEVELOPED IN KENYA

Live from Kenya, representing the *Kuruwitu Conservation and Welfare Association*, Remmy Safari and Katana Ngala presented a conservation project run by coastal communities in East Africa in Swahili, fisherman Katana Ngala, vice-president of the Kenyan association, explains in detail the "Kuruwitu experience" of collaborative reef management by coastal fishermen. Faced with multiple challenges (food security, overfishing, reef degradation, limited technical support, etc.), a range of solutions have been implemented: coral restoration, with 8,000 young corals replanted since 2018, involvement of women, reinforcement of the traditional *Tengefu* practice of establishing conservation areas to limit the decline in fish stocks. *"Since 2006, we have seen a 400% increase in biomass, a 30% increase in reef recovery and a 17% increase in restored seagrass beds in several areas. And that goes hand in hand with food security and the development of ecotourism"*, explains Katana Ngala, who is hopeful that Kuruwitu's collaborative and inclusive model will continue to spread. *"We're trying to promote solutions that can be replicated across Africa and around the world,"* adds Remmy Safari, referring to the programmes under development, such as the *Women 4 Oceans Programme*, awareness-raising initiatives for young people and a permaculture project, all of which need support.

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REOCEAN FUND

Launch of the Blue Investment Fund

The Prince Albert II of Monaco Foundation and Monaco Asset Management have joined forces to launch the *ReOcean Fund*, a private equity fund dedicated to SDG 14 - Aquatic life

On Tuesday, 21 March 2023, The Prince Albert II of Monaco Foundation and *Monaco Asset Management*, key player in the Monegasque financial market, officially launched a new private equity fund in the presence of HSH Prince Albert II of Monaco. The fund is designed to support the United Nations' Sustainable Development Goal 14, which focuses on "aquatic life". The aim of this innovative Blue Finance initiative? Investing €100 million to propel the next generation of ocean innovations towards supporting the transition to a net-zero, regenerative and fairer economy.

IN FIGURES

- **100 million € investited in blue economy companies**

BOOSTING SOLUTIONS

Overexploitation of ocean resources, chemical and plastic pollution, habitat destruction and the effects of climate change... While the ocean's health is deteriorating, blue and regenerative solutions are emerging, yet they often remain underdeveloped. How can we consolidate, accelerate, and boost the development of these innovations? The Principality's chosen response is to increase investment in growing companies that can make a real impact on the resilience of the ocean and the conservation (or restoration) of ecosystem functions that are essential to life on earth and to our societies. "*Philanthropy plays a crucial role in bridging the gap between the public and private sectors. But philanthropy alone is not enough to tackle the vast, daunting, and complex challenges facing the ocean,*" said Olivier Wenden, Vice-President and CEO of the Prince Albert II of Monaco Foundation, at the launch conference. *The creation of the ReOcean Fund is a continuation of the work that the Prince Albert II of Monaco Foundation has been doing for many years to promote the most innovative companies that have an impact on safeguarding aquatic life. The positive changes in regulations, the shift in consumer dynamics and the strong growth seen in certain sectors of the sustainable blue economy are all reasons to invest in the growth of these companies*". A great selection of these was presented at the *Ocean Innovators Platform* (see p48).

DESIGNING A BLUE FUTURE

Investment in the sustainable ocean economy has been largely underdeveloped in the past, but shifts in economic, political and consumer dynamics are changing this and making the ocean an asset that provides an investment opportunity. Therefore, the two Monegasque entities, with their combined expertise in ocean conservation and finance, have decided to join forces and co-manage the *ReOcean Fund*, which aims to support the growth of innovative, high impact, established companies that seek to have a positive impact on the aquatic environment.

NEW ECOSYSTEM INVESTMENT

Minna Epps, Director of IUCN's Ocean Team, welcomes the creation of the *ReOcean Fund*, "*a promising lever for unlocking the potential of the blue economy. It's currently the fastest-growing sector, so we need to take advantage of it and make sure we do so in a sustainable manner.*"

Anthony Torriani, founder and managing director of Monaco Asset Management, which co-manages the fund, talks about "*the opportunity to fill a financial gap in the market*", before going on to explain the blue investment window: "*There is already a very active investment ecosystem in the venture capital and seed capital sectors. However, we believe there is a real need for capital to support more established companies entering their growth phase.*"

This global fund is designed to reinforce The Prince Albert II of Monaco Foundation's mission to support effective solutions for the planet's biodiversity, climate, ocean, and water resources. The fund will be able to build on the Foundation's successful ocean initiatives and attract new partners and funding, particularly from the private sector. ■

FIVE SECTORS TO UNLOCK THE OCEAN'S REGENERATIVE POTENTIAL

- **solutions to plastic pollution,**
- **Blue Food: healthy, equitable, and sustainable,**
- **green shipping and sustainable yachting,**
- **restoration and protection of marine ecosystems,**
- **ocean data and knowledge.**

YACHTING OF THE FUTURE

The 12th Environmental Symposium promotes sustainability

This new edition, organised by the Yacht Club of Monaco, will focus on alternative energy sources and energy efficiency, with an emphasis on the input of new generations.

The symposium opened the Yacht Club de Monaco's Yachting Day, which was organised around the tenth edition of *Monaco Energy Boat Challenge* as part of Monaco Ocean Week. Ahead of a series of panel discussions involving a selection of leading innovators in the field, the symposium reviewed the findings of the latest IPCC report (2022) and examined current trends in maritime transport and yachting.

How can we move closer to the ambitious goal of reducing the carbon impact of the maritime sector, in line with the international Sustainable Development Goals (in particular SDG 14) and the recommendations of the International Maritime Organisation?

The proposed solutions include building new low-carbon ships and cutting emissions from existing ships by reducing their speed, introducing carbon taxes, or developing zero-carbon fuel. As detailed in the introduction, *"12,000 units must reduce their emissions by 65% by 2030. This means that the yachting industry needs to aim for a reduction in total emissions of almost 80%*. As part of its public service delegation, the Yacht Club de Monaco intends *"to play a part in the environmental transition and to act as a platform for discussions and communication in the yachting industry"*, explains Bernard d'Alessandri, the club's General Secretary.

OPTIMISING VESSELS

The first panel discussion, devoted to yachting industry initiatives, looked at ways of optimising vessels through the energy mix, as well as the crucial issues of vessel end-of-life and the possibility of recycling materials. "*The first step is to fully grasp the impact, based on accurate data,*" suggests Ollie Taylor, Associate Director of the Anthesis Group. "*The impact of a vessel also influences its design and use, for instance, by assessing the pressure exerted on Posidonia meadows in anchorages,*" says Vienna Eleuteri, founder and vice-president of the *Water Revolution Foundation*. Noting the need to support boat owners in this transition, the speakers highlighted easy-to-use tools such as the SEA Index®, which aims to target yachts over 40 metres in length to assess their CO_2 emissions.

INNOVATING: CONTRIBUTIONS FROM THE YOUNGER GENERATION

The second panel discussion, focusing on the role of the younger generation in the future of the yachting industry, addressed inspiring technical proposals, such as the development of electric or hybrid (hydrogen-powered) boats, with a focus on the different types of marine propulsion, the evolution of battery technologies and the shape of tomorrow's hulls, (eco-designed, carbon-free, foiling, and high-performance). The value of collaboration was central to the discussions, which featured *Bluetech* projects such as the first self-driving electric ferry in Denmark and the alluring *Blue Nomad*, a floating houseboat designed by young people at the Rosenberg Institute in Switzerland. ■

ZOOM ON

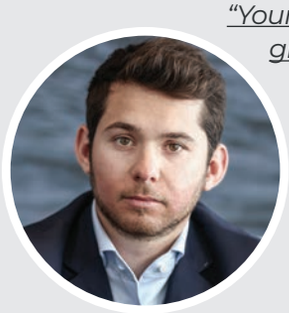
THE ZERO-CARBON YACHT OF THE FUTURE

The project started in Monaco in 2019. Supported by Fondation0, which has brought together an alternative group of scientists, data analysts, prototype designers, etc. with a sole mission to design a yacht with no fossil fuel on board, and no generator, ruling out hydrogen as an alternative from the outset. *"We wanted a radical change with 70% energy efficiency,"* says Vripack's Creative Director, Marnix Hoekstra. What's the key? Focussing on an inexhaustible energy trio: wind, water, and solar power (thanks to the development of high-tech hybrid solar panels). In addition to this approach, the innovative nature of the project stems from sharing knowledge, as Kees Jan Koester, from the Fondation0, can testify: *"All the data about the project is open source. If we reach a certain point, other people can continue. Together, we can go even further."*

IN FIGURES

- **10.7 million tonnes of freight cross the ocean on board 95,000 cargo ships each year,**
- **3% of the world's greenhouse gases come from maritime transport; if the sector does not make any changes, emissions will rise to 17% by 2050.**
  (sources : IMO)

IN SIGHT



"Young people can make a major contribution to global change and innovation. To achieve this, we need to work step by step and develop technologies for propulsion, hulls, structures, materials and energy sources with all the stakeholders in the sector".
***Thomas Grosjean**, head of marine fuel cell engineering at Hélion*

SHIPOWNERS INVOLVEMENT

The 27th *Captains' Forum*

One hundred and fifty superyacht captains came together to discuss the involvement of this type of boat in terms of management, leadership, and mentoring.

On Thursday, 23 March 2023, during the *Yachting Day* organised by the Yacht Club de Monaco (YCM), the captains of superyachts, who hold a Master 3000 certificate and sail under the YCM flag, put forward ideas for developing the yachting industry of the future. As part of the "Monaco, Capital of Advanced Yachting" initiative, the event was once again an opportunity to give a voice to the people who make the industry tick.

THE MICRO-SOCIETY ON BOARD

Insisting on the importance of teamwork aboard any unit, which is like a micro-society where the crew members have well-defined roles and personalities to deal with, explorer Paul Rose does not hesitate to make life aboard an inspiring model of management and leadership. This topic was widely reiterated by the panellists, who also spoke about the need to listen to crew members, how to manage crises and how to share common values. For Marianne Danissen, Director of *Yacht Management - Camper & Nicholson, "any position on board is as important as the role of the captain. They are all linked, and I hope that more training courses will pave the way for greater knowledge, sharing and kindness."*

EMERGING ECOLOGICAL AWARENESS

The new generation of captains has an undeniable environmental conscience. "*They ask questions about our fuel consumption, the products we use, how we save water...*" observes Christophe Guégan, captain of the *Mimtee*. Professionals are also looking at how to develop a career at sea by creating gateways and training courses. "*It's a question we all have to ask ourselves if we want to keep the crew,*" says Pieter Ferreira, captain of the Yas. They all stressed the need to train future sailors and mentioned the cutting-edge courses offered at *La Belle Classe Academy*, the Yacht Club de Monaco's training centre.

IN SIGHT

"It's an honour to be here, especially since we're young. I came here in 2018 for the Monaco Energy Boat Challenge and a few years later here I am again to receive this award. It's a very powerful moment!"
***Simon Bernard**, ship's officer, and founder of Plastic Odyssey.*

THE *YCM EXPLORER AWARDS*

BY LA BELLE CLASSE SUPERYACHTS 2023

The high point of the day was the YCM Explorer Awards for La Belle Classe Superyachts 2023, a tribute to those who follow in the tradition of innovation and exploration initiated by Prince Albert I. Four owners were honoured for their commitment to protecting the marine environment, both in the design of their yachts and in the exploration, they undertake while sailing.

"*In this anniversary year of the Yacht Club de Monaco, who is celebrating its 70th anniversary, it is a pleasure to be here among so many passionate shipowners who have made a name for themselves through their commitment to preserving the environment,*" commented HSH Prince Albert II of Monaco, President of the Yacht Club de Monaco, at the opening of this 5th ceremony.

S/Y MARIE JOSEPH **(Technology & Innovation)** and its many innovations, including innovative solar panels that form a "solar skin", a hydro-generation system and high-performance batteries.

—

M/Y OCEAN XPLORER **(Mediation & Science)** and its onboard laboratory, which collects data in inaccessible ocean areas and focuses on raising awareness among young people.

—

S/Y SEAHAWK **(dventure & Environmental Ethics)** whose many scientific missions have enabled it to monitor migration patterns, the impact of fishing... The ship is also involved in a number of educational projects.

—

M/V PLASTIC ODYSSEY **(the judges' favourite)** and its round-the-world expedition, which began with the goal of tackling plastic pollution, before enlisting local entrepreneurs to recycle plastic before it ends up in the sea.

Projet de station de capture du CO_2 des mers grâce à la technologie d'électrodyalyse (Captura)
© Courtesy of Chengxiang Ciang/Captura

47 INNOVATIONS

OCEAN INNOVATORS PLATFORM

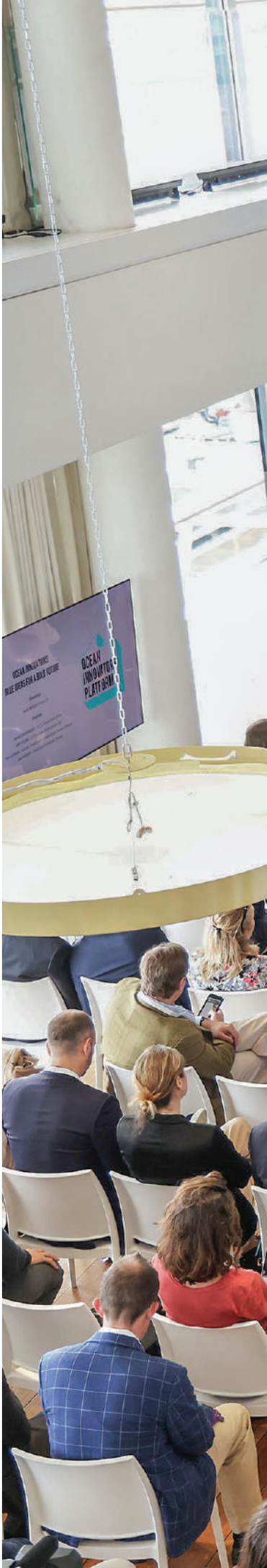
The ocean, the new DNA of innovation

At the crossroads of entrepreneurship, innovation and investment, this high-level meeting showcases cutting-edge technologies and pioneering solutions for the blue economy.

Offering a glimpse into a new world, the fourth edition of the *Ocean Innovators Platform* led by the Prince Albert II of Monaco Foundation was one of the highlights of Monaco Ocean Week 2023. On the afternoon of 21 March, at the Monaco Yacht Club, Olivier Wenden, Vice-President and CEO of the Prince Albert II of Monaco Foundation opened this now unmissable event by declaring that "*to achieve SDG 14 [Life Under Water] by the end of the decade, as well as the objectives of the Global Biodiversity Framework, we need the private sector to develop and speed up existing solutions to implement the necessary changes and finally launch the sustainable blue economy that we are all calling for.*" Alongside him, Gérald Mathieu, Head of Private Banking Europe and Middle East and Managing Director of Barclays Monaco, points out that "*the global challenges we have faced in recent years underline the importance of a healthy, functional and sustainable planet.*" Stating that "*environmental and social issues have become an integral part of Barclays' DNA*", he summed up the aim of these two days dedicated to innovation: "*To come together to encourage lively debate, discussion and action around the important issue of protecting and regenerating the world's oceans.*"

OCEAN INNOVATIONS: BLUE IDEAS FOR AN AMBITIOUS FUTURE

During the first half-day, the panellists discussed the general drive behind ocean innovations in the face of the major challenges threatening aquatic life. The issues of the relationship between the private sector and governments, the responsibility of investors, the question of scaling up innovations, the redefinition of the link between competition and collaboration, and the importance of regulation all generated constructive debate. Strong ideas, such as the redefinition of progress, were put forward: "*In the past, progress was measured in terms of economic values and social benefits; today, anything that doesn't take the climate into account is no longer progress*", says Alexis Grosskopf, Director of Ocean Hub Africa, and member of the *1000 Ocean Startups* Steering Committee. Discussing the issue of regulation on an international scale, Ben Lesage, global coordinator for the *Sustainable Ocean Alliance*, stresses that it is "*a powerful tool, even if being able to innovate means you have to break boundaries.*"



FUNDING OCEAN INNOVATORS

A market opportunity neglected by many investors, could the ocean prove more appealing? The second panel discussion, moderated by Damian Payiatakis, Head of Sustainable and Impact Investments at Barclays, invited a panel of investors involved in the ocean sector to shed light on how they seek out, select and support innovators in this emerging sector. From ecological and climate arguments to financial ones ("*early investors will be the most likely to benefit*", says Rita Sousa, a partner at *Faber Ocean*), the panellists gave pointers on how to raise capital and seek sustainable returns to support innovations over the long term. "*We're doing this because we see the urgency,*" concluded Jamie Rowles, co-founder of Planet Fund, who was joined by Lian Michelson, Investment Director for Vala Capital: "*We need to get on with a mission that may take 20 years, but most of all we need a sustainable ocean.*"

Monaco's Minister of Economy and Finance, **Jean Castellini**, was invited to share his experience of managing public finances and investments in the blue economy, pointing out that *"while the trend in these investments' dates back only a few years, Monaco's Constitutional Reserve Fund has been investing for over 20 years in a sustainable manner. The blue economy will become central to the global economy in the long term, which will lead to social progress"*

COASTAL RESILIENCE

How can we safeguard our coasts in the face of the growing threats posed by climate change and the accelerating loss of biodiversity? The third panel's discussions focused on existing best practices, as well as the challenges and opportunities that arise from them.

"*Involving communities at a grassroots level and using a bottom-up approach*" is seen as a key step forward, particularly by Dale Galvin, Director General of the Global Fund for Coral Reef (GFCR). Rupert Hayward, President of *Blue Action Lab* and Director of the Grand Bahama Port Authority, discussed the Bahamas' example of coastal protection.

IN SIGHT

"We need to create a narrative for the mass market so that the solutions we are developing today become the norm. You have to imagine that the next Marc Zuckerberg is not creating Facebook but finding solutions to save the ocean".
***James Lindsay**, Director of Builders Vision*

The following day's session began with a presentation by Mathieu Dufresne, Managing Director of COTY, France. From the introduction of the world's first highly purified ethanol to Lancaster's ocean-friendly solar range, the common thread running through the brand's innovations is sustainability, "*the ultimate driver of innovation*".

THE FUTURE OF COASTAL TOURISM

Although it constitutes a key economic sector for the prosperity of coastal populations, it also often has serious environmental consequences for marine and coastal ecosystems. Reducing the tourism industry's footprint and seeking more sustainable and regenerative tourism models are crucial societal challenges. Innovative approaches include setting up coral regeneration farms to attract tourists *(Coral Vita)*, underwater theme parks and laboratories *(Underwater Gardens)*, custom-made barriers to separate bathers from sharks in South Africa and Australia *(Shark Safe Barrier)*, and impact investing in the ocean sector (*Katapult Ocean)*.

"Now we need to provide evidence of the impact of companies on the ocean, based on reliable figures. It's no longer enough to say you're committed to sustainable development".
***Ingrid Maurstad**, Impact Director, Katapult Ocean*

FROM THE SEA TO THE PLATE

In Singapore, people are already eating products produced by growing fish cells in the laboratory *(Avant Meats)*, and in Israel and New York, plant-based salmon *(Plantfish)*. As for the fishing of tomorrow, what if it was based on the biological dynamics of fish, communicated in real time using cameras and innovative monitoring tools? These techniques have already been put in place by *Safety Net Technologies* and *Pegasus Capital Advisors*, who see the new High Seas Treaty as a springboard to sustainability.

Nico Rosberg, Formula 1 world champion in 2016, and now a sustainable development entrepreneur and investor in green technologies, came to talk about his commitment to accelerating green innovation in the quest for positive impacts for the environment and future generations. He outlined his main criteria for selecting the start-ups he supports: *"Firstly, we invest in people, the founder and their team; secondly, we look at the potential size of the market."*

"It takes time to launch a revolutionary new material, there has to be a push from governments, innovators and consumers", says innovator **Rodrigo Garcia Gonzalez**, co-founder, and co-director of Notpla, which is revolutionising the plastic packaging industry with a membrane made from algae that is biodegradable and edible (recently awarded the *Earth Shot Prize)*.

