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Oceans and the law of the sea: oceans and the law of the sea

Letter dated 10 October 2022 from the Permanent Representative of Monaco to the United Nations addressed to the Secretary-General

I have the honour to bring to your attention two documents relating to oceans and the law of the sea, in particular ocean acidification and marine pollution prevention.

The first document is the summary for policymakers of the Fifth International Workshop on the Economics of Ocean Acidification, which was organized by the Scientific Centre of Monaco and held from 12 to 14 October 2021 in the Principality of Monaco, and concerned the theme of blue carbon (see annex I).*

The second document is the Monaco Declaration entitled "Advancing human health and well-being by preventing ocean pollution", which was adopted at the conclusion of a symposium held in the Principality on 2 and 3 December 2020 and organized jointly by the Scientific Centre of Monaco, the Prince Albert II of Monaco Foundation and Boston College (see annex II).

I should be grateful if you would have the present letter and its annexes circulated as a document of the General Assembly, under agenda item 72 (a).

(*Signed*) Isabelle F. **Picco**
Ambassador
Permanent Representative

* The annexes are being circulated in the language of submission only.

Annex I

[Original: English]

CENTRE SCIENTIFIQUE DE MONACO

CEMAFI International Association

THE FIFTH INTERNATIONAL WORKSHOP ON THE ECONOMICS OF OCEAN ACIDIFICATION: SUMMARY FOR POLICY MAKERS

Bridging the Gap between Ocean Acidification Impacts and Economic Valuation

Monaco, 12-14 October 2021

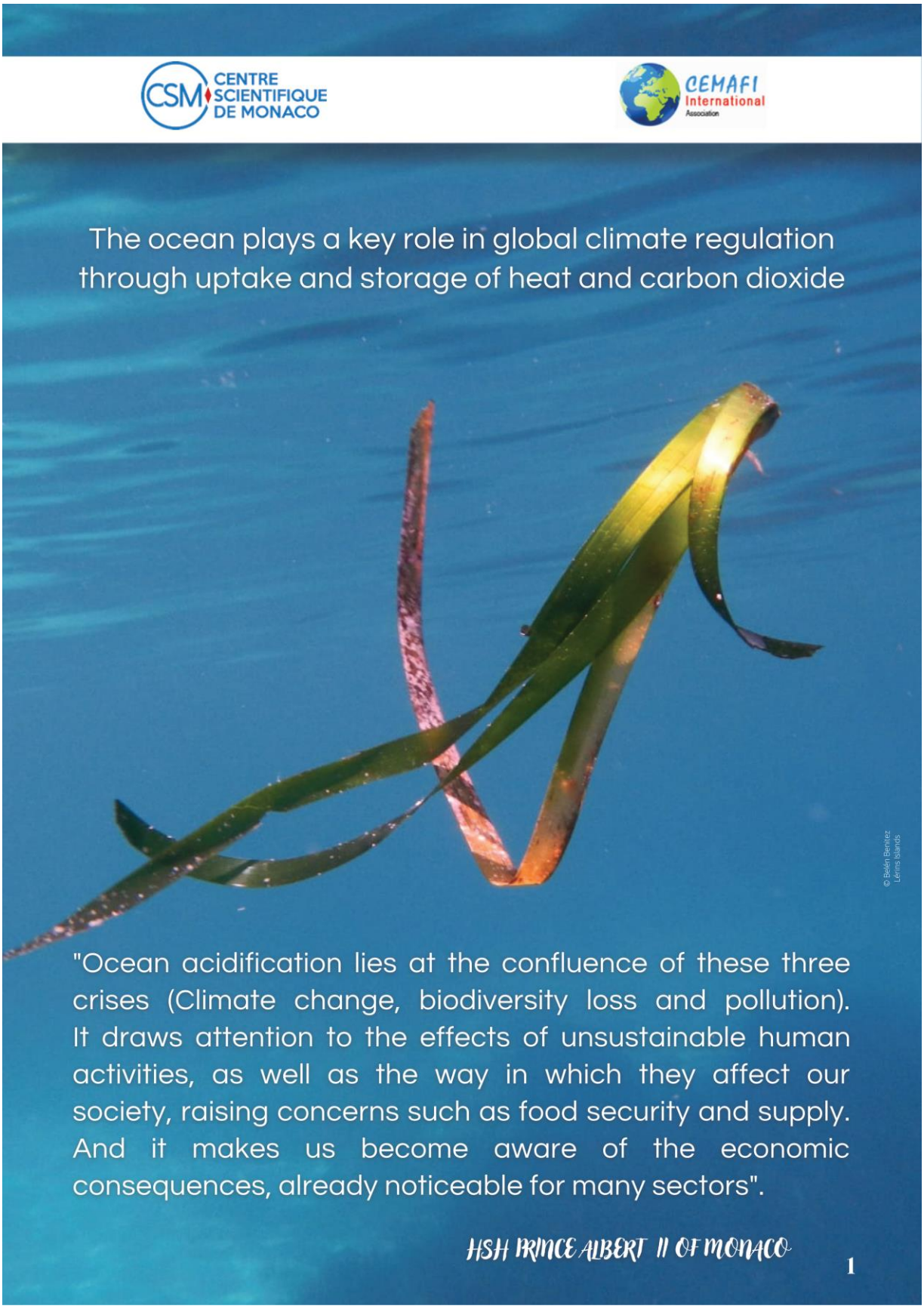
Blue carbon and other marine biological processes as a solution to mitigate the ecological and socio-economic impacts of climate changes in the ocean

