monaco ocean week

24|30
MARCH 2019

monaco ocean week

"The Monaco Ocean Week provides a unique forum for discussions, meetings, experimentation and opportunity."

HSH Prince Albert II of Monaco

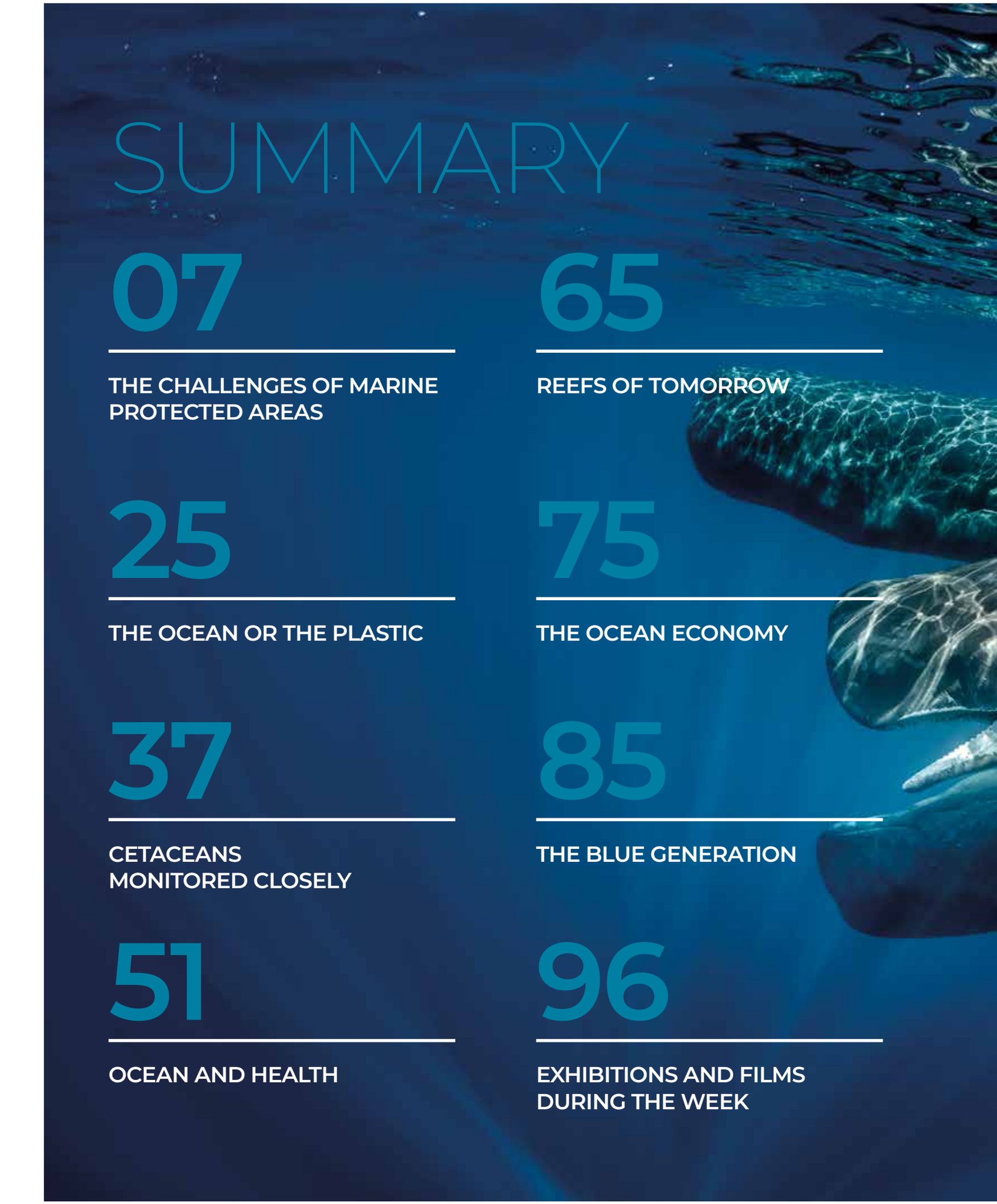
PREFACE

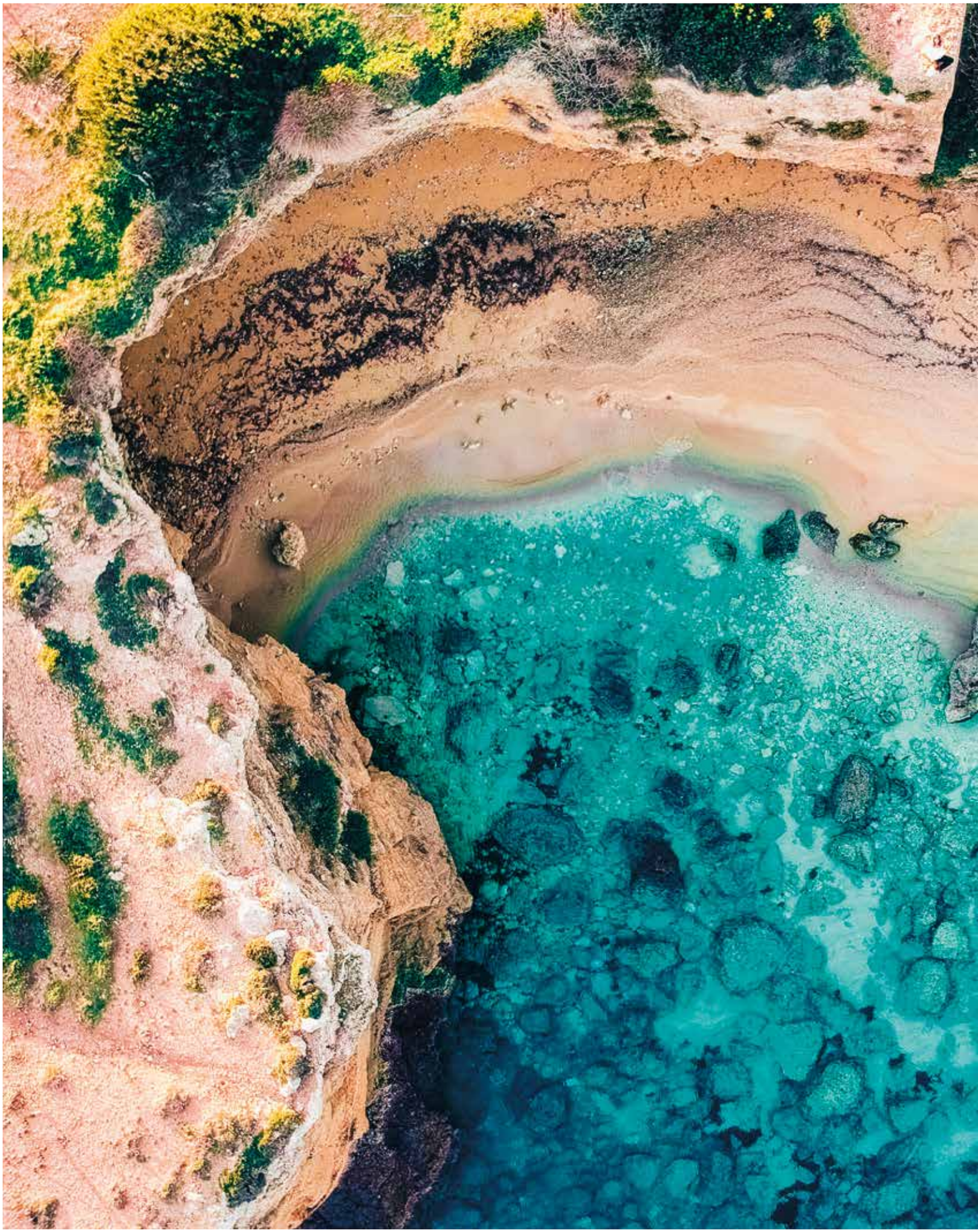

monaco
BLUE INITIATIVE
24/25 MARCH 2019
10th edition MONACO

The Principality of Monaco's commitment to the Ocean takes root from a very long and deep history.
For over a hundred years, what was initially a personal intuition, conviction and passion – those of my great great grandfather Prince Albert I – has become a collective concern.
For over a hundred years, Monegasque institutions dedicated to the Ocean have developed, resolutions have intensified, initiatives have been completed.
Today they form a unique network, an exceptional concentration.
There is my Foundation of course, which since 2006 has been implementing my action to protect the Ocean and the Planet.
There is my Government and its services dedicated to the preservation of our national maritime space or involved in international negotiations related thereto.
There are eminent scientific institutions, such as the Oceanographic Institute and the Scientific Centre of Monaco, multilateral scientific organizations, such as The CIESM (The Mediterranean Science Commission), the International Hydrographic Organisation, the Institute of Economic Law of the Sea and the International Atomic Energy Agency's Marine Environmental Laboratory.
There are long-established players, such as the Monaco Yacht Club, which is comprised of numerous individuals with a passion for the sea.
There are also international conservation organizations, including the ACCOBAMS or the RAMOGE and PELAGOS agreements.
There are NGOs striving to preserve the seas, such as the Monegasque Association for the Protection of Nature, the Monegasque Association on Ocean Acidification and the Environmental Fund for Mediterranean Marine Protected Areas.
To strengthen synergies between all those involved, to secure the widest possible support and to foster crucial dialogue between stakeholders across the globe, the Monaco Ocean Week has provided since 2017 a unique forum for discussions, meetings, experimentation and opportunity.
The 2019 edition, a fascinating overview of which is attached, once again demonstrated these efforts during the various events it organized.
And above all, it has proved the importance of collective and coordinated action to meet this major challenge of our era: to save the Ocean in order to save our future.

HSH Prince Albert II of Monaco

SUMMARY





07

THE CHALLENGES OF MARINE PROTECTED AREAS

MONACO BLUE INITIATIVE

The Marine Protected Areas of tomorrow

The 10th edition of the *Monaco Blue Initiative* took place at the Oceanographic Museum of Monaco on 25 March 2019, under the patronage of HSH Prince Albert II of Monaco. Nearly one hundred and fifty participants met to discuss the theme of Marine Protected Areas during an intense day of conferences and debates.

BACK GROUND

In 2009, following the Climate Change Conference in Copenhagen (COP 15) which did not result in any binding commitment, the Prince Albert II of Monaco Foundation and the Oceanographic Institute of Monaco started the first edition of the *Monaco Blue Initiative*, bringing together key figures from institutional, political, scientific and business fields to discuss ocean protection and the blue economy.

DEFINITION

A Marine Protected Area (MPA) is a recognised, dedicated and managed geographic space - through legal or other effective means - aiming to ensure long-term protection of nature, with the associated ecosystem services and cultural values. Seven MPA categories were established by the IUCN depending on its management objectives.

Major progress has been made in ocean protection, bringing the objective of 10% protection by 2020 - a figure approved by the Convention on Biological Diversity and UN member states - within reach. However, whilst it is recognised that Marine Protected Areas (MPA) are the most effective tool to protect biodiversity and economically develop ecosystems, it is clear that there are not enough of them, they are not sufficiently understood, and they are not effective enough.
Faced with increasingly urgent environmental threats, how can we rapidly respond to the challenges of improved ocean protection, this shared heritage which is so vital for a global balance? How can we combine the efforts of all countries to reach new international objectives, which target 30% protection? Moreover, by encouraging conservation such as species protection and ecosystem restoration, do MPAs guarantee sustainable fish stocks and the quality of attractive sites, and therefore the foundation for a responsible economy?

In the elegant conference hall at the Oceanographic Museum of Monaco, a select group discussed the geopolitical, ecological and societal problems linked to the implementation of Marine Protected Areas at a global level.

IN FIGURES

- **7,59%** of the Ocean is protected in 2019 (vs. less than 1% in 2010), i.e. **27,494,100 km²**.
- Only **4.8% of MPAs** are effectively implemented and actively managed.

High-ranking figures from governments and politics, leaders of international organisations and NGOs, scientists and the private sector shared their recognised view of the topic. Arguing their point of view, they offered their analyses and their recommendations to guide the future management of the Ocean - particularly the major international events in 2020, such as the Convention on Biological Diversity COP in China.

In his opening address, HSH Prince Albert II of Monaco set out the challenges of this day of discussion, which was organised around three sessions. Led by renowned and experienced moderators, the debates were supplemented by speeches given by government representatives from France, the European Union, China and Portugal. ■

MONACO BLUE INITIATIVE

30% Marine Protected Areas by 2030

Dedicated to the development of effective Marine Protected Areas, the first session of the MBI helped evaluate ocean protection over the last ten years, and to identify the priorities to guarantee long-term sustainability and effectiveness of the MPAs. The moderator, the American biologist Jane Lubchenco (former director of NOOA and current professor at the University of Oregon) referred to the resolution of the 2016 World Conservation Congress, approved by 90% of governments and nearly all non-governmental organisations, which called for at least 30% of each habitat to be strictly protected by 2030. The Ocean cannot be forgotten any longer.

Several speakers underlined the problem of differing conservation and management statuses, and sometimes even a divide between effective protection and designation. Reducing these “paper parks” is an ambition shared by members of the MBI, who are committed to developing a guide on MPA using a common language to describe the four stages of establishment and the levels of protection as well as the objectives. Marco Lambertini, director general of the WWF, called for greater clarity regarding the governance of future international treaties, monitoring and regular evaluation. The Member of the European Parliament, Ricardo Serrão Santos, pointed out the need for improved consideration of coastal habitats (seagrasses, mangroves, salt marshes, etc.) which represent nearly half of the total carbon sequestered in the Ocean.

IN SIGHT

“It is no longer about protecting a few ecosystems, but inventing a global ocean-level solution.”

HSH Prince Albert II of Monaco

The panel underlined the importance of sustainable finance, without which the MPAs could not reach the conservation objectives and would lose public and political support. In response to this requirement, the former chair of the French MPA managers' forum, Romain Renoux, coordinator of *the MedFund*, presented the environmental funds created in 2015 by Monaco, France and Tunisia, and now comprising six countries. The ambition is to fund the operation of over twenty Mediterranean MPAs over several decades. The lawyer Mark J. Spalding, president of The Ocean Foundation and the Sargasso Sea Commission, encouraged a change in grant policy which considers MPAs as a shared public resource. This line reflects the negotiations of the Intergovernmental Conference on an international legally binding instrument (BBNJ) reporting to the United Nations Convention on the Law of the Sea, which took place at the same time in New York. It relates to the conservation and sustainable use of marine biodiversity in zones which are not within the national jurisdiction.

New tools emerged during the meeting, which aim to integrate MPAs within a broader ocean management framework. ■

BRUNE POIRSON, SECRETARY OF STATE FOR ECOLOGY WITH THE FRENCH MINISTRY FOR THE ECOLOGICAL AND INCLUSIVE TRANSITION

"The matter of International Marine Protected Areas must be a core policy. The next Convention on Biological Diversity COP, which will take place in China at the end of 2020, will bear a huge responsibility: renewing the global framework for biodiversity to tackle the global climate challenge."

MONACO BLUE INITIATIVE

A network of MPAs including the high seas

© Frédéric Buyle, Monaco Explorations

These networks also encourage the distribution of effective management tools and skills with people in charge of implementing the networks. The members of the panel, such as the CNRS researcher Serge Planes, underlined the need for scientific monitoring, but also the value of practical and social skills and traditional knowledge, which provide a solid scientific foundation for the MPAs and encourage citizen commitment. Overall, the best performing MPA networks are those with significant local commitment

IN FIGURES

THE HIGH SEAS
61% of the Ocean
1.18% of the high seas are protected

The second session promoted the existing MPA networks, whilst recommending areas for further development. Invited by the climatologist Alexander Tudhope from the University of Edinburgh, experts explained several examples demonstrating the resilience effect of this protection network between coasts, the high seas and deep waters. They demonstrated how MPA networks facilitate natural connections between species and habitats in the sea. This is shown by the Mesoamerican Reef which contains fifteen MPAs, the Marine Conservation Corridor of the Eastern Tropical Pacific which has combined the protection efforts of four countries since 2004, or the network of Mediterranean Marine Protected Areas (MedPAN) which brings together around nineteen countries across the Mediterranean. Ensuring healthy migratory species - which cover several jurisdictions - is down to extensive ecosystem and geographic consistency.

It seems that MPA networks help reinforce local capacities whilst providing a broader platform to influence national and international policies. As underlined by the president of MedPan, Purificacio Canals, the example of humpback whales has demonstrated that the transfer of knowledge between managers with specific experience can improve the situation of a species at the scale of several oceanic regions, in this instance from the Caribbean to the Azores which host humpback whale populations from the North and South Atlantic. The French delegate for the Sea and Coasts, Olivier Laroussinie, listed the different legal and political tools available at an international level. The high seas are at the centre of the problem. Around ten countries fish in the high seas thanks to funding, as indicated by José Maria Figueres from Ocean Unite. He suggested declaring the entire high seas zone as an MPA, which would extend the international coverage of MPAs to 30%. ■

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KARMENU VELLA, EUROPEAN COMMISSIONER RESPONSIBLE FOR THE ENVIRONMENT, MARITIME AFFAIRS AND FISHERIES

"The network of European Marine Protected Areas is now equivalent to the size of Spain. But considering the increasing threats to the Ocean, stakeholders' ultimate objective should be to protect the global ecosystem, with MPAs representing the highest level of ambition that we can defend."

CHUANLIN HUO, DEPUTY DIRECTOR OF CHINA'S DEPARTMENT OF ECOLOGICAL AND ENVIRONMENTAL PROTECTION

"With over thirty years of experience in managing Marine Protected Areas, China has established over 275 marine reserves which cover 120,000 km². It recently agreed to implement a real "ecological barrier" in 11 coastal provinces by linking the MPAs and islands by 2020. As a host country for COP 15 of the Convention on Biological Diversity, China undertakes to encourage improved ocean management worldwide, notably through a reinforced partnership with Europe."

MONACO BLUE INITIATIVE

MPAs at the heart of the economy of tomorrow?

The third session of the MBI discussed the integration of the evaluation of ecosystem services in the development of the blue economy. The panel agreed that without the support of a wide range of socioeconomic and political stakeholders, Marine Protected Areas cannot fulfil their conservation role. Further still, the evaluation of their ecosystem services could encourage acceptance by all society figures and contribute to their development. The resilience of marine species and habitats, preservation of fishing resources, the dynamic of tourism, mitigating the effects of climate change... Healthy marine ecosystems provide precious services which must be measured with greater accuracy.

Several speakers criticised the lack of high-quality data, making evaluation difficult. Studies based on complex economic data should be promoted, instead of models. Other speakers highlighted new tools to integrate these values into the MPA process. Maria Damanaki, director of Ocean programmes at Nature Conservancy, shone the spotlight on the role of reefs and mangroves on Mexican tourist coasts, which helped considerably reduce the impact of extreme weather conditions, or more generally the services provided by coral reefs, estimated at a value of $9,900 billion. The growing interest of the idea of "natural capital" was noted, including amongst insurance groups and hotels. This emerging financial support could be expanded as a risk reduction strategy linked to climate change. An instrument which is increasingly adopted in land areas, payment for ecosystem services (PES) could also be used for marine conservation. The vice-president of the Seychelles, Vincent Meriton, shared ideas taken from his country's marine space plan, funded since 2015 through an unusual debt-for-nature swap and blue bonds, which will very soon allow it to reach 30% protection of its own marine territory. The example of an MPA managed by the communities of Joal Fadiouth in Senegal demonstrated how participative management and sharing of resources can reconcile socio-economic benefits with conservation benefits.

Finally, experts - such as Peter Herzig, director of the German Centre for Ocean Research (GEOMAR) - expressed their concern regarding new high seas extraction activities, and called for a balance between the use and protection of the Ocean.

During the discussion, it was suggested that setting a price for ecosystem services would help other solutions to emerge, making them competitive. Integrated multi-trophic aquaculture, providing ecosystem services in coastal MPAs whilst providing means of support and food security to local communities, is also a concept which could be developed further. ■

JOSÉ APOLINARIO, SECRETARY OF STATE FOR FISHERIES, PORTUGAL

"Portugal plays a very active role in establishing marine protected areas to reach 30% protection.
The Portuguese Minister for Maritime Affairs chaired the launch of the "Blue Azores" programme, which includes a new 150,000 km² MPA representing 150% of Portugal's continental surface area alone! (...)
The challenges regarding the Ocean's future are global and require a collective response. To reflect its desire to find solutions, Portugal will jointly organise the second United Nations Conference on the Ocean with Kenya, which will take place in Lisbon in June 2020."

ON THE TRAIL OF SHARKS

Malpelo, a well-defended oasis

In the conference hall of the Oceanographic Museum of Monaco, the Olivier Borde exhibition demonstrates the scope of sea explorations, a tradition started at the end of the 19th century by Prince Albert I, the father of modern oceanography, and continued by Commander Cousteau. The photographs offer an overview of the marine species which make up the diverse landscape of Malpelo, a protected site for twenty years. *"We can see schools of over 200 hammerhead sharks or a thousand silky sharks! Whale sharks, giant groupers, tunas, manta rays and turtles continue to prosper in this oasis"* explains Sandra Bessudo, president of the Malpelo Foundation.

In March 2018, a scientific expedition dedicated to tracking hammerhead sharks took place as part of the Monaco Explorations. The Sovereign Prince visited Malpelo and took part in a diving mission to tag the sharks, as explained by the exhibition presented at the Oceanographic Museum of Monaco. "*The fitting of satellite tags tells us about the migratory routes favoured by this threatened species"* Sandra Bessudo confirms.

PROFILE

The summit of an underwater volcanic mountain range, the **island of Malpelo** is the visible portion (1.2 km^2) of the largest zone of the eastern tropical Pacific, where fishing is prohibited. Eight oceanic currents meet around this major refuge for several species threatened worldwide. Located 500 kilometres from the Colombian coast, it is a forty hours journey. Its name, taken from the Latin *malveolus*, means "inhospitable". It has always been uninhabited. Its ecological isolation is comparable to the Galapagos (without the pressure of invasive species). The site has been classified as a UNESCO world heritage site since 2006.

INTERVIEW

Sandra Bessudo

President of the Malpelo Foundation. She created the Foundation in 1999 and made Malpelo a recognised marine sanctuary. She is also an Oceans adviser to the vice-president of Colombia.

In 2017, the Malpelo marine protected area tripled in size. What led to this extension?

Our research on sharks in Malpelo demonstrated that seamounts around the island are a crucial meeting place for many species. We successfully extended the marine protected area to the shallows of the underwater mountain range. These landforms - which reach 300 metres in depth - are difficult to study, particularly as they are located in the high seas. We would need small submarines to be able to understand what is happening. At the moment, we fit cameras with bait, and we start to work on the environmental DNA, an innovative approach to list all the species present. We already know that these seamounts are a resource for hammerhead sharks, thresher sharks and silky sharks.

Last March, the Sovereign Prince took part in a campaign to track hammerhead sharks as part of the Monaco Explorations. What are the next steps for this scientific program supported by the Prince Albert II of Monaco Foundation?

In the presence of HSH Prince Albert II of Monaco, we were able to tag five female hammerhead sharks with satellite tags. They were pregnant females. Thanks to the high-precision satellite tags, we saw that these females travelled to the North, near to the Colombian and Panamanian pacific coasts. This confirmed our previous research and we were able to demonstrate that this coastal region was a nursery for hammerhead sharks. However small-scale fishing is a key part of the region's economy, which is very poor. After noting that the pups were being widely caught, we started an awareness campaign with fishermen and children. Protecting shark nurseries is crucial if we want to protect the species. Out of the five females tagged during our expedition, two were caught near Panama. Only two returned to Malpelo. That is a very worrying ratio...

Which challenges drove the desire to protect migratory species?