THE CHALLENGES OF SUSTAINABLE MARITIME TRANSPORT

Vital to the global economy, since it carries around 90% of world trade, maritime transport accounts for almost 3% of total global emissions, a rate that could rise by 84% by 2050. Some of the proposals covered at this panel discussion include developing algae-based biofuels in South Africa *(SEAH4)*, launching the first clean container ship in the Bahamas *(Veer)* - which uses wind power and green hydrogen, optimising empty containers that could cut CO_2 emissions by 50% *(Navlandis)*, investing in breakthrough technologies aimed at decarbonising the world *(Extantia Capital)*.

THE FUTURE OF COASTAL INFRASTRUCTURE

The experts discussed the latest advances and best practices in the design and development of sustainable coastal infrastructure, which are essential for mitigating and adapting to climate risks: From installing floating photovoltaic farms capable of withstanding category 4 typhoons near the coast *(Ocean Sun)* to transforming wind farms into underwater species conservation parks *(ARC Marine)*, desalinating seawater using solar photons *(Desalenator)*, capturing CO_2 from the seas using electrodialysis technology *(Captura)* and, of course, developing a patient investment strategy *(Future Planet Capital)*.

ARTIFICIAL INTELLIGENCE IN THE DEEP BLUE OCEAN

"80% of the seabed is unmapped. But the seabed is ecologically and economically valuable because it sequesters carbon. We need high-quality, clear data to be able to take advantage of artificial intelligence. We're at a tipping point," says Joost den Haan, head of Plan Blue, a seabed mapping technology that could be deployed on the high seas. This view is shared by George Richards, Director of *Community Jameel*, who wants to involve indigenous communities in the global data acquisition process, and Jean-Marc Temmos, Director of Semantic TS, which has been using underwater noise to develop artificial intelligence (AI) dedicated to the marine environment for 30 years, focusing on monitoring Posidonia meadows, a major carbon sink. It's now possible to analyse seabed data from cloud servers. However, *"AI needs reliable data to train current systems. Once the network has been trained effectively, AI can create a virtuous circle capable of detecting errors"*, explains the expert. Kortney Opshaug, founder of *Blue Ocean Gear*, a technology company offering smart buoys that provide critical data for commercial fisheries, is also calling for a data pool that can be shared with governments to achieve sustainability goals for the ocean ecosystem. ■

"The solutions are there, and so is the will. But the scale of the work to be done means that these solutions and this determination need to be given a new perspective. Above all, this means that we need to work in a coordinated way with businesses, scientists, financial experts, and everyone else involved in making changes. Without this coordination, we won't be able to give the various initiatives mentioned here the scope they deserve".
HSH Prince Albert II of Monaco *at the closing ceremony of the 4th Ocean Innovators Platform*

"Sustainability can't just be a trend, it has to be integrated into your business plan. That's how we can make long-term positive changes".
***Thomas LeQuinquis**, Marketing Director at Lancaster*

BLUE INDUSTRY

What will the high potential of algae lead to?

The second Seaweed Day was held at Monaco's Oceanographic Museum and brought ambassadors of the seaweed industry together. Seaweed is emerging as a sustainable ocean-based solution with innovative economic prospects.

Speaking in the museum's conference room on 23 March 2023, Robert Calcagno, Director of the Oceanographic Institute, spoke of the momentum of development in the algae sector in Europe and throughout the rest of the world. At the start of the session, Australian explorer and scientist Tim Flannery expressed his delight at this development: "*The algae industry has a long history, particularly in Asia. It's an industry that's evolving very quickly at the moment, and it's an opportunity for society to change.*" The climate change and conservation specialist encouraged research and recognised the potential of algae to sequester carbon in the ocean environment, "*a potential that could have a real impact on climate change*". Especially as algae cultivation is likely to extend over 9% of the ocean, explained the renowned researcher.

A SECTOR WITH A BRIGHT FUTURE

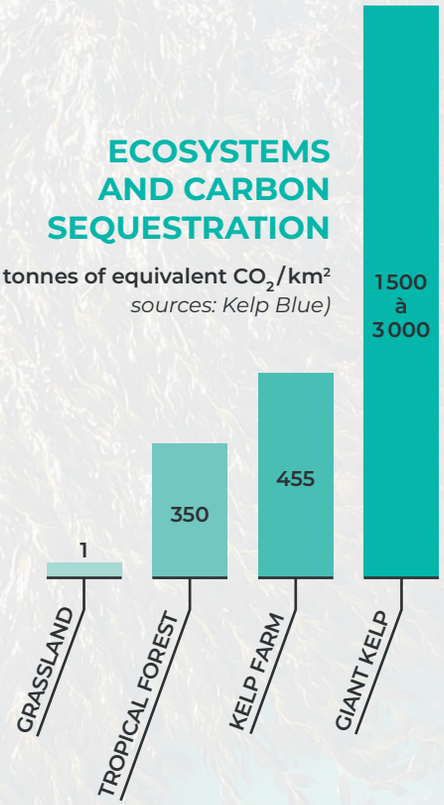
Opening the first session, two seaweed farmers shared the milestones in the development of seaweed farming from a start-up to a high-growth, sustainable business. Dutch entrepreneur Daniel Hooft, director of *Kelp Blue,* which he founded in 2020, showed how offshore kelp cultivation in Namibia is being developed on an industrial scale along sustainable lines that are integrated into the territory. In addition to its wide range of products and applications, this activity aims to generate carbon credits (*Kelp Blue* is aiming for accreditation in 2025).

A pioneering blue-growth company based in the Faroe Islands and California, *Ocean Rainforest* has expanded rapidly in the space of just one year, covering 4 countries: "*A momentum that we need if seaweed production is to become an industry with a positive environmental impact*", says Olavur Gregersen, who is identifying the most relevant market sectors for rapid scale-up. It builds further on the 2017 SAPEA report that "*the potential for seaweed mariculture to produce large quantities of food and biomass is much greater than for any other group of marine organisms*" (*The Evidence Review Report*, 2017). These two trajectories show just how much the algae sector has become worthy of investment and development, and where competitiveness seems to go hand in hand with collaboration.

The second panel went on to explore the possibility of restoring wild seaweed forests through sea urchin farming, with a presentation by a representative of Urchinomics, Vincent Doumeizel, Senior Advisor to the United Nations Global Compact, presented the pillars of action of the *Safe Seaweed Coalition*, which has over 1,000 members, and its main objectives, specifically responding to Sustainable Development Goal 11.

ECOSYSTEMS AND CARBON SEQUESTRATION

(in tonnes of equivalent CO_2/km²
sources: Kelp Blue)



"We have some very fine solutions based around algae, which meet some of the biggest challenges of our time. We need to reach out beyond our community, communicate about the benefits of seaweed, and involve young people and others... Our experiences need to be shared".
***Vincent Doumeizel**, Senior Advisor to the United Nations Global Compact, Director of the food programme Lloyd's Register Foundation*

WHEN SCIENCE TURNS ITS ATTENTION TO ALGAE

After a session devoted to innovators and the transformation of algae-based products, the final part of the event focused on the question of how science is guiding the development of a truly sustainable algae industry, with clear benefits for the climate and biodiversity. Philippe Potin, a CNRS marine biologist from the Roscoff marine station, discussed the various impacts of seaweed cultivation on the marine environment. The professor emphasised the "*ambivalence of the effects, which can be seen as positive or negative.*" This means that the supply of nutrients and the elimination of pollutants provided by algae can also compete with primary producers in the environment.

Similarly, the increase in sedimentation can reduce the turbidity of the water but can modify the composition of the environment. However, the researcher concludes, based on extensive field studies, "*we can focus on the positive effects rendered by ecosystem functions in terms of nutrient supply, sediment dynamics and biodiversity*" (in particular, algal forests create new habitats for species and juveniles). On the other hand, we need to be very careful about the risk of genetic pollution and the development of invasive species, which requires detailed consideration of the environmental conditions and design of the algae farm.

Finally, Samantha Deane, Director of the *Kelp Forest Foundation*, stressed "*the role of science in anticipating trends and appropriate actions.*" The director of the Dutch organisation presented the scope of the evaluation of the ecosystem services of wild and cultivated kelp forests, such as those in the Falklands: "*We measure biodiversity using environmental DNA or passive noise*", she explained, emphasising the need to monitor the impact of cultivated kelp forests using different techniques. If the industry wants to scale up and ensure its long-term future, it will have to rely on impact studies and the support of the scientific community. ■

IN SIGHT

"We see that the environmental awareness of the main stakeholders has increased, and it's up to us to propose adaptable solutions that will breathe life into this commitment. We need to make swift changes, find a wide range of solutions and encourage boat owners to be passionate about the oceans".
***Bernard d'Alessandri**, General Secretary of the Yacht Club de Monaco*

YACHTING OF TOMORROW

Practical solutions for sustainable yachting

On 23 and 24 March 2023, the Yacht Club de Monaco hosted the first *Monaco Smart Yacht Rendezvous*: an exceptional showcase for green innovations in yachting.

Establishing itself as a facilitating platform for a wide range of stakeholders committed to building the yachting of tomorrow, the Yacht Club de Monaco hosted this first meeting organised by *Monaco Marina Management*, a Monegasque company specialising in the management of marinas and yachting harbours. The event was launched by HSH Prince Albert II of Monaco, who wanted to meet the start-ups, scale-ups and companies that came to present innovative decarbonisation or refit solutions for superyachts.

With the support of the Prince Albert II of Monaco Foundation, Credit Suisse, the MB92 Group shipyard and Wider Yachts, this event is unique in that it brings together the entire yachting ecosystem, from the largest shipyards to designers, who have all come together to demonstrate their desire to contribute to the transformation of yachting. According to José Marco Casellini, Director of *Monaco Marina Management*, *"The participation of so many major figures in the yachting industry reflects their desire to provide a collective response to the challenges of climate change and to encourage responsible innovation."*

The event has a dual purpose: serving as an exhibition area where solutions can be shared, and as a discussion panel where environmental issues take centre stage, such as the presentation of the third environmental report, *A collective effort for the oceans*, initiated by the *MB92 Group*, the world's largest superyacht refit group. In his closing remarks, Olivier Wenden, Vice-President and CEO of the Prince Albert II of Monaco Foundation, paid tribute to "*the involvement of the Yacht Club de Monaco in promoting the sustainability transition within the yachting community.*"

IN FIGURES

- **40 start-ups**
- **10 scale-ups**
- **5 companies**
- **5 architects and designers**
- **9 shipyards**
- **5 engineering companies**
- **24 nationalities**
- **44 members of the panel**

A CLOSER LOOK AT THE LIFE CYCLE OF YACHTS

Faced with the rise of ecological concerns, many manufacturers are specialising in the research and development of tomorrow's yachts, responding to a need for sustainability to limit the industry's impact on the planet. The focus is on the life cycle of yachts, from the research and development phase through to their use, including maintenance and upgrading. New propulsion solutions, more eco-friendly materials, optimised energy consumption, water management, connectivity and safety are all being thoroughly explored, to extend the life cycle of ships.

MOVING TOWARDS GREEN YACHTING?

Carbon neutral yachts in 2030? "*We aim to switch from diesel hybrids to methanol in less than ten years, with a modular engine room that is flexible in terms of fuel,*" predicts Bram Jongepier, chief specialist at Studio De Voogt, Feadship. Pressured by growing demand from boat owners, the superyacht industry is turning to more eco-friendly technologies while addressing the key issue of refurbishment. Under pressure from environmental standards, boat owners have to choose between owning a 'sustainable' yacht or renovating their own: within 5 to 10 years, many coastal areas will no longer be accessible to diesel-powered vessels. ■

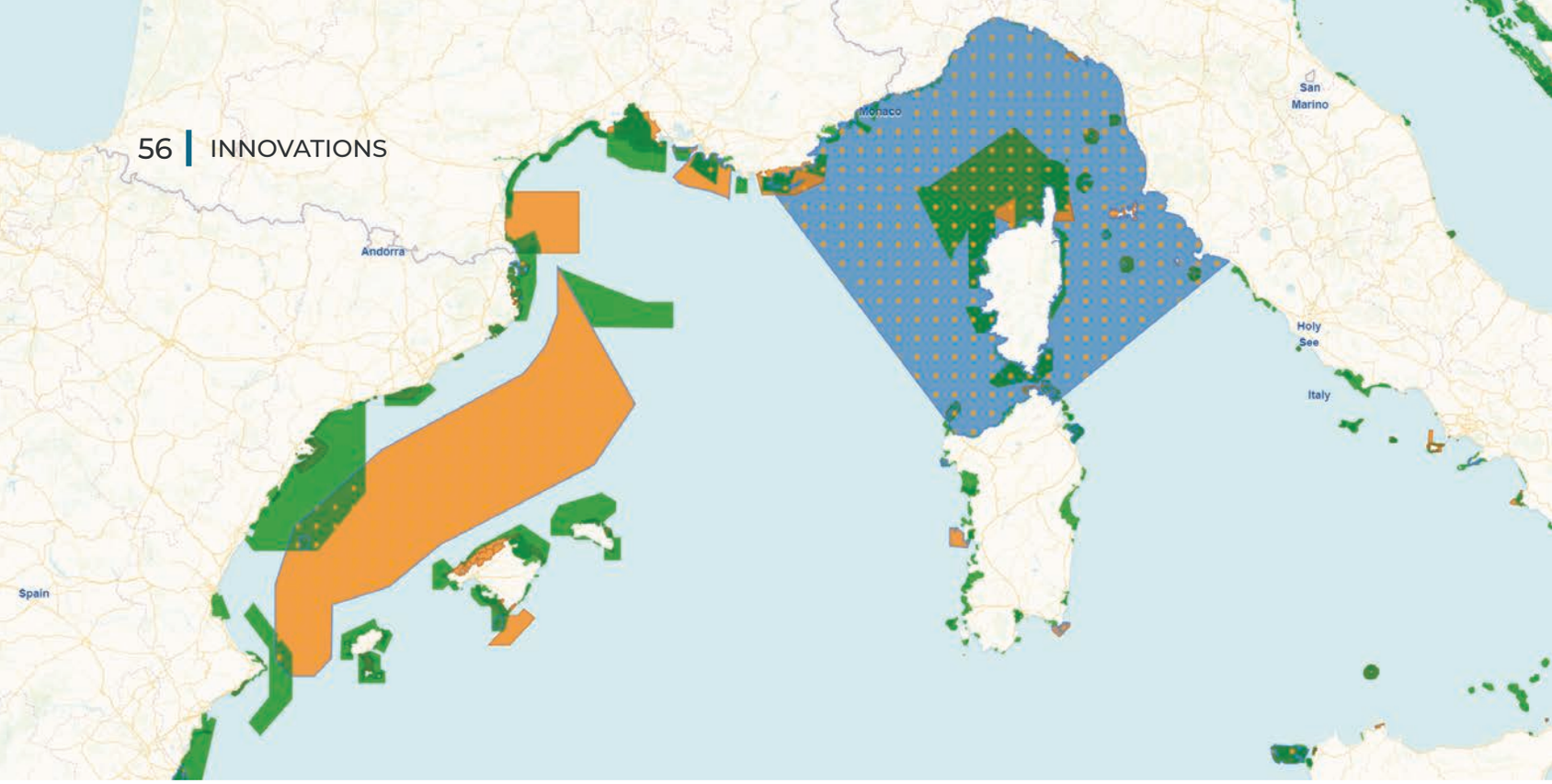
THE SMART INNOVATIVE YACHT AWARDS

After a lengthy process of interviews and deliberation, the members of the international panel of judges decided between the 50 start-ups, scale-ups and companies selected by the teams at Blumorpho, specialists in innovation for the sustainable economy. Three prizes were awarded at the Monaco event, which aims to promote the Principality as a centre of excellence in yachting innovation, and several partnerships were forged.

- **In the start-up category**, the Italians from **Northern Light Composites** (Nlcomp) won the *Smart Innovative Yacht Awards* with their "R-Composite", a recyclable composite capable of solving the complex problems associated with the end-of-life of fibreglass." *Currently, the blades of boats and wind turbines at the end of their life are buried underground. With R-composite, we're creating a completely circular economy,*" says Northern Light Composites director Fabio Biglolini.

- **In the scale-up category**, the British company **Lineat Composites** dominated the votes thanks to its process of transforming carbon fibre waste into a reusable carbon fibre ribbon. "*Winning this prestigious award allows us to demonstrate the truly unique properties of Lineat recycled carbon fibre*, said scale-up director Gary Owen. *This new material will be incorporated into numerous products in the maritime sector, including yachting, but also in the automotive, aerospace and sports sectors*".

- **In the business category**, The French company **Wisamo** won the prize for their innovative inflatable, retractable and automated wing, which can be adapted to both merchant and pleasure vessels and delivers fuel savings of 20%. "*We are very honoured that maritime and yachting professionals appreciate our innovation based on wind propulsion. We intend to contribute to the decarbonisation of yachting and maritime transport,*" says Fabien Monin, Wisamo's Business Development Manager.



FOLLOW-UP 3.0

NETCCOBAMS. A collaborative management tool

ACCOBAMS presents this innovative digital tool to support the conservation of cetaceans in the Mediterranean and Black Seas, particularly targeting the risks of boat collisions.

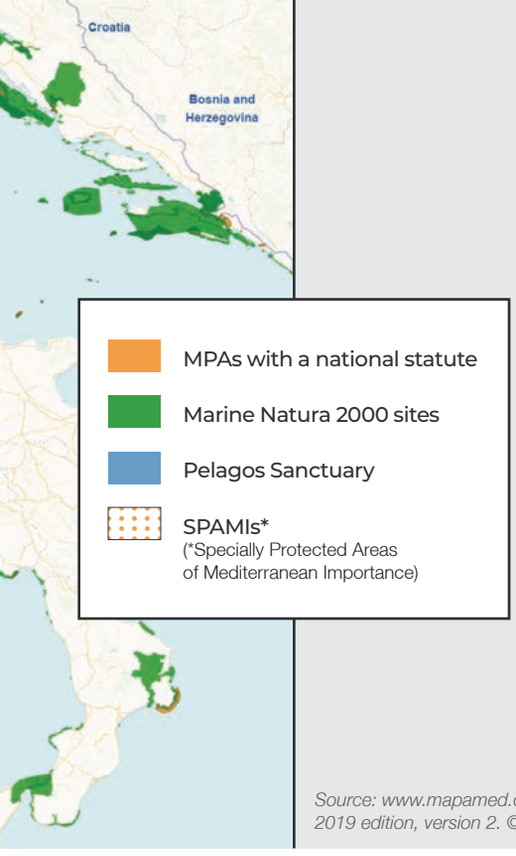
At the start of the meeting, held in the Hirondelle Room of the Oceanographic Museum on 23 March 2023, Susana Salvador, Executive Secretary of the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS), discussed the current challenges facing this cooperative legal instrument for biodiversity conservation.

THE CONTEXT

"Maritime transport in the Mediterranean basin is set to increase in the coming years, in both the number of routes and their density, particularly in connection with the future doubling of the Suez Canal".
(Source: Protecting large cetaceans from the risk of collision with vessels in the Mediterranean, preparatory study by the Ministry of Ecological Transition and Cerema, 2021)

SUPPORT FOR THE CREATION OF A PARTICULAR SENSITIVE SEA AREA (PSSA)

Discussions also focused on the proposal to create a Particularly Sensitive Sea Area (PSSA) in the north-western Mediterranean, submitted to the International Maritime Organisation in September 2022 by four of the twenty-four countries covered by the Agreement (Spain, France, Monaco, and Italy). From Spanish waters to the Pelagos sanctuary, the aim is to reduce the risk of collisions between cetaceans and boats in this specific area, a risk that is three times higher than in other parts of the Mediterranean Sea. Due to their high concentration and the intensity of maritime traffic (commercial and recreational routes), fin whales and sperm whales in the Mediterranean, are particularly affected.