Photo HSH Albert II Prince of Monaco. © Gaëtan Luci, Palais Princier

On October 2021, 37 experts from 15 countries participated in the Fifth International Workshop on the Economic Impacts of Ocean Acidification held in Monaco. The participants focused on using marine biological processes to fight climate change.

The multidisciplinary workshop connected knowledge from scientific and social areas related to the concept of blue carbon in coastal, open-ocean and deep-sea ecosystems, for the quantification of climatic benefits at local and global scales.

This workshop considered the feasibility of leveraging a range of oceanic biological processes related to the carbon cycle. Experts focused not only on rooted coastal vegetation, but also on macroalgae including kelps as well as phytoplankton production and organisms such as whales and fish that export carbon. They assessed the potential contribution of these biological processes to climate change mitigation, and as a solution to the ecological and socio-economic impacts of climate change-related consequences in the ocean.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The ocean plays a key role in global climate regulation through uptake and storage of heat and carbon dioxide
© Belén Benitez Lérins Islands
"Ocean acidification lies at the confluence of these three crises (Climate change, biodiversity loss and pollution). It draws attention to the effects of unsustainable human activities, as well as the way in which they affect our society, raising concerns such as food security and supply. And it makes us become aware of the economic consequences, already noticeable for many sectors".
HSH PRINCE ALBERT II OF MONACO
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WHAT IS BLUE CARBON....?

The term "blue carbon" refers to the carbon captured in coastal and marine ecosystems. This includes coastal vegetated ecosystems, such as mangroves forests, salt marshes, and seagrass meadows as well as the open ocean from the surface to the deep-sea.

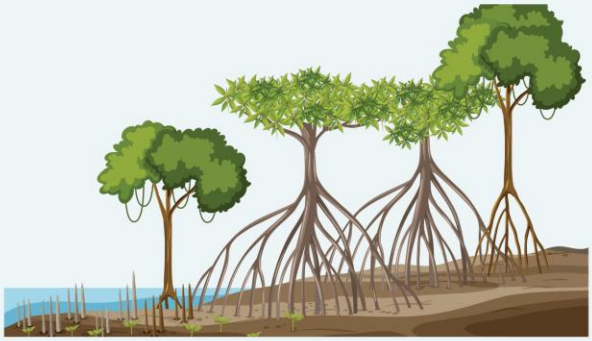
The carbon sequestration of ocean ecosystems is a crucial asset in order to limit global warming to 1,5° C above pre-industrial levels:

- in terms of volume: the Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) (Intergovernmental Panel on Climate Change, 2019) states that over the past 200 years the ocean has taken up 500 Gigatons from the atmosphere out of 1300 Gigatons of CO_2 total anthropogenic emissions.