Sharks are not limited by our borders. They follow migration corridors which are linked to marine currents. And our studies show that there is a connection not just between the tropical eastern Pacific islands (Galapagos, Cocos, Malpelo, Coiba), but also the Colombian and Panamanian pacific coasts. If we protect them in Malpelo but they are killed in the high seas or in the nurseries, our work will have been in vain. We need a better understanding of where the migration corridors and reproduction zones are located, which are essential to the survival of these marine species. We need to improve collaboration between countries, and create binational marine protected areas, like we already have with Panama, in order to actively tackle illegal fishing. ■

IN FIGURES

- **27,000 km²**: Malpelo MPA surface area
- **3,400 m**: shallows depth
- **10 endemic** marine and land **species**
- **480 species of fish**
- **60 species of bird**
- **500 tourists/year** (vs. 80,000 in the Galapagos)

THE FINAL STRETCH

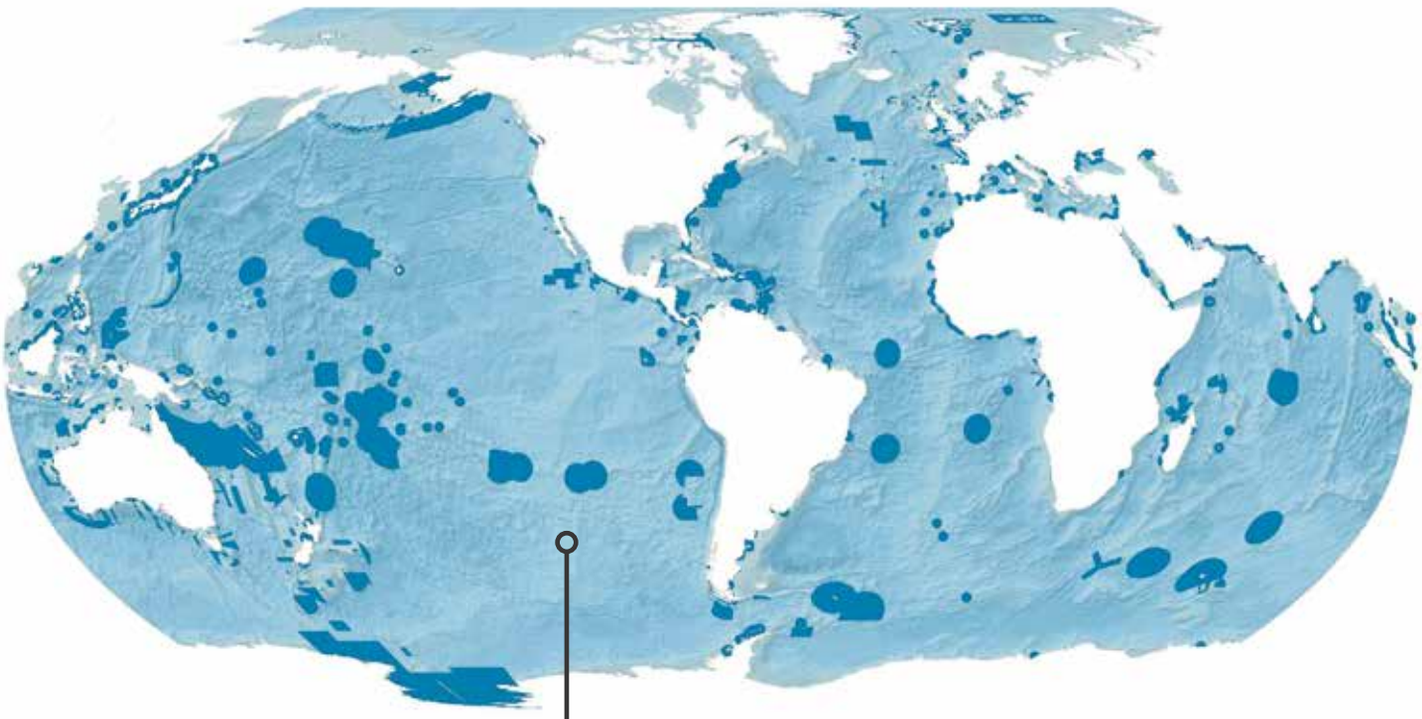
Establishing the global network of Marine Protected Areas

On the eve of the deadline for the Aichi Objectives of the Convention on Biological Diversity, the partners of the International Marine Protected Areas Network (IMPANA) met during the *Monaco Ocean Week* to review the situation.

The goal? Reaching Aichi Target 11 for the marine environment. The deadline? 2020. A tight deadline for 196 governments which are committed to protecting 10% of coastal and marine zones, especially areas of particular importance for biodiversity and ecosystem services. In 2013, during the 3rd International Marine Protected Areas Congress (IMPAC 3), the International Marine Protected Areas Network (IMPANA) was created. The purpose of this initiative is to create and reinforce work in progress on the international marine protected areas network. It is about raising awareness amongst governments and dedicated organisations to help establish consistent and effective networks and marine conservation measures, whether national, regional or international.

The international marine protected areas network targets effective management and resources to ensure ecological connectivity. *"IMPANA is a new opportunity to explore what we can do together to reach these targets and plan actions to protect the blue heart of our planet"*, summarised Dan Laffoley, vice-chair of the IUCN's World Commission on Marine Protected Areas, during the meeting which was held at the Monaco International Hydrographic Organisation on 27 March 2019. IMPANA brings together a multi-stakeholder partnership around marine protected areas, which must work as a driver to reach international targets, including challenges around negotiations in progress on a treaty for the conservation and sustainable use of marine biodiversity in the high seas. *"The international marine protected areas network is taking shape thanks to a human network"*, explains Puri Canals, president of the Mediterranean marine protected areas manager network. And during international conferences, ties are formed at all levels, between national agencies and during technical and scientific discussions between managers, experts, charities, institutional and private decision makers, financial backers, etc. Announced during the meeting, IMPAC 5 - planned for September 2021 in Vancouver (Canada) - promises to be a significant event.

The agenda is set in motion at a time when national, European and international strategies for biodiversity protection and the international marine protected areas network will be reviewed, with the Sustainable Development Goals (SDG) in mind in 2030. In June 2020, France will host the World Conservation Congress in Marseille. It will allow stakeholders to form alliances for the United Nations Biodiversity Conference in China at the end of 2020. ■



Source: UNEP-WCMC AND IUCN (2019). Protected Planet: The World Database on Protected Areas (WDPA) July 2019, Cambridge, UK:UNEP-WCMC. Available at www.protectedplanet.net

14,894 MARINE PROTECTED AREAS

7.66% OF THE OCEAN COVERED BY MPAS

27,738,316 km² TOTAL AREA PROTECTED

BACK GROUND

AICHI TARGETS

The Convention on Biological Diversity is the first treaty signed at international level which covers all aspects of biological diversity. Signed during the Earth Summit in Rio de Janeiro in 1992, it now includes nearly all countries (196). The United States is not one of them. 168 countries (the Parties) have ratified it.

In 2010, the international year of biodiversity, the Parties met in Aichi, Japan. After the failure of the previous target to *"halt biodiversity loss"*, it was about finding an agreement likely to make a difference and engage the international community. This led to the Aichi Targets which were adopted for 2020: an emergency plan built around 20 targets to end the decline in biological diversity, ensuring the resilience of ecosystems able to provide services essential to life on earth and human society. Target 11 applies to terrestrial areas (17%) and marine and coastal areas (10%).

NEW CONTRIBUTIONS

The MedFund consolidates its support in the Mediterranean

Taking part in major events during the *Monaco Ocean Week*, administrators of the environmental fund *The MedFund* met for a board of directors meeting to approve a certain number of guidelines regarding Mediterranean marine protected areas.

During the meeting held on the morning of Friday, 29 March 2019 at the Oceanographic Museum of Monaco, the board of directors of *The MedFund* (originally known as M2PA) approved the plans to reinforce and develop initiatives in favour of Mediterranean marine protected areas. Other than the first three supported in Morocco, Albania and Tunisia, it was decided to extend the scope of action to new marine protected areas within these countries, but also to extend the initiative to other Mediterranean countries. And it was about adapting the support depending on the specific requirements identified for each country:

- providing the systems to create the first marine protected areas in Montenegro and Algeria and supporting this momentum in the first years of managing these sites;

- supporting the existing marine protected areas in Turkey, Lebanon, Greece and Croatia, which require increased capacity and sustainable finance.

IN SIGHT

"Our initiative's goal is to fund activities carried out every day by marine protected areas: protecting sites in sensitive zones, surveillance, scientific monitoring of ecosystems, equipment maintenance, raising awareness amongst the general public and local stakeholders, improving governance, etc."
***Romain Renoux**, coordinator of The MedFund.*

Turkish island of Gökçeada
© Renaud Dupuy de la Grandrive

PROFILE

Launched in 2015 by Monaco, France, Tunisia and the Prince Albert II of Monaco Foundation, *The MedFund* encourages effective management of Mediterranean marine protected areas. Spain, Morocco and Albania plus around ten international organisations have joined the environmental funds supported by the Monegasque government, the Global Environment Funds, the French Funds for the Global Environment and the French Development Agency.

SUSTAINABLE FINANCE

The MedFund aims to support around twenty marine protected areas in the Mediterranean in the coming years. *"One of the specific features is that we are not focused on a specific project - this is a long-term commitment. The objective of the Funds is to create significant financial capital invested based on a responsible investment strategy. The interest generated each year by this capital is used to create a sustainable financial stream which can fund projects for long periods, ranging from ten to twenty years, or even indefinitely",* explains Romain Renoux, coordinator of *The MedFund.*

NEW PARTNERSHIPS

- The Prince Albert II of Monaco Foundation, which wanted to consolidate its involvement in *The MedFund*, donated €1 million to the fund. A financial partnership agreement was signed in the presence of the Sovereign Prince during the *Monaco Ocean Week*.

- Thanks to the international network of the Oceanographic Museum of Monaco, a reinforced partnership with two aquariums wanting to support marine protected areas:
  - a framework partnership agreement was signed during the MBI with the Nausicaá endowment fund, the Boulogne-sur-Mer aquarium which has raised funds from visitors but also by encouraging corporate sponsorship;
  - another agreement was signed with Sorbonne University which provides administrative control of the Banyuls-sur-Mer Biodiversarium, which wanted to support the initiative by donating visitor entry fees each year. ■

NEW AUDIT

The Pelagos Sanctuary under the watchful eye of experts

Four years after the last appraisal, the consulting technical committee ruled in favour of maintaining its status as a Specially Protected Area of Mediterranean Importance (SPAMI) with a more than satisfactory score of 83%.

In the offices of the Tour Odéon on Friday, 29 March 2019, the Committee appointed by the Regional Activity Centre for Specially Protected Areas left no stone unturned to evaluate the Pelagos Sanctuary, in accordance with the recommendations of the Barcelona Convention. Comprised of independent international experts, national experts, the chair of the Scientific and Technical Committee and delegations from three member countries of the agreement and its permanent secretariat, the Committee examined the activities, management plan, working programme and the status of the Sanctuary.

PROFILE

The subject of an Agreement signed in 1999 between Italy, Monaco and France, since 2001 **the Pelagos Sanctuary** has been a Specially Protected Area of Mediterranean Importance (SPAMI) in accordance with the Barcelona Convention's "Biodiversity" protocol. It also constitutes a pilot zone for the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) and represents the only international and high seas marine protected area dedicated to protecting marine mammals in the Mediterranean.

REINFORCED GOVERNANCE

The Committee appreciated the reinforced governance put in place since 2015 to improve the Agreement's workings. Amongst the measures adopted, the Principality of Monaco increased its financial contribution, now equalling other member countries, allowing the long-term operation of the Agreement's permanent secretariat, which is notably in charge of coordination between authorities. The permanent secretariat also opened its new headquarters in the Principality of Monaco, optimising cooperation between the secretariats of other relevant international organisations (ACCOBAMS, RAMOGE, etc.).

In order to ensure fairness when representing countries within the governance of the Agreement, the permanent secretariat team - which was originally French - has become international, and the chair of the scientific and technical committee, which until now was held by the Principality of Monaco, is now rotating and currently held by Italy. Finally, a six-year management plan has been established, allowing the implementation of a bi-annual work programme based on priorities identified by the Parties to the Agreement.

RECOGNISED MOMENTUM

Four international scientific projects are currently being carried out within the sanctuary to improve the conservation of marine mammals and their habitats. The experts also believed that the measures adopted in accordance with regulations were satisfactory (e.g. prohibiting offshore races in Italian sanctuary waters, or the making the anti-collision system mandatory on French vessels in French sanctuary waters) as well as soft law measures, such as adhering to the Pelagos partnership charter and the promotion of sustainable whale watching activities through the *High Quality Whale Watching*® label.

Finally, the evaluation demonstrates the commitment of the Agreement's three member countries, which are the managers of this vast area. By pooling their efforts and resources, they have considerably improved the functioning of this Specially Protected Area Of Mediterranean Importance (SPAMI), which will retain this status. The results of this audit will be officially announced during the Meeting of the Parties, which will take place in June 2019 in Slovenia. ■

IN FIGURES

- **87,500 km²**
- **4 to 18%** of the world's marine species
- **8 marine mammal species** regularly observed.

25

THE OCEAN OR THE PLASTIC

INNOVATION

Bioplastics from the Ocean

At the very start of the *Monaco Ocean Week*, BioMarine brought together around fifty business leaders, investors, technology suppliers and entrepreneurs to consider the future of blue bioplastics, a sustainable innovation which could considerably reduce the carbon impact of key industrial sectors.

"It is the time to take action together and release the blue potential", asserts Véronique Erwes, co-founder of BioMarine. Sustainability and biocompatibility emerged as the guiding themes of the workshop led by BioMarine. Blue bioplastics (which are manufactured from natural marine resources) represent a burgeoning industry. Beyond the technological aspects, it was about designing a sustainable and fair global production system. What would be the best models able to organise partnerships between raw material producers, emerging technology designers and manufacturers?

BioMarine is presented as a *"Blue catalyst"* which facilitates business opportunities to align them with market requirements. In addition to the technological and industrial prospects, the funding angle encouraged participants to consider the best options for this emerging economic sector. Cross-referencing these approaches has emphasised the main challenges of a promising blue bio-economy.

PLASTICS CREATED FROM THE OCEAN

"The Ocean should be considered an enormous reserve of biomass for blue bioplastics. Three French companies have already paved the way for algae-based bioplastics, an innovative and sustainable alternative to design cosmetics without plastic microbeads or created using carbon-free blue plastics. Microalgae is also an interesting option to extract starch and create a blue bioplastic. The recycling of waste subproducts created by the aquaculture and fishing industries can also provide unique solutions. Each year, millions of tonnes of fish scales are thrown away, when they are a real 'blue' goldmine." ■

Pierre Erwes, co-founder of BioMarine.

BioMarine Business Convention

© Biomarine Organization

BioMarine Organization is an investment platform bringing together over 6,000 companies, SMEs, government agencies and investors. It focuses on the sustainable development of biomarine resources to encourage the development of innovative products.

BEMED: A RESPONSIBLE NETWORK

Always committed to the fight against plastic

Each year, over 10 million tonnes of plastic are dumped in the Ocean. They can take up to 500 years to break down.

KEYFACT

In thirty years, the Ocean might contain more plastic than fish if nothing is done to reduce and deal with this pollution. More affected than any other part of the globe, the Mediterranean is on the front line.
It was against the backdrop of this alarming evidence that the Beyond Plastic Med (BeMed) network, created by the Prince Albert II of Monaco Foundation, was launched in Monaco in 2015, and is strengthened each year.

NGOs, local authorities, scientific institutions and companies in the Mediterranean are working hard to reach the same objective: a plastic-free Mediterranean. During the 2019 *Monaco Ocean Week*, fifteen new initiatives in eight Mediterranean countries were recognised by the BeMed network: A "zero plastic" campus in Turkey, a selective sorting system in Albania, single-use plastic-free tourism in Cyprus, fishing net recycling in Algeria, sailing trips in the Mediterranean, etc. After a morning of discussion workshops chaired by the founding members of BeMed, the 2019 winners officially presented their actions to HSH Prince Albert II of Monaco. The chosen micro-initiatives were briefly presented, reflecting the fundamental commitments of the BeMed network. With this support, the winners can now implement these key projects.

SHARING EXPERIENCE AT A MEDITERRANEAN LEVEL

As in each year, the winners of the BeMed call for micro-initiatives meet to share the different initiatives, receive feedback from previous projects and strengthen the network of Mediterranean figures committed against plastic pollution. On 28 March, the winners from the past three years and the founding members of the BeMed network met during workshops to discuss three topics:

FOCUS

BEYOND PLASTIC MED

BeMed 2019
15 micro-initiatives supported
8 Mediterranean countries

THEME 1

How can we regulate regional plastic pollution?

This workshop brought together BeMed members to establish an overview of pollution in the represented countries, to compare obstacles and drivers of action, and to find inspiring synergies. The different discussion groups underlined the lack of user knowledge regarding the environmental impact of plastic waste, particularly single-use plastic (e.g. in the tourism sector), the high cost of alternatives, the difficulties in collecting the expanded polystyrene used in fish crates (industrial sector) and the lack of purification station equipment to process industrial plastic pellets.

The chosen guidelines for action:

- Regulate the production of plastic (banning single-use plastic, banning planned obsolescence);
- Implement economic incentives for eco-responsible products;
- Effectively apply existing legislation;
- Create a solution database for best practices, including the regulatory framework for each country.

THEME 2

How can we involve private partners?

BeMed wants to enter into further dialogue with the private sector by encouraging research of innovative solutions to act on the entire plastic life cycle (design, production, distribution, use and recycling), with the circular economy in mind.

The chosen guidelines for action:

- Create and coordinate a business club with top scientists which aims to act as a *"solutions research centre"* to help businesses to innovate better and quicker (sharing existing best practices, pooling human and financial efforts);
- Target the tourist sector in the southern and eastern part of the Mediterranean basin to generate momentum;
- Implement monitoring of the blue economy, taking public expectations into consideration.

THEME 3

How can we reinforce the BeMed network?

Only a collective dynamic beyond borders will allow us to tackle the challenge of a plastic-free Mediterranean. BeMed's strength lies in this network of committed and supportive Mediterranean stakeholders. This collaboration workshop explored new lines to encourage the sharing of experiences and to reinforce the existing synergies.

The chosen guidelines for action:

- Improve communication promoting network actions;
- Organise regular meetings with network stakeholders to encourage the exchange of ideas and sharing of experiences (conferences, events, team building, etc.) ■

BEMED, A SOLUTION-ORIENTED NETWORK

Faced with the scourge of plastic pollution in the Mediterranean, the Prince Albert II of Monaco Foundation, the Tara Ocean Foundation, the MAVA Foundation and the Surfrider Foundation Europe came together to launch the Beyond Plastic Med (BeMed) initiative. Launched during the international conference *"Plastic in the Mediterranean: what next?"* which was held in Monaco on 10 and 11 March 2015, BeMed is now a Monegasque association coordinated by an extended group, as IUCN is involved alongside the founder members. For the 3rd year running, the BeMed network had launched a call for micro-initiatives to support projects located in the Mediterranean basin which actively combat plastic pollution.

WITH THE FIFTEEN 2019 BEMED WINNERS

Let’s imagine a plastic-free Mediterranean

2019 SEA Plastics Expedition
SEA Plastics - France

Collecting data and raising public awareness about the problem of micro-plastics during a sailing trip around the Mediterranean. The expedition is carried out in partnership with scientific laboratories. At each stopover, the yacht becomes an ambassador for the fight against plastic pollution.

CorSeaCare Mission
Association Mare Vivu - France

A kayak tour of Corsica to raise public and tourist awareness of the threats faced by the Mediterranean. A low-tech month of adventure at sea dedicated to researching scientific data on the impact of plastic pollution on marine species.

Plastiğe Hayır !! 2
University of Trakya (CEVSAM) - Turkey

Testing pilot activities for a “zero plastic” university campus: teaching and experiments on recycling, artistic projects based on farming plastic collected around the university, educational “zero-waste” camping, and an anti-pollution campaign...

Plastic-Free Muğla Education
Deniz Temiz Derneği Association - Turkey

Raising awareness of young people (7 to 14 years old) and teaching the right behaviour to combat plastic pollution. A project carried out in schools in partnership with the Turkish Ministry of Education and the General Directorate of Innovation and Educational Technologies.

Plastic-free Velika Plaža
NGO Green Life - Montenegro

Raising awareness, issuing warnings and implementing an action plan to coordinate plastic waste management at the tourist hotspots of Ulcinj and Velika Plaža. Awareness campaigns, affected zone maps presented to institutions, etc.

Young people for a clean Adriatic
NGO Our Action - Montenegro

Creating a network of stakeholders to ban single-use plastic. A charter has been created for coastal companies which are working towards plastic-free tourism, workshops and conferences, cultural activities, coastal and underwater cleaning operations, and reducing the use of plastic bags.

Between the Adriatic and Ionian Seas II
SEEP - Albania

Proposing adapted solutions and supporting sea users to reduce their plastic footprint. Creating a strong regional dynamic, particularly in the tourist destinations of Karaburun peninsula and the island of Sazan, and anti-pollution campaigns on land and on the water.

Cleaning the Balkan seas and rivers
Royal Albania Foundation - Albania

Implementing a university alliance between five Balkan states to reduce plastic pollution in the Adriatic Sea and rivers. Student activities are part of plastic waste recycling and cleaning campaigns.

River Side
Green Vision - Albania

Organising a sorting system and supporting the population towards improved management of plastic waste in a rural region of Albania located along the river Shushica. An awareness campaign about soil, river and sea contamination for local people in the ten villages in question.

#BeatPlasticCyprus
Together Cyprus - Cyprus

Creating, informing and supporting a network of "Zero single-use plastic" certified members in the public and private sectors. On the Beat Plastic Initiative web platform, an interactive map highlights all network members.

"Zero plastic" cruises and water sports
Cyprus Sustainable Tourism Initiative - Cyprus

Advising and engaging cruise operators, boat owners, municipalities, port authorities, marina and watersports users to reduce their plastic consumption and implement selective sorting.

The network of responsible coastal businesses against plastic
AKTI Projects and Research Centre - Cyprus

Involving local authorities to change the habits of bars, beach restaurants and users regarding the use of single-use plastics. Awareness campaigns about the marine environment and the production of a guide explaining best practices.

Safilbahr
ONDST - Algeria

Offering reusable bags made from old fishing nets to raise awareness amongst sea users and the general public regarding the dangers of plastic pollution. An ecological, responsible and sustainable alternative to improve consumer habits.

Surf without plastic in the Al Hoceïma National Park
Moroccan association of regional sciences - Morocco

Creating workshops and a collaboration network between the teachers at Parc National d'Al Hoceima and their students to design specific solutions for the problem of plastic pollution (prototypes, action planning, etc.).

A plastic-free sea: from awareness to action
Tunisie Recyclage - Tunisia

Developing a sorting and recycling network in Tunis: a training programme raises awareness of plastic waste amongst seven hundred students, with anti-pollution campaigns aiming to clean beaches and encourage users to sort selectively at the source.

BACK GROUND

A HISTORIC VOTE

On 24 October 2018, the European Parliament voted in favour of a complete ban on single-use plastics to combat ocean pollution by 2021.
Bans already exist in certain EU countries.
France is committed to banning plastic cups and plates by 1 January 2020.

IN SIGHT

The Principality, the perfect level to take action
"Monaco's strength is that we can enter into dialogue with all stakeholders and implement solutions quickly at a national level" **Annabelle Jaeger,** *project director for the Principality's Energy Mission.*

TAKING ACTION FOR THE FUTURE

Advocating sustainable takeaways

Tubs, disposable lids, bottles, packaging... Plastics used during lunch breaks before ending up in the bin. Monegasque stakeholders, committed businesses, government representatives and restaurant owners who have signed the National Deal for the energy transition and consumers met to discuss how to do things differently.

From the outset, the workshop reflected significant awareness of the impact of plastic, the primary source of greenhouse gas emissions in Monaco. *"We live with and on the sea, and the dramatic plastic pollution of the Ocean affects us significantly. Also, unsorted plastics burned in the incinerator represent the primary source of greenhouse gas emissions in the Principality"* confirms Annabelle Jaeger, project director for the Principality's Energy Mission which led this workshop.

SUPPORTING BUSINESSES TO GO FURTHER

Patrick Rolland, deputy director of the Environment, underlined the different stages of the government policy on the topic: a progressive regulation and adapted support. Some innovative alternatives were presented: wheat bran fibre plates, biodegradable cups made of squash, combustible tubs or straws... More familiar materials such as cardboard, stainless steel or glass could also return to takeaway counters. However, as underlined by Annabelle Jaeger *"there is no obvious perfect solution"*. Indeed, some new plastics are not recyclable, and sanitary problems are sometimes reported. Each innovation needs to be evaluated based on several criteria (raw material, energy impact, ethical production, planned use, storage, recycling, etc.). In this complex labyrinth, it is not easy to choose.