Source: www.mapamed.org
2019 edition, version 2. © 2022 by SPA/RAC and MedPAN

IN FIGURES

- **theoretical number of collisions with large cetaceans in the Mediterranean: 700 in winter and 2000 in summer** *(statistical approach of Gallou and Folegot, Technical Report, Quiet Oceans, 2020),*
- **1 in 5 cetacean strandings caused by collisions** *(Peltier et al., Mar. Sci. 2019),*
- **above 15 knots, the outcome of a collision is fatal** *(Di-Meglio et al., Final report - Pelagos France, 2010),*
- **the noise risk extends over 12.6% of the endangered sperm whale's habitat in the Mediterranean** *(NETCCOBAMS).*

These two species are listed as endangered by the International Union for Conservation of Nature (IUCN). "*It's a long process, starting in 2019, and one that requires the collaboration of several countries,*" says Armelle Roudaut-Lafon, Director of Maritime Affairs for the Principality of Monaco, pointing to the contribution of science. Cristina Farchi, from the Italian Ministry for the Environment and Safety, agreed: "*Since 2020, several regions of the basin have been monitored by experts who are trying to identify the long-term distribution areas, seasonal populations and specific hotspots of marine mammals in the area*".

During the Monaco Ocean Week meeting, the Spanish and Monegasque management tools supporting future measures in the Particularly Sensitive Sea Area were also discussed in detail. "*The stakeholders in the region share the same objectives, particularly in terms of coordinating and improving scientific monitoring,*" Vincent Szleper, from the French Ministry for Ecological Transition and Territorial Cohesion, explained, referring to the prospects of an environmental charter, "sustainable cruising in the Mediterranean" for example, a regional certification that would include the fight against collisions. How can we provide more support for the suggested recommendations, i.e., speed reduction, increased surveillance, and warning of cetaceans?

*"We need to speed up to slow down". **Nicolas Entrup**, Ocean Care's Director of International Relations*

NETCCOBAMS : A BOAT SPEED MONITORING SYSTEM

The NETCCOBAMS digital platform comes at the right time, providing stakeholders and decision-makers with a range of management tools for monitoring cetaceans in Mediterranean and Black Sea waters. Surveilling ships in the Mediterranean basin in real time, tracking their speed and the number of boats on the water, identifying the seasonal movements of cetacean populations, and mapping the overlap. Assessing noise risks, identifying noise pollution hotspots, visualising oceanographic features or the distribution of human activities in Mediterranean waters. By centralising all this data using artificial intelligence, all this becomes possible and accessible to everyone. Alessio Maglio, an expert in the marine environment, gave a live demonstration enabling the visualization of the position and speed of ships at any time in a specific area.

What are the future needs associated with the practical management measures in the PSSA? Speakers from MedPAN, Cerema, *EcoOcean* Institute and Ocean Care highlighted the importance of regulation, scientific monitoring and raising awareness. "*NETCCOBAMS is vital for both monitoring and forward-looking mapping which takes several factors into account. We need to rely on science to protect cetaceans in the Mediterranean*", concluded Nicolas Entrup and Carlos Bravo, from *OceanCare*, drawing attention to the importance of reducing noise and CO_2 emissions. ■

© Runa Ray

SUSTAINABLE FASHION

Fashion, a lever for the ocean's cause?

The ecological approach of designer Runa Ray, who came to exhibit her new collection, argues in favour of committed and sustainable fashion, a vector for profound change in defence of the ocean.

Her collection of dresses made from cyanobacteria, the planet's primary oxygen producers, was astonishing. Instead of plastic garments, she used organic fabrics made from marine microorganisms. Indian designer Runa Ray presented her 2023 collection at the Yacht Club de Monaco during Monaco Ocean Week. This time, the committed designer tackled the issue of industrial printing and dyeing. Drawing inspiration from the ancient art of Suminagashi, she revisits the skills of floating inks, which date back to the royal courts of 12th-century Japan. Her silk and satin dresses, with their delicate patterns reminiscent of the curves of the waves, are in themselves a statement about the ocean. Natural inks based on plants and minerals, responsible use of water, circular economy for the supply of seaweed, "peace silk" (non-violent for silkworms). With her new creations, this "fashion ecologist" is once again going against the grain of fast fashion and its irreversible pitfalls. One of the dresses even represents the dream of an ocean free of plastic and overfishing. What if fashion became a means of action to educate and advocate a change in environmental policy?

INTERVIEW

Runa Ray

is a fashion ecologist and interdisciplinary designer with expertise in circular fashion. Focused on sustainable development goals, she embraces the 3Rs model (reduce, reuse, recycle), zero waste initiatives, nature-based solutions and ancient techniques that reduce our impact on the planet.

With this new collection, are you speaking out against the way fashion affects our oceans?

Fashion has been criticised for printing and dyeing, which cause pollution and wastes water. The textile printing industry releases 99% of its toxic emissions into the air, with the remaining 1% dispersed in water and soil. These pollutants are transmitted through the atmosphere or via water, causing serious harm to marine life.

What is the art of floating inks?

I apply chlorophyll inks and dyes based on natural pigments, to which I add a small amount of acrylic, to a mixture of water and dissolved algae. Using a toothpick, I create the patterns that I capture by gently placing the fabric on the liquid.

How is this ancient Japanese skill more ocean-friendly?

This technique has allowed me to abandon the harmful chemical inks generally used in industry in favour of an eco-friendlier alternative of natural inks created from flowers, and plant roots such as Indian madder, turmeric or hibiscus flowers, and minerals. On top of that, I completed the whole process using just one container of water: 100 metres of fabric printed with just 75 litres of water! Plus, the resulting patterns are organic, distinctive and resemble our oceans.

Faced with the pitfalls of industrial printing, are you counting on algae to come to the rescue?

On one of my trips to the coastal communities of Mandapam, in southern India, I noticed women were harvesting wild seaweed without proper diving gear or gloves. The seaweed was then dried and sent to factories for food production (agar-agar and carrageenan). I wanted to enhance the value of the products of their harvest and contribute to their coastal life. So, I use this food-grade seaweed, which is very kind on the skin, as a coagulant in my printing process.

Do you think fashion can become a space for promoting the protection of the environment and the ocean?

As a fashion designer, I've always believed in environmental justice, meaning that my creations carry a message of hope to bring light to current climate change issues and help create solutions, keeping the end goal in mind and following the '3Rs': Reduce, Reuse and Recycle.

How did you become involved in environmental issues?

I first became aware of the waste problem when I was working for some of the big brands. Fast fashion does not conform to the concept of circularity. Why do the things we wear have such a negative impact on the environment? As an independent stylist, and this is what I advocated at the United Nations, I want to control and connect all the stages of my design, from the seed (even seaweed seeds) to the final creation. I want to be responsible with my designs, the choice of materials (sustainable cotton, peace silk etc.), the production methods, and manufacturing processes. The fashion world should be moving towards sustainable and responsible manufacturing processes, starting with independent designers!

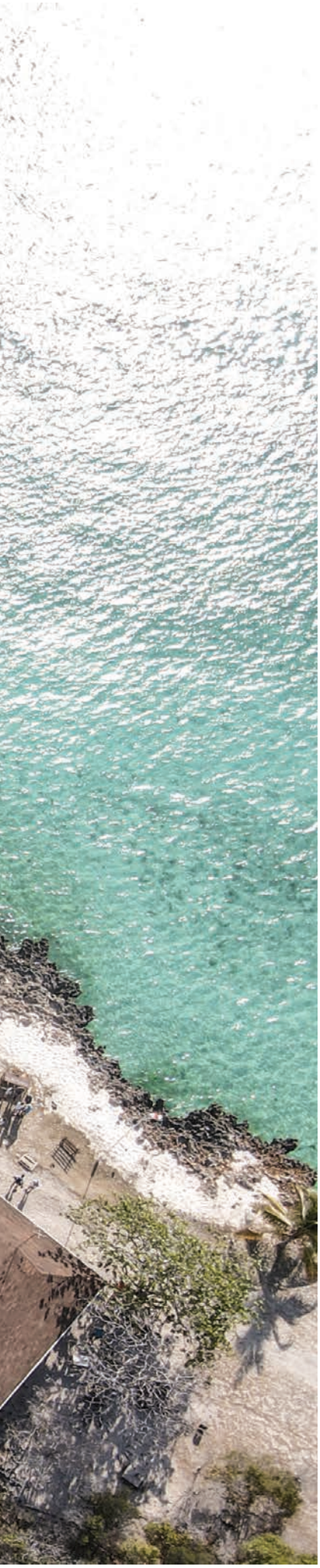
How do you approach the end-of-life of clothing?

When it comes to the end of their life, clothes can be reused in many ways to extend their lifespan. One way of giving back to the ocean is to convert garments into pouches or bags that hang on ropes and germinate seagrass. A unique way to use fashion to revive the ocean! ■

DID YOU KNOW?

The $3 trillion fashion industry is responsible for **20% of the world's wastewater** through the processing and dyeing of textiles.

Aerial view of Aldabra station
©Nicolas Mathys-Zeppelin
MonacoExplorations



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STRENGTHENING OCEANOGRAPHY

MONACO EXPLORATIONS

Rediscovering the Indian Ocean

The Monaco Explorations' Indian Ocean 2022 mission feedback day highlights the scientific, educational, and diplomatic dimensions that make this oceanographic adventure so original.

On 3 October 2022, from Cape Town, the South African oceanographic vessel S.A. Agulhas II, chartered by the Principality, cast off: it was the start of the mission led by *Explorations de Monaco* in the western Indian Ocean. Under the aegis of HSH Prince Albert II, the ship headed for Mauritius via Réunion, before moving on to the Seychelles. For two months, more than 100 scientists took turns on board, deploying 8 international research programmes, particularly in little-known or isolated areas, such as the Saya de Malha bank on the Mascarene Plateau, the Aldabra atoll, and the island of Saint-Brandon. The expedition was a real opportunity to educate and train young people while forging new diplomatic links between the states of the region.

IN FIGURES

- **2 month assignment,**
- **18 500 km travelled,**
- **8 international research programmes,**
- **150 participants from 20 nationalities,**
- **1000 species collected,**
- **150 articles in the national and international press,**
- **500 visitors welcomed on board during stopovers.**

A DIPLOMATIC ADVENTURE

Introduced by the Director General of the Oceanographic Institute, Robert Calcagno, the meeting on 21 March opened with an overview of the mission and its challenges. In the conference room of the Oceanographic Museum, speakers stressed the importance of regional knowledge and cooperation in the complex geostrategic and socio-economic context of the Western Indian Ocean.

The views of the authorities in Mauritius and the Seychelles emphasised this contribution from the expedition. "*By including Mauritius in this interdisciplinary programme, the mission has enabled us to strengthen our friendship with the Seychelles*", says Rezah Badal, Director General of the Department of the Continental Shelf for the Administration and Exploration of Maritime Zones in the Office of the Prime Minister of Mauritius, who acknowledges: "*We are at the centre of a very interesting maritime area, and it is essential that we protect this zone*".

"*The mission has succeeded in bringing our two countries closer together: although we are neighbours, we are very far apart,*" says Jean-François Ferrari, Seychelles' Minister for Fisheries, and the Blue Economy, before adding: "*I would like to thank the Principality on behalf of the young Seychelles scientists; this mission opens up new prospects for research in the Seychelles.*"

A CERTIFIED MISSION

Nick D'Adamo, one of the fourteen international experts on the mission's Steering Committee, recalls the sponsorship of the United Nations Decade of Ocean Sciences for Sustainable Development. The expedition is also one of the projects approved by the second International Indian Ocean Expedition, an international scientific programme developed over 10 years (2015-2025).

PROTECTING THE WORLD'S LARGEST SEAGRASS BED

The panel of six scientists from the expedition then described the plateau located in the open sea, along the Mascarene Archipelago: one of the largest seagrass beds in the world (the size of Switzerland). Investigations by oceanographers using a wide range of equipment (depth sounders, robots, nets, and towed gear) and divers have recorded hundreds of species and characterised the seabed and benthic biodiversity over a 3,000-kilometre circuit at depths of up to 1,500 metres.

The scientific results of the mission will help to determine whether this little-known, remote, and difficult-to-access ecosystem, which has already been weakened by fishing pressure, requires special attention in the medium term. If so, management measures could be discussed with authorities in Mauritius and the Seychelles, who manage the area together.

EDUCATING AND RAISING AWARENESS

The quarter-hour mediation sessions held on the feedback day gave an overview of the many initiatives designed to bring the mission to life for as many people as possible, especially young people, notably through the visits and events organised on board during the stopovers, or the direct contact between the scientists and schoolchildren in France or the Principality, as witnessed by Mrs Huet's class from the Cours Saint-Maur in Monaco.

TRAINING YOUNG RESEARCHERS

The "School on Board" programme organised between La Réunion and the Seychelles enabled twenty students from a Sorbonne University Masters programme and the European IMBRSea Masters programme to experience the first part of the mission as part of their course. Ten young research or technical students from the Seychelles and Mauritius also benefited from this "school on board" supervised by teachers from the oceanography laboratory in Villefranche-sur-Mer. An opportunity to learn about science in the field from experienced researchers.

A LARGE AREA OF OCEAN TRACKED BY SATELLITE

Throughout the mission, as part of the international BGC Argo programme, 29 autonomous floats were deployed in the previously poorly equipped area. For 5 to 7 years, sailing between 0 and 2000 meters depth, they will be constantly measuring the physicochemical and biological variables that are essential to understanding changes in the health of the ocean and its response to climate change. As part of the "*Adopt a float*" educational programme run by the Institut de la Mer in Villefranche-sur-Mer, nine classes in the region have adopted 3 floats, which they are tracking by satellite.

As part of a programme developed by Météo France, the IRD and the University of Western Australia, 19 small floats and 4 drifting buoys were placed out to sea to record surface temperature and current data from the analysis of their trajectory. A contribution to the modelling of ocean flows and the study of their influence on connectivity in the region.

AN OCEAN NOT SPARED BY PLASTIC POLLUTION

The Madcaps project team took around sixty samples from the open sea and several samples from Aldabra Island to determine the concentration and origin of the plastic residues collected and to identify any associated pathogenic microbial communities.

THE ARTISTS' VIEW

The intense day of feedback ended with a presentation of the artistic and audiovisual productions linked to the mission, opening the doors of the imagination to a region at the crossroads of global ocean issues.

GETTING TO KNOW ALDABRA ATOLL BETTER

Several scientific programmes have been deployed in one of the world's most extraordinary marine sanctuaries, one of the fifty marine sites listed as a UNESCO World Heritage Site.

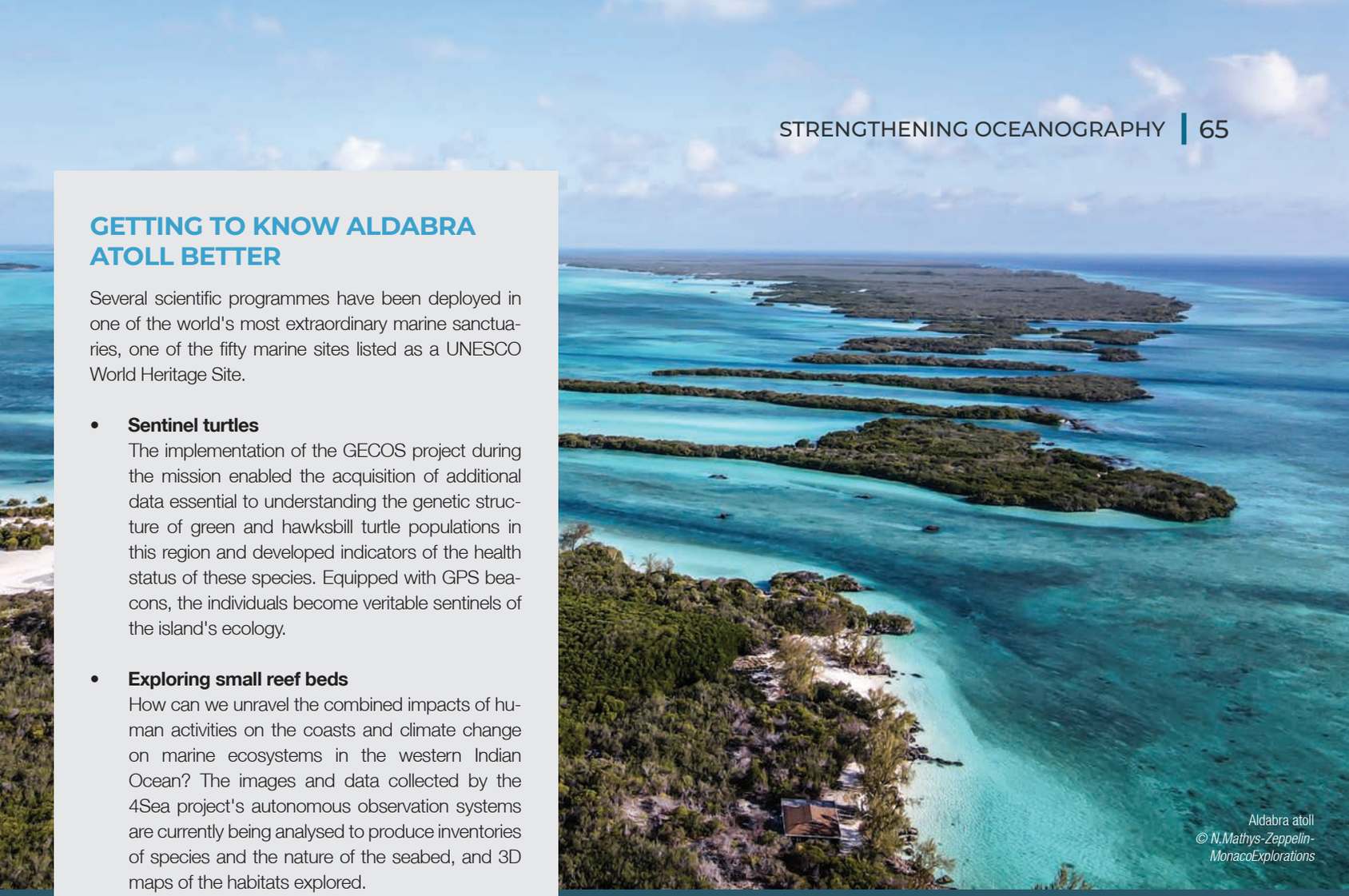
- **Sentinel turtles**
  The implementation of the GECOS project during the mission enabled the acquisition of additional data essential to understanding the genetic structure of green and hawksbill turtle populations in this region and developed indicators of the health status of these species. Equipped with GPS beacons, the individuals become veritable sentinels of the island's ecology.

- **Exploring small reef beds**
  How can we unravel the combined impacts of human activities on the coasts and climate change on marine ecosystems in the western Indian Ocean? The images and data collected by the 4Sea project's autonomous observation systems are currently being analysed to produce inventories of species and the nature of the seabed, and 3D maps of the habitats explored.

- **Successful coral sampling**
  The mission enabled the first samples to be taken as part of the World Coral Conservatory, an initiative supported by the Monaco Scientific Centre and the Oceanographic Institute: 58 colonies of living coral representing 21 species were collected and then transferred to the European aquariums responsible for their conservation.

- **Coral: connected colonies?**
  Do the atolls and the shoals in the central Indian Ocean play a decisive role in the attraction and biodiversity of corals and invertebrates in the eastern and western basins? The programme led by the Zoological Society of London and the University of Oxford focuses on the connectivity of coral species in the Indian Ocean. The team sought to determine Aladabra's contribution to the resilience of the region's corals and to find out whether the brain coral, endemic to the Chagos Archipelago, was present at Saya de Malha.