- in terms of efficiency: in the case of coastal vegetated ecosystems, the rates of carbon accumulation in sediments of salt marsh, mangrove, and seagrass habitats range between 18 and 1713 g C per m^2 per year (Mcleod et al. 2011). Rates of carbon accumulation in soils of terrestrial forests range from 0.7 to 55 g C per m^2 per year , depending on disturbance affecting these ecosystems (Mcleod et al. 2011).

- in terms of time: marine ecosystems can store carbon for millennia compared with terrestrial forests that only store carbon for decades or centuries. Damage to marine ecosystems releases ancient stored carbon, accelerating climate change.

For these reasons, the good management, protection, and restoration of blue carbon habitats should be central to local and global climate change mitigation policies.



NATURE-BASED SOLUTIONS...

Nature-based Solutions (NbS) are defined by the IUCN (2016) as "actions to protect, sustainably manage, and restore natural or modified ecosystems", as strategies for simultaneously solving both socioeconomic and environmental problems.

They address societal challenges effectively and adaptively, alongside providing human well-being and biodiversity benefits. NbS are cost-effective and helping to build resilience.

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TROPICAL & TEMPERATE COASTAL ECOSYSTEMS

Context

- Tropical and temperate coastal ecosystems are highly productive and form biologically rich habitats that play an important role in supplying ecosystem goods and services of great value to human well-being (Ayyam et al. 2019).
- Tropical and temperate coastal ecosystems include mangroves forests, tidal marshes, seagrass meadows, kelp beds, rocky coastlines, sandy, muddy, and cobble shores. These ecosystems sequester and store large quantities of carbon in both plant biomass and in sediments (Marcreadie et al. 2019).

Characteristics

- In addition to their ability to store carbon, these ecosystems provide numerous benefits and services to reduce the consequences of climate change (Ayyam et al. 2019), such as:
  - protecting coastlines from erosion.
  - buffering the impacts of hurricanes and storms.
  - forming natural flood defences.
  - regulating water quality.
  - providing habitats for marine life.
  - supporting food security for people.
  - creating job opportunities in fisheries, tourism.
  - bolstering spiritual values for surrounding communities.

Key figures

- Tropical and temperate coastal ecosystems are profoundly affected by humans. Development and urbanization of coastal areas due to increasing populations continue to destroy these habitats worldwide, with additional impacts from fisheries, aquaculture, and pollution (Gullström et al. 2021; Cohen et al. 1997).
- Coastal vegetated ecosystems have been and are still currently being lost or degraded worldwide. Up to 67% of mangrove forests, 29% of seagrass meadows and 50% of tidal salt marshes have already been lost (Himes-Cornell et al. 2018).
- Coastal vegetated habitats play a key role in the global sequestration of atmospheric carbon (Pendleton et al. 2012). For the top meter of sediment, carbon storage is approximately 259 Megagrams carbon per ha for tidal marshes, 407 Megagrams carbon per ha for mangroves, and 142 Megagrams carbon per ha for seagrass beds.

© photos: Belén Benitez -Med Sea & Galapagos Islands

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OPEN WATER & DEEP SEA ECOSYSTEMS

Context

- "The open ocean provides more than 99% of living space on earth. It includes the epipelagic zone (or upper open ocean), the mesopelagic zone, and all the water column down to the sea floor (eg., bathyal, abyssal and hadal zones).
- The deep sea (defined here as the layer below the permanent thermocline where sunlight does not penetrate anymore) is vast and remote; it includes areas within and beyond national jurisdictions covering over 85% of the ocean floor. These ecosystems are teeming with life and support important and unique ecosystems.