HISTORY

2016
Single-use plastic bags are banned. The cotton "bag for life" is handed out to 12,000 Principality residents.

2017
The Monegasque government launches the "Committed Business" initiative.

2019
Plastic drink mixers and straws are banned. Launch of the "Committed Restaurant" initiative.

2020
Plastic covers, plates and cups will be banned.

FOCUS ON THE PRIORITIES

Like a world *café*, the round tables emphasised the difficulties encountered by some businesses involved in this approach, but also the future benefits, such as customer retention. At the end, participants voted to define the priority actions to implement. Three actions emerged:

- rewarding and retaining people who use reusable containers (loyalty points, discount, etc.): a tried and tested solution which works!
- providing businesses with a specification of environmentally-friendly materials and solutions which could take the form of an online guide;
- having a reusable "lunch box" at Principality level and organising a collection and redistribution system with partner businesses under the "Committed Restaurant" label. ■

IN FIGURES

Single-used plastics, plus abandoned fishing equipment make up over **70%** of marine waste in Europe.

The life of a takeaway salad container
Time used: **15 minutes**
Life span: **400 years**

ALTERNATIVES WITHIN REACH

How can we live without plastic?

During a public conference, *The Animal Fund* (TAF) invited people to understand the phenomenon of plastic pollution in the Ocean, and to plan citizen alternatives within everyone's reach.

Invested in this campaign for four years, Berit Legrand, chair of *The Animal Fund* (TAF), underlined the ecological role played by the Ocean in regulating climate and providing oxygen. Shown in the conference room of the Monaco Yacht Club, the short film *"How whales change climate"* underlined the importance of whales in the Ocean's balance.

Travelling along the water column, cetaceans fertilise the Ocean through their waste, which is rich in iron and nitrogen. These nutrients required by plankton are a source of life which absorbs the atmosphere's carbon. That is why the producer Steve Agnos can claim that *"whales change climate"*. However as stated by the speaker during his introduction, these animals are now threatened by major imbalances. Plastic pollution is one of the sources of this upheaval.

THE ANIMAL FUND

PROFILE

***TAF – The Animal Fund* celebrates 4 years of campaigning**

Created in March 2015, the Monegasque association aims to raise public awareness of environmental problems which threaten the Ocean, such as plastic pollution, overfishing and the use of animal origin products in cosmetics. Cetacean protection is one of this association's core actions. Awareness campaigns, beach clean-ups and *"whaleathons"* are its means of action.

www.theanimalfund.net

IN FIGURES

51 trillion microplastics in the Ocean, i.e. **500 times more** than stars in our galaxy.

Every minute, 20 tonnes of plastic are dumped in the sea.

Plastic waste reaching the Ocean's surface is carried by major ocean currents. This has led to five giant "islands" measuring **over 30 metres thick.** One of them is known as the "7th continent".

REDUCING THEIR PLASTIC IMPACT

And what if the deterioration of the world's largest ecosystem wasn't a foregone conclusion? The speaker invited attendees to consider the fact that each person can immediately play their own part to reduce their "plastic impact". As emphasised by Berit Legrand and his team, the threat of plastic lies in the everyday.

The Animal Fund (TAF) recommends that we change our habits by promoting responsible alternatives: not using liquid soap, disposable toothbrushes or razors, shunning cotton buds, banning plastic sponges as well as all straws, food containers, cups, bottles and all objects designed using this non-biodegradable material. At the end of the workshop, these false friends seemed easily replaceable with ecological and sustainable options which respect the Ocean, which were shown on stage for the curious. ■

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CETACEANS MONITORED CLOSELY

A MAJOR FIRST

A huge marine megafauna tracking campaign in the Mediterranean

After two months of flights and navigation dedicated to visual and acoustic tallying, thousands of pieces of data collected during the *ACCOBAMS Survey Initiative* delivered an initial overview of Mediterranean biodiversity, but also the abundance of floating debris.

The *ACCOBAMS Survey Initiative* pilot project aims to establish a coordinated surveillance system for cetaceans and megafauna in the Mediterranean and Black Sea. The first public presentation of the results of this major campaign took place on Wednesday, 27 March 2019 at the conference room of the Monaco Yacht Club. HSH the Sovereign Prince, the French and Italian ambassadors, the Albanian consul, the Monaco ambassador to UNESCO, representatives from international organisations, the Monaco Soroptimist Club and the general public were in attendance.

"Over ten years ago, the scientific committee and all member countries wanted to carry out a major census of the cetacean populations in the Mediterranean" explained Florence Descroix-Comanducci, executive secretary of the ACCOBAMS in charge of supervising the tracking campaign. *"If we want to implement effective conservation measures, we need accurate information on the distribution and numbers of cetaceans."* Whilst this key stage brought together the twenty Party States during summer 2018, it was the result of a long-term funding strategy, specifically counting on the support of the MAVA Foundation, the Prince Albert II of Monaco Foundation and International Fund for Animal Welfare.

It is also true that this initiative meets recent recommendations from Europe and the Barcelona Convention, which invites States to monitor marine biodiversity in their regions to ensure a positive ecological balance. The ACCOBAMS is the perfect tool to collaborate and implement these obligations in the Mediterranean and Black Sea.

The survey campaign involved one hundred scientific observers on board small aircraft or boats which, over two months, combed the Mediterranean basin looking for cetaceans. The objective was to count and determine the population distribution areas. *"This data is being analysed and will help provide a reliable image of megafauna in the Mediterranean"*, the speaker explained. The census was extended to other species visible using these survey methods, including rays, sharks, turtles, sea birds but also plastic debris: *"We counted eleven thousand pieces of marine debris, mainly plastic"*, confirming that highly enclosed seas like the Mediterranean are more sensitive than ever to human activities.

PERSPECTIVE

In November 2019, the ACCOBAMS will organise the 7th conference of parties in Istanbul. Member states will make decisions to protect cetaceans.

In force since 1 June 2001, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) brings together 24 member countries in 27 coastal countries. It is the first inter-governmental agreement regarding cetacean protection.

KEYFACT


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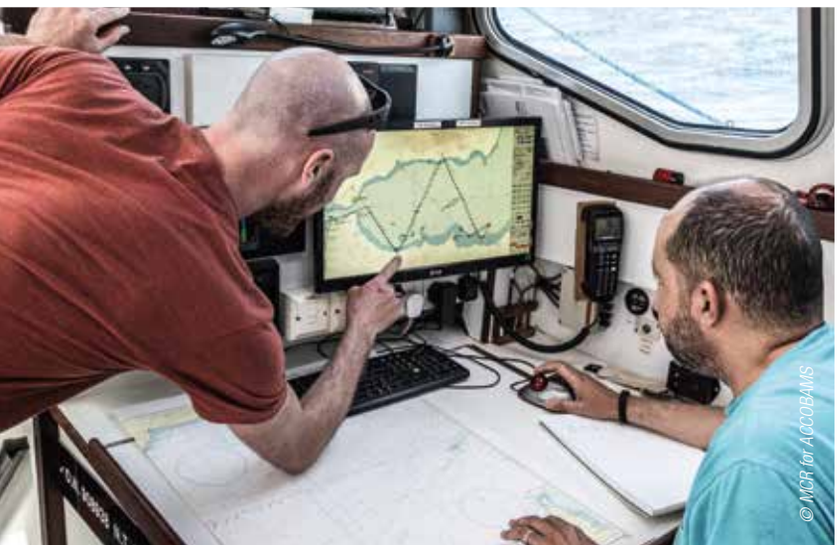
PROFILE

The ACCOBAMS Survey Initiative

- the participation of all Agreement member countries;
- **20 countries** involved in the Mediterranean campaign in summer 2018;
- **100 scientific observers**;
- **8 aircraft used** and 70,000 km travelled (800 hours of flight);
- **6 vessels used** (the main boat, *The Song of the Whale*, travelled 22,000 km);
- tens of thousands of pieces of data collected;
- **over 30 organisations involved**, including the Pelagis observatory (based in La Rochelle) which helps process aircraft data, and Marine Research Conservation (in the UK) which processes data from the boats;
- the Black Sea aircraft observation campaign is planned for summer 2019.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"This project is exceptional due to the geopolitical, human and technical challenges that it represents. There was a real synergy between countries, we were able to experience a Mediterranean commitment", underlines Florence Descroix-Comanducci. *"But the exceptional nature of this initiative is because it provides robust and reliable data at a global scale, real decision-making tools which will allow States to work more efficiently to implement protection measures and work towards sustainable development policies."* *As part of the global effort on biodiversity protection to halt its loss beyond 2020, the time to take action is now.*

"I encourage decision-makers to take concrete action by adopting effective measures to reduce the impact of human activities to better protect Mediterranean species and their habitats. I also encourage everyone to take heed and act responsibly", concluded the executive director of the ACCOBAMS, which places sustainable development at the heart of this collaborative approach. ■

IN FIGURES

More debris than cetaceans

Over 11,000 pieces of marine debris measuring over 25 centimetres were identified during the Mediterranean campaign. **3/4 are made of plastic** and 2/3 of this plastic debris is from single-use food packaging.

THE ACCOBAMS RECOMMENDATIONS

Solutions to deal with the threats

- **Maritime traffic and the risks of collision:** with 63,000 boat passages per year between Sicily and Tunisia, or 130,000 in the Strait of Gibraltar, the Mediterranean is a sea under pressure.

  ✓ The REPCET system, an anti-collision system which has been mandatory in France for two years, could be adopted in other countries, in addition to reducing speed in critical zones.

- **Plastic pollution:** the presence of various debris results in damaged habitats and the stranding of cetaceans due to the ingestion of floating debris.

  ✓ The implementation of measures prohibiting the use of single-use plastics and raising awareness of responsible behaviour should be encouraged.

- **Underwater sound pollution:** The campaign recorded significant background noise in the Mediterranean, mainly due to maritime traffic. This ambient noise affects communication and lifestyle of cetaceans, particularly toothed whales.

  ✓ Population distribution data could support maritime traffic regulation decisions (particularly reducing speed in sensitive zones).

- **Impulsive noise** caused by the use of sonar during oil exploration campaigns or underwater work affects cetaceans and can result in their beaching.

  ✓ Noise pollution attenuation protocols are in place: on-board observers to implement the ACCOBAMS guidelines on noise, anti-noise absorption barriers...

- **Interactions with fishing:** occasional bycatch in nets or drift nets are a cause of cetacean death.

  ✓ Attenuation measures are being developed in partnership with the fishing industry.

- **Tourist pressure:** whale watching activity can affect cetacean populations, particularly in summer, when the young are present.

  ✓ The *High Quality Whale Watching*® label, an ACCOBAMS trademark, aims to encourage the implementation of best practices for whale watching (how to approach whales, keeping a minimum distance, limiting the number of boats...).

AFFECTED RESIDENTS

Mediterranean and Black Sea cetaceans

Out of eighty-five species of cetacean listed worldwide, eleven permanent species have chosen to live in the Mediterranean.

The different species of cetacean rarely compete with each other: from the fin whale which eats any small crustaceans to the common dolphin which competes with man for anchovies and sardines, plus the opportunistic common bottlenose dolphin and the deep diving Ziphius, they have each found their adapted ecological niche in the Mediterranean. Niches which are very fragile. In 2014, the ACCOBAMS experts recommended considering cetaceans as indicators of Mediterranean warming: their migration and distribution suggest changes to the marine environment and marine resources.

	AVERAGE SIZE	LENGTH	DIET	IUCN GLOBAL CONSERVATION STATUS
1 **Fin whale** *(Balaenoptera physalus)*	20 m	60 to 75 years	mainly krill and small fish	vulnerable
2 **Sperm whale** *(Physeter macrocephalus)*	15 m	70 years	mainly squid, crustaceans and fish	vulnerable
3 **Orca** *(Orcinus orca)*	7 m	*	bluefin tuna in particular and fish	insufficient data
4 **Cuvier's beaked whale (or Ziphius)** *(Ziphius cavirostris)*	6 m	35 years	cephalopods (including giant squid) and fish	insufficient data
5 **Long-finned pilot whale** *(Globicephala melas)*	5 m	50 years	cephalopods (squid)	insufficient data
6 **Risso's dolphin** *(Grampus griseus)*	3.5 m	30 years	squid, cuttlefish more rarely	insufficient data
7 **Common bottlenose dolphin** *(Tursiops truncatus)*	3 m	50 years	fish and cephalopods	vulnerable in the Mediterranean/threatened in the Black Sea
8 **Short-beaked common dolphin** *(Delphinus delphis)*	2.5 m	30 years	schools of small fish	threatened
9 **Rough-toothed dolphin** *(Steno bredanensis)*	2.5 m	30 years	squid, cuttlefish and fish	endangered
10 **Harbour porpoise** *(Phocoena phocoena)*	2 m	17 years	fish and cephalopods	threatened
11 **Striped dolphin** *(Stenella cœruleoalba)*	2 m	35 years	fish, cephalopods and plankton	vulnerable

**40 to 50 years in males, 80 to 90 years in females*

KEYWORD

The word cetacean comes from the Greek *ketos*, meaning “large fish”.

CONCERNING DEATHS

Monitoring the southern right whale

The Monegasque association AMA invited the Argentinian NGO *Protejamos Patagonia* to present its work during the *Monaco Ocean Week*. The NGO works to protect the southern right whale which frequents the Valdés Peninsula in Patagonia, the most important location in the world for their reproduction. The species, which has suffered greatly from commercial fishing, is now affected by global warming.

During a conference organised by the Association Monaco Argentine (AMA), members of the Argentinian foundation *Protejamos Patagonia* raised public awareness of the concerning future of the southern right whale. Even if it is no longer hunted, the species must deal with various challenges. The whales are protected in reproduction zones such as the Golfo Nuevo or the Valdés Peninsula (they are found in these zones during the southern winter, for approximately seventy days per year). But once at sea, they must deal with various risks linked to human activities.NGO manager, biologist, economist and naturalist guide, the speakers establish a shared review of the situation and presented measures to be taken to improve conservation of this famous species.

THE DIFFICULTY OF PROTECTING MIGRATORY SPECIES

All the famous species for which Valdés Peninsula is internationally known only stay in the area for a short period. It is therefore clear that despite successful conservation of critical and sensitive habitats in this peninsula, protected from industrial equipment, the future of cetaceans also depends on the presence of intact and appropriate habitats in other locations worldwide. ■

PROFILE

The Valdés Peninsula, UNESCO world heritage site since 1999
Located in Patagonia in the Argentinian province of Chubut, the Valdés Peninsula is a site of international importance for the protection of marine mammals. With 400 kilometres of coastline and protective gulfs, it is home to significant reproducing groups of threatened southern right whales, as well as South American elephant seals, seahorses and orcas.

KEY**FACT**

Historically, right whales were the most sought after species by whalers due to their high fat content. Hunting had taken place since ancient times in the Northern hemisphere, and in the 17th century in the Southern hemisphere. The whale was ultimately protected in 1935. In 1984, it was declared a "natural monument" by the National Argentinian Congress.

JOINT INTERVIEWS

Romina Bottazzi
President of the Protejamos Patagonia Foundation, Puerto Pirámides (Argentina)

Do right whales create a significant economy linked to tourism in the Valdés Peninsula?
When my father started whale watching forty years ago, he was one of the first. Around twenty people visited each season to see the whales. Now companies bring around 100,000 visitors each season. Naturalist tourism linked to whales has developed considerably in recent decades. It needs to be regulated to limit the impacts.

What systems do you have to manage this activity?
We created the Protejamos Patagonia Foundation two years ago. Along with Stéphanie Stefanski, a US researcher in environmental economics and policy, and Enrique Alberto Crespo, an Argentinian biologist, we defined our priorities: balancing biodiversity protection and the development of local communities in the Valdés Peninsula.

What are your major actions?
The majority of our actions are based on educating children in local communities. We work with Association Monaco Argentina to raise awareness amongst young people, allowing children to become scientists for a day. I know how important that is. When I was a child, I often talked to naturalists and biologists. The discoveries I made inspired me and made me want to pass it on to my region's communities. These activities with children can have a significant impact on the way that communities think. They are the key to the future.

"Marine mammals are subject to increasing pressure. There is an increasing number of fisheries, an increase in local populations, growing development of tourism. Our NGO aims to limit conflicts between populations, economic stakeholders and the wild."
***Stéphanie Stefanski**, researcher in environmental economics and policy at Duke University (USA)*

KEYFACT For 4 years, 23 right whales visiting the Valdés Peninsula were tracked for 4 months using satellite tags.

IN FIGURES

605 southern right whales have died on Argentinian coasts since 2003, including **538 newborns.**

Enrique Alberto Crespo

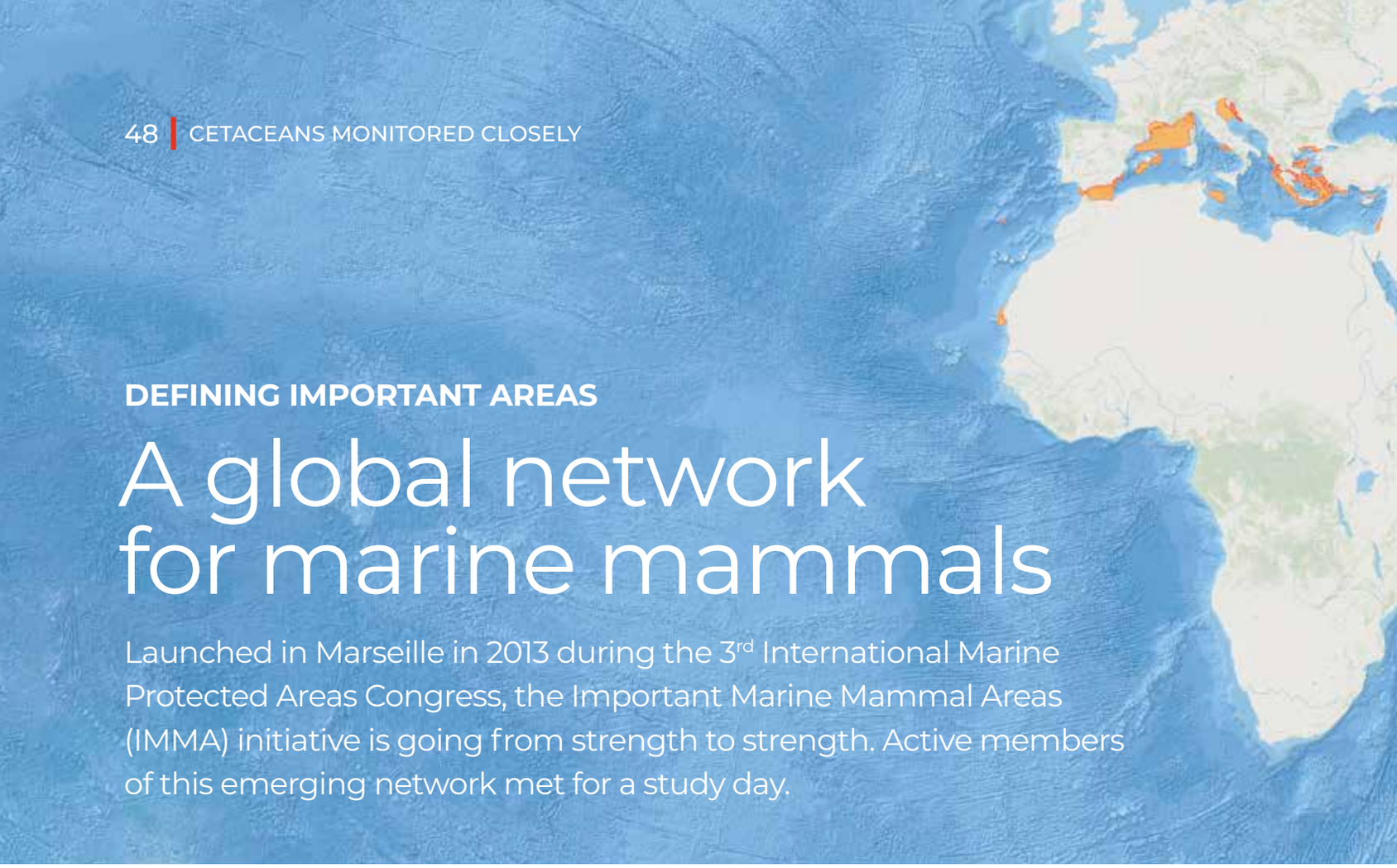
A doctor in biology and professor of ecology at Universidad Nacional de la Patagonia San Juan Bosco (UNPSJB-Argentina), he has studied southern right whale populations for twenty years.

What is happening with the southern right whale population that we can observe in this region of Patagonia?

The efforts which have been made in terms of conservation played and still play an important role in boosting this whale species, which is only just starting to recover from the exploitation it has suffered for centuries. The original South Atlantic population, which extends from Brazil to South Georgia, had 30,000 individuals. After nearly disappearing, this group is now made up of around 5,000 individuals. We are closely following their slow recovery. However for several years, the whale population - which reproduces in the sheltered gulfs of the Valdés Peninsula - is affected by abnormal mortality levels. It is the newborns which are dying. Some years, 3% of the calves die, in other years the figure rises to 20 or 30% of births. Out of the four right whale populations worldwide, this is the only one affected by this phenomenon.

There could be many causes for this abnormal mortality, including climate change. The increased temperature of the Antarctic waters causes reduced krill numbers. This affects the whales and quantity of other species, penguins, dolphins, sealions, cetaceans... The whales have been lacking food for several years. When the females return to the Valdés Peninsula coast to give birth, they do not have enough reserves to feed their calf. Over 2,000 whales visit the site each year, and 113 calves died in 2012. Our objective is to understand the reasons for these deaths in order to limit them. ■

Since its creation in 2006, the **Association Monaco Argentine (AMA)** has implemented several projects in the fields of education, health and culture in the Principality of Monaco and Argentina. Supported by the Monegasque Government's International Cooperation Department, the association develops activities in partnership with associations and foundations, with the objective being to form ties between the two countries.



DEFINING IMPORTANT AREAS

A global network for marine mammals

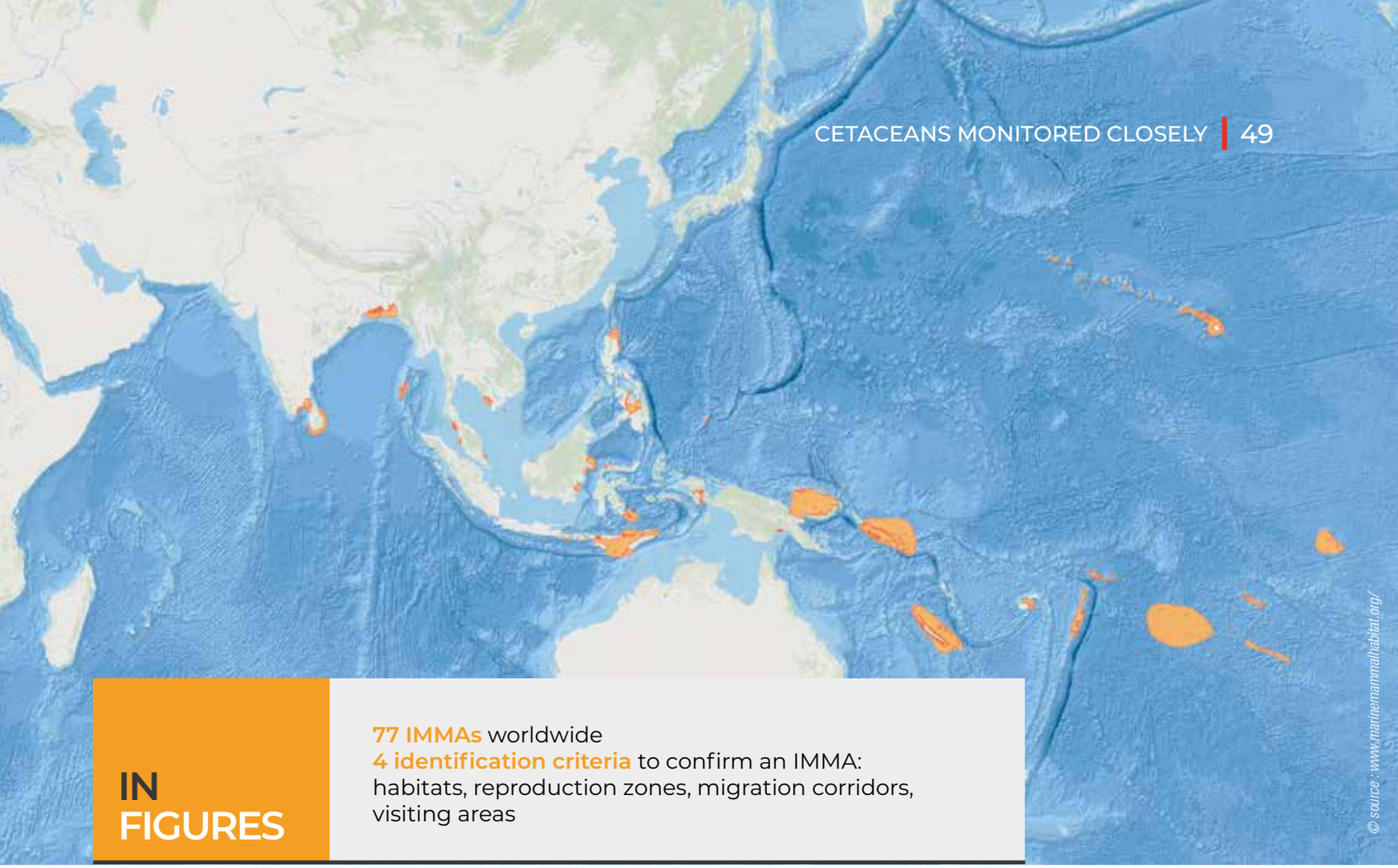
Launched in Marseille in 2013 during the 3rd International Marine Protected Areas Congress, the Important Marine Mammal Areas (IMMA) initiative is going from strength to strength. Active members of this emerging network met for a study day.