- **A first for Aldabra**
  The investigations carried out with the ROV (remotely operated underwater vehicle) on the slopes of the Aldabra reef to a depth of 700 metres pushed back the limits of exploration of the site, which had previously not exceeded a depth of 250 metres. ■



Aldabra atoll
© N.Mathys-Zeppelin-MonacoExplorations

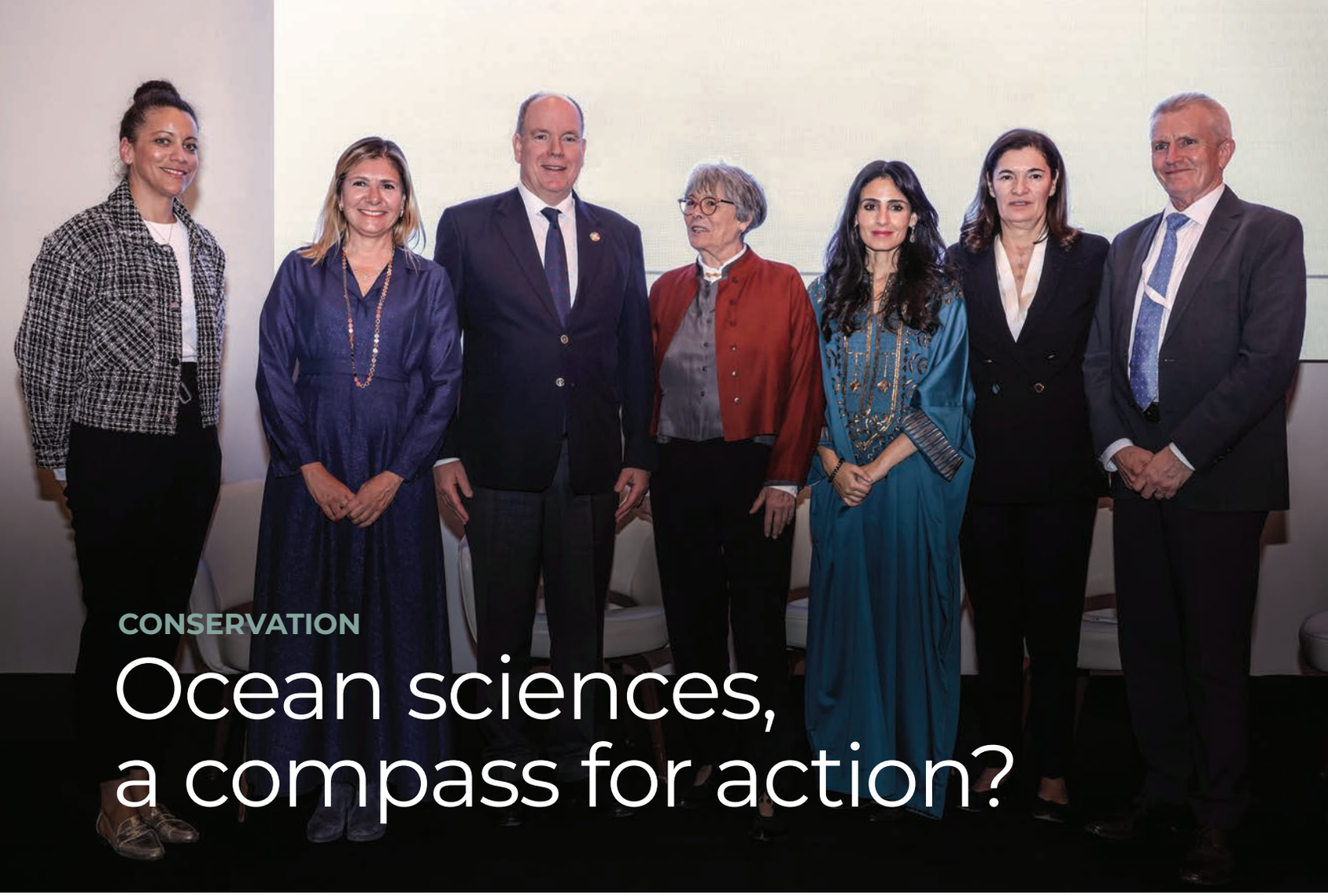
ZOOM ON

THE DISCOVERY OF NEW SPECIES AT SAYA DE MALHA

The photographic inventory and collection of organisms made it possible to list:

- almost 400 species of molluscs,
- around 300 species of crustaceans,
- around a hundred species of algae,
- very probably 4 new species: 3 gastropod specimens and 1 crustacean specimen not yet described by taxonomists,
- 2 emblematic species, the gastropod Conus primus, and the clam Tridacna rosewaterii rediscovered.

"Gigabytes of digital data on physico-chemical and biological parameters measured by the bathysonde in the water column and long hours of video footage filmed by the ROV (remotely operated underwater vehicle) or various cameras sent down to the seabed were stored on the computers. This will provide a wealth of research topics for our young researchers in the region. This valuable information on the properties of the water column and the habitats visited gives context to the floristic and faunistic inventory described above", comments Francis Marsac, head of the project devoted to the Saya de Malha bank and representative of the Research Institute for Development, in the Seychelles.



CONSERVATION

Ocean sciences, a compass for action?

A public event bringing together IUCN and MSC Foundation officials and scientific experts to discuss the future direction of ocean science.

PROFILE

Founded in 1948, **the International Union for Conservation of Nature (IUCN)** has over 1,400 member organisations and 15,000 experts in 148 countries. This diversity and expertise make IUCN the global authority on the state of the natural world and the measures needed to safeguard it.

How can we reverse the decline in the health of the world's oceans? Faced with the challenges of the oceans and the gaps in our knowledge, it is essential to have access to high-quality, up-to-date science that can inform decisions and investments. The event organised by the International Union for Conservation of Nature (IUCN) and the MSC Foundation on 21 March 2023 at the Yacht Club provides a platform for leading experts to discuss the importance of accelerating ocean science. The event brought together the partners who support IUCN in strengthening the provision of global biodiversity information services.

In his opening speech, HSH Prince Albert II of Monaco recalled the major challenges facing ocean conservation and "*the need to continue our efforts to better understand the various mechanisms of the ocean*". Addressing the assembly, which included representatives of the IUCN's *Patrons of Nature*, the Sovereign reaffirmed Monaco's commitment to protecting the oceans, a commitment that is in line with the IUCN's objectives, even more so since the Principality and its Foundation support the IUCN's Red List, the most reliable reference tool for assessing the level of threats to specific biological diversity.

A STRONG SCIENTIFIC COMMUNITY

The President of the IUCN, HE Razan Al Mubarak, then went on to say: "*From COP26 in Glasgow to the Convention on Biological Diversity in Montreal, which opens up the possibility of managing biodiversity beyond national jurisdictions, and of course the very recent High Seas Treaty, the ocean has finally attracted the attention it deserves within the international community.*" The international scientific community, which includes some 15,000 IUCN scientists, has a lot to do with this result. The institution's president drew attention to science's ability to bring forces together: "*It is thanks to this understanding that bridges have been built*" *while emphasising* "*the need for financial support to continue to develop rigorous and up-to-date data.*"

MAJOR FINANCIAL LEVERS

In addition to renewed support from the Principality and the Prince Albert II of Monaco Foundation to strengthen its work, a promising partnership between IUCN and the MSC Foundation was announced during the session. Particularly committed to the cause of coral, Daniela Picco, Managing Director of the MSC Foundation, spoke of the importance of philanthropy and the private sector in protecting and regenerating the oceans, and the urgent need to deploy ocean science: "*There are major gaps in the provision of data on marine biodiversity, and these must be remedied as a matter of urgency if we are to achieve the United Nations' targets by 2030.*" ■

DID YOU KNOW?

The IUCN Red List Index shows trends in the global risk of species extinction (for 5 taxonomic groups) and is used by governments to monitor their progress towards targets to reduce biodiversity loss.

#rootsofhope

CONTRIBUTION OF MANGROVES TOWARDS ACHIEVEMENT OF THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK'S VISION

IN FIGURES

- 60% of marine habitats **have been significantly changed** *(source: United Nations),*
- less than 3% of the world's ocean **escapes human impact,**
- **In the latest edition of the IUCN Red List of Threatened Species (2022),** 1/3 of the species studied (150,388) are classified as threatened. **Of these,** 41% of amphibians, 13% of birds and 27% of mammals **are threatened with extinction worldwide. This is also the case for** 37% of sharks and rays, 36% of reef-building corals and 34% of conifers.

Moderated by Minna Epps, Head of IUCN's Marine and Polar Programme, the panel discussion brought together three ocean experts to discuss the possibility of creating a Blue List of threatened species.

TOWARDS TRANSDISCIPLINARITY

Françoise Gaill
Scientific Adviser at the CNRS, Vice-President of the Ocean & Climate Platform

"As scientists, we need to create new ways of preserving the ocean, such as focusing on ecosystem types or transdisciplinarity, as envisaged by the Ocean and Climate Platform. What's more, science is vital, not only to discover new species or find out more about ecosystem functions but also to spark a vision for how we use the ocean, which is what the Ocean Innovators Platform in Monaco is all about."

THE MEDITERRANEAN LABORATORY

Patricia Ricard
President of the Oceanographic Institute Paul Ricard

"Only a "sustainable science" will allow us to develop the blue economy. This means reconsidering the way we think about climate, ocean biodiversity, health, and human dignity in a circular approach. If we can achieve this in the Mediterranean, with 23 countries on its shores, we will achieve it everywhere, because the Mediterranean is the focus of the changes that await us on a more global scale."

FIGHTING ECOSYSTEM COLLAPSE

Stewart Maginnis
Deputy Director General of IUCN

"The good news is that conservation works! Without the level of conservation that we have put in place over the last twenty years, thanks to scientific research, the level of species extinction would have been four times higher than it is today. The IUCN Red List, which is based on 60 years of data on species, can guide our conservation actions. We recognise the absolute importance of containing the risk of species extinction but, more than anything else, of ecosystem collapse. And we're paying attention to the emerging concept of ecosystem types."

INTER
VIEW

Razan Al Mubarak

President of the International Union for Conservation of Nature (IUCN), elected UN High-Level Champion for Climate Change at COP28

During your training, you wrote a thesis on a marine region in the United Arab Emirates. Has this given you a better understanding of the specific challenges of ocean conservation?

As part of my Master's in Public Understanding of Environmental Change at University College London, I studied traditional fishing rights, particularly in the Persian Gulf and the Arabian Sea. It was the start of a long journey of discovery for me, particularly in terms of the importance of traditional ecological knowledge. Indigenous voices are essential to climate and conservation action and decision-making, as they are often on the front line in responding to the consequences of climate change because of their dependence on and relationship with nature and its resources.

"The ocean is dynamic and needs dynamic management models, especially as we consider it a 3D or 4D space".

Are there any ocean areas identified by the IUCN as priorities for conservation?

The IUCN is fighting against the loss of biodiversity in the high seas, coastal seas, and deep seabed. Every part of the ocean is important, but there are biodiversity hotspots as well as important ecologically productive areas such as currents that provide the nutrients needed to maintain ocean food webs.

In the wake of the High Seas Treaty, IUCN's priority is to take action to conserve marine biodiversity beyond national jurisdiction. How do we do it? By helping the entry into the force of the Treaty. As the world's oldest and largest environmental network, IUCN is well-placed to play an important role in the effective and equitable implementation of this agreement.

However, the greatest loss of marine biodiversity concerns coral reefs, one of the most diverse habitats in the world. It is estimated that 60% of reefs are threatened by a combination of ocean warming, acidification and other human-induced effects, a figure that could rise to 100% over the next few decades if no immediate action is taken to curb the phenomenon.

Are tomorrow's conservation challenges inseparable and compatible with those of sustainable development?

Nature and biodiversity are under threat from changes in land and sea use, exploitation, climate change and invasive species. Climate change is an increasingly important factor in biodiversity loss and, according to forecasts by the United Nations Convention on Biological Diversity, it will become the principal factor responsible for biodiversity loss by the end of the century. Yet nature can provide up to 30% of the mitigation requirements under the Paris Agreement

The Sustainable Development Goals provide a common plan for all nations to address issues of global peace and prosperity and are certainly compatible and inseparable from the conservation challenges we face today and in the future. As environmentalists, we need to focus our attention and actions on Sustainable Development Goals 13, 14 and 15, while remaining mindful of the others, because sustainability recognises the interconnectedness of our natural and built environments.

Ecological change is happening fast and on a massive scale. Are there any new scientific concepts or tools that can be used to influence the fate of ocean species and ecosystems?

Yes, there are! IUCN is a global standards body that guides best practices and assessment tools. Examples include the Key Biodiversity Areas (KBAs), the Species Threat Abatement and Restoration (STAR), plastic pollution assessments and tools, the marine component of the IUCN Green List of Protected and Conserved Areas, the Red List of Marine Ecosystems, the IUCN Global Standard for Nature-based Solutions, etc.

What do you think about the possibility of creating a blue list, as proposed at the Monaco Ocean Week panel discussion?

It's great! The IUCN Green List of Protected and Conserved Areas is endorsed by over 80 countries, and the Global Biodiversity Framework apply to marine ecosystems, and there are currently 50 marine sites on the Green List. A blue list could be based on the green list but would be better suited to the high seas, seascapes, and large marine protected areas, with blue corridors to protect highly migratory species. The ocean is dynamic and needs dynamic management models, especially as we consider it a 3D or 4D space, so a blue list would be constructive. ■

PARTICIPATORY SCIENCE

Preserving Mediterranean heritage species

The conference organised by the RAMOGE Agreement invited leading scientists to take stock of the role of citizen science in the preservation of five emblematic Mediterranean species.

Groupers, corbs, large nacres, ferruginous limpets, brown seaweed forests... How are these so-called heritage species faring? Their good ecological status is a fine indicator of the health of the Mediterranean ecosystem. For several years now, under the impetus of the RAMOGE Agreement, scuba divers and associations have been recording these five heritage species.

During Monaco Ocean Week on 24 March 2023, the RAMOGE Agreement organised a conference for the general public in the conference room of the Oceanographic Museum on the benefits of citizen science. More than 70 participants, including around 20 by videoconference, were able to follow this feedback session. Four leading scientists presented the current state of knowledge and the challenges involved in achieving good conservation status for each of these species. In 2023, when the moratorium protecting groupers and corbs in French waters are due to be renewed, the collection of data on these species takes on a particular meaning, that of supporting conservation objectives and measures.

The **Ramoge Agreement** is an intergovernmental cooperation agreement between the French, Italian and Monegasque states for the preservation of the marine environment, focusing on biodiversity and the fight against marine pollution.

THE 3 RAMOGE COUNTRIES ARE COMMITTED TO

In France
- 1980 in Corsica / 1993 in mainland France: 1st moratorium banning underwater and hook-and-line fishing for brown grouper. Little by little, brown grouper populations are recovering,
- 2013, 1st moratorium protecting the corb,
- Moratorium is renewable every 5 years.

In Monaco
- 1993: Sovereign Order of 29 January prohibiting underwater hunting and fishing for groupers and corbs.

In Italy
- A moratorium is being published to ban recreational fishing and non-professional underwater fishing for 5 species of grouper and corbs.

© Déclic Bleu Méditerranée

GROUPERS AND CORBS ARE SIGNS OF A BALANCED ECOSYSTEM

Situated at the top of the food chain, these two regulatory species are indicators of the quality of the marine environment, "*their abundance reflects the good ecological state of the food chain as well as moderate poaching and fishing pressure,* explains Leonardo Tunesi, research director at ISPRA. *Highly coveted by fishermen and underwater hunters, these species are in sharp decline and are classified as vulnerable by the IUCN.*" A coastal species, the corb now prefers the seabed, rich in safe shelters, to the open waters it favours in protected areas, such as in the Principality's waters.

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THE NOBLE PEN SHELLS: TOWARDS A RENAISSANCE?

- Protected since 1992, this endemic bivalve, emblematic of the Mediterranean, has been the victim of an epizootic since autumn 2016, causing 80 to 100% mortality. In 2018, the noble pen shells in Monaco's Larvotto reserve were decimated by the parasite. By 2021, the entire northern Mediterranean was affected, except for a few specimens found in lagoons and ponds. Pinna nobilis is classified as "critcally endangered" by the IUCN.

- "*Citizen science makes an active contribution to observations of the mortality of noble pen shells, and therefore to the state of populations of this shellfish, which usually lives for almost 40 years,*" explains Nardo Vicente, Emeritus Professor of Oceanology at the IMBE Aix-Marseille University. And among the studies carried out, the inventory of populations still in good health in the Thau lagoon, in the Occitanie region, points to certain sectors that are suitable for maintaining noble pen shells. However, only four noble pen shells have been counted in the Urbinu pond in Corsica.

- A new, smaller pen shell *(Pinna rudis)* from North Africa via Gibraltar has been reported on the rocky Mediterranean coast. Genetic studies are carried out in laboratories to determine the existence of hybrid species.

CYSTOSEIRA, THE ENGINEERS OF MEDITERRANEAN MARINE FORESTS

- Imagine 40 species of large brown algae endemic to the Mediterranean forming underwater canopies that undulate with the currents for several decades. These marine forests are the most productive ecosystem in temperate zones and provide numerous services, from oxygen production to habitat creation, water purification, wave energy reduction and fishing.

- But as Luisa Passeron-Mangialajo, professor of marine ecology at the Côte d'Azur University, deplores, these forests of brown seaweed are shrinking because of the proliferation of herbivores (sea urchins, saupes and rabbitfishes), eventually giving way to ecosystem deserts. In the face of this threat, citizen science can contribute to their conservation by helping scientists to gain a better understanding of their distribution.

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THE FERRUGINOUS LIMPET, AN ALMOST EXTINCT SPECIES IN THE RAMOGE ZONE

- Mariachiara Chiantore, a researcher in environmental sciences at the University of Genoa, presented the RELIFE project for the repopulation of this giant araped endemic to the western Mediterranean *(Patella ferruginea)*. Now very rare on the Ligurian coast and considered almost extinct in the northern Mediterranean, this species is considered "threatened" by the Bern Convention, the Habitats Directive, and the Specially Protected Areas of Mediterranean Importance (SPAMI).

- Given the rarity of the gastropod, citizen science allows scientists to be alerted to the presence of specimens, which are also very easy to detect in the marine environment. "*The RELIFE project could give us a glimpse of its return to the Côte d'Azur, thanks to juveniles arriving from Corsica or Liguria,*" explains the project representative.

A BOAT LIKE NO OTHER

30 years of ALDEBARAN

To mark the 30th anniversary of the *German Ocean Foundation*'s maritime research and dissemination vessel, the conference for the general public looks back at the ALDEBARAN's achievements in "ocean literacy".

Over the past 30 years, with the help of numerous supporters and partners, ALDEBARAN has created a genuine platform for interdisciplinary dialogue, inspiring younger generations for the marine world by emphasising the importance of sustainability. "*It's about helping each and every one of us to understand the ocean and its influence on us and our lives ALDEBARAN's mission is to give the most important ecosystem on this planet the voice it deserves*", stated Frank Schweikert, Director of the *German Ocean Foundation*, inspired by the historic and committed figure of Elisabeth Mann-Borgese, defender of marine resources and founder of the International Ocean Institute. Media campaigns on the oceans, educational and research programmes at sea for young people, biodiversity expeditions, data collection, awareness-raising on plastic pollution, and even the discovery of new species…

The conference organised by the German foundation on 23 March 2023 at the Monaco Yacht Club was opened by the project's founder with HSH Prince Albert II of Monaco in attendance. The need to protect the ocean as a "*common heritage of mankind*" was emphasised. "*Ocean education is a horizontal catalyst for citizen engagement*", says Delilah Al Khudhairy, Director of the European Commission - DG MARE, in a video message to the assembly.

IN SIGHT

"The oceans force us to think and act differently and to think in new ways".
Elisabeth Mann-Borgese,
founder of the International Oceans Institute

IN FIGURES

- **Over 30 years old (1992),**
- **100,000 nautical miles,**
- **More than 500 projects,**
- **10,000 minutes of broadcasting.**

A SHIP AT THE HEART OF HISTORY

The following speakers detailed their personal relationship with ALDEBARAN and how their daily lives are linked to knowledge of the oceans. The founder's daughter, Marina Schweikert, project manager at Landkreis Lüneburg, spoke movingly about the history of the ship, which once sat in the family garden in the heart of a village in the Black Forest, a long way from the oceans!