Characteristics

- The ocean has absorbed the equivalent of 39% of industrial-age fossil carbon emissions, significantly modulating the rise of atmospheric CO_2concentrations and the associated impacts on the climate (McKinley et al. 2020).
- Thus, carbon stocks down to 1 m depth in coastal sediments represent accumulation over hundreds to thousands of years, while a depth of 1 m in deep-sea sediments represent accumulation over 100s of 1000s to millions of years (Atwood et al. 2021).
- Carbon sequestration occurs in two ways that both have different impacts and occur at different scales:
  - Physical – the dissolution of CO_2in the surface water, which is entrained in the global circulation to the deep layers (this is the cause of acidification).
  - Biological – the biological carbon pump, where carbon fixation by phytoplankton and its transfer to higher trophic communities is followed by deep sedimentation of the material produced by all living organisms, thereby sequestering carbon to the ocean interior for thousands of years or more.
- The open ocean and deep-sea ecosystems:
  - Are essential to the human-perturbed carbon cycle (Sweetman et al. 2017).
  - Are the largest stores of anthropogenic carbon after the atmosphere (Rogelj et al. 2018).
  - Play a crucial role in maintaining anthropogenic carbon in the Deep Ocean.

Key figures

- Since 1830, the open ocean is estimated to have absorbed around 500 Gigatons (Gt) of carbon. At today's market price of carbon, the value of this amount of carbon would be around $2 trillion.
- Most of the oceans remains to be explored. It harbours a tremendous biodiversity, even in highly extreme environments.
- Warming, deoxygenation and acidification affect biodiversity and the functions of life in the ocean, which modify the oceans capacity to absorb / sequester carbon (Levin and Le Bris, 2015).
- Threats and Emerging activities are reflected in the following:
  - Climate change-related pressures.
  - Warming and acidification.
  - High vulnerability to deoxygenation.
  - Projected reduction in carbon flux to depth reducing food availability to deep communities.
  - Deep-sea fishing.
  - Mining exploration and exploitation activities.
  - Offshore aquaculture.

© photo 1: NOAA Ocean Services website. The website caption reads, "A vampire squid... [+]

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POLICY RECOMMENDATIONS

To preserve, restore and enhance blue carbon sinks

ECONOMICS & FINANCE

In order to better protect the ocean, there is a need to establish sustainable financial mechanisms. Without certain measures, there will be considerable economic risks given the importance of the ecosystem services provided by the ocean (with an increasing cost of no-action). In such context, it is recommended to:

- Subsidize blue carbon preservation projects through targeted use of public and philanthropic funding. Funding policies could include:
  - Give tax breaks for blue carbon contributions.
  - Implement carbon pricing, so that the prices of all goods produced to reflect the costs of blue carbon degradation.
  - Give subsidies for protection.
  - Implement fines for violations.
  - Implement accounting and sale of carbon offsets from the open ocean.
- Establish an Universal Ocean Wealth Fund for restoration, monitoring, and supporting scientific research and ocean literacy.
- Conduct inclusive and participatory cost-benefit analysis of restoration. The decision-making should incorporate management in the short, medium and long run.
- Assess locally the opportunity costs (such as local fishing rights, potential investment in infrastructure, nuclear facilities) for keeping or replenishing coastal wetlands.
- Adopt ambitious policies with long run horizons, involving multiple (including young) generations since micro-pricing and opportunity costs of protecting an ecosystem are short run issues.
- Monitor the open ocean is necessary to avoid damaging its absorptive capacity.
- Conduct research on the open ocean so as to better understand it as a regenerative economy, and therefore, to construct a Regenerative Ecosystem Services Shadow Gross domestic product (GDP) . Open waters constitute the 7th largest GDP globally.
- Provide liquidity and credit facilities such as green banking credit investments and funding for decarbonated investments.
- Reassess monetary policy in light of carbon conservation considerations.
- Avoid asset bubbles in nature, considering that putting synthetic universal carbon prices on natural resources can create asset bubbles.