Around ten scientists met at the offices of the International Hydrographic Organisation on Tuesday, 26 March 2019 on the theme of Important Marine Mammal Areas (IMMA). Representing Italy, France, Chile, the United States, Monaco, Switzerland, Canada or the Mediterranean network, the experts - a sample of the IMMA task force which now has fifty members - presented the results of workshops carried out in different world regions in recent years. These workshops were used to define important marine mammal areas, based on criteria taking into account their habitats, reproduction zones, migration corridors, visiting areas...

"We are meeting today to consolidate the IMMA evaluation strategy", states Phénia Marras, project engineer for European and international cooperation at the French Biodiversity Agency.

A NETWORK UNDER DEVELOPMENT

Since 2016, a series of studies financed by the MAVA Foundation and the Global Ocean Biodiversity Initiative (GOBI) were carried out in order to scientifically establish favourable or critically interesting areas for marine mammals. After starting with the Mediterranean basin, independent scientific experts examined the Pacific island regions. In 2018, it was the turn of the north-east Indian Ocean, South-East Asian seas and the Southern Ocean, where studies were co-financed by the French Biodiversity Agency. The next three years will be dedicated to defining important areas in the west Indian Ocean, the Arab State seas, then the seas of Australia, New Zealand and finally the pacific waters of Latin America. At the end of this process, the IMMA world atlas will be complete and available on line. To date, seventeen significant IMMAs have been listed, with the largest being the Cook Islands in the Pacific.



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IN FIGURES

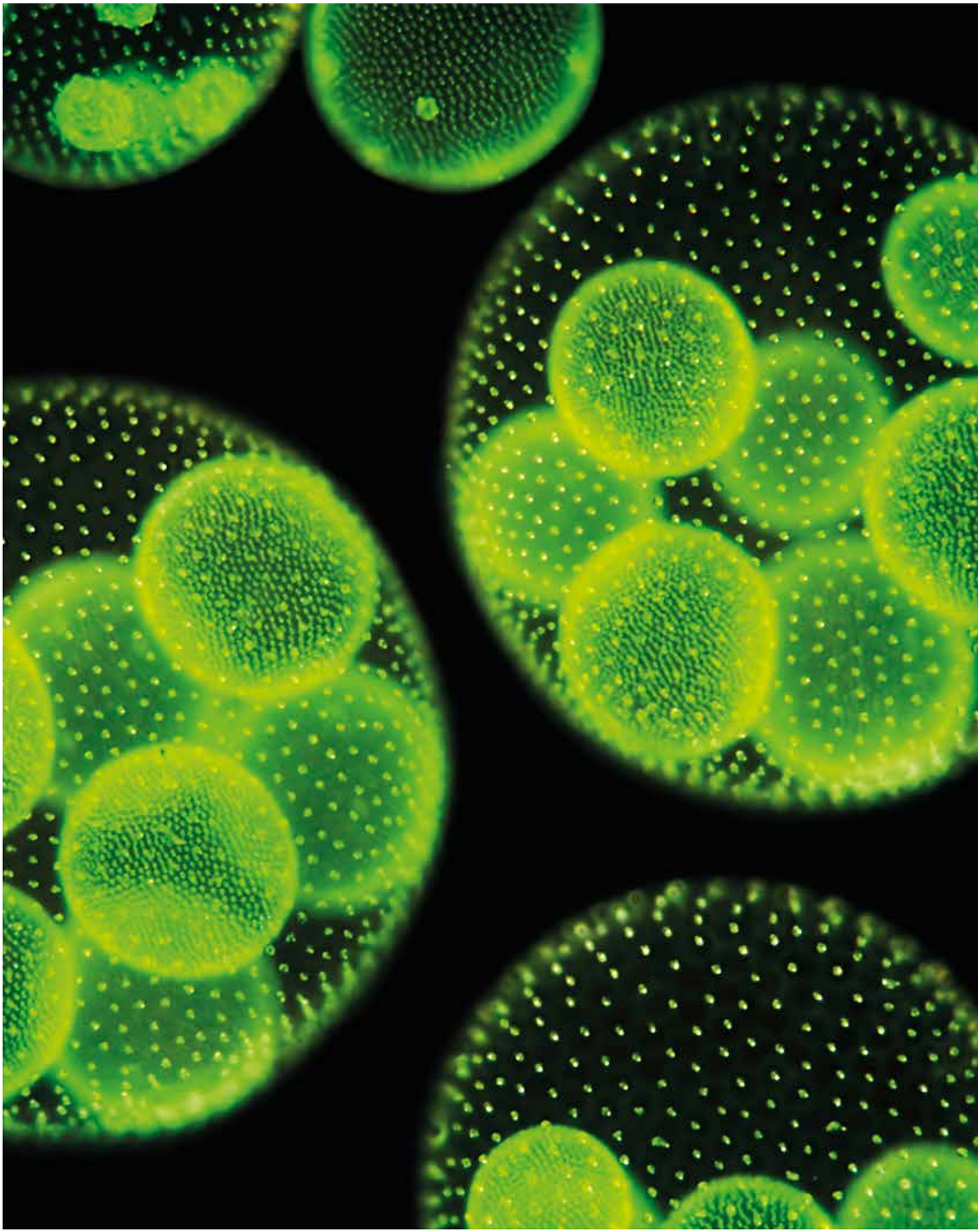
77 IMMAs worldwide
4 identification criteria to confirm an IMMA: habitats, reproduction zones, migration corridors, visiting areas

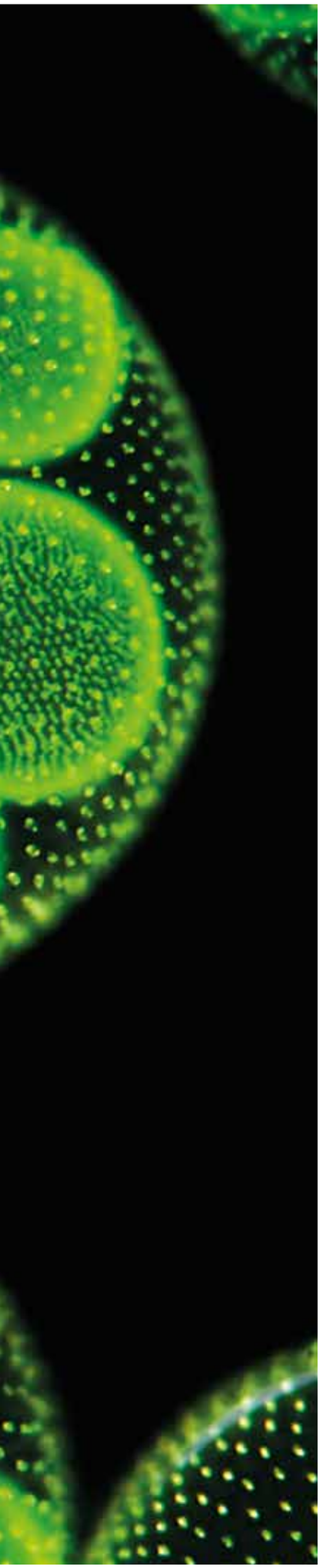
"An IMMA is defined over ten months. It is a process which has several stages, approved by scientific expertise which guarantees that the identification process is solid" explains the Italian researcher Giuseppe Notarbartolo di Sciara, from the *Tethys Research Institute*, also secretary of the *Global Ocean Biodiversity Initiative* (GOBI). *An important nuance*, he continues, *"is that IMMA are not marine protected areas, which are spaces appointed and marked out by governments. On the contrary, IMMA exist because animals have decided so. Their identification is based solely on scientific criteria which confirm the presence of marine mammals, and not on political pressure".*

A DECISION-MAKING TOOL

After a reminder of the methodology and sharing of results, the study day focused on considering the way that these studies could influence decision-makers, particularly during major future international meetings. *"The challenge is to popularise IMMAs as a tool to support decision making in all processes linked to marine environment conservation"*, claims Phénia Marras. Experts have insisted on the importance of working with local communities to integrate IMMAs in the conservation and management policy. *"In some cases, IMMAs can support certain development, sustainable tourism or maritime traffic regulation projects in the Mediterranean"*, explains Giuseppe Notarbartolo di Sciara. Underlining the presence of well-known species, IMMAs will be used to promote the conservation of a wider range of habitats, species and ecosystems, not just limited to marine mammals.

At the end of the day, the experts welcomed the French ambassador for international negotiation for the Arctic and Antarctic, Ms. Ségolène Royal, who acknowledged their work and the IMMA network. *"We are at a turning point where biodiversity must be considered alongside climate change, and in all international negotiations"*, she underlined. The ambassador noted that the collapse in biodiversity threatening marine mammals is even more prevalent at the poles, which are particularly affected by climate change. ■





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OCEAN AND HEALTH

IN FIGURES

10 laboratories gathering leading international experts on the subject

May 2020: publication of the first report on the effects of ocean pollution on human health

SCIENCE SOUNDS THE ALARM

When ocean pollution affects our health

Leading international experts met on 27 March 2019 for a study day on this phenomenon, which has just started to be studied in detail. The first complete report is on the horizon.

BACK GROUND

An important and little known part of global pollution, ocean pollution is continuing to get worse due to growing industrialisation, continued release of chemical products and toxic pesticides into the Ocean and global climate change. The experts are warning that decisive action is needed.

A select group of internationally renowned researchers in public health, toxicology, medicine, planetary health, neurosciences and marine sciences met to prepare the guiding theme for the following year of collaborative study. Ten laboratories have agreed to evaluate the global scale of ocean pollution and the consequences on the health of individuals and groups, predicting future trends, identifying shortcomings in knowledge and proposing realistic and profitable solutions.

A HIGH-POWERED WORKSHOP

Representatives from the World Health Organisation (WHO) and the UN Environment emphasised the crucial issues of this research with regards to the planet's ecological context. The workshop was chaired by professors Patrick Rampal, president of the Scientific Centre of Monaco and Philip Landrigan, director of Boston College's Global Observatory on Pollution and Health, who were responsible for explaining the scale of the problem. Professor Landrigan insisted on the multi-factor nature of marine pollution. He added that the worrying increase had growing effects on human health.

A HIGHLY ANTICIPATED REPORT

The researchers then presented the work of their laboratory, reviewing current knowledge for each source of pollution. The priority areas for study were indicated, namely plastic pollution, pollution due to artificial fertilisers and biological pollution. This progress was presented to the Sovereign Prince during a review which put across the desire to update recommendations and solutions, based on improved scientific knowledge. *"We are looking forward to publishing our results next year"* Patrick Rampal confirmed to the small group. *"There are solutions, we need leadership and we have the chance to have a leader in our midst!"* Concluding the meeting, the Sovereign Prince confirmed his unwavering support.

At the end of the day, the plan for the future scientific report was established. This document - aimed at decision-makers, governments, the media and the general public - will be distributed during the International Symposium on the Ocean and Human Health which will be held in Monaco from 11 to 13 May 2020 under the auspices of the Scientific Centre of Monaco, the Prince Albert II of Monaco Foundation and the Boston College's Global Observatory on Pollution and Health.

THE EFFECTS OF MARINE POLLUTION ON HUMAN HEALTH PRESENTED DURING THE WORKSHOP

- poisoning the indigenous people in the Far North with DDT (powerful insecticide), PCBs and other persistent organic pollutants which accumulate at high levels in predatory fish and marine mammals;
- neurotoxicity for the development of infants exposed to methylmercury in contaminated fish;
- asthma and neuro-psychological illnesses in people exposed to the toxic algae caused by coastal pollution by nitrogen and phosphorous;
- certain infectious diseases;
- difficulties in procuring food amongst fish-eating populations where fish stocks have collapsed due to ocean pollution;
- respiratory diseases and mental health problems in coastal populations exposed to oil spills;
- the other toxic pollutants known to contaminate the planet's oceans include plastics, endocrine disruptors, pharmaceutical waste and radionuclides;
- *"Still poorly defined and understood, the negative effects of marine pollutants on human health must be urgently deciphered"*, insists Professor Rampal, explaining that pregnant women, infants and children are the most vulnerable groups. ■

Industrial agriculture or an inadequate waste treatment causes microalgae proliferation that proves to be toxic for the marine environment as well as for humans.

INTERVIEW

Professor Philip Landrigan

Director of Boston College's Global Observatory on Pollution and Health, paediatrician and epidemiologist specialising in an environmental approach to human health.

Is this the first time that leading experts have met to work on the impact of marine pollution on human health?

There has been extensive research on parts of this problem. What we are trying to do - and this is very new - is to tackle the problem holistically. We are interested in the effects of exposure to heavy metals, chemical and plastic pollution, toxic algae and emerging bacteria.

What are the most concerning forms of pollution for human health?

We have known for a while that the marine environment is highly polluted by mercury, which is found in deep waters. It can travel thousands of kilometres in the atmosphere after having been released by the coal industry and placer mining, which contaminates rivers. It accumulates in fish, and finally on our plates. It is particularly dangerous for pregnant women, as mercury accumulates in the foetus's brain and causes irreversible damage. Mercury emissions in the atmosphere are falling, but the molecules have a very long life span.

A second form of significant pollution is bacteria. The Ocean is heating up and salt levels are falling due to glaciers melting. This has a consequence: the proliferation of dangerous bacteria, particularly a genus called "vibrio". One of the most well-known is responsible for cholera. It has other cousins, and they are all harmful. With climate change, we have noted that harmful bacteria are migrating further north. Our CO_2 emissions leading to climate change are the reason for these epidemiological changes.

The third form is toxic algae which are proliferating around the world. Do you remember the event in August 2018 in Florida, known as the "red tide"? Algae growths have caused many respiratory problems in residents. In Europe, there is a phenomenon of this type known as the "brown tide". Some algae produce very dangerous toxins which are also absorbed by crustaceans, oysters, mussels... If people eat them, they are at very high risk (neurological damage, diarrhoea, etc.) But what is causing this increase in toxic algae? Waste from intensive farming and industrial livestock is teeming with nutrients which change the chemistry of the water, and toxic algae proliferate as a result.

Would you say that we are experiencing a global health crisis?

Yes, I would say that this crisis has been ignored until now. We need to stop and focus our attention on the problem, which has many factors. Ocean pollution is an important part of the overall problem, which also includes air pollution, drinking water pollution, soil pollution, etc. Each is a part of a large puzzle. And all this pollution is a result of uncontrolled human activity. We saw the warning signs around fifty years ago. The signs are now becoming more frequent and intense.

We have made huge progress on health in the past two hundred years. Life expectancy has doubled, we have reduced infant mortality, maternal mortality, controlled terrible diseases like polio or cholera, and many others...But now, we have reached a critical point where we are polluting our environment and we are starting to see more and more chronic illnesses: heart disease, strokes, dementia, and in children, asthma, developmental disorders, increases in cancer... In the United States, there has been a 40% increase in childhood cancer since the 1970s, which is clearly due to environmental factors.

What stage is research at on this topic?

Currently we are at a relatively early stage with these studies. We have been studying the effects of mercury in the Ocean on human health since the 1960s. The awful Minamata disaster in Japan was a turning point. We have studied the algae blooms, which mainly affect coastlines, for 25 years. Studies on micro-plastics have mainly emerged in recent years. Very mobile particles, micro-plastics travel long distances and affect all oceans, including deep waters. They are ingested by krill, fish and birds. When we eat fish, we eat micro-particles, with their toxic components, such as phthalates, which are endocrine disruptors, or brominated flame retardants, which remove iron which is essential for human health and damage the brain, particularly in babies.

Could the future scientific report have an impact on decision-makers?

We really hope so. That's our plan! We will insist on the fact that solutions are only applied with pressure by governments and influential figures. That is why we are so happy that HSH Prince Albert II of Monaco is firmly committed, and we hope that he will inspire other leaders as well as the general public. ■

IN SIGHT

The irony is that this pollution is produced by humans themselves. The materials that we put in the Ocean damage marine ecosystems and affect us as a result, because we eat fish, we wash ourselves, we live near to the sea. ***We cannot keep pretending that the Ocean is a giant dumping ground without destroying ourselves.***

THE *"PRINCE ALBERT II DE MONACO - INSTITUT PASTEUR"* PRIZE

The Swedish researcher Joacim Rocklöv, 2019 winner

His work on epidemiology won him the prize which, since 2012, rewards researchers who have particularly contributed to studying the impact of environmental changes on human health.

On Thursday, 28 March 2019, His Excellency Bernard Fautrier, vice-president and CEO of the Prince Albert II of Monaco Foundation, launched the third edition of this scientific award. After a review of the history of this prestigious award by the deputy director of international affairs at the Institut Pasteur, Jennifer Heurley, Professor Patrick Rampal, director of the Scientific Centre of Monaco, talked about the winner's exemplary career. The prize recognises his work on studying the impacts of climate change on human health and the development of predictive models on abroviruses[1]. Thanks to his expertise in statistics, he developed a mathematical model to detect vector-borne disease epidemics, notably the Zika virus and dengue fever, based on the dynamic of the Aedes Aegypti mosquito. The algorithm also includes the different IPCC climate scenarios to create epidemic progression trends. *"The development of these early warning epidemiological systems in the cloud is very innovative"* confirmed Patrick Rampal.

As underlined by Professor Stewart Cole, director general of the Institut Pasteur, *"this work helps us to monitor the global endemic threat of arboviruses encouraged by climate change."*

Joacim Rocklöv's is also recognised for his interdisciplinary commitment: he was able to bring together health and climate scientists, economists and political decision-makers on major public health topics. As a specialist in vector-borne diseases, he was also invited to join the group of experts in the Lancet Countdown[2] and contributed to recent IPCC and WHO reports.

"An excellent scientist" in the words of HSH Prince Albert II of Monaco, who gave a speech underlining the significant and forward-thinking cooperation between the three institutions involved in awarding this Prize, firmly committed to combatting emerging diseases. When handing over the prize, the Sovereign Prince added *"This evening, you have demonstrated your ability to bring together health and climate scientists."*

1. Arboviruses are viral diseases transmitted by mosquitoes.
2.The Lancet Countdown is an international research collaboration dedicated to measuring the impacts of climate change on human health. An annual report is published in The Lancet.

IN SIGHT

"Joacim Rocklöv takes his place in the long list of eminent scientists and whistleblowers whose tireless work is the key to saving our planet."
HSH Prince Albert II of Monaco

INTER
VIEW

Joacim Rocklöv

A professor of epidemiology at the Department of Public Health and Clinical Medicine at the Uméa Medicine Faculty (Sweden) and associate researcher at the Heidelberg University Institute of Public Health (Germany)

What does the Prince Albert II de Monaco - Institut Pasteur prize mean to you?

The prize encourages me to get stuck back into my research, and gives me more confidence in my ideas and the value of the results obtained. The prize recognises quality of research, and it is a symbol of its importance in the field of environmental changes and health at an international level.

Have your studies allowed you to establish specific effects of climate change in the Ocean on human health?

Part of my research relates to illnesses caused by vibrios. In the Baltic Sea, vibriosis was observed for the first time in fish and shellfish in 2004. Last year, due to the heatwaves, the number of cases reached record numbers. The bacteria usually proliferates in warm waters with low salt content. This change due to climate change is concerning, as the Baltic Sea is an oasis for many people in summer, and the risks of vibriosis (which can cause septicaemia or poisoning) are increasing rapidly. We have studied the long-term risk, and we are developing early warning systems to predict the disease.

How are these warning systems innovative?

Thanks to innovative methods based on cutting-edge mathematics, they combine laboratory, field, epidemiological, social, demographic, ecological and climate data. Algorithms are used to translate the results to high-resolution maps indicating the degrees of uncertainty and risks. The objective is to prevent the disease from proliferating through a better understanding of the risk of propagation before it occurs.

You have included IPCC data in your predictive models. How would dengue fever change depending on the scenarios?

The consequences of 2°C (we are already at 1°C) are much lower than at 4°C. 4°C would be a fundamental change with systemic consequences on health and socioeconomic systems, which we would not be able to manage easily. For example, from 4°C, new vectors could infect the Mediterranean region, and transmission could continue throughout the winter season.

Can these trends be applied to vibrios carried by the Ocean?

Future development scenarios for vibrios are trickier due to the complex impact of climate change on the Ocean system. A forecast we created indicates that they could be significantly reduced in the Baltic, but they should considerably increase elsewhere worldwide, in the United States, the Mediterranean, etc. ■

HIGHLIGHT

Biomimicry, responsible innovation

Backed by 3.8 billion years of innovation, is the blue planet not best placed to inspire our societies? For some years, researchers, engineers, architects and designers have taken inspiration from life sciences to innovate.

And what if biomimicry became the tool of the next industrial revolution? Energy, chemistry, materials, architecture, information management, organisation... there are an increasing number of fields of application. Innovation can work alongside reconciliation ecology. That was the topic of the conference held on Wednesday, 27 March at *Stars and Bars*, Monaco. There were many visitors, several speakers were in attendance, and it was Patricia Ricard, chair of the Paul Ricard Oceanography Institute, who opened the meeting with a few words from Paul Eluard: *"There is another world, and it is this one." "There is another world, and not for much longer if we continue on this path"* shoots back the famous biologist Gilles Bœuf, professor at Pierre and Marie Curie University and chair of the Science Council of the French Biodiversity Agency. *"Biomimicry - I prefer the term bio-inspiration - is key"*. The history of living things has demonstrated their ability to create sustainable forms, mechanisms and relations. *"A small Mediterranean sponge can be used to make a biodegradable concrete, so strong that it can resist earthquakes. As an example!"* explains the eminent scientist who, in 2014, helped to create CEEBIOS, a national network of biomimicry skills.

Kalina Raskin, the director general of CEEBIOS, took the floor: *"The industry has not yet made use of biomimicry to solve its problems. That is why we have created CEEBIOS, which in France alone brings together over two hundred research teams working on biomimicry"*. Whilst the Ministry of Ecology is interested in the topic, in the future we need the Ministries of Industry, Research, Defence and Overseas Territories to get involved.

IN SIGHT

"150,000 synthetic molecules invented by modern chemistry since 1950 damage our environment on a daily basis. Nature never produces a substance which it cannot break down. Let's take inspiration from that, and keep it in mind!" ***Gilles Bœuf, biologist***

Biomimicry is an initiative to study nature in all its forms and to draw technological developments, design materials and processes which are innovative, recyclable, less energy intensive and safer.