Carsten Spieker, Director of the GEA Group, a German engineering company, recalled the arrival of the ALDEBARAN in front of the German Parliament: "*It was just after German reunification when the Parliament was in Bonn. A crane lifted the boat to place it at the foot of Parliament. The aim was to create awareness and visibility, and we succeeded!* ".

Finally, Marion Koch, Technical Director of the sustainable boat-building company *Innovation Yachts*, and Michael Maass, Vice-President of *Sustainability Solutions Sea*, discussed the carbon and ecological footprint of the maritime sector in the ocean. ■

CLIMATE RESILIENCE

Are the corals of the Red Sea an oceanic exception?

Scientists from the *Transnational Red Sea Center* are expanding their missions to the Red Sea to unravel the mystery of the resistance of its corals to global warming. Combining science, technology, and diplomacy, they aim to preserve one of the ocean's last coral haven.

"*The corals of the Red Sea will survive global warming and will certainly be the last corals of mankind. They represent a unique ecosystem for future generations,*" says Olivier Küttel, head of international affairs at the Ecole Polytechnique Fédérale de Lausanne (EPFL), as he sets the opening evening of Monaco Ocean Week, on 21 March 2023, under the theme of adapting living organisms to climate change.

PROFILE

Created in 2019, the **Transnational Red Sea Centre** is the first research centre of its scale to have cutting-edge technology for genetic analysis and 3D mapping of coral reefs. The results are made available to everyone, under the principles of 'Open Science'.

A GLOBAL EXCEPTION

The studies carried out by the Swiss school, which currently involve researchers from Djibouti, Israel, Jordan, and Sudan, have shown that the corals in this long-isolated geographical area are extremely resistant to rising water temperatures, withstanding up to 5°C of warming, as well as to acidification of the waters. On his return from the southern tip of the Red Sea, in the Gulf of Tadjourah (Djibouti), biochemist Anders Meibom, director of the EPFL's *Transnational Red Sea Centre* notes the exceptional health and diversity of the corals: "*In September, the temperature averaged 31°C during the seasonal maximum, well above what most other corals can withstand in other parts of the world.*"

Transnational
Red Sea
Center

VISION INTO ACTION

As part of the 2022-2025 expedition to establish the first-ever inventory of the ecosystem and biodiversity of the coral reefs of the Red Sea, the Swiss research centre has carried out four initial coral reef inventory missions in the northern Gulf of Aqaba (Israel and Jordan), the Gulf of Tadjoura (Djibouti) and Sudan. "*The aim was to make a detailed inventory of the coral cover and extract DNA from different species of coral in order to assess the way in which the environment impacts the genetics of populations*", explains scientific coordinator Guilhem Banc-Prandi, before presenting the latest results obtained using the innovative 3D mapping tool developed by EPFL.

Lightweight on-board data acquisition system: a diver holding a system of poles, to which GoPro-type cameras are attached, films long segments of coral reef. Using artificial intelligence, the software recognises the types of soil and coral encountered and instantly maps the reef in 3D, providing an incomparable reference base for monitoring its evolution over time. A revolution in the way these ecosystems are mapped. "*It's a low-cost method with sufficient resolution that we're developing with the countries in the region. We plan to open a workshop in Djibouti,*" continues the diver and scientist. "*The health of coral reefs is a very important issue for local communities in the Red Sea basin, which is why it is so important to raise their awareness and involve that community in their protection.*"

IN SIGHT

"The aim is to establish the first-ever Red Sea-wide inventory of the coral ecosystem and its biodiversity on the basis of standardised scientific programmes, enabling the regional stakeholders concerned to strengthen their environmental and conservation policies for corals, which have demonstrated their exceptional resilience to climate change".
***Anders Meibom**, Director of the Transnational Red Sea Centre at l'EPFL*

RIPARIAN COUNTRIES, FUTURE STAKEHOLDERS IN CONSERVATIONN

That's why the missions have included an awareness-raising dimension, welcoming some of the region's key stakeholders on board. At the same time, the first reef monitoring equipment has been deployed thanks to the partners of the *Transnational Red Sea Center*. Two coral health monitoring stations have been installed in the Gulf of Aqaba, forming part of a network that the centre hopes to extend. Ultimately, coastal countries could use this data to decide on the best measures to take to protect their reefs from the threats of pollution, intensive fishing, and mass tourism. It remains to be seen what strategies these corals develop to survive the stress of rising temperatures. The *Transnational Red Sea Centre* is doing all it can to understand this astonishing adaptation. Diplomacy is at the heart of the scientific process, as demonstrated by Ambassador Alexandre Fasel, the Swiss Confederation's Special Representative for Science Diplomacy. ■

IN FIGURES

- **1065 coral samples taken as part of 4 scientific programmes,**
- **15 000 m² of reefs mapped,**
- **2 coral health monitoring stations deployed.**

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CURBING PLASTIC POLLUTION

PRACTICAL SUGGESTIONS

The 2nd World Plastic Summit proposes solutions

For three days, scientific experts and industry representatives worked on innovative approaches and proactive collaborations to make a real impact on the plastic crisis.

Following on from the success of the first Global Plastic Summit launched at Monaco Ocean Week 2022, the new edition of the event is building on its momentum of facilitating international scientific collaboration. This year, however, the emphasis has been on developing and promoting practical solutions to this widespread pollution.
The summit opened on 22 March 2023 at the Méridien Beach Plaza Hotel with a speech by environmental philanthropist Oxana Girko, the initiator of the summit and president of the Monaco World Plastics Association, an organisation inaugurated for the occasion.

OVER 60 EXPERTS IN SEARCH OF SOLUTIONS

At the opening of the event, HE Bernard Fautrier, Special Adviser to HSH the Sovereign Prince on the Environment, who was present at the summit, outlined Monaco's involvement in the negotiations for a global treaty on plastics, which could come into effect by 2030. This introduction laid the foundations for international politicians to tackle this issue, which is having a growing impact on human and global health.

Welcoming the delegates alongside the organisers of the summit, Oleg Novachuk, vice-president of the Monaco World Plastics Association, emphasised "*the need to move from discussion to action*". Some sixty eminent biologists, chemists, engineers, environmentalists, materials specialists, sustainable development analysts and representatives of leading companies worked towards the same goal: to develop and accelerate new solutions. They have developed innovative multinational projects aimed at providing concrete solutions to reduce plastic pollution and create a circular and virtuous economy.

PROFILE

Registered with the Principality's Minister of State in January 2023, l'**Association mondiale des Plastiques de Monaco** *(World Plastics Association Monaco)* aims to accelerate the development and implementation of plastics recycling and redesign technologies through international collaboration and to stem the flow of plastic pollution into the natural environment.

INNOVATIVE APPROACHES AND TECHNOLOGIES

Several innovative technologies for transforming some of the most polluting and persistent mixed plastic waste into resources were presented. New perspectives have been revealed by recycling technologies that transform (nylon) fishing nets into products compatible with ocean life and capable of providing a source of income for local fishing communities. The team benefited from a direct industrial perspective, with the presence of companies focused on changing the use of plastic, such as Amazon and Patagonia. The importance of working on the social perceptions and uses of plastics, as well as on alternative materials, was also highlighted.

Operations to collect floating plastic waste in South America and South-East Asia have demonstrated the potential of this concept for cleaning up ocean areas. The presence of organisations such as *Ocean Cleanup* has brought to light the technologies deployed, particularly in the Pacific and in rivers, to intercept plastic waste before it reaches the seas. Textile recycling was also in the spotlight, with a host of solutions developed or under evaluation. Solutions for dealing with microplastics featured prominently, with innovative ideas on the extension of technologies, but also the need for small-scale deployment, in communities that can directly benefit from them.

Finally, the emergence of recyclable alternative polymers that avoid the production of microplastics and the persistence of pollutants in the environment is one of the milestones of a post-plastic era. ■

ZOOM ON

THE MONACO WORLD PLASTICS ASSOCIATION BEGINS ITS MISSION TO COMBAT PLASTIC POLLUTION

Monaco Ocean Week ended with the launch of a new Monegasque association dedicated entirely to reducing plastic pollution around the world. Its president, Oxana Girko, welcomed guests on the deck of the Monaco Yacht Club, facing the Mediterranean, reminding them of the importance of the mission ahead: to save the ocean from the growing plastic crisis.

Leaders from a wide range of disciplines gathered at the Aquarama Riva to listen to the keynote address, which highlighted the urgent need for proactive solutions. Professor John McGeehan, Secretary General of the Association, and a professor renowned for his team's work on "plastic-eating enzymes" at the University of Portsmouth in the UK, presented the highlights of the World Plastics Summit. Olivier Wenden, Vice-President, and Director General of the Prince Albert II of Monaco Foundation thanked the team for their ongoing efforts and collaboration with the Prince Albert II of Monaco Foundation and the Monaco Science Centre.

"Nature has no waste; every form of life exists within organised global cycles. Plastics affect nature's cycle, persisting in the environment for hundreds of years. We urgently need to find solutions to deal with existing plastic and develop the circular materials of the future".
***Oxana Girko**, President of the World Plastics Association Monaco*

AN UNPUBLISHED REPORT

Plastics threaten human and global health

The Minderoo-Monaco Commission presents an unprecedented analysis of the risks posed by plastics to human and global health. The conclusions of the 48 world-renowned researchers are now a benchmark.

On 21 March 2023, at a press conference held at the Monaco Science Centre, a select group of experts from the Minderoo-Monaco Commission, including members of Boston College's Global Observatory for Planetary Health, the Departments of Medicine and Marine Biology at the Monaco Science Centre and the "Plastics and Human Health" team at the Minderoo Foundation (Australia), summarised the first global report on the impact of plastics throughout their life cycle on human health and the planet's ecosystems, particularly the ocean. The medico-economic analysis, i.e., the healthcare costs incurred as a result of this pollution, is included at the end of the report.

PROFILE

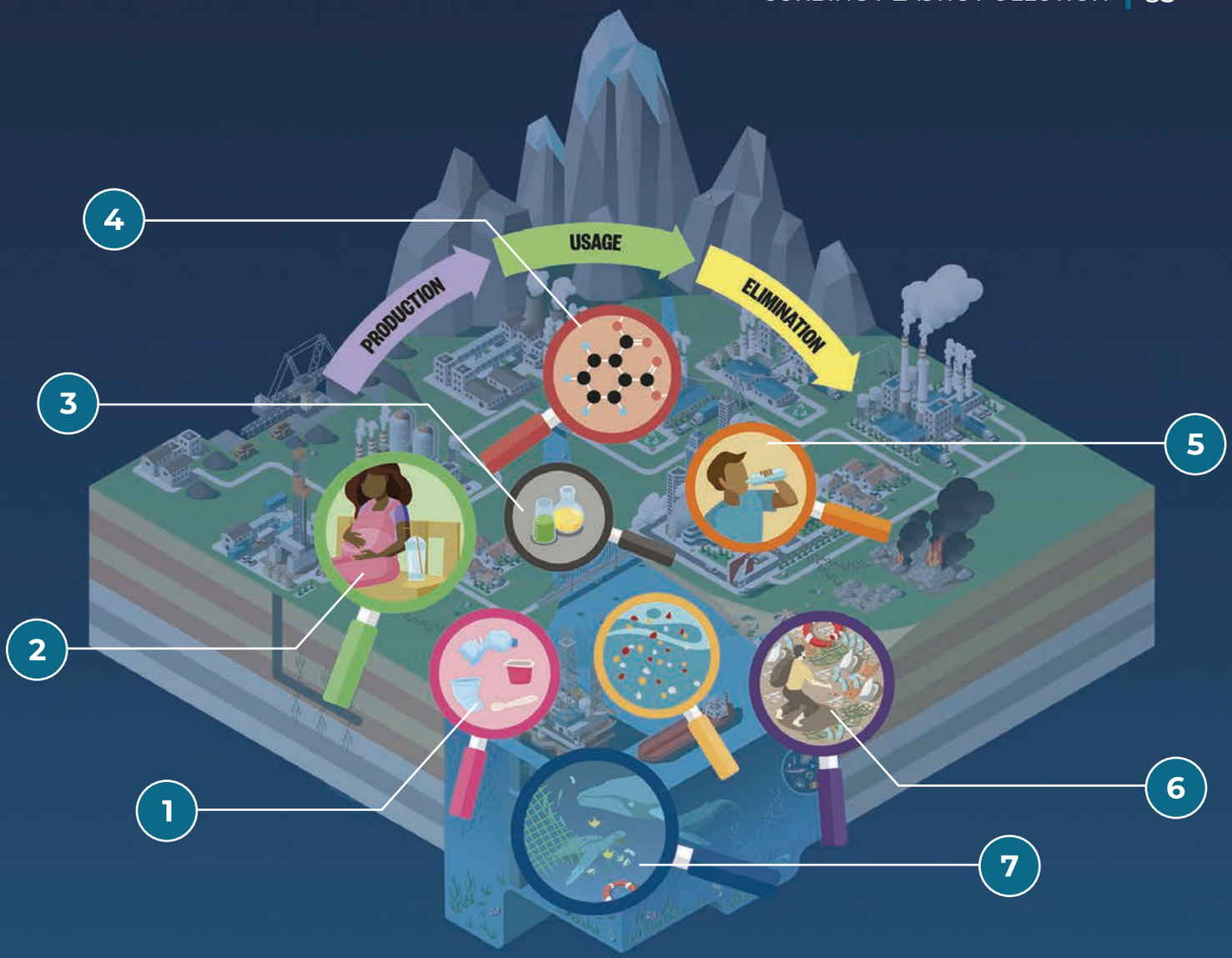
Launched to coincide with Monaco Ocean Week 2022, the **Minderoo-Monaco Commission** was set up to break down barriers in research into the many dangers that plastic poses to human health.

THE REFERENCE DOCUMENT

The event took place on the day the report was published in the leading journal *Annals of Global Health*. The result of a year's worth of research, and in line with previous reports on plastic pollution presented in Monaco, this major publication (226 pages) is based on contributions from 48 experts, scientists, clinicians, and policy analysts from around the world. Their in-depth, well-documented approaches converge.

Neurotoxic, carcinogenic, immune, and endocrine disruptors i.e., plastics and their many chemical components have an impact on living organisms and ecosystems. Derived from fossil fuels, washed away daily, fragmented, ingested in minute and repeated doses, sprayed into the atmosphere, and scattered in the ocean, plastics are an invisible, growing, and global source of pollution of great concern. Increased cardiovascular disease and cancer, neurological and fertility disorders, learning disabilities, obesity, increased risk of miscarriage... Experts detail the devastating repercussions of widespread human exposure to this chemical, which disproportionately affects children, the vulnerable, people on low incomes and minorities. From the extraction of the oil and gas that make up their raw materials to their elimination from vital ecosystems, the toxicity of plastics and their chemical components is now brought to light in this document, unveiled as a preview at the sixth Monaco Ocean Week.

4. The Minderoo-Monaco Commission report is available at http://tinyURL.com/Minderoo-Monaco



1. **700 industrial chemicals** are regularly found in the human body
2. according to several recent studies carried out in the United States, the EU and Canada and mentioned in the commission's report. **90,762 deaths** are thought to be attributable to levels of DEHP (a phthalate) found in the body, i.e., around **5.2% of all deaths in 2013**
3. more than **10,000 synthetic chemicals** are an integral part of plastics
4. plastic is a complex chemical mixture of interwoven polymers
5. micro and nano plastics can cross cell barriers and cause damage
6. models of the impact of plastic predict massive ecological effects in 50 to 100 years if no corrective action is taken (Everaert et al., 2020)
7. microplastics have been found in over 1,200 marine species

A MATTER OF SOCIAL AND ENVIRONMENTAL JUSTICE

"*We argue that human health must become a priority argument in international negotiations on plastic pollution*", says Professor Philip Landrigan, Director of the Global Observatory on Planetary Health at Boston College, who is very concerned about the lack of progress by regulatory bodies. In this sense, the interdisciplinary commission supports the adoption of a strong global treaty on plastics, structured around the protection of human and global health.

"*These results lead us to call for the banning or severe restriction of unnecessary, avoidable and problematic plastic items, many of which contain dangerous chemicals linked to horrific damage to people and the planet,* adds Professor Sarah Dunlop, head of plastics and human health at the Minderoo Foundation. *We will work to ensure that plastics are considered as persistent pollutants in international conventions.*"

Dr Hervé Raps, a doctor at the Monaco Scientific Centre, emphasises the still largely unknown effects of micro- and nano-plastics and pollutants on the marine environment, a subject addressed in detail in the third section of the report: "*Plastic waste is endangering the ocean ecosystems on which all humanity depends. In addition to their intrinsic effects, plastics can also be a vector for potentially pathogenic micro-organisms.*"

THE COMMITTEE'S RECOMMENDATIONS

In the seventh section, the Minderoo-Monaco Commission concludes that current methods of producing, using, and disposing of plastics are not sustainable and are responsible for significant damage to human health, the environment, and the economy. It, therefore, recommends establishing health protection standards for plastics-related chemicals, requiring all polymers and plastics-related chemicals to undergo toxicity testing before entering the market, as well as post-marketing surveillance. The committee recommends that the principles of social and environmental justice and intergenerational equity should be essential components of the global plastics treaty and the global agenda, alongside climate change.

Better production practices, alternative design methods, less toxic chemicals, reduced consumption... Finally, the report lists the sustainable solutions that can be implemented by governments and industry to minimise the negative consequences of global contamination by plastics.

The experts then met behind closed doors to continue their work and agree on the next steps. ■

IN SIGHT

"Although there are still gaps in knowledge about the harmful effects of plastics and uncertainties about their extent, the data available today unequivocally demonstrates that these effects are significant and will worsen in the absence of urgent and effective action on a global scale". ***Report of the Minderoo-Monaco Commission*** *on Plastics and Human Health, Annals of Global Health, 21 March 2023*

THE CHALLENGES OF SCIENCE

What impact do plastics have on marine organisms?

The workshop organised by the Monaco Science Centre and the International Atomic Energy Agency focused on the known and emerging impacts of microplastic pollution on marine organisms.

On Wednesday, 22 March 2023, as part of Monaco Ocean Week, the Monaco Scientific Centre (CSM) and the International Atomic Energy Agency (IAEA) brought together experts from the University of Plymouth, the University of Exeter, the Sea Education Association, the Woods Hole Oceanographic Institution, Sorbonne University, and the French National Centre for Scientific Research. At the CSM offices, researchers took stock of the current state of research and knowledge on the impact of microplastics on marine organisms. They also looked at ways of minimising environmental risk.

IN FIGURES

- **Over the last 15 years, there has been an unprecedented increase in plastic pollution: more than 170,000 billion plastic particles (weighing between 1.1 and 4.9 million tonnes) are floating in the world's oceans.**
  (Source: Eriksen et al. (2023) A growing plastic smog, now estimated to be over 170 trillion plastic particles afloat in the world's oceans—Urgent solutions required. PLoS ONE 18(3))

- **Of the 12,000 chemical additives used in plastics, more than 2,400 have been identified as substances of concern, meeting one or more of the European Union's criteria for persistence, bioaccumulation, and toxicity.**
  (Source: Helene Wiesinger et al (2021) Deep Dive into Plastic Monomers, Additives, and Processing Aids. Environmental Science & Technology 55 (13))

EXPERTS FACE TWO MAJOR CHALLENGES

During the session, these local and international experts focused on two major challenges:

1. assessment of microplastics as vectors of pollutants and pathogens in marine organisms,
2. the difficulties in assessing the concentrations of this micro-waste that infiltrates marine ecosystems.