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POLICY RECOMMENDATIONS

To preserve, restore and enhance blue carbon sinks

GOVERNANCE & LAW

Governance of the ocean is a crucial issue in order to jointly tackle the common threats to blue carbon. This requires urgently a mobilization on the following points:

- Improve "good governance" for Nature-based Solutions (access to information, access to public participation and access to justice) at all the levels of governance in order to empower local communities and citizens to face climate change related societal challenges.
- Undertake national conservation efforts to ensure that blue carbon ecosystems continue to play their role as carbon sinks in the long term.
- Use community-based ecosystem management programs for an optimal use of available resources. Complement Marine Protected Areas (MPAs) with Marine Spatial Planning (MSP) strategies and implement sustainable fisheries and better stakeholder engagement and input.
- Consider by policy-makers carbon of autochthonous$_2$ origin in blue carbon ecosystems.
- Establish regulations that include parameters on carbon capture to reduce emissions.
- Make climate stability a long-term viable strategy.
- The open ocean and its deep sea are a "common heritage of humankind". Governance at the global level would ensure the interests of all countries in the long term (100 years or more) consistently with the common interests of all humanity.
- Make fisheries management tools take into account ecosystem-based approaches by changing the cap of fisheries, as well as carbon fluxes and storage.
- Improve policy and legal tools and instruments protecting deep-sea ecosystems to achieve the objectives of the United Nations Framework Convention on Climate Change (UNFCCC).
- Incorporate blue carbon commitments in Nationally Determined Contributions (NDCs).

[1] Carbon authoctonous: This type of carbon is produced and deposited in the same location. Plants remove carbon dioxide (CO2) from the atmosphere/ocean through photosynthesis (primary production) and convert it for use by plant tissue (such as leaves, stems, roots/ rhizomes) to increase plant biomass (UICN, 2019).

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POLICY RECOMMENDATIONS

To preserve, restore and enhance blue carbon sinks

GOVERNANCE & LAW

Governance of the ocean is a crucial issue in order to jointly tackle the common threats to blue carbon. This requires urgently a mobilization on the following points:

- Ensure relevant synergy between Locally Determined Contributions (LDCs) and the Nationally Determined Contributions (NDCs).
- Make Nature-based Solutions gain universal acceptance by including marginalized communities and indigenous populations.
- Better integrate climate law and biodiversity law at multi-regulatory level (international, regional, national, and local) to address problems of implementation.
- Explicitly incorporate, integrate, and coordinate blue carbon activities in existing regulatory frameworks to mitigate and adapt to climate change.
- Identify key human activities that contribute to protecting carbon stocks and improving carbon sequestration.
- Implement and coordinate better climate conventions with other legal and policy instruments of ocean and biodiversity governance to improve communities' livelihood and collective universal interests. For instance, an inventory of the type of ownership of coastal areas could be useful, including NGOs and privately held areas.
- Take into account in policy making that the complementary goals of climate stabilization and biodiversity (such as conservation) and meeting human needs are indispensable for sustainability.
- Monitor the open ocean and deep-sea floors in order to avoid damaging their absorptive capacity (carbon sequestration). Penalties should be applied, in case of damage due to human activity.
- Create a network of Marine Protected Areas (MPAs) involving local, regional, and international governments.
- Develop mechanisms within the UNFCCC that (i) incentivize preservation over restoration of blue carbon ecosystems and (ii) allow proactive conservation to be accounted for in Nationally Determined Contributions (NDCs).

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POLICY RECOMMENDATIONS

To preserve, restore and enhance blue carbon sinks

RESEARCH

We are only able to manage what we know, and in the case of the ocean a lot remains to be done in the fields of scientific research and ecosystem characterization and monitoring for a better understanding of blue carbon processes. It is therefore recommended to:

- Invest in research to understand changes and make projections for the future of the world's oceans.
- Take inventory/stock of coastal vegetated ecosystems to assess losses as these ecosystems migrate to higher latitudes with global warming.
- Conduct scientific research on blue carbon in both coastal and high sea contexts, to evaluate carbon sequestration and losses.
- Assess and minimize the potential impacts of bottom trawling on carbon stored in the seabed.

- Scale up funding for assessments and research on the importance and value of blue carbon ecosystems.
- Strengthen investment and financing for research projects on blue carbon ecosystems.
- Engage multiple generations and a diversity of people when assessing the value and the relationships of people with blue carbon ecosystems.
- Coordinate the different research and monitoring players in direct or indirect relation with blue carbon ecosystems to achieve the expected results.