"We are not the first to have created major cities" claims the biologist Denis Allemand, from the Scientific Centre of Monaco. If we look closely, coral reefs can be a model for an ideal ecological city offering energy self-sufficiency, waste recycling, water purification... *"Inspiring, as instead of releasing CO_2 back into the atmosphere, corals transform it into carbon thanks to photosynthesis, producing a sort of eco-concrete"* the professor enthusiastically explains, referring to the case of a US company which has taken inspiration from this system to produce environmentally-friendly concrete.

Sylvain Pioch, lecturer at the University of Montpellier 3, then underlined the need to integrate the notion of evolution from the design phase of maritime structures to encourage their colonisation by marine species. The founder of the start-up Bioexegy, Sidney Rostan, added that *"Biomimicry has the extraordinary ability to reconnect us to other species. Beyond science, it is sociological."* Closing the session, Michèle Barbier, the founder of the Institute for Sciences and Ethics, pointed out each person's responsibility, both in civil society as well as industry, entrepreneurs, politicians and scientists, who must work for innovations to become a source of savings but also durability and environmental and human protection in the future. ■

TAKING INSPIRATION FROM MARINE ORGANISMS

- **the nautilus** inspired Commander Cousteau to create his diving saucer at the end of the 1940s;
- **marine worms** inspired the design of a blood substitute rich in haemoglobin or surgical adhesives encouraging wound healing;
- **the structure of a sponge** was used as an architectural model for the Gherkin, the famous London skyscraper shaped like a spiral;
- **the shape of a box-fish** was used to develop a car, with its impressive light structure and aerodynamics;
- **a species of octopus** inspired the functioning of an underwater robot able to work at great depths;
- **the pearly film of shells** inspired the design of body armour;
- **fluorescent bacteria** are used in bulbs;
- ecological anti-fouling paint was designed after observing the gelatinous films of **marine biopolymers**;
- earthquake warning systems could be improved by copying **dolphins' ability** to detect them...

The term **epigenetic** was created in 1942 by the British biologist and embryologist Conrad Hal Waddington.
We had to wait until the development of molecular biology in the 1980s for it to be confirmed as a field of biology.

KEYFACT

AT THE FOREFRONT

When the sea helps develop genetics

A first: researchers are studying marine bacteria in the Mediterranean to have a better understanding of the genome.

Could we counter the runaway of cancerous cells? Are degenerative diseases inevitable? Can the cellular genome be reprogrammed? And could the sea help us to better understand genetic heritage, and human health as a result? A unique marine epigenetics project launched by the Mediterranean Science Commission (CIESM) in 2017 generated its initial results during the *Monaco Ocean Week*.

For a year and a half, twelve biologists specialising in epigenetics from prestigious research institutes focused on marine microbes to further study hereditary DNA modifications in response to environmental pressures. The scientists used the latest technologies in terms of genome sequencing to uncover the enormous diversification of molecular systems in the sea based on a process at work in any form of life - cellular differentiation. *"Knowledge in terms of microbial epigenetics rarely goes beyond bacteria which are dangerous for human health"* explains Laura Giuliano, scientific director at CIESM and coordinator of this research project, dedicated to microbial epigenetic processes in the Ocean.

PIONEERING WORK

Scientists met at the Oceanographic Museum of Monaco on Friday, 29 March 2019 to discuss the results obtained from experiments on seven known strains of marine bacteria, reacting to the effects of pressure, variations in salt and temperature, or even a lack of iron, a particularly stressful environment for most living cells. Seven research laboratories carried out analyses on gene regulation mechanisms. With one of the rare next-generation sequencing machines able to analyse DNA methylome[3], a Norwegian analysis centre offered details on their reactions and adaptations. Dorota Czerucka, responsible for the Ecosystems and immunity team at the Scientific Centre of Monaco, explained that adenine methylation plays an important role in the virulence of various human and animal pathogenic agents.

The researchers from Marseille, Montpellier, Dublin, Madrid, Amsterdam, Genoa and Messina discussed the scope of their research. *"The discovery of new molecular systems based on the control of the genome expression could have effects on medical and therapeutic research"* states Laura Giuliano. The industry's interest was confirmed by the attendance of Roberto De Ponti and Marianne Bjordal from Helsinn International Services Sarl at the workshop. An overview of the CIESM project results has already displayed some very interesting scenarios. Amongst the thousands of pieces of data obtained, some still need to be fully analysed. A complete report and scientific publications are expected, and a larger research project is planned. Marine epigenetics could shed new light on marine system ecology and the human genome. ■

3. DNA methylation is part of the key mechanisms of cell hereditary specialisation processes.

23,000 human genes
The 1st human genome sequencing took place in 2004.

IN FIGURES

IN SIGHT

"In the realm of the living, marine organism cells offer the widest range of adaptations to the environment."
Laura Giuliano, Scientific director, CIESM

Molecule of methylated DNA on two strands
© Christoph Bock,
Max Planck Institute for Informatics

MARINE MICROBES, THE CHAMPIONS OF CELL ADAPTATION

Marine microbes are exposed to many typical stresses in the Ocean environment (changes in temperature, salt levels, pressure, pH, etc.). The human body, in comparison, is a relatively standard and stable environment. These minuscule marine organisms have found a way to resist the sometimes extreme conditions of the Ocean thanks to a wide range of cell adaptations. At work in all cells on earth, this cell adaptation phenomenon is the most diverse at sea.

ENVIRONMENTAL MONITORING

Watch out for toxic microalgae

After three years of work on toxic microalgae in five regions of the globe, scientists met in Monaco to draw their conclusions.

During the *Monaco Ocean Week,* three days of study rounded off the international research project on the prevention of the impacts of marine toxins produced by benthic microalgae, launched three years earlier by the International Atomic Energy Agency (IAEA). Unlike the previous edition dedicated to the first aspect of this problem, working meetings took place in small sessions at the IAEA environment laboratories. Representing Cuba, Thailand, Brazil, France and Spain, the scientists in question worked in different parts of the world, from the tropics to Europe, which helped them to make significant progress. *"We want to make progress in identifying benthic microalgae, such as the development of technologies to identify toxins in the environment and fishing products"*, summarises Marie-Yasmine Dechraoui-Bottein, director of the scientific programme.

Researcher in environmental toxicology at the IAEA environmental laboratories in Monaco, she explained the scope of a poorly understood environmental and health problem: "*Over the past ten years, toxic algae have proliferated in an increasingly large geographic zone, and their impact has continued to grow. Many countries have already established surveillance measures."* The objective of the IAEA, a United Nations Agency, is to help develop a science and health monitoring network worldwide, particularly in coastal developing countries (continental or insular). A network based on reliable and robust scientific data. The *Monaco Ocean Week* offered the ideal setting for the five researchers of this programme, who are committed to producing their results through the publication of a report. This could be used to establish technical cooperation projects to develop algae and toxin monitoring capacities in countries which must deal with these health problems.

The **IAEA** has been involved in the field of toxic algae for twenty years. Faced with the growing demand of its member states, this United Nations agency helps develop the food poisoning management strategy associated with algae biotoxins and health monitoring in over forty countries.

DEFINITION

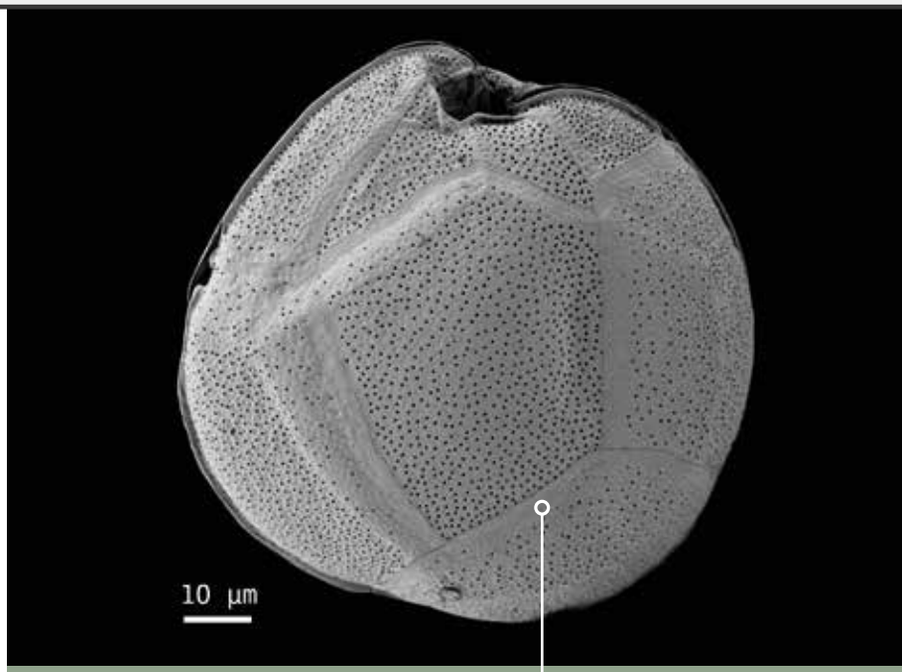
Benthic microalgae (from the Greek *benthos*, meaning "depth") live on the seabed. These single-celled organisms are part of phytoplankton. When they proliferate rapidly, they form blooms. The species vary depending on the latitude. Toxic species are found in tropical and temperate zones.

A 100% POSITIVE OVERVIEW

- 1 draft publication of a report on benthic microalgae aimed at managers in all countries;
- 12 communications to international conferences;
- 4 scientific publications and another 9 being prepared;
- support for training: 4 research students and 2 bachelor's degree students

IN SIGHT

"These three years of scientific exploration have allowed us to verify the performance of a test evaluating the presence and rate of biotoxins in fish. It is an essential step to validate a health monitoring protocol. Let's not forget that in countries where biotoxins are not monitored in shellfish, there are still deaths. By relying on these research programmes, managers can implement robust environmental monitoring methods."
Marie-Yasmine Dechraoui-Bottein, Researcher in environmental toxicology at the IAEA environmental laboratories in Monaco



Close-up of a Gambierdiscus cell the source of toxins found in fish and which are responsible for Ciguatera-based food poisoning. © scanning electron microscope photo.
Nicolas Chomerat, Ifremer

MICROALGAE, THE PLANET'S "LUNGS"

Life on earth relies on these microscopic single-celled plants. Along with cyanobacteria, they make up phytoplankton. These minuscule organisms, which only represent 1% of biomass, produce over half of the planet's oxygen, and consume half of the carbon dioxide. These photosynthesis experts are vital for marine life, as they are the first link in the marine ecosystem's food chain.

65

REEFS OF TOMORROW

THE INTERNATIONAL CORAL REEF INITIATIVE

Corals monitored closely

Over fifty participants and experts emphasised the international community's commitments to protecting coral reefs worldwide.

During the morning of 26 March 2019, the ICRI promotion event brought together participants around the main objectives of the ICRI 2018-2020 action plan, adopted during the General Meeting in December 2018 which was held in Monaco. Amongst the scientists, experts and decision-makers, Peter Thomson, the United Nations' Special Envoy for the Ocean, and His Excellency Bernard Fautrier, vice-president and CEO of the Prince Albert II of Monaco Foundation, were the guests of honour at this session, which was based around four central themes.

- **Increased vigilance for 2020**

  Whilst target 10 of the Aichi Targets defined in 2011 covers the protection of coral reefs, it will not be reached by 2020. *"One of the reasons"*, explains Francis Staub, secretary of the ICRI, *"is that it was very badly defined and the measures taken are difficult to measure".* However during the next Convention on Biological Diversity COP, which will take place in China in October 2020, a post-2020 global biodiversity framework will be adopted.

  During the meeting in Monaco, the ICRI committed to making sure that coral reefs are still taken into consideration in this new international framework. A working group was created to develop recommendations to define a new, more ambitious and precise target than the previous one.

- **A global report on coral reefs**

  One of the highlights of the meeting was the announcement of the production of a global report on the health and trends of coral reefs for 2020. Twelve years have passed since the last report on the topic.

  "We want to review the health of coral reefs, but also review trends, i.e. changes to coral coverage and its diversity", explains Francis Staub. Around sixty experts will be called upon through the Global Coral Reef Monitoring Network.

  The ICRI report will be presented in June 2020 during the United Nations Conference on the Ocean, as well as during the World Conservation Congress and the 13th International Symposium on Coral Reefs, which will be attended by HSH Prince Albert II in July 2020.

- **Work on illegal trade**

  The ICRI reaffirmed its commitment to work on combatting illegal trade of reef fish, a significant problem in South-East Asia. The initiative is supported and implemented by Indonesia.

- **Reef emergency finance**

  The ICRI wants to promote innovative finance to protect coral reefs: debt exchange, insurance, blue bonds and even the creation of a global fiduciary fund for coral reefs.

This meeting was also an opportunity to reiterate the ICRI's involvement in the *Coral Reef Community of Ocean Action* which it co-chairs with UN Environment. Finally, there was a presentation of the initial results of the five projects financed as part of the ICRI/UN Environment small projects programme to encourage the resilience of coral reefs and the associated ecosystems. ■

"We breathe thanks to the Ocean, which produces half of the earth's oxygen." Peter Thompson, United Nations Special Envoy for the Ocean

IN SIGHT

IN FIGURES

- Coral reefs cover just **0.2% of the Ocean's surface**, but are home to over **30% of marine biodiversity**.
- A healthy coral reef can:
  - generate **5 to 15 tonnes of fish** per km2 and per year.
  - act as a barrier against storms (it can reduce wave energy by up to 97%) and **prevent coastal erosion**. Coral reefs are the first line of defence for millions of people worldwide.
- **€325 billion/year:** estimated annual revenue from coral reefs worldwide (production of food, tourism, coastal protection).

PROFILE

The International Coral Reef Initiative (ICRI) is an informal partnership between nations and organisations which aim to protect coral reefs and related ecosystems worldwide. Founded in 1994 by 8 governments, it now has around 60 members. Since July 2018, Monaco has co-chaired the ICRI alongside the Australian and Indonesian governments.

INTER
VIEW


© Maeva Bardy

Serge Planes

A Research Director at CNRS, he coordinates the CORAL observation department within the Insular Research Centre and Environmental Observatory (CRIOBE).

What is unique about the ICRI's future report?

There was a global report twelve years ago which provided an overview of the health of coral reefs. We are creating a global network to observe the trends of coral reefs to create a global vision. Within the ICRI and the Global Coral Reef Monitoring Network, we are working on a long-term follow-up analysis. This new approach, coupled with statistical analysis, promises a deeper understanding of the processes and therefore current trends at work on a large scale.

What is the difference between the trend and health of corals?

The health of a reef is like a snapshot taken at a specific moment. The trend describes changes. For example, if we observe 20% coral coverage on a site, it might be very low compared to what there was a few years earlier, or it could be a lot, but to understand this figure we need a reference to compare it to! We need to be able to compare this percentage against changes to the reef life.

What methodology did you use to establish this global report?

It is a collaborative study which requires significant effort to collect data from collaborators in each geographic zone. The data is provided by observation services, oceanography institutes, associations, research laboratories, and sometimes citizen science... The most important thing is that we have "time series", i.e. data over a long time period. We base our approach on around ten years of monitoring minimum.

Have you already taken part in a similar scientific adventure?

I coordinated the regional report on the health and trends of coral reefs in the Pacific, which was completed in 2018. Over twenty-five different institutes were involved. Overall, we were able to observe less of a decline in the reef recovery rate, and more of a significant transformation: a large group of corals tends to dominate over time. These are massive corals, which seem more resistant. The diversity of the landscape and its hosts suffer as a result. We have noted that over time, in a landscape where massive corals dominate, species specific to branching corals are no longer in their preferred habitat and are weakened.

The international community is rather pessimistic on the future of corals, will this ICRI report provide more specific details?

We need to be realistic. There will always be corals, but they will certainly be very different. According to existing studies, everything suggests that the diversity we see now in coral reefs will certainly not be the same in fifty or one hundred years' time. Where we had one hundred species of fish, we will perhaps have just a few tens of species, but the corals will still be there! Not all species, only some, the most resistant.

The corals are not experiencing their first episode of warming. The problem is the speed of the processes being put in place.

We want to observe the corals' ability to adapt. The stress experienced by ecosystems will lead to a decline in principle. But how will this take place? It is difficult to predict. We lack hindsight to know at which point the reefs will be transformed. It isn't a black or white issue. Whilst the ICRI ordered this report, it was to establish an approach based on anticipation and prediction. Our analyses will be based on figures regarding changes to reefs in the last twenty years. Summarising this data at an international level will help us to be really clear about the trends of these ecosystems at a global level.

What type of actions can we carry out to encourage the recovery of a coral reef?

Firstly, we need to limit deterioration. It is currently difficult to limit climate change at a local level, but everyone can reduce local damage due to various sources of pollution, from coastal management, waste... One of the keys is to implement a real coastline management policy, with better control over what we discharge into the sea and which will affect the coral reef in tropical zones.

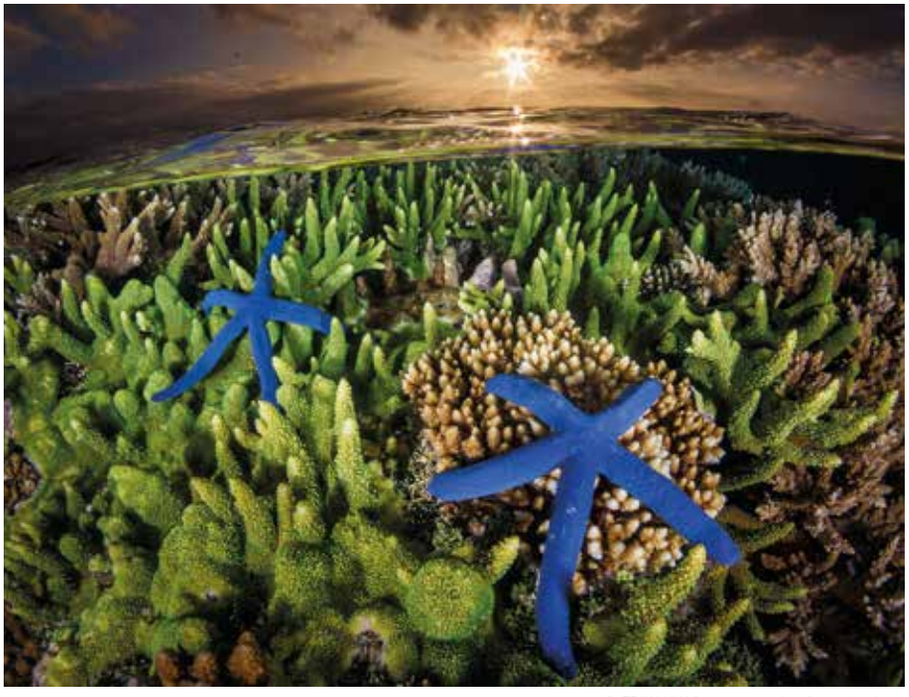
KEY**FACT**

Initial monitoring of the health of coral reefs goes back around thirty years. The oldest reefs studied are those in Polynesia, particularly the Moorea corals which have been monitored since 1984. The Great Barrier Reef in Australia has been monitored for twenty-five years.

How resilient is a coral reef?

If you look at all ecosystems, there is a resilience which can be significant after a bleaching episode. On the Great Barrier Reef in Australia, we have recorded 30% coral death, therefore, not all corals died. We need to use these survivors, which will be the reefs of tomorrow. At our laboratory, we try to understand the recovery capacities of these ecosystems across the South Pacific. We have observed that there is a lot of self-recruitment. That means that the population renews itself, the young ones recruit the reef from where they came. But the reef's resilience is significantly based on connectivity: there are exchanges during the larval phase, dispersions of individuals and species, flows... all phenomena which help renew populations. We generally need twelve to fifteen years to return to a balanced reef.

Next, restoration programmes can be put in place, but these often have very localised and limited results. However they offer a significant educational and consensus-based benefit. And in the long term, projects based on the notion of "assisted development" where we will promote more resistant corals can help coral reefs with their survival. ■



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RESCUE OPERATION

A Noah's Ark of coral

On the initiative of the Scientific Centre of Monaco and the Oceanographic Institute (Albert I Foundation), the ambitious World Coral Conservation Association was officially launched during the *Monaco Ocean Week*.

Threatened by global climate change combined with local environmental stress factors, the one thousand six hundred species of coral which make up the world's reefs are no longer safe in the Ocean. According to international experts, these habitats, which host a third of marine organisms, risk becoming scarce by 2100. How can we protect their extraordinary diversity in a natural setting threatened by major changes?

Currently, the majority of marine management and conservation programmes focus on protecting "virgin" zones in the hope that these spaces resist disruption and allow repopulation of damaged sites. However as global changes increase, this approach is becoming limited, as shown by the recent deterioration of the Great Barrier Reef, which has lost 30% of its surface area. Following discussions held during the 2016 International Coral Reefs Symposium in Honolulu (Hawaii), the idea of a Global Conservation Association emerged as a new solution to protect the biodiversity of coral reefs.

A GLOBAL NETWORK OF AQUARIUMS

During the morning of Tuesday, 26 March 2019, twelve members of the Global Coral Conservation Association's steering committee, aquarium directors and scientists, set out this major project with financial and institutional partners faced with a fact: fewer than two hundred species of coral are currently cultivated in aquariums worldwide.

"In five years, we want to have protected one thousand species of coral, i.e. two-thirds of the existing species. These corals, taken from a natural setting in accordance with regulations in force, will be cultivated and spread across the major public aquariums and museums worldwide" announced Didier Zoccola, researcher in molecular biology at the Scientific Centre of Monaco, responsible for presenting the project to the financial partners of the Prince Albert II of Monaco Foundation and the MSC Foundation (which comes from the maritime freight company of the same name) as well as members of the aquarium network. The latter already has the support of the most prestigious aquariums, including Georgia Aquarium (Atlanta, US), Burgers Zoo (Arnhem, the Netherlands), Océanopolis (Brest, France), Nausicaá (Boulogne-sur-Mer, France) and Churaumi Suizokukan (Okinawa, Japan). *"We want to benefit from the support of establishments which already have knowledge of coral growth, cutting reproduction and even artificial fertilisation"*, explains Robert Calcagno, director of the Oceanographic Institute. As real pioneers on the topic, the Scientific Centre of Monaco and the Oceanographic Museum can be proud of over thirty years of conservation of living corals.

The Conservation Association project unites its worldwide public aquarium network. The Conservation Association corals will be maintained and cultivated in all partner aquariums. *"In the Ocean, the environmental parameters such as light, temperature and pH can vary to the point of causing stress which can kill coral reefs. However in an aquarium, we can control these parameters, and therefore offer optimum conservation conditions"* explains Dominique Barthelémy, the deputy conservationist in charge of the natural environment at the Océanopolis discovery park.

SAMPLING AT A GLOBAL LEVEL

Amongst the countries represented during this kick-off meeting, Indonesia was in the spotlight, the archipelago with thirteen thousand islands forming part of the famous “Coral triangle” which has the most coral worldwide, with eight hundred species recorded. The first collection campaigns were planned for October 2019. With forty-three endemic strains, the Caribbean will also provide precious varieties which will enrich the collection. The seventy coral species found in the Persian Gulf are particularly interesting to researchers thanks to their ability to endure significant changes in temperature, opening up the possibility of unexpected adaptation.

ASSISTED DEVELOPMENT AND SUPER-CORALS

As it is more than just a coral bank, the Global Coral Conservation Association promises to be a major laboratory encouraging fundamental research. *“Having a thousand coral species in aquaculture will help make progress with research in terms of evolutionary biology”*, explains professor Denis Allemand, scientific director at the SCM. The second part of the meeting was based around these issues. The scientists emphasised the fact that the network will be a platform for coral exchanges intended for reef restoration, which involves transplanting corals to devastated areas. On the other hand, the sampled strains could be used to implement a so-called “assisted development” approach to improve the resilience of coral reefs. Teams plan to work on coral acclimatisation protocols, and on the selection or even creation of “super-corals”, i.e. corals resistant to climate change, as defined in 2015 based on the pioneering work by the American marine biologist Hollie Putnam, who attended the meeting.

In addition, the Global Coral Conservation Association must be able to provide decision-makers, reef managers and users with suitable tools in terms of information, methodologies and decision-making (online resources, communication tools, etc.).