Indeed, as Philippe Bersuder, head of the IAEA's Marine Environmental Studies Laboratory, has shown, *"the effects of chemical contaminants from plastics on marine ecosystems are not yet widely understood. It is therefore extremely important to identify and fill these gaps."* Such challenges in assessing the impact of this pollution call for the sharing of knowledge and collaboration between institutions to expand the current state of knowledge. The very aim of this workshop, during which the experts highlighted the need to study the role and impact of microplastics and associated chemicals in the marine environment.

CORALS AFFECTED BY PLASTIC WASTE

"Pollution by micro- and nanoplastics has been observed even in the most pristine and remote coral reefs", explained Christine Ferrier-Pagès, director of ecophysiology research at the Monaco Science Centre, before going on to explain the consequences: *"The presence of artificial chemicals in coral reefs can increase the risk of coral bleaching."*

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TOWARDS A MORE IN-DEPTH STUDY

The identification of new research applications and potential institutional collaborations for a more in-depth study of the impact of plastics on marine organisms was discussed. Particular attention was paid to the challenges and gaps in knowledge in assessing the role of microplastics as vectors of contaminants for marine organisms, as well as in assessing the impact of plastic additives that seep into marine ecosystems. As vectors, microplastics can absorb environmental contaminants from the surrounding environment and transfer them to organisms when ingested. Plastic additives (flame retardants, plasticisers, etc.) can also seep into marine organisms, potentially affecting their health and that of the human beings who depend on them. In addition, microplastics come in a wide variety of sizes and chemical compositions, leading to different impacts on marine organisms and requiring different solutions.

WHAT ARE THE ALTERNATIVES?

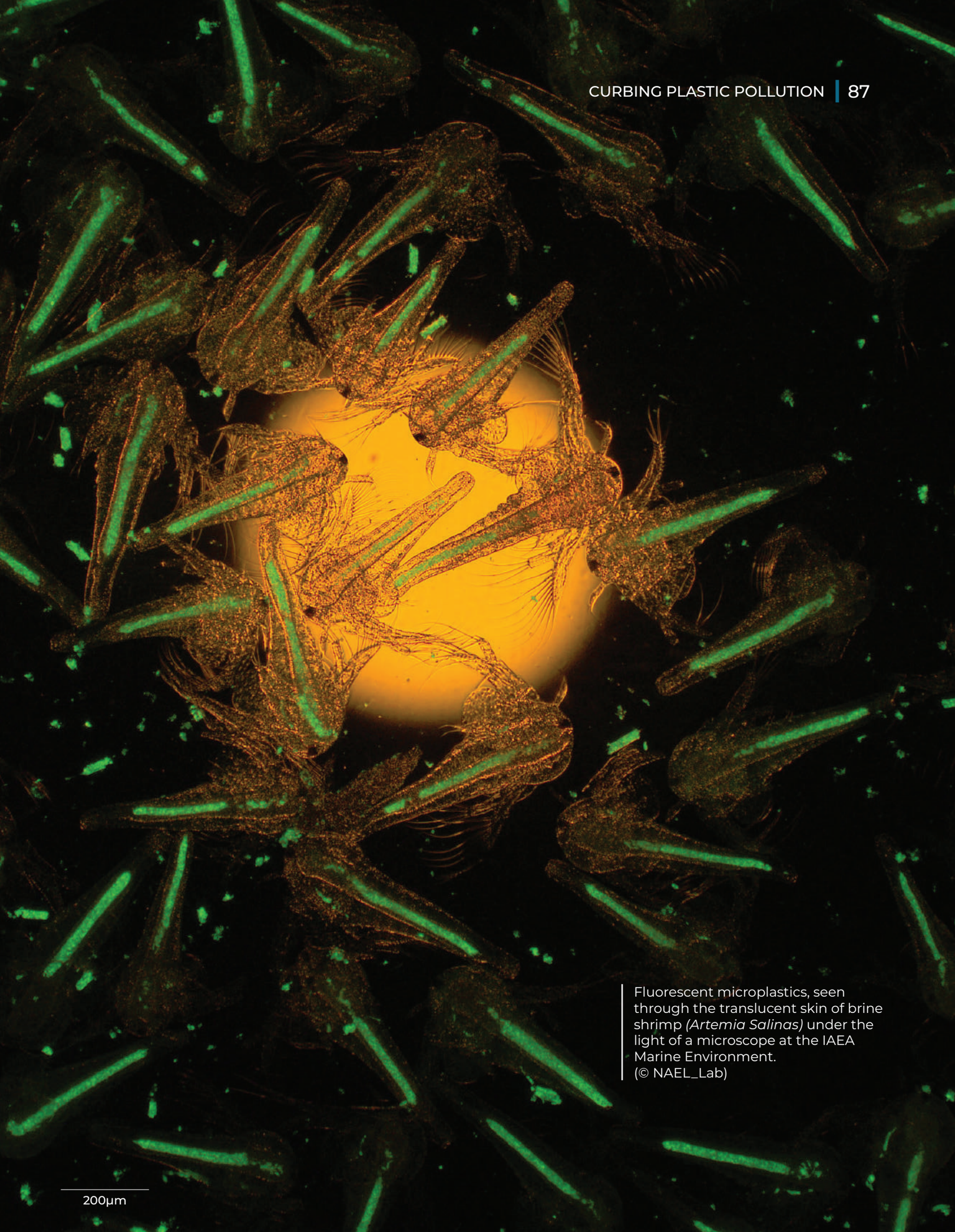
The workshop reached a consensus that substitutes for plastics and toxic additives should be evaluated with a view to their widespread use and that further research is needed to determine which materials could be used that have less impact on the health of the oceans. Workshop participants also agreed that the lack of evidence of the harmfulness of nano and microplastic pollution at environmental concentrations should not be a determining factor in efforts to reduce plastic pollution. Finally, future research should focus on collaborative efforts on a global scale to assess the potential risk of these particles on marine ecosystems. ■

ZOOM ON

MICROPLASTICS IN CORAL REEFS

"They are mainly composed of fibres, pellets, fragments, films and granules (...) which mainly include PP, PET, PA, PVC, PE, PS, PU, PP-PE, PAN and UA, which mainly come from waste emissions from coastal cities and intensive fisheries".

(Sources: "Microplastics in the coral reefs and their potential impacts on corals: a mini-review", Huang & al, Science of The Total Environment, 762, 2021)

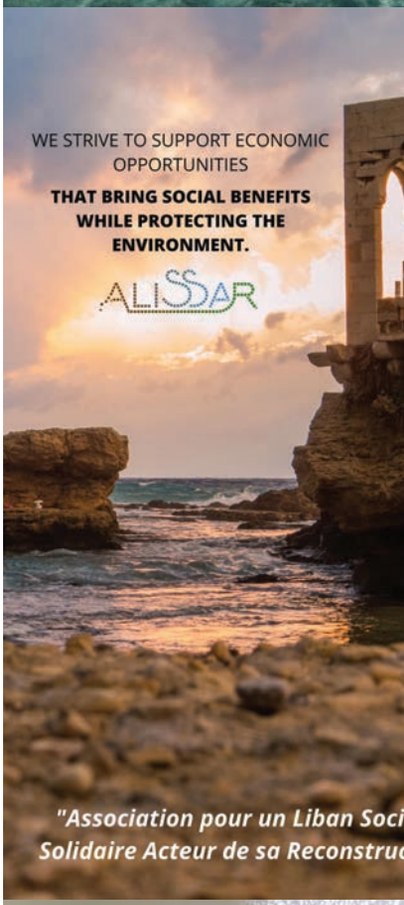


Fluorescent microplastics, seen through the translucent skin of brine shrimp *(Artemia Salinas)* under the light of a microscope at the IAEA Marine Environment.
(© NAEL_Lab)

MICRO-INITIATIVES

The 11 BeMed 2023 winners committed to a plastic-free Mediterranean

For the seventh year running, the Beyond Plastic Med (BeMed) association is committed to supporting Mediterranean stakeholder by renewing its call for micro-initiatives. Eleven new projects supported by the association in six Mediterranean countries are tackling the plastic issue, a major source of pollution in the Mediterranean like no other part of the ocean. Drastically reducing single-use plastics, raising awareness, and training local stakeholders, citizens, and young people, collecting data on waste, and innovating... These were the main themes around which the project leaders joining the BeMed network had the opportunity to present their initiatives at the online press conference held on 24 March 2023. Once again, the members of this active network are mobilising to implement sustainable and inclusive solutions and share best practices in the fight against the plastic pollution. ■



BEYOND PLASTIC MED

BeMed is an association fighting plastic pollution in the Mediterranean. The BeMed network now extends to 15 different countries, with a total of 92 projects supported. Hosted by the Prince Albert II of Monaco Foundation, the BeMed association has received support from the Didier and Martine Primat Foundation, the Aether Fund of the Foundation for Future Generations for its call for micro-initiatives.

REDUCING SINGLE-USE PLASTICS

Review of the situation in Cyprus regarding the use and import of single-use plastic bags, including an analysis of the implementation of the law banning such bags and an awareness-raising campaign.

Together Cyprus - *Cyprus*

Mapping of public and private actors offering drinking water refill points and promotion of alternatives to single-use plastic water bottles through awareness-raising campaigns.

OMNIA - *Cyprus*

Working with supermarkets and locals to eliminate the use of plastic bags on the island, by developing a unit to produce bags from unused hotel sheets and fabric scraps in an island context subject to summer tourist pressure.

Association for the Ecological and sustainable development of Elafonisos - *Greece*

RESEARCHING AND RAISING AWARENESS

Implementation of a participatory science protocol on microplastics in ten schools: the data collected will be analysed and incorporated into existing databases. An initiative relayed on social networks and in the media.

SciCo - *Greece*

Training local tourism businesses to reduce the use of single-use plastics and raising awareness among the public through the creation of the "Plastic Free Beach" label and actions on the municipality's beaches, which record a 40% increase in visitors during the summer period.

Municipality of Agia Napa - *Cyprus*

Co-construction with schoolchildren (primary and secondary), via diving activities, of tools to raise public awareness of plastic pollution and its effects on health and the environment, which will be used with a variety of local stakeholders. Collection of plastic waste by divers and young people taking part in the project.

Club des activités de plongée de Bizerte - *Tunisia*

Replication of the setting up of a sorting centre in the Bizerte region, accompanied by raising awareness of selective sorting among five schools, fishermen, the municipality, and the tourism sector.

Tunisie Recyclage - *Tunisia*

Raising awareness of the environmental impact of using single-use sanitary products. This action is accompanied by the extension and facilitation of access to public facilities adapted to the use of reusable alternatives.

Rezero - *Spain*

The organisation of awareness-raising sessions and clean-up campaigns in schools, municipalities, and local businesses in the Tyre region of Lebanon aim to preserve the region's beaches and waters.

Alissar Liban - *Lebanon*

INNOVATE, COLLECT, AND RECYCLE

Capacity building for the collection and treatment of waste from fishing and mussel farming (with a target of over 20 tonnes of waste recycled) and exploration of ways to improve practices in the sector, including reusable alternatives, in collaboration with fishermen.

iSea - *Greece*

Creation of an "Eco-patrol" in the canyon of a river that flows into the Adriatic Sea, and implementation of a waste collection system and monitoring protocols to effectively reduce plastic pollution.

Sub-Merus - *Croatia*

THE BEMED NETWORK

The collective force against plastic pollution

With the launch of a community of practice to combat plastic pollution in the Mediterranean in 2022, the members of the *Beyond Plastic Med* (BeMed) network are strengthening their collaboration.

Following on from the Monaco Ocean Week 2022 workshops, which established a community of practice to tackle the scourge of plastic pollution in the Mediterranean, the laureates day on 21 March 2023 mobilised the members of the BeMed network around shared objectives: to identify priorities and points of vigilance and to enhance a common toolbox.

In the Hirondelle room of the Oceanographic Museum, members of the BeMed network took advantage of the latest resources from the PlastiMed project, supported by the IUCN, to gain a better understanding of the origins of plastics and how they reach the sea, as well as their dispersion and impact on marine biodiversity and the food chain. These reference results, which reinforce other scientific reports aimed at decision makers, encourage the dissemination of knowledge about the origins of plastic pollution in the Mediterranean. It can be used in local and regional lobbying, and help to spread good practice among stakeholders.

TARGETED WORKSHOPS

To what extent are public decision makers addressing the microplastic issue at international and Mediterranean levels? The regulatory measures required to stem these invisible pollutants, which are universally widespread but particularly concentrated in the Mediterranean basin, fuelled the various workshops held on this day of Monaco Ocean Week, which explored a range of solutions: specific water treatment, microplastics, innovations, the role of scientific cooperation, regulations, new ways of raising awareness, especially among young people, etc.

The emphasis is on discussions with sectors that use plastic in the environment (agriculture, fishing, etc.) and sectors that "consume" plastic (hotels, restaurants, supermarkets, etc.). The network is focusing on defining responsibilities, the consequences of the emergence of bio-sourced and recycled products and the introduction of incentive mechanisms such as a system of labels (e.g. "low plastic zone") and financial incentives for good practice.

IN CONCLUSION

The members of the BeMed network agree on the need to disseminate the many existing initiatives more widely, from raising awareness to popularising science, from sharing sustainable practices to advocacy, and point to many societal challenges:

- assigning responsibility to the right stakeholders (public players and companies),
- the establishment of a robust regulatory framework,
- sharing methodologies and scientific research,
- obtaining funding to complete the work. ■

ZOOM ON

WATER TREATMENT PLANS:
IS THERE A STANDARDISED METHOD FOR COLLECTING AND MEASURING MICROPLASTICS?

The point of view of Marie-Pierre Denieul *(above)***, Project Manager at Veolia**:
The ISO drinking water standard is due to be published in 2024 for the European Union. To date, only California in the United States has legislation on microplastics in drinking water. Discussions are underway at the European Union level, but there are difficulties in finding a standardised method.

The point of view of Marc Metian *(below)***, researcher at the International Atomic Energy Agency**:
The more we move towards small-calibre plastics, the more problematic standardised methods become. Measurement methods are increasingly complex and costly, requiring specific equipment and the capacity to collect these microplastics. We, therefore, need to develop the financial and practical resources to be able to set up this cooperation.

© Ocean Culture Life - jeunes Kenyans partant pour l'observation du corail

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RAISING AWARENESS AMONG YOUNG PEOPLE

HEADING FOR THE ARCTIC

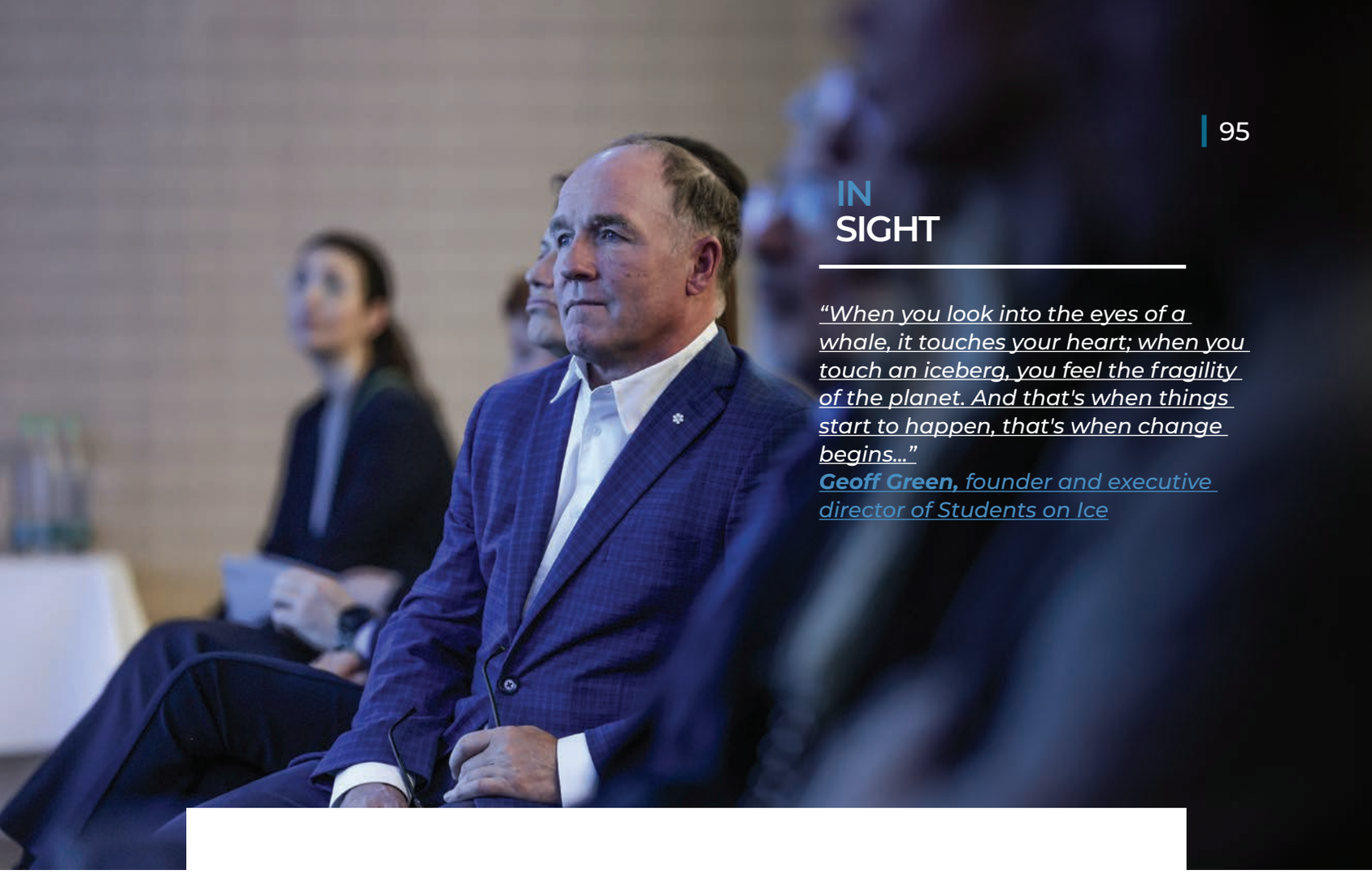
15th edition of *Students on Ice*, Monaco

The conference to launch the 2023 edition of this Arctic education programme, supported by the Prince Albert II of Monaco Foundation, featured testimonials from passionate and committed personalities, revealing inspiring perspectives for young Monegasques.

Since 2008, thanks to the collaboration between Monaco and *Students on Ice* (SOI), around twenty secondary school students from the Principality have been able to explore the Polar Regions, meet local populations and discover first-hand the impact of global warming on these areas that are so rich in biodiversity yet so vulnerable. After a break due to the Covid-19 pandemic, the Prince Albert II of Monaco Foundation, in partnership with the Ministry of Education, Youth and Sport, has reactivated its participation in the *Students on Ice* programme this year. A conference was held on Tuesday, 21 March, as part of Monaco Ocean Week 2023, in the auditorium of the Lycée technique et hôtelier de Monaco, in front of almost 200 high school students.

Isabelle Bonnal, Commissioner General for Education, Youth and Sport, opened the conference by describing *Students on Ice* as "*an invitation to travel, to get involved and to raise awareness.*"

After showing a video presenting the SOI expeditions, which bring together young people from all over the world, Geoff Green from Quebec, founder and executive director of the programme, took the floor to underline the educational aims of the Arctic expeditions, which "*open a window on the rest of the world*" and "*inspire and strengthen leadership in young people by bringing them back to nature, to knowledge and to people, to all those resources that we are losing at the moment and that can make a lasting difference for the future.*"



IN SIGHT

"When you look into the eyes of a whale, it touches your heart; when you touch an iceberg, you feel the fragility of the planet. And that's when things start to happen, that's when change begins..."
***Geoff Green**, founder and executive director of Students on Ice*

A LIFE-CHANGING EXPERIENCE!