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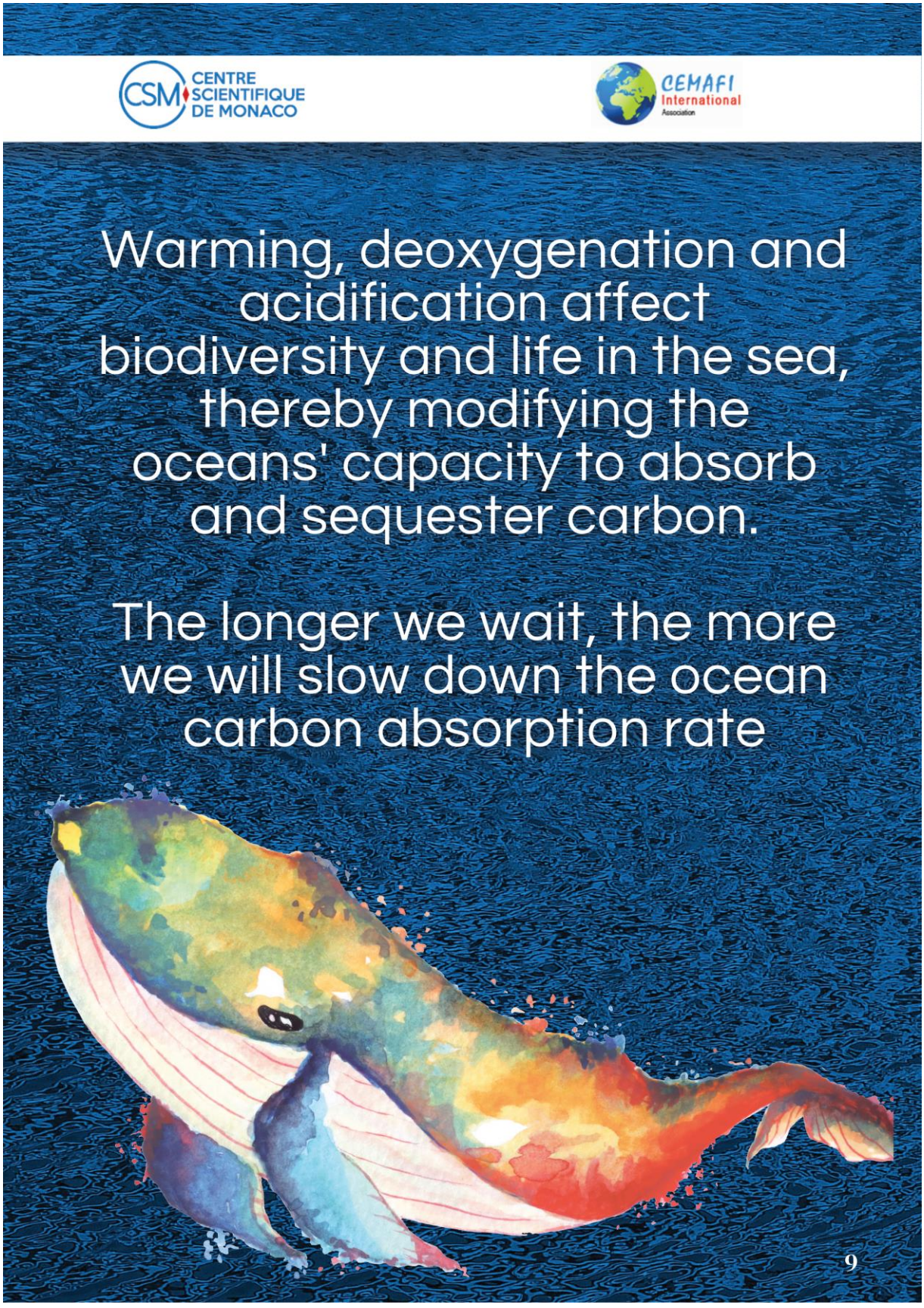
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Warming, deoxygenation and acidification affect biodiversity and life in the sea, thereby modifying the oceans' capacity to absorb and sequester carbon.
The longer we wait, the more we will slow down the ocean carbon absorption rate
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THE FIFTH INTERNATIONAL WORKSHOP ON THE ECONOMICS OF OCEAN ACIDIFICATION: SUMMARY FOR POLICY MAKERS