During the *Monaco Ocean Week*, the foundation stone was laid for the global network to protect living coral colonies in the presence of members of the steering committee and financial, institutional and university partners, which took part in a final brainstorming session and to define the action strategies required to succeed with this major project. Like corals in the largest molecular biology bank, this Conservation Association aims to be a centre of resources, research and assistance for international decision-making. ■

IN FIGURES

1,600 species of corals recorded in the Ocean
200 species cultivated to date in an aquarium

KEY**FACT**

By 2100, the coral reefs will be reduced by 70 to 90% with global warning of 1.5°C. If the threshold of 2°C is reached, nearly all corals (>99%) will be lost[1]. Currently, over **600 million people** worldwide depend directly on coral reefs for their survival.

1. according to the IPCC report dated October 2018.

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THE OCEAN ECONOMY

DEVELOPING COUNTRIES

The challenge of the blue economy

The durability of the Ocean and the blue economy in developing countries was the theme of three study days organised by the Scientific Centre of Monaco from 26 to 28 March 2019.

During the *Monaco Ocean Week*, the workshop coordinated by the environmental economics researcher Nathalie Hilmi brought together around ten researchers from prestigious research institutes at the International Hydrographic Organisation. Together, they examined the problem of ocean durability in detail, and discussed the compatibility of ecological priorities with blue economy issues, i.e. economic activities linked to the Ocean. The focus was on developing countries and marine or maritime economy industries in view of the ultimate objective: the production of an overview on the Ocean economy in relation to the economic development of poorer countries.

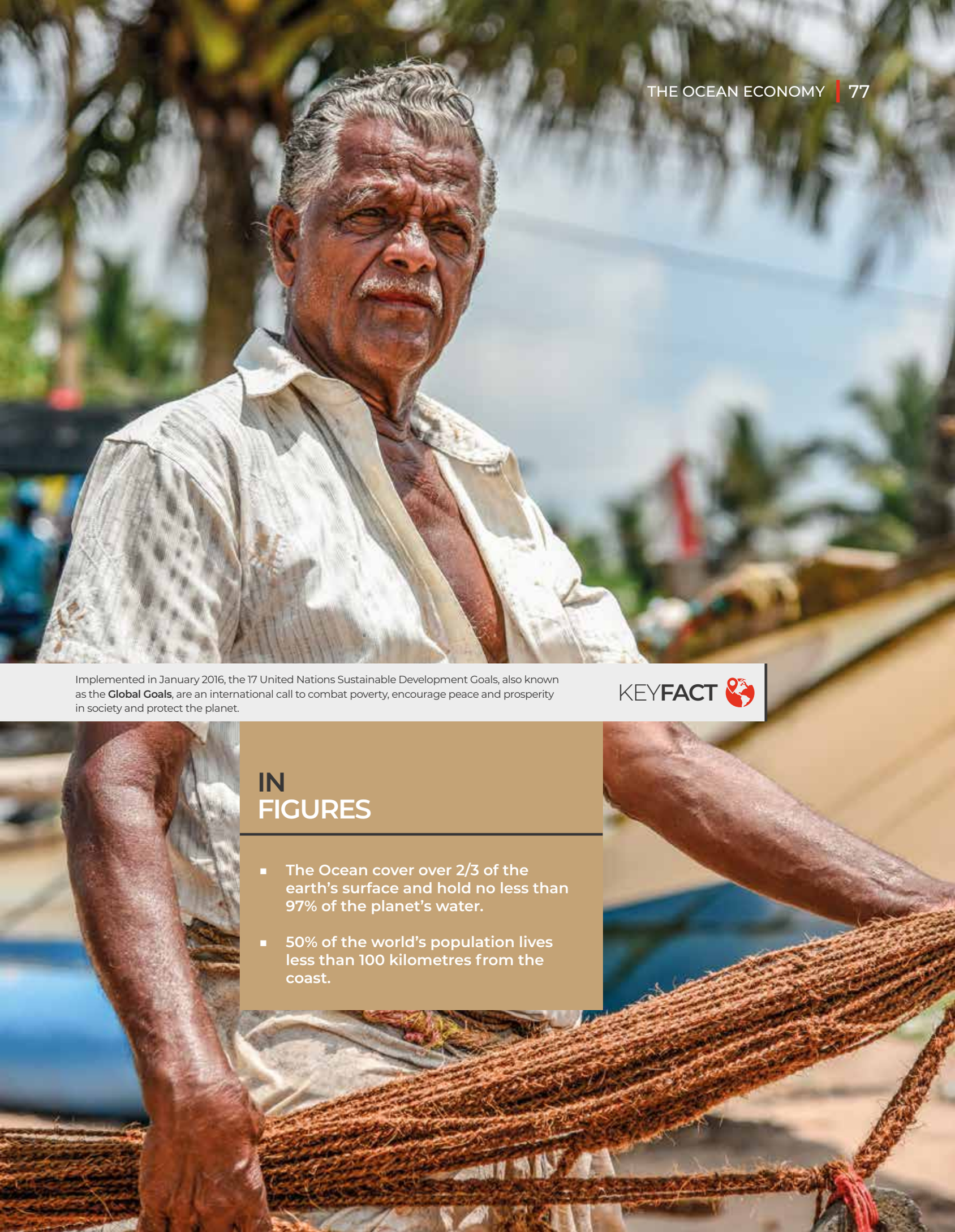
The following themes were discussed during the workshop:

- coastal and maritime tourism (including cruises);
- the role of the Ocean in economic development;
- the blue economy and ocean durability;
- the Ocean's natural capital and ecosystem services;
- fossil fuel extraction;
- the maritime transport industry;
- fishing and aquaculture;
- mining of seabeds and minerals in the Ocean;
- ocean-powered energy.

Researchers agreed to draw up a summary of the conclusions and recommendations aimed at political decision-makers. During 2020, the working group will finalise a research article which will be submitted to a scientific journal. The question was also raised regarding a research project to obtain grants to continue research on this topic.

THE OCEAN AND HUMAN SOCIETIES

Made up of complex environments rich in biodiversity, the Ocean supplies essential ecosystem services which largely benefit human societies, particularly developing countries. Indeed, marine resources greatly contribute to reducing poverty and food security, particularly in coastal communities. The Ocean is also an important source of high-value resources. Despite the important economic role of the Ocean, human activities threaten the durability of marine environments, which are particularly vulnerable to pollution, overfishing and habitat degradation. The United Nations Sustainable Development Goal 14 aims to "Conserve and sustainably use the Ocean, seas and marine resources for sustainable development". Worldwide, both at local and global level, researchers, decision-makers and other stakeholders are endeavouring to reach this objective set by the UNDP. ■



Implemented in January 2016, the 17 United Nations Sustainable Development Goals, also known as the **Global Goals**, are an international call to combat poverty, encourage peace and prosperity in society and protect the planet.

KEYFACT

IN FIGURES

- The Ocean cover over 2/3 of the earth's surface and hold no less than 97% of the planet's water.
- 50% of the world's population lives less than 100 kilometres from the coast.

THE ART OF LIVING AT SEA

Focus on responsible yachting

The Monaco Yacht Club, in collaboration with the Prince Albert II of Monaco Foundation through the Sustainable Yachting Network, hosted the 9th *environmental symposium La Belle Classe Superyachts*, a hotly anticipated event during the *Monaco Ocean Week*.

Over the course of a day, scientists, explorers, engineers, entrepreneurs and government officials compared their approaches, confirming their intent to make respect for the marine environment a core aspect of yachting. Created by Bernard d'Alessandri, general secretary of the Monaco Yacht Club and organised by Cristina Ruiz Martinez, responsible for relations with shipowners and skippers at La Belle Classe Superyachts, plus Yvan Griboval, round-the-world sailor and explorer and president of the OceanoScientific association, this environmental symposium brought together experts from across the world around four major workshops dedicated to responsible yachting. On 28 March 2019, twenty-four specialists answered questions from the journalist Cyrielle Hariel, who hosted the event like a televised talk show, for over two hundred participants - mostly skippers and yachting professionals - mostly part of Cluster Yachting Monaco.

A TESTING GROUND FOR YACHTING OF THE FUTURE

Innovative and ecological prospects were presented by the prestigious guests, giving the symposium the feel of a real testing ground for yachting of the future. Mike Horn, renowned explorer, adventurer and sailor, hosted the first talk dedicated to new yachting destinations, and the need to act respectfully to protect the maritime environment. The topics relating to regulations were hosted by Anne Vissio, executive secretary of the RAMOGE agreement, particularly those regarding sustainable anchorage or coastal navigation in Monaco, France and Italy. The early afternoon was dedicated to ways to limit pollution by common superyacht maintenance operations. The last talk of the symposium looked forward to the future of yachting, with architects, fleet managers and clean energy specialists - including hydrogen, which was in the spotlight - and renowned personalities like the designers Mike Van Peteghem, Philippe Briand and site managers for the M/Y Black Pearl, one of the most famous vessels currently in the industry, with various eco-responsible charms.

This day of discussions highlighted how respect of the marine environment is an increasingly important concern in yachting, from the ship architect to the skipper, mainly as shipowners as a whole want to "navigate better", i.e. by limiting their ecological impact.

Following the success of this edition, it was decided to renew and develop this initiative each Thursday of the *Monaco Ocean Week* to make it a must-visit responsible yachting event.

THE FIRST EXPLORER AWARDS

In the evening, in the presence of the Sovereign Prince, the Monaco Yacht Club recognised shipowners working for a better understanding of the Ocean and more sustainable navigation, using fewer fossil fuels. *"After La Belle Classe Superyachts Explorer created in 2018, we established the Y.C.M. Explorer Awards to recognise shipowners who meet their environmental responsibilities"* explained Bernard d'Alessandri, general secretary of the Monaco Yacht Club. *"This can be a technical innovation to significantly reduce their CO_2 emissions, assistance provided to scientists or, quite simply, the ability to pass on and share maritime adventures so more of us love and protect the Ocean."* These men and women, the yachting explorers of the future, continue the Art de Vivre la Mer, which is one of the fundamentals of the Monaco Yacht Club.

Chaired by Mike Horn, with the presence of Richard Wiese, president of the *US Explorers Club* and Olivier Archambeau, president of the *French Explorers Society*, the international jury gave out four awards and a special mention, awarded to the winners during a dinner by HSH Prince Albert II of Monaco, President of the Monaco Yacht Club.

IN FIGURES

- 79 super-yachts in competition
- 4 winners
- 1 jury's special mention

The winners

1. The motor yacht **ALUCIA** (56 m) owned by Ray and Mark Dalio (Dalio Philanthropies Foundation) received the “Mediation/Science” Explorer Award.

2. The motor yacht **BRAVO EUGENIA** (109 m) owned by Jerry Jones received the “Technology/ Innovation” Explorer Award.

3. The motor yacht **E&E** (42 m) owned by Murat Vargi received the “Adventure/Ethics/Behaviour/ Environment” Explorer Award.

4. The sailing yacht **TARA** (36 m) owned by Étienne Bourgois and Romain Troublé (Fondation Tara Océan) received the “Favourite” Explorer Award.

5. The motor yacht **POLARFRONT** (55 m) owned by Yann Lebellec and Sophie Galvagnon received the “Jury’s special mention” Explorer Award.

EUROPEAN COMMITMENT

Major research centres commit to the Ocean

The managers of some of the largest marine sciences research organisations in Europe have agreed to consolidate their strategic cooperation and increase the scope of marine sciences in society by creating a Federation.

NEW MOMENTUM FOR MARINE SCIENCES

Giving new momentum to ocean sciences at a European level - that was the ambition of the meeting which took place at the Oceanographic Museum of Monaco on 26 March 2019, in the presence of HSH Prince Albert II and representatives from the European Commission, the International Oceanographic Commission and other networks. On invitation by the Oceanographic Institute, they decided to create a Monaco Federation of Ocean Sciences.

PROFILE

Reflecting the Sustainable Development Goals, the **Monaco Federation of Ocean Sciences** aims to develop initiatives to reinforce ocean culture throughout Europe and to embody the values of respect for nature and sustainable development. Mobilising marine sciences, it includes the economy, sociology and law applied to the sea, in order to cover all aspects of man's relationship with the sea.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A NEW OCEAN NARRATIVE

The increased threats faced by the Ocean makes it more necessary than ever to understand these complex ecosystems. This involves modelling, greater interdisciplinarity, but also a new narrative to spread simple knowledge. The Federation aims to collectively create positive communication regarding the Ocean's role in improving human well-being. The reinforcement of scientist communication initiatives, but also new ocean knowledge stakeholders (private initiatives by major sponsors, explorers, etc.) will make often complex topics linked to ocean ecology more accessible. There is a wide target audience in order to encourage grassroots public involvement.

TAKING IMMEDIATE, FIRM ACTION

With the goal of long-term action, the Federation works to identify major priority research fields to clarify sustainable decisions. The sequence indicated how the impact of climate change (the subject of the IPCC's special report "Climate change, the Ocean and the cryosphere") and plastic or industrial pollution on the Ocean can have an effect on current negotiations. It also emerged that a focus should be placed on improved understanding of major seabeds before planning any mining operations.

A PLEA FOR THE OCEAN

From September 2019, based on a scientific consensus shared by the major member European centres, The Federation has agreed to develop a scientific plea regarding the Ocean's major ecological challenges. This holistic message is intended to clarify matters for decision-makers. It can be managed by each member in their country, within their networks and with the media. It will also support the commitment made by HSH Prince Albert II of Monaco.

The Federation will support ambitious proposals for the Horizon Europe programme, as well as for the United Nations Decade of Ocean Science for Sustainable Development (2021-2030). It will examine the opportunities of more formal cooperation structures, right through to the creation of a *European Oceans Agency*. ■

SMART AND RESPONSIBLE FINANCE

Encouraging investments in the blue economy

The global challenge of climate change and the need for sustainable development requires the construction of an economy able to protect the health and resilience of ocean ecosystems.

How can we align “green” finance with “blue” priorities for a more responsible economy? The fundamental question regarding a shift in investments was discussed during the workshop organised by *Citizens Climate Education*, *the International Centre for Dialogue and Peacebuilding* and the *Geoversiv Foundation*, which was held in the Oceanographic Museum. Since the climate conference in October 2015 in Minneapolis, government leaders, businesses and international agencies, as well as leaders in investment, science and innovation, have considered how to handle the problem of ocean resilience at an early stage. This high-level dialogue continued during the *Monaco Ocean Week*, which underlined that investment efforts targeting a sustainable ocean economy should be extended to the varied sectors of industry, agriculture, waste management, as well as ecosystems, urbanisation, transport and energy production, activities which all have downstream repercussions. *“The banking and finance sector was not initially designed to include considerations in advance when evaluating the viability of any given investment. However the Sustainable Development Goals and the Paris Agreement have created conditions encouraging this consideration”*, explains Joseph Robertson, event organiser, founder and president of the *Geoversiv Foundation*.

A FINANCIAL INFORMATION ECOSYSTEM

Four major systemic and technical questions structured the meeting, which resulted in a smart climate-related finance tool: *Resilience Intel*. Following this dialogue, the experts decided to prepare a report entitled “Investing at the source” which will explain how the Ocean, as a global system connected to the local experience, provides us with information on the status of global resilience. Ten specific areas will be discussed on work linked to investments in health and ocean resilience. Guidelines were originally arranged for the Summit on climate by the general secretary of the United Nations in September 2019. ■

IN SIGHT

“Resilience Intel aims to provide this information, not just in the form of briefings on sustainability, but as an everyday financial information ecosystem”, explains ***Joseph Robertson***

PROFILE

By networking socioeconomic and financial commitments combating climate change and scientific data, the **Resilience Intel** information system evaluates the resilience value of any investment.


Ecole des Révoires
Aire Marine Educative de Monaco
OCEAN IS LIFE
Ocean is life
MONACO OCEAN WEEK 2019
Ecole des Révoires
Aire Marine Educative de Monaco
OCEAN IS LIFE
Monaco Ocean Week 2019

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THE BLUE GENERATION

Over one hundred schools and educational establishments are committed
to creating an educational marine managed area on the mainland and in overseas territories.

KEYFACT

YOUNG MANAGERS OF THE SEA

An educational marine area in the Principality

A warm welcome awaited HSH Prince Albert II in the conference hall of the Oceanographic Museum of Monaco on Wednesday 27 March 2019. Wearing t-shirts depicting their new educational marine managed area, the students from class 7C at École des Révoires celebrated the arrival of the Sovereign Prince.

Each was carrying an environmental message written on a small wooden panel. The official launch ceremony of the Monaco educational marine managed area showcased the citizen commitment by these young Monegasque students. At the start of the ceremony, the students from class 7C at École des Révoires sang *"I want to save the Ocean"*, a song full of hope written specially for the event. This particularly moving moment introduced the speech by Jacqueline Gautier-Debernardi, director of the Monaco Association for the Protection of Nature (AMPN). The creator of this educational project, inspired by an example in Polynesia, she congratulated the students for their hard work, without which the educational marine managed area would not have been possible.

THE TREASURE OF LE ROCHER

Before choosing the site, there were several visits to the Monegasque coastline as well as an initial review. The site was subject to a collective decision made by the *"Children's Council for the Sea"* founded for the occasion within the school. After deliberation, and thanks to the support of the AMPN science officer, the students chose the zone from the Port Hercules solarium to the chalk cliffs located at the foot of the Oceanographic Museum. This portion of the Monegasque coastline has six ecosystems with a diverse range of land and marine species, including some

PROFILE

Remarkable elements of the Monaco EMMA

Land: endemic or exotic plants, chalk cliff fauna, birds (including the peregrine falcon and the Mediterranean shag).

Sea: Rocky outcrops, pebble beaches, artificial rockfill, the Le Toulonnais shipwreck at a depth of 30 metres, visited by groupers and corbs.

endemic species. The young managers of the educational marine area also identified the rare pearl of Le Rocher, a natural habitat protected from human activities. After this, the students thought about how to protect the area from urban and maritime pressures. They underlined several problems associated with their protection approach and planned measures to be put in place.

A MODEL BASED ON THE MARQUESAS

Cécile Gaspard, a doctor in marine biology and the founder of the Te mana o te Moana association in French Polynesia, talked about the inspiration for this concept in the Pacific: the very first educational managed marine area was created in 2012 on the small island of Tahuata, in the Marquesas, *"on the request of students who wanted to look after a marine area in their bay"*. Very quickly, this educational tool was used to promote the marine environment near the class, pass on cultural heritage linked to the sea and educate people on citizen action. The example in the Marquesas made a start, and a network was formed. In the European-sized archipelago, twelve educational managed marine area now have the certification (eight others are being certified) which ensures the quality of this citizen ecology model.

"With Monaco, this is the first time that a school is going to be part of the certification process outside the Polynesian region" explains Cécile Gaspard.

OPEN LETTER TO THE SOVEREIGN PRINCE

Children from the École des Révoires prepared a letter addressed to HSH the Sovereign Prince, taking centre stage: *"Sir, we are honoured to ask your Highness to provide us with His support to create the Monaco educational managed marine area"*, a little girl starts, soon followed by students from her class. Each explains part of the adventure, earnestly explaining the responsibility of protecting this micro-region, which is a real oasis of biodiversity on the city's doorstep. *"We are going to inform users about everything we have learned about species in the zone"* promises a boy, announcing the project to create information signs. Finding waste, cigarette ends and chewing gum on the site or speeding boats has barely discouraged these young defenders of the common good: *"Users will be informed and bit by bit, they will help us".*

Finally, the children welcomed HSH Prince Albert II to the stage, and then gave him some gifts, including a Monaco educational managed marine area t-shirt. Each year, a new CM2 class (10-11 years old) will take up the reins from these initial managers and carry out activities to protect the sea. As underlined by Jacqueline Gautier-Debernardi, *"the educational marine managed area is a teaching tool allowing children - who are the adults of the future - to become better ambassadors for environmental protection"*. Long live the Monaco educational marine managed area! ■

THE BEMED WORKSHOPS

Children commit to a plastic-free future

In line with previous editions, BeMed has designed four fun and educational workshops about plastic pollution in the Ocean. Aimed at Principality students, the workshops did not disappoint at the Stars & Bars on the 26 March.

1 A QUIZ ON PLASTIC WASTE

Classes of around twenty students took part in a fun and education game on the theme of plastic waste. What waste is the most commonly found in the sea? What are known as mermaid's tears? How much time does it take for a plastic bottle to degrade? What can you make with plastic bottles: a bicycle, a fleece, a t-shirt? Supported by the host's comments, the quiz answers emphasised the scale of plastic pollution in the Ocean and its consequences on the environment and human health.

2 THE SORTING RACE

Which bin for which waste? A practical workshop helped the youngest to understand selective sorting. A domino effect which will continue to have an effect when they return home.

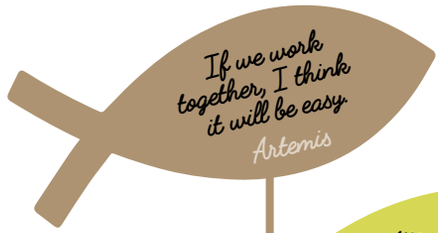
3 ALTERNATIVES TO PLASTIC

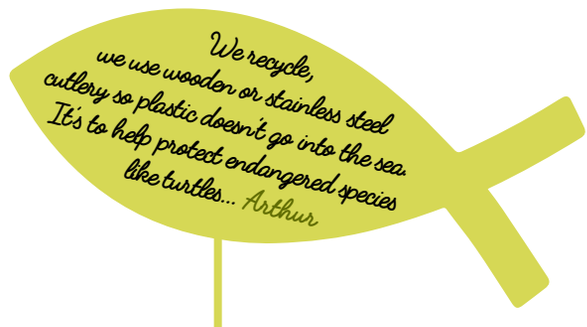
A picnic is laid out on a table. This scene reflects daily life: tablecloths, cutlery, bottles of water, containers, packaging... plastic rules. How can we find alternatives? That is the challenge taken on by students in this workshop. They let their imaginations run wild and left full of ideas to take action at their own level.

4 TIME TAKEN FOR WASTE TO DECOMPOSE

The goal of this workshop: working out how much time it takes for cans, bottles and other waste thrown in the sea to start to decompose and lining them up in a timeline. 5 months for a cardboard box, 50 years for a tin can, 450 years for a nappy, 600 years for a fishing net... Children enjoyed the educational experience, learning about concepts which are often difficult to understand.

At the end of the day, the children left with a booklet on ocean preservation, "*The Smurf Rider*". These young ocean ambassadors now have new tools in their hands to look more closely, transform their daily lives and their little corner of the planet!





1

When I find a plastic bottle in the mountains, I put it in my bag and then I put it in the recycling when I get back home. *Matthieu*

2

I encourage all schools on the planet to play their part! *Loris*

3

4

FOCUS ON THE POLES

Students on Ice, polar inspirations

Each year, a competition aimed at Monegasque high schools allows two winners to take part in the educational expedition *Students on Ice*, an unforgettable stay in the polar regions to raise awareness amongst young people across the world about climate change.

Many high school students were in attendance during the launch of the 11th edition of the competition, organised by the Prince Albert II of Monaco Foundation and the Ministry of National Education, Youth and Sport. In the amphitheatre of the Lycée technique et hôtelier de Monaco, in the presence of HSH Prince Albert II, the adventurer and photographer Laurent Ballesta talked about his Antarctic expedition. The Minister of the Interior, the director of National Education, Youth and Sport, Cécile Mouly, and the ambassador responsible for international negotiation for the poles, Ségolène Royal, were joined by directors of scholar establishments to support this educational programme.

IMMERSED IN THE ANTARCTIC

The auditorium was immersed in the rocky floors of the Antarctic. During his expedition to the great South, the diver Laurent Ballesta tracked Weddell seals which guided him through a labyrinth of ice and rock in the coldest water on earth. Lucky witness to the extreme biodiversity, he talked about his discoveries, with plenty of *"oohs"* and *"aahs"* from the students. The diver's photographs illustrate the fierce beauty of a forgotten and fragile continent. *"The protection of polar regions requires improved understanding of these environments, and that is why exploration is so important"*, concludes the man who spent five weeks exploring the icy environment for the filmmaker Luc Jacquet.