Both deeply affected by their Arctic expeditions, two former winners shared their thoughts and experiences. "*It's as if everything I do has to have something to do with the environment,*" says 22-year-old Célia Limandat, winner of the SOI competition in 2017 and a history, politics, and economics graduate from University College London, who recently set about creating MUSU, an eco-responsible eyewear brand. "*When I got home,*" confides Justin Sargenti, 24, winner of the SOI competition in 2015, "*I felt very small, wondering what contribution I could make to the environmental issue*". With a degree in architecture in his pocket, he embarked on a mission to Antarctica, while at the same time initiating a doctorate in architecture in a polar environment in Strasbourg. Both spoke about this unique experience, which has shaped their professional careers and strengthened their commitment to the environment.

Justin Sargenti then gave a more detailed account of his work at the Concordia Franco-Italian research station for the Monegasque grey water recycling company FGWRS, as part of a project supported by the Prince Albert II of Monaco Foundation *(see interview on next page).*

POLAR RESEARCH FOR YOUNG PEOPLE

Lastly, Céline Le Bohec, a CNRS researcher in polar biology at the Scientific Centre of Monaco, described the work carried out by Monegasque scientists in Antarctica and the Southern Ocean, with a focus on the long-term monitoring of seabird populations to understand changes in polar ecosystems, which are sentinels of the planet's state of health. She also spoke about the training courses for researchers and the specific features of polar research, such as the spirit of innovation, enthusiastically sharing her personal experience in the polar environment and her latest discoveries on tracking emperor penguins: "*The Arctic Ocean plays a fundamental role in regulating the world's climate. Research conducted in this environment helps us to better understand the Earth system.*"

The conference closed with the announcement of the "Un lycéen en Arctique" competition, inviting volunteer students from the Principality's high schools on Wednesday, 29 March to tackle the theme of global health. Two winners will join *Students on Ice* for a trip to the Arctic in July 2023, departing from Ottawa along the Labrador coast to the Torngat Mountains National Park in the Inuit region of Nunatsiavut. ■

© Justin Sargenti_IPEV

Justin Sargenti

winner of the Students on Ice 2015 competition, qualified architect, technical designer for FGWRS and doctoral student at the AMUP laboratory in Strasbourg

In December 2022, Justin Sargenti set off on a mission to the Franco-Italian Concordia research station on behalf of the Monegasque grey water recycling company Firmus Grey Water Recycling System (FGWRS), as part of an environmental improvement project run in collaboration with the French Polar Institute Paul-Émile Victor and the European Space Agency, and supported by the Prince Albert II of Monaco Foundation.

How has the Students on Ice programme influenced your career path?

After my experience in the Arctic with Students on Ice, I decided to study architecture with the aim of working in a polar environment. After graduating, at the invitation of the Prince Albert II of Monaco Foundation, I applied for a mission to recycle grey water from the Concordia station in Antarctica. It was an incredible opportunity, particularly for my thesis project. I was selected for this assignment, which was developed in partnership with the Monegasque company FGWRS. Before leaving on this mission, I first worked as a technician and trained in the greywater recycling system.

What were your responsibilities at Concordia?

My main task was to install a pilot plant for testing FGWRS ultra-filtration membranes and to carry out daily tests on two greywater recycling machines. I analysed the data and sent it to company. We are currently finalising reports to determine which membrane performs best and adapts best to the hostile environment. In partnership with the Prince Albert II of Monaco Foundation, I also carried out a communication campaign aimed at secondary school students on the importance of protecting the poles and the role of innovation.

Before I left, I met with five classes of high school students in the Principality. During our stay at Concordia, in the most hostile environment in the world, we were able to hold a video conference with around fifteen people on the station representing different professions, including one of Concordia's first overwinterers. This is the only videoconference from the Concordia base that has been carried out for France in 2022. Posts on social networks rounded off this communication campaign around the mission.

Has your time at Concordia changed your approach to architecture?

I was able to experience life in a hostile environment for myself, as well as the state of the local infrastructure. It changed my architectural approach to polar environments. I'd read a lot of books on new polar stations, particularly those built after 2010, but going there showed me that the architect's point of view never takes precedence over the technical aspect: you must be able to adapt to environmental constraints that are so extreme that the technical aspect is always right, which implies certain compromises in terms of comfort or building renovation. This calls into question the role of the architect, who can very rarely visit the site to monitor the work.

Ultimately, this experience is changing the angle of my doctoral research, as I'm going to focus on planning strategies adapted to environmental impact. This involves some complex questions about tolerance thresholds and space design.

What would be the scope of this research?

The question of tolerance thresholds was raised by the English architectural critic Reyner Banham, who questioned the technology added to buildings designed for temperate environments to make interior spaces more comfortable. How comfortable can you get in a harsh environment? This was something that really bothered me when I was in Antarctica. Because the more comfortable you are in a polar station, the more open access you will have to the Antarctic continent. This raises the question of the human footprint in this protected area. What footprint do we want for the research stations in Antarctica, 81% of which are located on ice-free land where wildlife is concentrated?

During my trip via the Dumont d'Urville base, I was able to discover the beauty and fragility of the continent's fauna and flora. Despite significant environmental protocols, there are concerns about the future of Antarctica, which is also seeing an increase in tourism, including land-based tourism, with people setting foot on the continent and even going hiking!

What is your vision for conservation in Antarctica?

The issue of environmental protection in Antarctica has been around since the Antarctic Treaty of 1959 and the Madrid Protocol of 1991. Today, we know that this continent owes its specific climatic conditions to the circumpolar current. This makes the current awareness of the close links between protecting the ocean, the Southern Hemisphere, and the global climate even more important. ■

"The more comfortable we are in a polar station, the more open access we will have to the Antarctic continent. This raises questions about the human footprint in this protected area".

OCEAN LEADERS

Leading the transition to a healthy and inclusive ocean future

Recognising the need for systemic change, the professionals involved in the Edinburgh *Ocean Leaders* programme are charting the way forward for positive change in the oceans on an international scale.

Launched in March 2020, the University of Edinburgh programme supported by the Prince Albert II of Monaco Foundation strengthens the new generation of ocean change actors, which today includes 32 ocean leaders from 25 different countries and a variety of professional backgrounds (conservation, politics, law, finance, research, entrepreneurship, arts, and education), harbouring major ambitions for ocean protection. At the Yacht Club de Monaco, introduced by Meriwether Wilson, co-founder and co-director of the programme, the Monaco Ocean Week event brought together two *Ocean Leaders* 2022 panels with students from the International University of Monaco and professionals from various sectors.

BUILDING A SYSTEMIC LOGIC

Shirley Binder, Senior Adviser to Panama's Ministry of the Environment, moderated the meeting, which was designed to promote leadership in the ocean sector across all sectors, geographical areas, and scales. During the first panel, three leaders were invited to share their views on the responsibility of leaders and the possibility of exerting influence on a large scale.

"As a scientist," says Boris Solovyev, a specialist in the polar regions and consultant for WWF's Arctic programme, "*I was convinced that to reach an agreement, companies, coastal communities, and governments needed data, figures and facts. But actually, the most important thing is to establish trust, and that starts with clearly identifying the interests of each party. It takes decades to create a protected area like the ones at the poles. It's all about building long-term relationships.*"

Lucy Holmes, Senior Director of Blue Finance at WWFUS, advocates systemic change through the development of a new economic discourse whose leverage could be used: "*These marvellous ocean ecosystems are the natural capital on which our economy is based.*" It commits to working with all players in the financial sector to redirect traditional capital towards sustainable business models and to encourage the possibility for financial players to invest in restoring the oceans.

Lawyer Javiera Calisto, campaign director for *Oceana Chile*, is banking on a systemic and fully democratic approach to facilitate change. She gives the example of a salmon farm in Chile which, under the influence of the campaign and following the passing of a law requiring all companies to publish data on pollutants, is now exemplary in terms of transparency.

IN FIGURES

- **32 ocean leaders,**
- **25 countries.**

STRENGTHENING THE ROLE OF COMMUNITIES

Inclusion and communication are at the heart of the second panel's question, that of giving communities more means to take action for the ocean. What's the most important tool to use? "*Citizen science*", Lucy Babey, Deputy Director and Head of Science and Conservation at ORCA, replies with conviction, "*is about creating a group of passionate, trained people that you can send anywhere in the world and who can create this huge dataset, it's a cost-effective tool that delivers results.*" The head of the British organisation working to protect whales and dolphins cites the example of a marine protected area in the North Sea in the UK, more than 90% of whose designation is based on data generated by citizen science.

Then Stephen Kankam, co-founder and deputy director of Hen Mpoano in Ghana argues that "*one of the tools for empowering communities is to involve women more and more in fisheries decision-making, in particular by mobilising women's voices in illegal fishing and empowering them to use technology-based approaches.*" Finally, Kenyan Peter Manyara, Head of the Regional Coastal and Ocean Resilience Programme at the IUCN Office for Eastern and Southern Africa, stresses the essential role of informing local communities about the ocean issues that affect them.

Throughout their discussions, these charismatic ocean leaders explore and compare their points of view, highlighting the main challenges they face in their actions.

In the final part of the event, the *Ocean Leaders* took on the role of facilitators, leading various panel discussions on leadership and the obstacles encountered by all the participants. The dialogue was fuelled by the questions and concerns of young people who were as determined as they were concerned about the future of the ocean. ■

PROFILE

Launched in 2020 by the University of Edinburgh and supported by the Prince Albert II of Monaco Foundation, ***Ocean Leaders*** is the only leadership programme designed specifically for young professionals working on the oceans. It combines leadership, mentoring, international field experience and network support.

IN SIGHT

"To lead change, you need not only passion, skills, and creativity, but also courage, the will to do something different, and perhaps to fail. So, it's very important to create these supportive spaces and communities".
Sandy Tudhope, *professor, co-founder and co-director of the Ocean Leaders programme*

FUN WORKSHOPS

Living better with cetaceans

A morning of educational games about cetaceans brought together pupils from the Saint-Charles school in charge of Monaco's Marine Education Area. An event co-organised by the AMPN and the secretariats of the ACCOBAMS and Pelagos agreements.

For the 2022-2023 school year, pupils from the 7A class at Saint-Charles school, in charge of Monaco's Marine Education Area, are running a project to raise awareness of the need to protect cetaceans. During Monaco Ocean Week, on Wednesday, 22 March 2023, three educational workshops were offered to the class to supplement their knowledge in a fun way. In line with its missions, the Monegasque Association for the Protection of Nature (AMPN) organised this awareness-raising event in collaboration with the secretariats of the ACCOBAMS and Pelagos agreements.

3

1 DISCOVERING LITTLE-KNOWN SOUNDS

What sounds travel across the ocean? Why are they essential to marine life? In the centre of the classroom, 22 photos are placed on the floor and a loudspeaker emits the sound of waves heard from the surface... The workshop can begin! During their sound dive, the children encounter different animals and surprising sounds. Each sound is matched by an image, giving rise to numerous interactions with the young audience.

2 A CARD GAME ABOUT PROTECTING CETACEANS

The host shuffles the cards and distributes them to the 8 participants. It doesn't take long for pupils to discover 5 species of cetacean and 4 types of ships, as well as special cards: speed, noise pollution, plastic, collision, *High-Quality Whale-Watching*®, marine protected areas, scientific research, and fishing. *Whale Risk* is a card game designed to raise awareness of environmental conservation and the protection of cetaceans, focusing on maritime traffic.

3 A STRATEGY GAME FOR SUSTAINABLE MANAGEMENT OF THE MARINE ENVIRONMENT

CETAMER turns its players into eco-ambassadors for cetaceans and the marine environment in the Ligurian Sea. What problems do humans and marine species encounter when they share the same space? How can we improve living together? The participants' mission is to increase the harmony gauge as much as possible by completing the challenges set, bearing in mind that the starting gauge is only 25%. Incredibly, solutions are emerging among the players, who are working together to imagine sustainable, eco-responsible management of the marine environment!

In parallel with this event, Saint-Charles school has undertaken to offer various activities to other classes during Ocean Week, all linked to raising awareness of the need to protect cetaceans. ■

ARCTIC WILDLIFE

Focus on the narwhal, a mysterious ocean dweller

The Arctic cetacean, the legendary "unicorn of the seas", was given pride of place during Monaco Ocean Week at a conference for the general public given by one of the world's leading specialists on the species.

Pristine expanses of water and ice, intimidating mountains... These are the landscapes of the narwhals, the discreet migratory cetaceans that travel to the Arctic in summer to breed. For centuries, there have been many legends and hypotheses about the role of their oversized, twisted ivory tusks. Scientific research has been looking into this issue since the early 2000s, and it was in 2014 that Martin Nweeia, a researcher for *Harvard's Catalyst* and assistant professor at Case Western Reserve University, demonstrated the sensory function of the 'horn' in live narwhals. To do this, using a laboratory floating in Arctic waters, he compared the physiological response of the heart rate of animals exposed to different degrees of salinity introduced into the defence. The results of the study made the cover of the journal *The Anatomical Record* and attracted the attention of the international press. Since then, the study launched on the narwhal genome, led by Dr Nweeia, a Canadian researcher at the Canadian Museum of Nature and *Zoonomia* partner at the *Broad Institute of MIT/Harvard*, has produced the reference genome of this species as well as a narwhal cell line at the *Frozen Zoo* in San Diego.

The results of this research were presented by Dr Nweeia at a conference for the general public on 24 March 2023, during Monaco Ocean Week, contributing to a better understanding of narwhals. A male prerogative, the hypertrophied tooth, which reaches 2.5 metres in length, is said to be "*the most flexible material on the planet, since it bends at a rate of 12 degrees in all directions*", according to the lecturer, who shows striking macroscopic 3D images of the central nerve: "*The rich nerve endings in the tooth enable the animal to perceive differences in pressure, salinity and temperature, key factors in the formation of the ice that determines the migration of the species*", explains the researcher.

This research has had repercussions for the Inuit communities, who are now in charge of monitoring narwhal populations: "*These cetaceans are difficult to track because they barely come out of the water, so we don't see them very much*", says a local representative. This trend is now being challenged by changes to the ice pack, which is being severely impacted by global warming. The species may soon be faced with changes to its migratory routes, the presence of new predators and noise pollution from maritime traffic and the development of seismic prospecting.

ISUMAQATIGINGNIQ OR "THINKING TOGETHER"

This hybrid education model led by Dr Nweeia combines traditional Inuit observations and knowledge with scientific research. The innovative approach of this programme for secondary schools was supported by the *National Science Foundation*, *Fulbright Hayes* from the US Embassy in Canada and the Prince Albert II of Monaco Foundation and its Canadian branch.

AN INTERNATIONAL EDUCATIONAL PROGRAMME

At the end of the conference, which took place at the Yacht Club, environmental economist Pamela Peeters presented the *Eco Hero* educational programme, which aims to transform young people through education for a sustainable Arctic. The project began in 2015 in the Canadian High Arctic, expanded to western Greenland in 2021 and now reaches over 10,000 young people. As a participant in many expeditions led by her husband Dr Nweeia, Pamela Peeters outlined various initiatives to raise awareness of narwhals (augmented reality experience, graphic novels, etc.), and their shared ambition to inspire and train young people to become ambassadors for ocean ecosystems. ■

© WeberArctic

PROFILE

- latin name: ***Monodon monoceros***
- inuit name: ***Tuugaalik***
- estimated population: ***around 170,000***
- Species status: ***Special concern***
- Habitat: ***Ocean (open sea) and under pack ice***
- Range: ***Arctic waters of Canada, Greenland, Norway, and Russia***
- Diet: ***Greenland halibut, polar and Arctic cod, squid, and shrimp***

THE EYES OF HUMANITY

And what if we needed them to survive? TAF - *The Animal Fund* is organising a conference for the general public to explore the role of whales in the planet's ecosystem.

THE ANIMAL FUND

Bowhead, blue, right and humpback whales, sperm whales, belugas, narwhals, orcas... "*Whales are the heroes of the ocean*," says Berit Legrand, president of the Monegasque Association in favour of cetaceans, before explaining the role of these large mammals that appeared on the planet some 50 million years ago. By sailing through the water column and the seas, whales fertilise the ocean, bringing essential nutrients to phytoplankton, the planet's main oxygen provider. "*If this ecosystem breaks up, there will be no life left on Earth,*" says Berit Legrand. As well as playing a major role in the health and balance of our ecosystem, whales also have an impact on the climate! By sinking to the bottom of the sea at the end of its life, a whale can store up to 33 tonnes of CO_2, an ecosystem service valued by the World Monetary Fund at over 2 million dollars.

By plunging deep into the world of whales, through stories and images, the conference invites us to become familiar with these giants of the seas and to shift the viewpoint that has for too long focused on humans. Ambassador Alexandra Zeiner, a marine biologist, then highlighted the essential cultural value of these animals for local communities around the world, from dugongs in Australia to seals and whales in Canada. Daniela de Winter, from the UK, focused on the threats facing large cetaceans (plastic, chemical and noise pollution, collisions, global warming, etc.), suggesting solutions that could reduce these threats.

As a loyal supporter of Monaco Ocean Week, The Animal Fund has devised an event to raise awareness of the future-based global solution to the ecological challenges of our time. ■

IN FIGURES

- **86 species** of cetacean.
- Whales indirectly provide **more than 50% of the Earth's oxygen.**
- **1 whale** helps to remove, **on average,** as much carbon **from our atmosphere as 30,000 trees** (33 tonnes).

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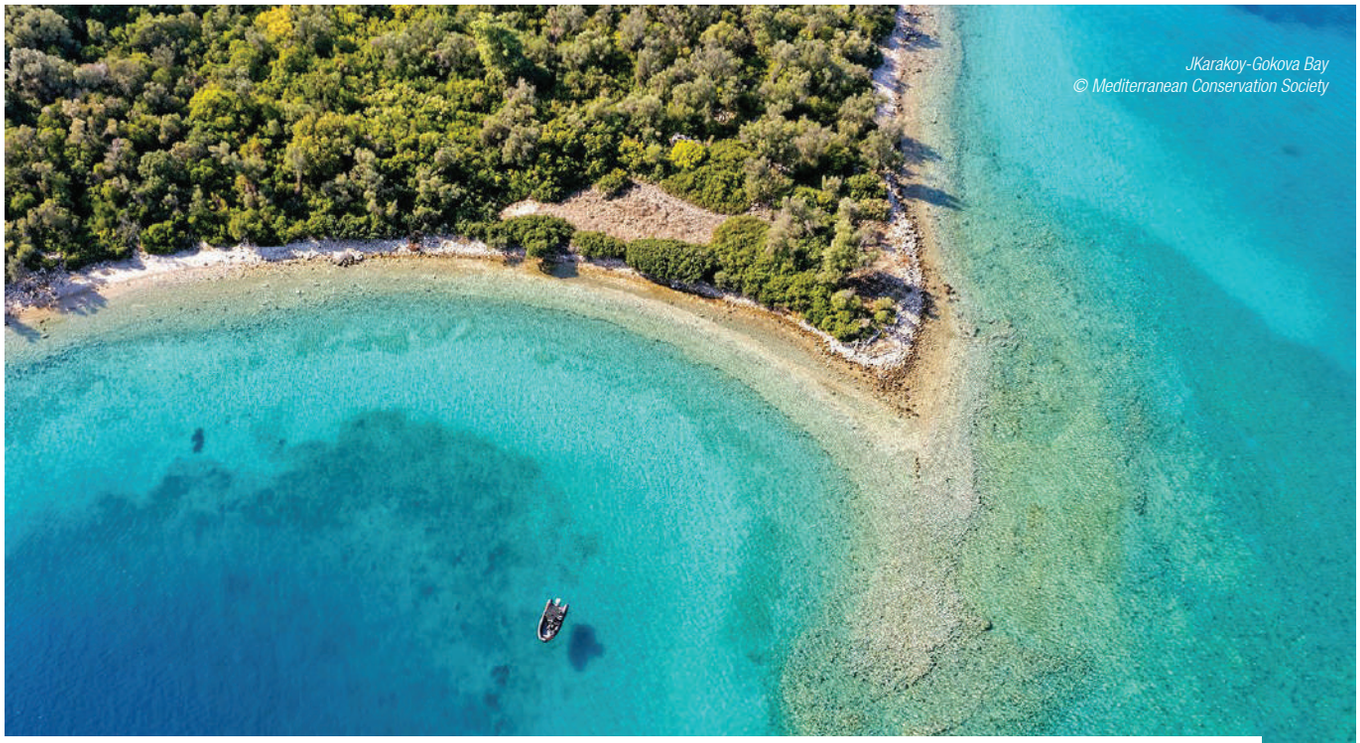


JKarakoy-Gokova Bay
© Mediterranean Conservation Society

THE MEDFUND EXPANDS ITS ACTION IN THE MEDITERRANEAN

During the Board of Directors meeting held in Monaco during Monaco Ocean Week and chaired by Leila Chikhaoui-Mahdaoui, Tunisia's Minister for the Environment, The MedFund made several commitments aimed at improving the effectiveness of the management of marine protected areas (MPAs). The latter are recognised as effective tools for protecting marine ecosystems and conserving biodiversity while contributing to local development. However, due to a lack of human and financial resources, many of the MPAs created in the Mediterranean are not effective and do not fulfil their objective of preserving marine environments. The MedFund's efforts are part of this trajectory.