Bridging the Gap between Ocean Acidification Impacts and Economic Valuation

Monaco, 12-14 October 2021

Blue carbon and other marine biological processes as a solution to mitigate the ecological and socio-economic impacts of climate changes in the ocean

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The workshop was organized by the Scientific Center of Monaco (CSM)

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Annex II

[Original: English]

The MONACO Declaration

Advancing Human Health & Well-Being by Preventing Ocean Pollution

Human health and its interactions with other issues is currently at the heart of many of our concerns: biodiversity, with zoonotic diseases such as the Coronavirus disease, the Oceans, whose situation poses so many risks.

Your discussions have demonstrated that human health is being affected more and more by the state of the oceans.

We know the consequences of the proliferation of micro-plastics, the effects of mercury and the damage caused by chemical pollution. We know that they derive primarly from land-based sources, that they are linked to our industrial and agricultural practices, to our excessive and haphazard use of plastic, to the lack of waste sorting and recycling infrastructure, and more generally to our dependance on hydrocarbons.

And we also know of course that it is vital to break away from all of this if we want to ensure ocean health more effectively – and in so doing, ensure the health of the human population.

H.S.H. Prince Albert II

THE FOLLOWING DECLARATION: "ADVANCING HUMAN HEALTH & WELL-BEING BY PREVENTING OCEAN POLLUTION" WAS ADOPTED IN THE CONCLUDING SESSION OF THE MONACO INTERNATIONAL SYMPOSIUM, "HUMAN HEALTH AND THE OCEAN IN A CHANGING WORLD" HELD IN MONACO ON DECEMBER 2-3, 2020 UNDER THE HIGH PATRONAGE OF H.S.H. PRINCE ALBERT II OF MONACO.

This Declaration summarizes the key findings and conclusions of the Monaco Commission on Human Health and Ocean Pollution.

It is based on the recognition that all life on Earth depends on the health of the seas. It presents a Call to Action -an urgent message addressed to leaders in all countries and to all citizens of Earth urging us to safeguard human health and preserve our Common Home by acting now to end pollution of the ocean.

The Declaration was endorsed by the scientists, physicians and global stakeholders who participated in the Symposium in-person in Monaco and virtually from around the world.

The MONACO Declaration

Advancing Human Health & Well-Being by Preventing Ocean Pollution

On 2-3 December 2020, the Centre Scientifique de Monaco, the Prince Albert II de Monaco Fondation and Boston College convened the Monaco International Symposium on Human Health & the Ocean in a Changing World in partnership with the Government of the Principality of Monaco, the European Marine Board, the European Centre for Environment & Human Health, the French National Centre for Scientific Research (CNRS), the French National Institute for Ocean Science (IFREMER), the Mediterranean Science Commission (CIESM), the Monaco Oceanographic Institute, the Scripps Institution of Oceanography, the United Nations Environment Programme (UNEP), the Woods Hole Oceanographic Institution and the World Health Organization (WHO) under the High Patronage of H.S.H. Prince Albert II of Monaco.
Symposium participants presented comprehensive, up-to-date information on all forms of ocean pollution and their effects on human health. They examined trends and geographic patterns of ocean pollution and pollution-related disease. They proposed recommendations for the prevention and control of ocean pollution and the improvement of human health and well-being.