A CHANGE IN PERSPECTIVE

Next, the winners of the previous Students on Ice competition talked about their journey to the Arctic. In August last year, two final-year students from Lycée Albert 1er de Monaco joined one hundred and twenty-five students from around twenty countries on an expedition craft. *"For two weeks, we learned Inuit games and songs and saw seals, sled dogs, humpback whales, polar bears and lots of ice..."*, explained Morgane Pons, appreciative of having enjoyed such a unique experience. Deeply affected after seeing this open-air archaeological site, Baptiste Crovetto talked about his transformation: *"Seeing a glacier melt before my eyes, I realised how important it was to save the environment. In our everyday lives, we don't always realise. By travelling faraway to places really affected by climate change, we realise that we need to protect them."* The report by the two winners raised their fellow students' awareness of the fragility of the Arctic. *"This expedition allowed us to grow and see the world from a different perspective"* the high school student concluded emotionally, calling on her peers to take their chance to receive the study grant.

POLES IN DANGER

The ambassador responsible for international negotiation for the poles, Ségolène Royal, emphasised the vulnerability of these regions, which are twice as sensitive to climate change: "*For the first time, the Greenland ice sheet has broken. The melting of the Arctic ice sheet leads to a rise in sea levels, resulting in the disappearance of island states like Fiji, as well as coastal erosion. This phenomenon affects half of the world's population, which lives less than 100 kilometres from the coast."* Positioned within the planet's ecological and political issues, the Students on Ice programme puts things in a different light. The high school students - the leaders of the future - are at the forefront of problems to protect the polar regions. This summer, two Monegasque high school students will have the chance to travel on the expedition vessel departing from Canada. It will take them to the wild landscapes of Greenland and communities who have developed extraordinary know-how from living in contact with hostile nature. An inspiration for a new balance? ■

THE BEST CLASSROOMS IN THE WORLD

A testimonial which will please Geoff Green, founding president of Students on Ice, which has led one hundred and thirty-five expeditions: *"The poles are the best classrooms in the world. They are windows onto the world in terms of peace, conservation, cultural pluralism and many important topics during these critical times for our planet."* By devising these educational cruises to discover the Arctic and Antarctic, Geoff Green chose to focus his efforts on raising young people's awareness. On the agenda: navigation, traditional fishing, observing wild fauna, kayaking, music, art, science and even swimming in the sea... *"An adventure like this is a life-changing experience"* the expedition director summarises. He ensures that 40% of the students are from indigenous communities. So Inuit or Sami young people visit alongside students from the South Pacific, India, Canada, Europe and Monaco.

IN FIGURES

Students on Ice

- **11 years of adventure**
- **3,000 students from 57 different countries**
- **38 expeditions**

© Célia Benkerrache-Limandat

INTER VIEW

Laurent Ballesta

A nature photographer and professional diver, he dedicates his life to scientific exploration and artistic promotion of the marine world. After leaving to explore the luxurious beds of the Antarctic ocean, diving with the sharks in the Fakarava atoll in Polynesia, he is prepared to discover the coral reefs in the deep Mediterranean.

In 2016, after being contacted by the filmmaker Luc Jacquet, you travelled for 48 hours to the Antarctic with Vincent Munier. When you dived under the ice for the first time, did you feel like you were discovering a new landscape?

In Adélie, there is a significant contrast: above the water, you are in the most sterile continent in the world. The Sahara is home to several hundred species; in the Antarctic, even in summer, there are barely ten species! It is the largest desert in the world, completely monochrome.

When you dive into the water, you see colours everywhere! There are a range of ecosystems. Nine thousand species have already been described! The extreme temperature of the water creates something unique: slow metabolisms. The animals are all slower, invertebrates need millennia to reach a respectable size. When you dive, you are aware that the scenes you are seeing have not moved, or barely moved for centuries. Each day when leaving the water, I knew that I had photographed a species which had never been pictured alive before. We are in the third millennium, and we are now saying that once a day!

Is the relationship with the wild different on this relatively unscathed continent?

In the Antarctic, the animals watch you. If you don't move, the penguins get very close. Fear of humans is not in their DNA. There is no other place like it on the planet. This shows that we have put our stamp everywhere, from the far end of Papua New Guinea to Greenland, where animals have been hunted for millennia. In the Antarctic, they aren't afraid of hunters, but they are distantly affected by pesticides, heavy metals... That is a universal problem, unfortunately.

What is this new challenge that you have started in the Mediterranean?

They say that the Mediterranean is a write-off, a cesspit full of plastic. Of course it is hurt and polluted, but I think that it is much more interesting to show that it is full of luxuriant oasis, more colourful sites than tropical coral reefs. With my colleagues, we will explore the twilight zone of the Mediterranean in July 2019. We will spent 28 days at a depth of 120 metres. It is my biggest diving challenge ever, I think. At the end of each dive, which will last hours, we will return to a pressurised cabin, which will take us to our living chambers. That will allow us to explore these depths for a month, where I have previously only spent a few minutes in the past twenty years.

How will you stay at these depths for so long?

Thanks to saturation diving, we will be able to overcome problems related to decompression. This technique was only used by the offshore industry until recently. The idea is to use this tool for exploration and conservation, and not just for resource exploitation. The offshore platform divers leave the cabins with a large helmet, a cord which links them to the base, they have no displacement around their bell. We will go out with modern diving suits, electronic recyclers which will allow us to dive independently for hours, provided that we return to the cabin as we can no longer go back up...

Exploration is a remote concept, but can it be done closer to home?

There is nothing more complicated than exploring your own home. Exploring in Greenland or Papua is almost easier! Here, on the French and Monegasque coast, many people have gone before us... In the Mediterranean, you just need to go a few hundred metres deeper to discover a new world. Twenty years ago, when we went to a depth of 200 metres, we felt like we were the only people to photograph the animals that no one had ever seen. At the same time, we felt very frustrated, as diving was a round trip to the bed, due to decompression stops. I was somewhere between the feeling of having discovered a gem and the feeling of not being able to discover it due to a lack of time. I then had this idea: as the problem is coming back up, we shouldn't come back up! That's saturation diving. Now my biggest dream has become a reality.

After twenty years of exploration, what message would you like to pass on to young people?

I want to show them that they do not need to follow other people's lessons to find their own path. Jacques Brel said: "I wish you never-ending dreams and the furious desire to realise just one of them". I didn't understand the difference, but Brel knew what it took to realise just one of his dreams... When I was at uni, with the person who became my partner, we dreamed of our career and we had a saying: "To keep hold of your dreams, you need to start by losing any illusions". A way of nurturing realism whilst wanting to achieve your dreams. I dreamed of becoming a Calypso diver, following in the footsteps of Cousteau, many naive things like that... I am not there, far from there, but I stayed true to the child I was, I haven't betrayed him. That's the most important thing. ■

© Laurent Ballesta

THE PRINCE ALBERT II OF MONACO FOUNDATION AND THE MONACO EXPLORATIONS OFFER THEIR SUPPORT TO THE GOMBESSA V EXPEDITION TO THE MEDITERRANEAN TWILIGHT ZONE

July 2019

- 28 days of expedition
- 25 days of diving
- 3 days of decompression
- 4 divers
- Diver living chamber (5 m^2) under helium pressure
- Itinerary: from Marseille to Monaco at a depth of 120 metres
- €2.7 million
- 32 collaborators

OFFSHORE RACING

Around the world with Malizia

The children of Monegasque schools were regaled with stories from the professional sailors Boris Herrmann and Pierre Casiraghi, who travel across the world at high speeds on board the Malizia, a cutting-edge monohull.

On Friday 28 March 2019, the conference hall at the Oceanographic Museum of Monaco was full. The educational conference opened on the question which Boris Herrmann asked his young audience: *"What are your dreams for the future?"*. Hands were raised, and the dreams of children filled the room. The sailor admitted that he is about to achieve his biggest dream: to take part in the Vendée Globe. Thanks to the support of his teammate, the sailor and Monegasque businessman Pierre Casiraghi, the skipper will raise Malizia's anchor in autumn 2020, flying the Monaco flag. He will be the first German to take part in this solo race without stopovers and without assistance. An extreme adventure prepared carefully and tactically with Pierre, his teammate, which aims to be a sporting challenge focused on ocean protection and the future young generations.

A LITTLE GEOGRAPHY

Pierre Casiraghi quickly moved onto the itinerary of the most difficult race in the world. The Ocean is no longer an abstract concept. It is crossed in eighty days, more if ice from the southern summer has formed before the boats pass through. There are punishing crossings, fearsome stages and temperamental winds. The speakers then displayed a large map. In a year and a half, Malizia will leave Sables d'Olonne to travel to Africa and to try and reach the dreaded Cape Horn. The children work out the best path, learning about key concepts like ocean currents and wind cycles.

IN FIGURES

A HI-TECH CATAMARAN

- **60 ft** (18.3 m)
- material: **carbon**
- mast height: **27 m**
- **2 Foils**
- weight: **8 tonnes**
- mainsail: **400 m²**
- minimum speed during a round-the-world trip: **16 knots** (30 km/h)
- maximum speed: **35 knots** (65 km/h)

© Jean-Marie LIOT

LIFE ON BOARD MALIZIA

How do you cross the seas alone? How can you sleep during a solo race over nearly three months? The speakers showed immersive films on board the racing vessel. Navigation is like a top-class sport, life on board is carefully arranged, the dehydrated food like something astronauts would eat.

The conference then focused on the threats affecting the Ocean, particularly plastic pollution and the phenomenon of climate change.

Showing a strong interest in environmental problems, the children dived feet first into Boris and Pierre's adventure, *My Ocean Challenge*. Through this high-flying sporting challenge which they will follow closely, they take part in a major scientific and ecological exploration.

A LITTLE SCIENCE, A LOT OF ECOLOGY

Beyond the sporting aspect of the challenge, the German-Monegasque team is focused on a bigger cause: *"We also want to better understand the Ocean to better protect them"* explains Pierre Casiraghi, reflecting his family's past. He noted that his ancestor - Prince Albert I - studied the marine currents in 1885, discovering the approximate route of the Gulf Stream. His teammate told the children about the scale of the scientific programme which Malizia is involved in: on-board sensors collect valuable data sent to scientific institutes specialising in monitoring CO_2 levels, temperature, salt and pressure in the Ocean.

"The scientists who study the impacts of climate change are often lacking data as some regions are difficult to reach, like the southern ocean. With Malizia, we will help them".

Boris Herrmann
Professional German sailor.

"On board Malizia, we have a small box which will allow us to collect high-quality data while sailing. During the Route du Rhum race, we took our first samples for our partners, the Max Planck Institute and GEOMAR. Some years, researchers have no data to make progress with their work. That is the case for Peter Landschutzer, a specialist in surface CO2 in the Southern seas, who we are working with. That is the interest of using Malizia which crosses the seas. At the end of 2019, we will have accumulated data over nearly 50,000 miles!", Boris Herrmann.

Moya at the Scientific Centre of Monaco

On request by the president of the Scientific Centre of Monaco, the Nice artist Patrick Moya created three pieces on the marine world launched during the *Monaco Ocean Week*.

Three digital artworks are now part of the institution. Here is the unmissable little *"Moya"*, accompanied by Dolly the sheep, transported into the marine world. The tiny characters become molecular biologists in the laboratory, amongst a colony of emperor penguins or exploring the tropical depths. The humorous universe of this famous artist is mixed together with the Scientific Centre's research themes. Marine, polar and medical biology are now part of the Moya utopia. And soon, we will be able to visit the Scientific Centre of Monaco in Moya Land, a 3D digital world, provided that you create your hologram!

Ports: new marine nurseries

For five years, some marinas have been homes to Mediterranean marine life. The exhibition at the Galerie des Pêcheurs is focused on the theme of *biohuts*, a new type of nursery.

Designed using zinc-plated steel grids and oyster shells, these structures create a reef suited to life at the very heart of the port areas. Since the launch of this initiative in 2014, 17 Mediterranean ports have created these nurseries where coastal fish can develop. In Monaco, the Hercule port has 22 biohuts, and Fontvielle port has 18. Over 2,000 juveniles have found refuge in the Monegasque nurseries. 10 sea fish species (sea bream, black bream, mullet, pomfret, oblade, etc.) and 2 rare species, including the tentacled blenny, have been able to develop sheltered from predators. The marine flora also colonises these artificial reefs, offering a habitat and food. To have such an effect, the *Biohut* process requires involvement by port areas to reduce sources of pollution. An ecological initiative presented to the general public at the Galerie des Pêcheurs in Monaco.

The Fascinating Blue Planet

The British director and producer James Christopher Honeyborne came to present his *3D Oceans masterpiece - Blue Planet* - a documentary where the Ocean appears in all its splendour, genius and power.

The breathtaking images of this unique film instantly captivated the many viewers at the public screening organised on Thursday, 28 March in the conference hall of the Oceanographic Museum of Monaco. *"We wanted to move the audience regarding ocean wildlife. Connecting to this universe, is about taking care of it"* confirmed James Christopher Honeyborne, who heads up the company *OceanX Media*. His captivating marine odyssey from the BBC TV series Blue Planet II was the outcome of five years of adventure, during which twenty-five expeditions were carried out across thirty-eight countries. He needed no fewer than six thousand hours of diving to capture the unique stories of the most surprising sea creatures, from the coastal shallows to the deepest and most mysterious worlds.

"New ocean science and technology allowed us to go further into the unknown, which we never would have thought possible", explained the British director. The programme was supported by Alucia, a research vessel which has two submarines, a scientific laboratory, a helicopter and ultra-modern diving and filming equipment.

A PLANETARY VOYAGE

The journey starts amongst the tropical coral reefs where, amongst a myriad of species which shelter there, we discover an ingenious fish which uses a tool to open shellfish which it eats. Focusing on the temperate waters of South Africa, the giant laminaria form vast underwater forests which produce as much oxygen as forests on land. Traversed by thousands of dolphins, the high seas appear as the largest wilderness on earth. The film then explores the underwater volcanic landscapes, the twilight zone or the deep seabeds and its methane emanations 1,000 metres under the surface. *"We are more connected to the marine depths than we could have ever hoped: ocean currents have created a favourable climate for life on earth*". The planetary journey across the globe's seven oceans culminates in an environmental plea: *"Our future relies on a healthy blue planet"*, the documentary concludes.

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MONACO OCEAN WEEK PARTNERS

FONDATION
PRINCE ALBERT II
DE MONACO

THE PRINCE ALBERT II OF MONACO FOUNDATION

In June 2006, HSH Prince Albert II of Monaco decided to create his Foundation as a response to the challenges facing our planet. Active at an international level, the Prince Albert II of Monaco Foundation works to advance environmental protection and the promotion of sustainable development by mobilising citizens, political leaders, scientists, NGOs and economic actors.

Since its creation, the Foundation has focused its activity on three major issues: climate change, biodiversity and water resource management. It targets three priority areas: the Mediterranean, the Polar Regions and Least Developed Countries (LDC).
For several years, ocean conservation has been a key concern of the Foundation.

The Foundation mobilizes funding to assist projects in the field. It also initiates campaigns such as the fight against plastics pollution in the Mediterranean through the BeMed initiative, the protection of the monk seal by bringing together leading specialists and the development of Marine Protected Areas (MPAs), by creating an environmental fund for MPAs in the Mediterranean with France and Tunisia.

The Foundation also works hard on sustainable management of sea resources. To this end, together with the Monaco government, it has worked to recover bluefin tuna stocks in the Mediterranean and is in charge of developing the Mr.Goodfish campaign along the Mediterranean coast. Mr.Goodfish aims to raise awareness amongst the public and professionals regarding sustainable seafood consumption and the ways they can act to preserve marine resources.

Since 2010, the Foundation together with the Oceanographic Museum of Monaco has organised the Monaco Blue Initiative, a thinktank focused on MPAs. It also launched the *Monaco Ocean Week*, which hosts nearly 40 events each year featuring speakers of the highest level.

Regarding climate and the Ocean, the Foundation has brought together a number of organisations based in the Principality such as the Scientific Centre of Monaco and the International Atomic Energy Agency's marine laboratory to create the Monegasque Association for Ocean Acidification.
With the support of the government of Monaco and a number of other countries, the Foundation also instigated the future IPCC report on the Ocean and Climate, due in September 2019.

The Prince and his Foundation actively pushed for the Paris Agreement to explicitly include the Ocean. Together with the government of Chile, they launched the "Because the Ocean" Declaration in which 39 signatory countries call for the development of specific ocean-related measures in their national climate change mitigation and adaptation plans.

www.fpa2.org

Gouvernement Princier
PRINCIPAUTÉ DE MONACO

PRINCE'S GOVERNMENT

Protection and Conservation of Seas and Oceans.

HSH Prince Albert II of Monaco has followed in the footsteps of his ancestors in making the sustainable management of seas, oceans and marine resources a national and international priority for Monaco.

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.

This was the impetus for the Government's strong mobilization behind the events of *Monaco Ocean Week*, led by the Prince Albert II of Monaco Foundation with the participation of the entire Principality.

While the Principality of Monaco may not have a large maritime domain, it does have extensive expertise with regard to seas and oceans, which it has had occasion to put into practice on a very broad scale.

This expertise makes it a natural ally of the United Nations and many other international organizations, where Monaco's voice is expected, heard and highly regarded.

The relevance of the Principality's actions in the sea and ocean domain builds on the coherence of its involvement with the activities of many institutions based in the Principality. These include the International Hydrographic Organization; the International Atomic Energy Association's Environment Laboratories, which host the International Coordination Centre on Ocean Acidification; the secretariats of ACCOBAMS (Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area), the PELAGOS Agreement, the RAMOGE Agreement and the Mediterranean Science Commission (CIESM).

Through its actions on conservation and the sustainable development of the Ocean, the Monaco Government enhances the Principality's political visibility on the international stage according to the guidelines established by HSH the Sovereign Prince.

This international presence and mobilization also reflect the national policy of environmental exemplarity consistently highlighted and shared with other states in international forums.

As a way to broaden awareness of the importance of conserving marine resources for future generations, Monegasque schoolchildren also took part in a number of events during this Ocean Week.

Institut océanographique
Fondation Albert Ier, Prince de Monaco

THE OCEANOGRAPHIC INSTITUTE, PRINCE ALBERT I OF MONACO FOUNDATION

The Oceanographic Institute was founded by Prince Albert I, a passionate and visionary navigator. Recognized as a public interest organisation by French presidential decree on 16 May 1906, the Foundation has been advocating for the Ocean for more than a century. To promote, cherish and protect this heritage, it brings together political, scientific, economic and associative actors as well as the general public. Managed by a Board of Directors assisted by a Scientific Council, it carries out its mission of environmental mediation through its two institutions, its international outreach as well as the support of its partners.

The Oceanographic Museum of Monaco
Leaning against the mythical Rock of Monaco, the Oceanographic Museum is the Foundation's «flagship» and raises awareness among more than 650,000 visitors per year. Beyond its remarkable architecture, it stands out for its world-renowned aquarium, its exhibitions events and the alliance of art and science. A site for culture and exchange, where experiences on the protection of the Ocean are shared, the Oceanographic Museum organizes and hosts international symposia. In 2019, a Care Centre dedicated to marine species was added to the original building, strengthening its capacity for action and awareness.

La Maison des Océans in Paris
Located in the heart of the Quartier Latin in Paris, the Maison des Océans is the Foundation's headquarters. As an environmental «hub», it hosts major actors in the protection of the Ocean: the Prince Albert II of Monaco Foundation, the Foundation for Research on Biodiversity (FRB), the Ocean and Climate Platform (POC), Special Envoy of the United Nations for the Ocean, CIESM, CRIOBE. The Maison des Océans hosts high-level business or public events around current major issues (sustainable management of the Ocean, climate, biodiversity, etc.).

www.institut-ocean.org

CENTRE SCIENTIFIQUE DE MONACO

THE SCIENTIFIC CENTRE OF MONACO

The Scientific Centre of Monaco (C.S.M.) is an autonomous public Monegasque institution created in 1960 by Prince Rainier III. Devoted to scientific research, the C.S.M. today counts three departments:

A MARINE BIOLOGY DEPARTMENT

Created in the early 1990s, this research unit specializes in the study of tropical and Mediterranean coastal coral ecosystem functioning in light of global climate change. Its research draws on techniques from molecular biology, ecology, biochemistry and microscopy but also environmental economics. The C.S.M.'s strength is in bringing together unique expertise in coral physiology and ecophysiology with the long-term ability to grow coral in controlled conditions and with modern technical equipment of the highest quality.

A POLAR BIOLOGY DEPARTMENT

Created as an Associated European Laboratory with the C.N.R.S. and the University of Strasbourg, this department provides the scientific underpinnings for using penguins as indicators of change within polar ecosystems.

A MEDICAL BIOLOGY DEPARTMENT:

Providing a bridge between basic research and clinical applications, this department groups together:

- four translational research teams (of which one is an associated international laboratory) bringing the results of basic research to clinical services. These teams develop research projects on anti-cancer compounds, gene therapies for neuromuscular diseases and the study of the relationship between the intestinal microbiota and immunity;
- an agency working for the development of clinical research in the Principality;
- an observatory for the use of umbilical cord blood in the treatment of sickle cell anaemia;
- an environmental health unit linking human health to environmental changes occurring in the Ocean. This activity takes place in the context of the Human Health Division of the C.S.M.'s Medical Biology Department being designated as a WHO Collaborating Centre for Health and Sustainable Development.

The juxtaposition of these different teams within a single organization enables the creation of promising and original interface programmes, such as using coral to shed light on the mysteries of aging. The Centre attracts candidates from all over the world: since its move to new headquarters in 2013, more than 60 specialists have arrived from 15 European and other countries (the USA, Japan, Australia, New Zealand, Palau, Brazil, the Caribbean, Canada, Oman, Saudi Arabia...).

YACHT CLUB DE MONACO

The Art of living the Sea

With the prestigious signature of the architect Lord Norman Foster, the building of the Yacht Club de Monaco, inaugurated on 20 June 2014, resembles a ship. Anchored on the Quai Louis II, it was conceived with respect for the environment. This commitment was rewarded with ISO 14001 certification in June 2016, an environmental management process that grants the Club with eco-responsible business status.

The Y.C.M. extends this philosophy beyond its walls by encouraging environmentally oriented round-the-world sailing expeditions to use Monaco as their starting point. One example is Mike Horn who set off on May 8, 2016 on his Pole2Pole adventure, covering 42,000 kilometres by sail, by road and on foot, visiting both poles and whose return is expected in the Principality by mid December 2019.

Founded by Prince Rainier in 1953 and presided over by Prince Albert II of Monaco since 1984, the YCM. is a private club counting 2,000 members of 68 nationalities.

The Y.C.M. is resolutely turned towards the future, including that of energy, hosting its first solar and electric boat gathering in 2016. Organized since 2014 in collaboration with the Union Internationale Motonautique (UIM) and the Prince Albert II of Monaco Foundation, the Monaco Solar & Energy Boat Challenge is a world-leading competition dedicated to the latest innovations in propulsion. The next edition will take place from 30 June to 4 July 2020. The aim is to give free rein to the creativity of young engineers combined with the experience of industrialists, in order to imagine the Yachting of tomorrow.

Similarly, the Yacht Club de Monaco is currently working on the launch of a Zero Emission Committee boat to support the regattas and nautical events organised by the Club. Naval architect Espen Oeino designed the hull and structure, while Dario Calzavara (Terra Modena) was in charge of the engineering of this 100% ecological catamaran, without carbon emissions but also without noise pollution, in order to allow whale watching off the Principality, in complete discretion.

The Y.C.M. also launched the first Y.C.M. La Belle Classe Explorer Awards in 2019, during its environmental symposium La Belle Classe Superyachts, a day of conferences and debates to discuss the major current trends in the protection of the marine environment. The aim of this ceremony is to honour the most virtuous explorers of yachts. All initiatives are recognized, whether in construction, life on board management, scientific data collection, or the roads used.

www.yacht-club-monaco.mc

Mairie de Monaco

THE MONACO TOWN HALL

Mindful and respectful of its environment, in accordance with the orientations desired by HSH Prince Albert II, the Town Hall of Monaco has been committed, for many years, to an approach in favor of the environment and sustainable development. Therefore, the members of the Communal Council wished to create, in 2015, a delegation dedicated to Living Conditions, Environment and Sustainable Development. It was entrusted to Marjorie Crovetto-Harroch, second deputy.