To date, over €1 million in grants have been paid to support Mediterranean MPAs, representing a total commitment of over €4.6 million up to 2027.

Five new funding agreements were approved at the Council meeting to support the Katic and Platamuni MPAs in Montenegro, the Kerkennah MPA in Tunisia, and two high-protection MPAs, the Telascica MPA in Croatia and the Datça Bozburun MPA in Turkey.

Launch of a new cross-border initiative

The MedFund and MedPAN, the network of Mediterranean MPA managers, will be working together with Conservation International as part of a new project funded to the amount of $5 million by the Global Environment Facility (GEF): "Build back a blue and stronger Mediterranean" aims to provide comprehensive and integrated support for the management of these protected areas.

Through this project, financial support will be provided to twenty official MPAs and MPAs in the process of being created, covering almost 220,000 hectares across six Mediterranean countries - Albania, Algeria, Lebanon, Morocco, Montenegro, and Tunisia. The project will also strengthen the skills and management capabilities of the teams working in these protected areas.

2021 Gokova MPA Turkiye
© Yankı Tandırcıoğlu

Launch of a new call for expressions of interest dedicated to high-protection MPAs

With the support of the MAVA Foundation, the Board of Directors of The MedFund has decided to launch its second call for expressions of interest specifically dedicated to high-protection marine protected areas. The latter are MPAs whose management plan includes one or more strongly protected zones (no-take zones, no-go zones, fully protected areas).

This call is open to the priority countries designated in The MedFund's 2020-2025 strategy: Albania, Algeria, Croatia, Greece, Lebanon, Morocco, Montenegro, Tunisia, and Turkey. ■

IN BRIEF

NO MORE TIME - OCEANS ARE LIFE

The message is inscribed on the resin globe by Paola Buratto Caovilla, a polymorphous artist who has retired to the Veneto region. In the presence of HSH Prince Albert II of Monaco, the work was installed in the gardens of the Prince Albert II of Monaco Foundation on the opening day of Monaco Ocean Week, 20 March 2023. Painted in acrylic, a multicoloured world map draws the eye to the blue expanse where the world's oceans meet. With this universal watchword, the artist's sculpture is a clear reminder of the urgency of our commitment to future generations. The mobilisation of the artist, who is exhibiting in Monaco, is in line with the commitment of Princesses Maria Chiara and Maria Carolina of Bourbon-Two Sicilies, ambassadors for this initiative.

SUSTAINABLE HOTELS AND PROTECTING THE OCEAN

For the first time, the themed event "The Sea is Green", organised by the Green Globe-certified Monte-Carlo Société des Bains de Mer, is part of the official programme of Monaco Ocean Week.

On 22 March 2023, in the presence of HSH Prince Albert II of Monaco, at the Hôtel Hermitage Monte-Carlo, the morning will begin with a meeting based on feedback from players in the sustainable hotel industry. What are they doing to protect the environment? Interviewed by journalist Leïla Ghandi, they give their vision of an ethical and responsible hotel industry, committed to reducing its ecological footprint, starting with its water consumption.

Monaco's Tourism Authority aims to position the Principality as a committed luxury tourist destination, and as such, a technological leader and laboratory. "*The tourism industry must create a new development model that respects the planet*", in the Sovereign's encouraging words.

From major trends to technical challenges

Denis Allemand, Scientific Director of the Monaco Scientific Centre, gave an overview of the economic and ecological challenges posed by tourism, which accounts for 10% of global GDP. "*It is the lifeblood of both rich and poor countries. In the Pacific Islands, tourism accounts for 90% of GDP*". And how can luxury tourism become a model, an ambassador for good environmental practice? Using natural solutions to combat and reduce greenhouse gases, consuming locally and in season, raising customer awareness of a new vision of luxury that embodies the principles of sustainable development, training young professionals, recycling soaps, limiting plastic packaging... Record-breaking freediver Pierre Frolla, director of the Monegasque Marine Academy and a figure who illustrates the values of the SBM Group, invites us to "*multiply the small actions that produce big changes.*"

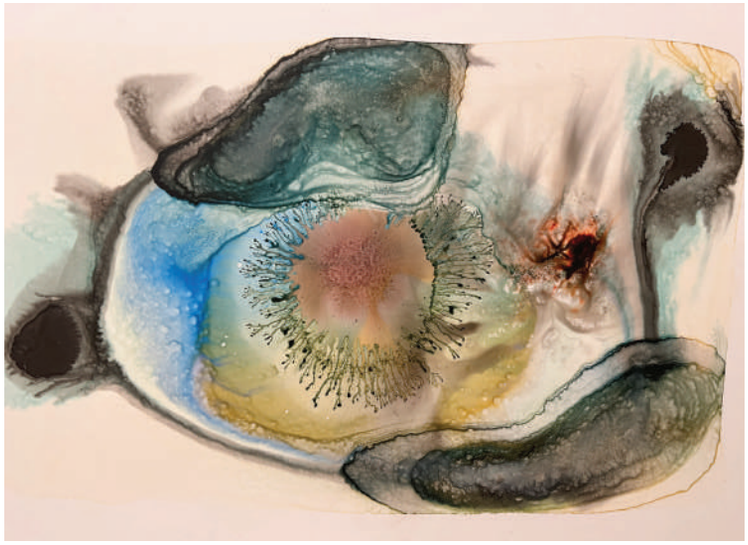
More technical subjects are emerging, such as the rationalisation of water consumption or the new generation of heat pumps in all SBM hotels, a heating system that has already been in place since the 1980s, as Luc Blain, the Group's Technical Services Director, explains. The Monte-Carlo Bay Hotel and Resort can boast a 35% reduction in water consumption and a 45% reduction in energy consumption, an effort reinforced by the photovoltaic installation.

Efforts are also being redoubled right down to the plate, as pointed out by Tom Biscéré, in charge of Mr Goodfish, an initiative supported by the Prince Albert II of Monaco Foundation for the French Mediterranean coast, which has 30 members in Monaco, including 5 from the SBM.

Ceramics for a mise en abyme

The second part of this private event puts the spotlight on art, from the hotel lobby to the winter garden beneath the Eiffel Dome. The event includes a visit to the marine ceramics exhibition in the presence of Jean Boghossian, an abstract multidisciplinary artist who questions the act of creation and the idea of degradation through the process of deliberate damage and the use of a blowtorch as a paintbrush. The future of the oceans depends on it. ■

© Monte-Carlo Société des Bains de Mer



PROFILE

Since 2014, SBM has received more than 30 environmental certifications, including Green Globe, rewarding the commitment of Monte-Carlo Société des Bains de Mer to its proactive policy on energy transition, waste management, local gastronomy, and preservation of the natural heritage. As the leading private employer in the Principality of Monaco, the Group is launching its fourth Ethics Charter at the end of 2022 to promote its values of integrity and responsibility in the practice of its business activities.

THE EYES OF HUMANITY

THE ANIMAL FUND

And what if we needed them to survive? TAF - The Animal Fund is organising a conference for the general public to explore the role of whales in the planet's ecosystem.

Bowhead, blue, right and humpback whales, sperm whales, belugas, narwhals, orcas... "*Whales are the heroes of the ocean*" says Berit Legrand, president of the Monegasque Association in favour of cetaceans, before explaining the role of these large mammals that appeared on the planet some 50 million years ago. By sailing through the water column and the seas, whales fertilise the ocean, bringing essential nutrients to phytoplankton, the planet's main oxygen provider. "*If this ecosystem breaks up, there will be no life left on Earth,*" says Berit Legrand. As well as playing a major role in the health and balance of our ecosystem, whales also have an impact on the climate! By sinking to the bottom of the sea at the end of its life, a whale can store up to 33 tonnes of CO_2, an ecosystem service valued by the World Monetary Fund at over 2 million dollars.

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IN FIGURES

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- Whales indirectly provide **more than 50% of the Earth's oxygen,**
- **1 whale** helps to remove, on average, as much carbon from our atmosphere as **30,000 trees (33 tonnes).**

RAMOGE LAUNCHES A PHOTO COMPETITION

The prize-giving ceremony for the "RAMOGE - Man and the Sea" international photography competition took place at the end of the conference organised by RAMOGE on participatory science at the Oceanographic Museum in Monaco on 24 March 2023. Held under the auspices of the International Federation of Photographic Art (FIAP), this international competition attracted a huge number of entries from 65 countries.

A prestigious panel of judges, made up of leading naturalist photographers, chose from almost 500 photographs: "*The fact that everyone is sharing their vision is very important,*" said Greg Lecoeur (voted "Nature Photographer of the Year" by *National Geographic* in 2016). "*We didn't award prizes to the most beautiful images, but to those that appealed to the jury, i.e., images with a strong message*", explained Sergio Pitamitz (voted "Environmental Photojournalist of the Year" by the *National Press Photographers Association* in 2016).

The 12 winning photos, divided into 4 different sections, were unveiled in the presence of Riccardo Busi, President of the FIAP, who has high hopes for the competition: "*I am convinced that this competition will become one of the most closely followed events in the world of photography*". Some of the winners, who live in Italy, Spain, and Indonesia, shared their emotions and their support for RAMOGE's values. "*This photo competition is a way of raising awareness of the importance of protecting the marine environment beyond our zone,*" concludes Anne Vissio, Executive Secretary of the RAMOGE Agreement, before mentioning that the photographs presented at the Oceanographic Museum in Monaco will be exhibited in Nice and then travel to the volunteer municipalities in the RAMOGE zone, continuing their role of raising awareness of the need to protect the marine environment. ■

IN FIGURES

- **65 participating countries,**
- **567 photographers,**
- **3370 sent,**
- **451 photos accepted.**

© Noah Munivez - pexels.com

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PARTNERS OF MONACO OCEAN WEEK

FONDATION PRINCE ALBERT II DE MONACO

THE PRINCE ALBERT II OF MONACO FOUNDATION

HSH Prince Albert II of Monaco decided to create his Foundation in June 2006 as a response to the concerning challenges facing our planet's environment. For 15 years, the Prince Albert II of Monaco Foundation has carried out actions in three main geographic areas: the Mediterranean, the Polar Regions, and the Least Developed Countries (according to the United Nations list) in order to limit the effects of climate change and encourage renewable energies, protect biodiversity, manage water resources and combat desertification. Active at an international level, the Foundation involves citizens, political officials, scientists and economic stakeholders to defend nature, a common good of humanity.

www.fpa2.org

Gouvernement Princier
PRINCIPAUTÉ DE MONACO

THE MONACO GOVERNMENT

HSH the Sovereign Prince has made sustainable management of the seas, oceans and their resources a priority area of Monaco's national and international policy. The Monaco government works tirelessly to this end, and particularly within the framework of the 2030 Agenda for Sustainable Development adopted by the United Nations.

That is why the Government is now involved in events for Monaco Ocean Week supported by the Prince Albert II of Monaco Foundation, in which all Principality stakeholders are involved.

www.gouv.mc/Action-Gouvernementale/L-Environnement

Institut océanographique
Fondation Albert Ier, Prince de Monaco

OCEANOGRAPHIC INSTITUTE, PRINCE ALBERT I OF MONACO FOUNDATION

The Oceanographic Institute aims to raise awareness of the wealth and fragility of the oceans, and to promote sustainable management and thoughtful and effective protection. To do this, it mediates between scientific and socio-economic stakeholders, the general public and policy-makers. It carries out this mission by promoting the exceptional heritage of Prince Albert I and the exemplary commitment by HSH Prince Albert II of Monaco to: "Raise awareness, love and protect the oceans".

www.institut-ocean.org

MONACO SCIENTIFIC CENTRE

The Monaco Scientific Centre (CSM) is an autonomous public Monegasque institution created in 1960 by Prince Rainier III. Its aim: to give Monaco the means to carry out scientific research and support the action of government and international organisations responsible for protecting and conserving marine life. The Centre attracts candidates from all over the world: since its move to new headquarters at Quai Antoine Ier in 2013, more than 50 specialists have arrived from 15 countries (Europe, the USA, Japan, Australia, New Zealand, Palau, Brazil, the Caribbean, Canada, Oman, Saudi Arabia...).

www.centrescientifique.mc

THE YACHT CLUB OF MONACO

Founded in 1953 by Prince Rainier and chaired since 1984 by HSH Prince Albert II of Monaco, the Monaco Yacht Club has 1,200 members from 60 nationalities. Home to some of the most prestigious private yachts in the world, the YCM now enjoys a unique position in the world of international yachting and sailing.

www.yacht-club-monaco.mc

MONACO TOWN HALL

The Town Hall is the oldest institution in Monaco, with over 650 people working in 19 municipal departments, in areas of expertise like the Environment and Sustainable Development. Deeply mindful of the environment, based on guidelines given by HSH Prince Albert II, the Monaco Town Hall has been committed to protecting the environment for many years; a commitment which is reflected in tangible and sustainable actions in the Principality.

www.mairie.mc

THE PELAGOS AGREEMENT

The Pelagos Sanctuary is a 87,500 km^2 marine area subject to an agreement between Italy, Monaco and France to protect its marine mammals. What makes the Pelagos Sanctuary unique is the fact that it is managed by three different authorities, and it includes coastal areas and international waters which form a huge ecosystem of major scientific, socio-economic, cultural and educational interest.

www.sanctuaire-pelagos.org

ACCOBAMS

ACCOBAMS (Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area) is a cooperative body working to conserve marine biodiversity in the Mediterranean and Black Sea. Its primary objective is to reduce the threats to cetaceans in this geographic area, and improve our knowledge about these animals. ACCOBAMS is the first agreement binding countries from two sub-regions and allowing them to collaborate on a general interest topic.

www.accobams.org

THE RAMOGE AGREEMENT

The RAMOGE area includes the maritime areas of the Provence-Alpes-Côte d'Azur region, the Principality of Monaco and the Italian region of Liguria, forming a pilot area to prevent and combat marine pollution. The RAMOGE agreement is an instrument of scientific, technical, legal and administrative cooperation allowing French, Monegasque and Italian governments to carry out actions for integrated coastal management.

www.ramoge.org

THE MEDITERRANEAN SCIENCE COMMISSION (CIESM)

CIESM has supported multilateral research in the Mediterranean and the Black Sea since 1910, the date it was founded. It is a unique forum for scientific discussion and dialogue, bringing together thousands of researchers who, together, use the newest technologies and approaches to understand, monitor and protect a very exposed sea. The Commission is able to define the Mediterranean's priorities in terms of marine and environmental research with greater impartiality, consolidated by the political support of its 23 Member States.

www.ciesm.org

THE INTERNATIONAL HYDROGRAPHIC ORGANISATION (IHO)

The International Hydrographic Organisation (IHO) is the intergovernmental body responsible for ensuring that all seas, oceans and navigable waters are hydrographically surveyed and mapped through the coordinated efforts of national hydrography services. The IHO has been hosted by the government of Monaco since its creation in 1921 and currently has 93 member states worldwide.

www.iho.int

INDEMER: THE INSTITUTE OF THE ECONOMIC LAW OF THE SEA

The Institute of the Economic Law of the Sea, founded in 1985 as an approved Monegasque association, whose patron is HSH the Sovereign Prince of Monaco. Its primary goal: to carry out studies and research concerning legal, economic, social and environmental issues raised by the use of the ocean and the marine environment.

www.indemer.org

INTERNATIONAL ATOMIC ENERGY AGENCY

The IAEA Environmental Laboratories, located in Monaco and Seibersdorf, Austria, work with Member States to develop strategies for sustainable management of their land, marine and atmospheric resources. Together, they apply nuclear and isotope science to understand and mitigate the environmental impact of radionuclides, trace metals, organic contaminants (PCBs, hydrocarbons), as well as to study the impacts of climate change, habitat destruction and the loss of biodiversity. This includes inspecting and monitoring contaminants in the oceans, such as mercury or plastics, as well as biotoxins linked to microalgae, and studying how they are transferred to marine animals.

www.iaea.org

MONEGASQUE ASSOCIATION FOR THE PROTECTION OF NATURE (AMPN)

The Monegasque Association for the Protection of Nature (AMPN) manages two Marine Protected Areas (MPAs) in Monaco, which it created in 1976 and 1986.

It regularly develops monitoring and research programmes. This includes work carried out on 3D printed artificial reefs submerged in the Larvotto MPA. These lead to the development of innovative tools to protect or reinforce biodiversity. AMPN also created the Monaco Educational Marine Area for which it plays a central role. Its expertise contributes to its success, and guarantees that children can play their part in environmental protection.

www.ampn-nature-monaco.com

BEYOND PLASTIC MED - BEMED

With over 3 trillion microplastic particles, the Mediterranean is the most polluted sea in the world. Faced with this finding, the Prince Albert II of Monaco Foundation asked the Tara Océan Foundation, Surfrider Foundation Europe, and the MAVA Foundation to join forces and launch the Beyond Plastic Med (BeMed) initiative during the international conference “Plastic in the Mediterranean: what next?” which was held in Monaco in March 2015.

In January 2019, the Beyond Plastic Med (BeMed) association was founded and is now led by a large group, as the IUCN wanted to get involved alongside the founding members. As BeMed’s goal is to act at the source of the problem, the association aims to support and network stakeholders committed against plastic pollution in the Mediterranean, implement sustainable solutions, encourage the research of new alternatives and rally stakeholders and the general public through knowledge and sharing best practices.

www.beyondplasticmed.org

THE MEDFUND
ENVIRONMENTAL FUND FOR MEDITERRANEAN MARINE PROTECTED AREAS (MPAS)

The MedFund is an environmental trust fund based in Monaco, specifically dedicated to funding marine protected areas (MPA) in the Mediterranean. Founded in 2015 by Monaco, France and Tunisia with the support of the Prince Albert II of Monaco Foundation, MedPAN network and SPA/RAC, the MedFund realises the commitment by several Mediterranean countries and international environmental organisations who believe that immediate action is required to protect the future of the Mediterranean and its populations.

The environmental fund partially relies on an innovative funding mechanism which aims to capitalise a solid financial amount whose regular profits are reinvested sustainably in MPA support. Transparent and secure, The MedFund observes a responsible investment policy which helps address the issues of a new, more sustainable Mediterranean economy.

www.themedfund.org

OCEAN ACIDIFICATION AND OTHER OCEAN CHANGES – IMPACTS AND SOLUTIONS – OACIS

Ocean Acidification and other ocean Changes – Impacts and Solutions (formerly the Monegasque Association for Ocean Acidification - AMAO) is a Monegasque association founded in 2013 on the initiative of the Prince Albert II of Monaco Foundation to study the impact of climate change on the ocean, such as acidification, as well as potential solutions to mitigate its impacts. It is hosted by the Prince Albert II of Monaco Foundation.

OACIS involves several stakeholders: the Prince Albert II of Monaco Foundation, the Monaco Government, the IAEA environment laboratories, the Monaco Scientific Centre and Oceanographic Institute, as well as representatives from the International Union for Conservation of Nature (IUCN) and the French Scientific Research Centre (CNRS).

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