This commitment is reflected in concrete and sustainable actions, such as raising awareness of municipal staff for an eco-friendly Town Hall; the establishment of an environmental charter; the signing of the Edenergie contract and the Wood Charter; the reforestation program «1 birth = 1 tree»; the organization of conferences to raise public awareness of environmental issues, and more recently the signing of the National Pact for Energy Transition. Through the Pact, three lines of action have been clearly identified by the Prince's Government: mobility, waste and energy. For its part, the Communal Institution has already undertaken many actions: the transformation of its buildings to reduce energy consumption and the consideration of this issue for any new work; rational energy management; the development of a fleet of 100% electric vehicles; the removal of plastic cups and water bottles; the sorting of paper and plastic in offices ...

Another action: «Monaco Clean Beach» created in 2010 - the result of a partnership between the Monaco City Council, the Monegasque Sanitation Society (SMA) and the Tourism and Convention Department - aims to reduce the number of cigarette butts thrown on the beach and in the sea. In 2019 for the tenth year of the operation, «Monaco Clean Beach» becomes «Monaco zero butt», with distributions of ashtrays in town to prevent these butts from reaching the sea.

All these actions are part of the active policy pursued by the Monaco City Council in favor of Environment and Sustainable Development. The Town Hall wishes to be a daily actor of the environmental policy set up by the Government of Monaco, and to make its contribution in raising the awareness of visitors and residents to these issues.

THE PELAGOS AGREEMENT

Following the bycatch of various dolphins in the nets of fishers in the Ligurian Sea in the late 1980s and the support of various associations, France, Italy and the Principality of Monaco signed the Pelagos Agreement regarding the creation of a Sanctuary for Marine Mammals in the Mediterranean on 25 November 1999 in Rome, with the goal to protect marine mammals and their habitats from threats deriving from human activity such as pollution, noise, collisions with ships, bycatch, reduced food stock, disturbances, etc.).

The Sanctuary covers a maritime area of 87,500 km^2 and 2,022 km of coastline including the maritime territory of five Regions (Provence-Alpes-Côte d'Azur, Corsica, Liguria, Tuscany and Sardinia) and 241 municipalities.
Eight species of cetacean are regularly present in the Sanctuary, including five dolphin populations, Ziphius (Cuvier's beaked whale), sperm whales and fin whales.

The Pelagos Sanctuary is managed by the governments of France, Italy and the Principality of Monaco with the support of a permanent Secretariat based in Monaco and the support of the Scientific and Technical Committee.
Each country is responsible for applying the Agreement's provisions within its own territory.

Research activities carried out as part of the Agreement have allowed major progress to be made in terms of understanding of marine mammals and their threats.

Thanks to legislative measures, bycatch in fishers' nets is no longer a threat for cetaceans. France, Italy and the Principality of Monaco are continuing their efforts, notably to reduce pollution by limiting the use of plastic and by involving coastal communities through a Partnership Charter. Various training and awareness actions are also being launched so that the protection of marine mammals and the quality of our environment is everybody's business.

The Pelagos Sanctuary is on the list of Specially Protected Areas of Mediterranean Importance (SPAMI), renewed recognition on March 29, 2019 by the Commission of the Barcelona Convention It is the largest Marine Protected Area (MPA) in the Mediterranean and the only international MPA devoted to the protection of marine mammals.

www.sanctuaire-pelagos.org

ACCOBAMS

An international agreement for marine biodiversity.

The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) is **an intergovernmental cooperation tool for the conservation of marine biodiversity**. This **Agreement** embodies riparian countries' commitment to preserve all species of cetaceans and their habitats by applying measures to mitigate impacts of economic activities.

ACCOBAMS responds to the need expressed by four international, European and Mediterranean Conventions specialized in the conservation of marine biodiversity and in protection of the marine environment: the **Barcelona Convention** for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean, the **Bonn Convention** on the Conservation of Migratory Species, the **Bern Convention** on the Conservation of European Wildlife and Natural Habitats and the **Bucharest Convention** on the Protection of the Black Sea Against Pollution.

The agreement was signed under the auspices of the Bonn Convention, signed in Monaco on **November 24, 1996**. The Agreement Area consists of the **maritime waters of the Black Sea, the Mediterranean and the Atlantic area** west of the Straits of Gibraltar (this area was extended in 2010 to the entire Portuguese and Spanish Atlantic coast) covering 24 countries. The Agreement participates in global conservation processes in sea and Ocean conservation.

In order to improve knowledge on marine biodiversity and to offer countries credible and acceptable conservation measures, the agreement relies on a Permanent Secretariat (based in Monaco), a Scientific Committee and a Monitoring Committee tracking application of these measures.

Conservation measures include :

- **Obligations** to prohibit all voluntary capture; to reduce accidental capture of cetaceans in fishing nets; to conduct impact assessments for all activities liable to affect cetaceans and to reinforce the fight against pollution;
- The **evaluation and management of interactions between human activity and cetaceans** (fishing, pollution and waste, underwater noise from all sources, collisions with ships, tourist activity...);
- **The protection of habitats**, namely by creating **Specially Protected Areas** and by maintaining **migration corridors**;
- **Research and monitoring** to justify conservation measures and improve their effectiveness;
- **Capacity building** to enable effective implementation of conservation measures and the collection of relevant data;
- **Information, training and education programmes** for the public and for professionals;
- **Emergency response capability** for the rescue of wounded, ill or stranded animals and follow-up for improving scientific understanding of the causes of such events.

THE RAMOGE AGREEMENT

Signed in 1976, the RAMOGE Agreement aims to protect the waters of the Mediterranean coast. It is part of the Barcelona Convention and the resulting Mediterranean Action Plan. Originally, the area of jurisdiction extended from Saint Raphael in France, Monaco to Genoa in Italy. In 1981, it expanded from Marseille to La Spezia, for a better consideration of the administrative divisions of each state.

The RAMOGE Agreement is a tool for sub regional cooperation, both scientifically, technically, legally and administratively, and is taking concerted action to protect the coastal area from La Spezia to Marseille.

Among its various activities, the agreement has, for many years, been concerned with preserving Posidonia oceanic, a marine plant endemic to the Mediterranean, which constitutes the richness of its coastal waters but is unfortunately threatened by human activities. The frequentation of its coasts by the pleasure craft is increasing so much that this activity constitutes, because of the mechanical action of the anchorage, a threat to the posidonia meadows.

On the occasion of the *Monaco Ocean Week* 2019, the Agreement wanted to raise the awareness of yachting stakeholders by proposing a «sustainable anchorages: respect and preservation of coastal areas» workshop as part of the 9th Environmental Symposium La Belle Superyacht class, organized by the Yacht Club of Monaco.

www.ramoge.org

CIESM - MEDITERRANEAN SCIENCE COMMISSION

The Mediterranean Science Commission (CIESM) promotes multilateral marine research in the Mediterranean and Black Sea since 1910. The Commission has grown since its founding to 23 Member States, with the recent accession of the Russian Federation in October 2013.

Focused on one of the most troubled, conflict-ridden region of the world, CIESM represents a unique forum for peaceful dialogue and exchange of scientific knowledge among thousands of marine researchers who apply the latest tools and approaches to understand, monitor and protect a highly vulnerable Mediterranean Sea.

Acting as a think-tank, the Commission is engaged since its conception in:

- promoting trans-frontier, cross-basin scientific cooperation through its international programmes,
- providing advice to Member States, research institutes and international Agencies on emerging issues and research priorities for the Mediterranean/ Black Sea Basin (expert workshops, triennial congress, atlas)
- developing independent, impartial proposals to economic stakeholders and decision makers for a sustainable maritime governance in the Mediterranean/ Black Sea (white papers, charts…).

The Commission integrates a broad spectrum of marine disciplines, federating more than 8,000 active researchers from hundreds of institutes located in fifty countries. This exceptional expertise, coordinated by a scientific team at CIESM Headquarters based in Monaco, covers the most important sectors of marine research.

THE INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO)

The International Hydrographic Organization (IHO) is the intergovernmental body charged with ensuring that all seas, oceans and navigable waters be 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 counts 90 member States throughout the world.

Hydrography consists of measuring water depth (bathymetry) and determining the position of all navigational hazards resting on the seabed such as shipwrecks and rocks. It is carried out primarily by ships and special craft using depth sounders and sonar, and by aircraft equipped with lasers. Useful information can also be obtained from satellite observation. Hydrography also measures tides and currents.

Hydrographic information is crucial to the safe, efficient and sustainable conduct of all human activity on, in or under the sea. Without hydrography, no ship sails; without hydrography, no port is built; without hydrography, no infrastructure is developed in the sea; without hydrography, no environmental program is implemented; without hydrography, no coastline is safe nor any island protected; without hydrography, no search and rescue operation is attempted; without hydrography, no maritime boundary is delineated. Hydrography is integral to the protection and sustainable development of the Ocean in ensuring the marine environment is respected and that no negative economic or social impact is incurred.

The IHO has as its mission :

- To promote the use of hydrography for navigational safety and marine environmental protection as well as for all other maritime activities, while building public awareness of hydrography's importance;
- To improve the global coverage, availability, accessibility and quality of hydrographic data, information, products and services;
- To expand global hydrographic capacity as well as funding, training, science and techniques;
- To establish and support development of international norms for hydrographic data, information, products, services and techniques to achieve the greatest possible uniformity;
- To provide authoritative advice on all hydrographic questions in a timely manner to governments and international organizations;
- To facilitate coordination of hydrographic activities among member States;
- To improve cooperation in hydrographic activities between States at the regional level.

www.iho.int

INDEMER: THE INSTITUTE OF THE ECONOMIC LAW OF THE SEA

INDEMER, the Institute of the Economic Law of the Sea, was created in 1985 with the status of a Monegasque Association under the high patronage of His Serene Highness the Sovereign Prince of Monaco.

INDEMER has a Board of Directors, chaired by Mr Jean-Charles Sacotte, and a Scientific Board chaired by Ms Annick de Marffy-Mantuano.

Its objectives are:

- To carry out all studies and research concerning legal, economic, social and environmental issues raised by the use of the maritime space and the marine environment;
- To organize symposia, seminars, round tables and meetings of experts gathering the most highly qualified international specialists;
- To publish works related to these activities (reviews, books, theses, conference proceedings…);
- To annually publish and distribute the "Directory of the Law of the Sea", a complete working document that reports on and analyzes legal acts and events of the previous year relating to maritime affairs and the law of the sea while providing a critical perspective;
- To promote knowledge of maritime affairs and the law of the sea;
- To recognize research relevant to its mission by awarding a prize every two years.

INDEMER's main achievements pursuant to its objectives are:

- Holding 12 international meetings since 1994, all the works of which have been published;
- Publication of the Directory of the Law of the Sea since 1996, the 21st tome appearing in 2017. This 900-page document is the only one of its kind in French, and is recognized as a global reference on the law of the sea;
- Since 1994, INDEMER has awarded 9 Prizes recognizing doctoral theses on the law of the sea.

INTERNATIONAL ATOMIC ENERGY AGENCY

The International Atomic Energy Agency (IAEA) was founded in 1957 within the United Nations system as a specialized body working towards the safe, secure, and peaceful use of nuclear science and technology. Today, the IAEA also actively contributes to the implementation of the UN Sustainable Development Goals for effective social, economic and environmental development. One of the IAEA's principal goals is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world". For its efforts to prevent nuclear proliferation and enhance the peaceful uses of nuclear energy, the IAEA was awarded the Nobel Peace Prize in 2005.

As part of the Department of Nuclear Sciences and Applications, the IAEA Environment Laboratories assists Member States in protecting the environment through improved monitoring and radioactivity assessment capacity. The Environment Laboratories develop nuclear and isotopic techniques that help better understand physical and chemical processes in the Ocean and that are shared with the Member States through technology transfer and capacity building efforts. Seafood safety, radioactive tracers, harmful algal blooms and the Ocean carbon cycle are some of the topics that are currently being addressed by the Laboratories.

Nuclear and isotopic techniques can constitute unique tools to advance ocean acidification research. They allow scientists to assess past changes in seawater chemistry, as well as to evaluate the biological response of marine species to ocean acidification (e.g. primary production, growth, calcification rates etc.).

The IAEA Environment Laboratories has been engaged in ocean acidification activities since 2013. It hosts the Ocean Acidification International Coordination Centre (OA-ICC) - a project launched at the RIO +20 conference. The OA-ICC implements the following three key overarching activities: science, capacity building, and communication. The project also contributes to the Global Ocean Acidification Observing Network (GOA-ON), supports joint experiments and inter-comparison exercises, advocates for a stronger collaboration between natural and social sciences, works towards the development of best practices in ocean acidification research, and offers free access to its unique bibliographic data base on ocean acidification.

Frequently the OA-ICC organizes regional training courses for scientists from developing countries and supports their participation in international scientific events.

The project offers daily updated information on ocean acidification research results, related jobs, meetings etc. on its news stream and provide comprehensive resources grouped according to audience and language on its website.

The OA-ICC contributes on a regular basis to major international publications and participates in high-level international meetings addressing the problem of ocean acidification.

www.iaea.org

MONEGASQUE ASSOCIATION FOR THE PROTECTION OF NATURE (AMPN)

The AMPN is an NGO in charge of managing Monaco's marine protected areas. It was created in 1975 to fulfill HSH. Prince Rainier III's wish to preserve a section of the Monegasque coast.

The AMPN created Monaco's marine protected areas in 1976 and 1986 and is responsible for their management.

The first, covering an area of 33 hectares, is located to the east pf the Monegasque coast bordering the Larvotto neighbourhood and contains a Posidonia meadow.

The second, intended to preserve the Spélugues coral reef and covering an area of 2 hectares, is located at the opening of Port of Hercule.

For over 40 years, the AMPN has implemented protection and management measures with the help of volunteers and in collaboration with the Universities of Nice-Sophia Antipolis, Marseille, Montpellier and Genoa.

From the very beginning, the AMPN immersed artificial reefs to strengthen habitats and encourage settlement by fauna and flora. Innovative reefs, created using a 3D printer, were submerged in 2017. Their design, reflecting the complexity of the natural environment, makes them even more effective tools for bottom management in coastal areas.

Various research programs have focused on the dynamics of the Posidonia meadow, the impact of reefs on fish fauna and the study of their complexity, the dynamics of invertebrate populations, the study of sea urchin reproduction or the in situ culture of red coral. Recent studies have shown the link between the Larvotto marine protected area and the richness of birds and have highlighted the reserve effect.

Participatory science operations are regularly carried out. Volunteer divers clean the seabed. Training is provided to identify and quantify fish in order to assess the state of stands, identify heritage species such as grouper and corb, or ensure the arrival of non-native species.

Public awareness campaigns are organized. Conferences, films, reports, exhibitions, recreational activities are offered to interest the public in the protection of the marine environment.

A desire to integrate Monaco's marine protected areas into an international dynamic.

The AMPN is a member of the MedPAN network (network of managers of marine protected areas in the Mediterranean).

Its presence at national or international events makes the particularities of Monaco's MPAs and the actions carried out there more visible. It strengthens scientific partnerships, particularly in the context of major reef research using a 3D printer.

The AMPN is also the initiator of the Monaco Marine Educational Area.

This programme, for which the AMPN is in charge, is carried out in collaboration with the Prince Albert II of Monaco Foundation and the Gouvernement Princier. Its purpose is to raise children's awareness of environmental protection by managing the marine educational area themselves. The acquisition of knowledge about the marine environment enables them to suggest concrete preservation actions and to assess their benefits.

www.ampn-nature-monaco.com

BEYOND PLASTIC MED - BEMED

The Beyond Plastic Med (BeMed) initiative was born from the observation that with more than 3000 billion microplastic particles, the Mediterranean Sea is the most polluted sea in the world. In order to act for a Mediterranean without plastic, the Prince Albert II of Monaco Foundation, the Tara Expeditions Foundation, Surfrider Foundation Europe and the Mava Foundation have joined forces to launch the BeMed initiative.

Launched during the international conference "Plastic in the Mediterranean: what next?" held in Monaco in 2015, the BeMed initiative is now coordinated by an extended group, as IUCN wanted to get involved alongside its founding members.

As BeMed's objective is to act at the source of the problem, the initiative aims to support and develop a network of Mediterranean stakeholders committed to curbing plastic pollution, implement sustainable solutions and encourage the research of new alternatives and mobilise stakeholders and the general public by raising awareness and sharing best practices.

BeMed leads awareness-raising initiatives with the general public, organises and/or takes part in workshops and international conferences and supports actions in the field. Notably, BeMed launches a call for micro-initiatives each year to support NGOs, local authorities, scientific institutions or small companies in the Mediterranean region, which aim to fight against the arrival of all plastic pollution on the shores and in the Mediterranean Sea.

The initiatives supported fall within the priority areas of action: researching alternatives to plastic, raising awareness and passing on knowledge, advising and helping to implement new regulations, bringing together and mobilising stakeholders, collecting data and conducting research. Since 2016, 38 micro-initiatives have already been launched in 12 different countries.

In the near future, BeMed will also work alongside companies to support them in their strategy to reduce their plastic footprint and initiate concrete collective actions whose impact will be directly measurable at the Mediterranean level.

www.beyondplasticmed.org

MONEGASQUE ASSOCIATION FOR OCEAN ACIDIFICATION – AMAO

Ocean acidification, along with climate change, is one of the main consequences of increased atmospheric CO_2 due to human activity.

The Prince Albert II of Monaco Foundation instigated creation of the AMAO (Monegasque Association for Ocean Acidification). HSH the Sovereign Prince publicly announced its establishment in his Dec. 3, 2013 speech during the Ocean Acidification International Reference User Group meeting.

The AMAO's purpose is to disseminate, promote and facilitate international actions on ocean acidification and other global factors of stress on the marine environment.

To this end, the AMAO undertakes to unify communication among the different institutions working in Monaco on ocean acidification: the Prince Albert II of Monaco Foundation and the Monaco Government, the IAEA's environment laboratories, the Scientific Centre of Monaco and the Oceanographic Institute.

The AMAO is also composed of representatives from the International Union for Conservation of Nature (IUCN) and France's National Centre for Scientific Research (CNRS).

It has several objectives:

RAISE AWARENESS

The AMAO works constantly to build awareness, beginning with the Monaco Declaration launched by 155 scientists from 26 countries during the October 2008 international symposium in Monaco, "The Ocean in a High-CO2 World".

UNDERSTAND AND ANTICIPATE IMPACTS

The CSM and the IAEA organize workshops every two years on the socio-economic impacts of ocean acidification. These workshops allow experts from the natural and human sciences to discuss and evaluate the economic and societal consequences of ocean acidification and to develop mitigation and adaptation strategies.

INFORM AND SENSITIZE CITIZENS AND DECISION-MAKERS

The *Ocean Acidification International Reference User Group* annually gathers scientists, industry representatives and NGOs on this issue.

The AMAO's actions include building public awareness of ocean acidification by developing communication tools and organizing conferences and exhibitions.

CARRY THE DEBATE FORWARD

Thanks to the activities of the *2015 Oceans Initiative,* the AMAO greatly contributed to placing oceans at the centre of discussions during the Paris COP21 in 2015.

The AMAO is committed to identifying the most effective adaptation, protection and restoration solutions in order to minimize damage.

The AMAO is participating in preparations of the IPCC's special report on "climate change, the Ocean and the cryosphere."

SOLUTIONS

The AMAO coordinates the *"The Ocean Solutions Initiative"* project which assesses solutions offered by the Ocean to minimise the impact of acidification and climate change on marine ecosystems and the services they provide.

COORDINATE INTERNATIONAL PROJECTS

Under its *'Peaceful Uses Initiative'*, the IAEA created the 'Ocean Acidification International Coordination Centre in Monaco to promote and facilitate international action on ocean acidification.

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

In order to enhance a more effective management of Mediterranean marine protected areas (MPAs), three countries, France, Monaco and Tunisia, have initiated an environmental fund dedicated to MPAs in the Mediterranean: The MedFund, created in Monaco in 2015.

The MedFund is a private, non-profit institution that provides sustainable funding for the conservation of marine biodiversity. This conservation trust fund mobilises and invests financial resources to provide grants to NGOs and national marine protected area management authorities in the various countries.

A Mediterranean cooperation platform is piloting this initiative. It now has 15 members, including 6 Mediterranean countries[1] and regional civil society organisations[2].

The MedFund is financially supported by the Government of Monaco, the Prince Albert II of Monaco Foundation, the Oceanographic Institute, Prince Albert I of Monaco Foundation, the Leonardo Di Caprio Foundation, Basel Zoo, Sorbonne University - Biodiversarium, the French Global Environment Facility, the Global Environment Facility and the French Development Agency.

(1) France, Monaco, Tunisia, Morocco, Albania and Spain
(2) The Oceanographic Institute, Prince Albert I of Monaco Foundation, the Regional Activity Centre for Specially Protected Areas - UN Environment / MAP, the Partnership Fund for Critical Ecosystems, the network of MPA managers in the Mediterranean MedPAN, WWF-Mediterranean, IUCN-Mediterranean, the Conservatoire du Littoral and the Small Islands of the Mediterranean Initiative.

www.themedfund.org

STARS'N'BARS

Monaco's first sports bar and family restaurant STARS'N'BARS (founded by Kate and Didier in 1993) have made environmental awareness, well-being and personal development a priority, while offering a diverse menu based on home-made, organic and locally sourced dishes.

STARS'N'BARS is a vital player in the sustainable development of the Principality, and plays an active role in events such as the Monaco Ocean Week, the Ever Salon, The Africa Eco Race, The E-Prix, to name a few.

Ecological initiatives are a key concern to the restaurant, and they were the first to say no to plastic straws, plastic water bottles, single-use coffee cups and to install a composter on their terrace!

STARS'N'BARS has reduced its carbon *"food print"* by launching meat-free days, only serving Mr.GoodFish sustainable fish and offering filtered water bottled on site.

Today the family restaurant serves as an EcoHub with:

- Vegetarian, gluten-free, organic meat and responsibly caught fish (Mr.GoodFish) options,
- A terrace on the port surrounded by a 120 square metre vegetable garden,
- 100% of the restaurant's electricity comes from renewable energy and the restaurant also has its own electric vehicle fleet,
- Cleaning of the port and the surrounding area with local students,
- Monacology, an association cofounded by STARS'N'BARS and environmentalist Olivier Arnoult in 2004 which aims to raise children's awareness of the environment. In 2017, Stars'n'Bars and Monacology welcomed Yann Arthus Bertrand, in partnership with the Grimaldi Forum and the Oceanographic Museum,
- Workshops, meetings and monthly conferences in the restaurant based on ecology, personal development, well-being and nutrition,
- Activities and games for children regarding recycling, clean energy and reducing waste, and protecting the sea.

"Everyone needs to reduce their carbon footprint: the future of our planet and our children depends on it", Didier argues.

www.starsnbars.com/en

The Prince Albert II of Monaco Foundation would like to thank all of its partners who took part in the third edition of the *Monaco Ocean Week*.

The Government of Monaco | The Oceanographic Institute | The Scientific Centre of Monaco | The Yacht Club of Monaco | The Monaco Department of Marine Affairs | The Monaco Town Hall | International Coral Reef Initiative | The Pelagos Agreement | The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) | The RAMOGE Agreement | Monaco Explorations | The Mediterranean Science Commision | The International Hydrographic Organisation | The International Atomic Energy Agency's Environmental Laboratories | The Monegasque Association for the Protection of Nature | Beyond Plastic Med | The Monegasque Association for Ocean Acidification | The MedFund | Tara Expeditions Foundation | The MAVA Foundation | Surfrider Foundation Europe | International Union for Conservation of Nature | The Science and Ethics Institute | Ecomers | Stars' N' Bars | Novotel Monte-Carlo | The Animal Fund | Boston College | BioMarine organization | The French Biodiversity Agency | Association Monaco Argentina | Students On Ice Foundation | Geoversiv Foundation | EAT Foundation | International Center for Dialogue and Peacebuilding | Club Soroptimist Monaco | Mission for Energy Transition with the Department of the Environment | the Department of Urban Planning | the Monegasque Sanitation Society (SMA) | The Pasteur Institute | Ocean X Media and all participants of this third *Monaco Ocean Week*.

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