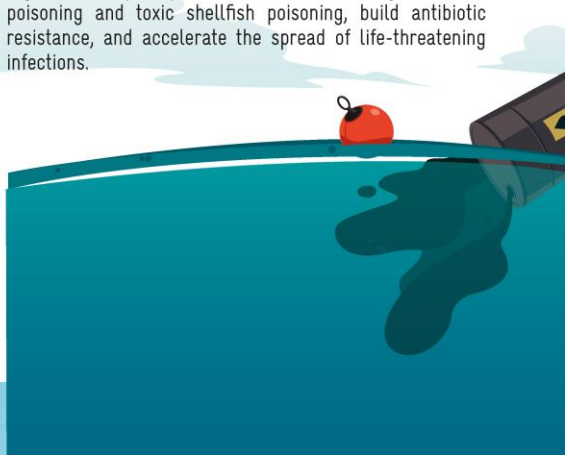
MAJOR CONCLUSIONS OF THE SYMPOSIUM ARE THESE:

A POLLUTION OF THE OCEANS IS WIDESPREAD, WORSENING, AND IN MANY PLACES POORLY CONTROLLED. HUMAN ACTIVITY THAT RELEASES UNWANTED WASTES INTO THE SEA IS THE MAJOR SOURCE.

- Ocean pollution is a complex mixture of plastic waste, toxic metals, manufactured chemicals, oil spills, urban and industrial wastes, pesticides, fertilizers, pharmaceutical waste, agricultural runoff and sewage.
- More than 80% arises from land-based sources.
- Chemical and plastic pollutants have become ubiquitous in the earth's oceans. They contaminate seas and marine organisms from the high Artic to the abyssal depths.

B OCEAN POLLUTION HAS MULTIPLE NEGATIVE IMPACTS ON HUMAN HEALTH AND WELL-BEING. THE MAGNITUDE, SEVERITY AND GEOGRAPHIC RANGES OF THESE EFFECTS ARE INCREASING.

- Petrochemicals and persistent organic pollutants (POPs) in the oceans threaten the marine microorganisms that produce much of the earth's oxygen supply.
- Mercury pollution of the oceans causes high levels of contamination in tuna and other widely eaten fish. When pregnant mothers eat mercury-contaminated fish, mercury enters their bodies and can damage their children's developing brains. The consequences are lifelong reductions in intelligence (IQ), developmental delays, and increased risk of attention deficit/ hyperactivity disorder (ADHD).
- Coal combustion in power plants and factories is the main source of marine mercury pollution. Gold mining is a second source.
- In adults, mercury pollution increases risk of cardiovascular disease and accelerates cognitive decline, thus increasing risk of dementia.
- Plastic microparticles and microfibers – the microscopic breakdown products of plastic pollution – persist in the oceans for years, enter the marine food web and concentrate in fish and shellfish consumed by humans
- Plastic microparticles carry multiple toxic chemicals– PCBs, phthalates, bisphenol A, brominated flame retardants, organophosphorus compounds, organotin compounds, and perfluorinated chemicals. When they enter the human body in plastic microparticles, these chemicals can reduce male fertility, increase risk of heart disease, disrupt endocrine signaling, depress immune function, and cause cancer.
- Agricultural runoff. Industrial waste and human sewage released into harbors and coastal waters trigger Harmful Algal Blooms (HABs), increase incidence of ciguatera fish poisoning and toxic shellfish poisoning, build antibiotic resistance, and accelerate the spread of life-threatening infections.



C OCEAN POLLUTION HAS MULTIPLE HARMFUL EFFECTS ON MARINE ECOSYSTEMS. CLIMATE CHANGE AND OCEAN ACIDIFICATION ARE EXACERBATING THESE EFFECTS.

- Plastic pollution kills seabirds, fish and marine mammals.
- Pharmaceutical waste, chemical pollution and sewage discharges damage fragile estuaries and mangrove swamps that are the nurseries of the sea.
- Chemical pollutants and pharmaceutical wastes destroy coral reefs.
- Increased absorption of carbon dioxide into the oceans – the direct consequence of fossil fuel combustion - results in ocean acidification. Ocean acidification destroys coral reefs, dissolves oysters, and dissolves calcium-containing plankton at the base of the marine food web.
- Pollution contributes to declines in fish stocks and threatens food security of millions.

D OCEAN POLLUTION IS DEEPLY UNJUST.

- Ocean pollution and all its impacts fall disproportionately on people in small island nations, indigenous communities in the far North, coastal communities in the Global South, and fishing communities worldwide -populations that create only miniscule amounts of pollution.
- This is environmental injustice on a global scale.

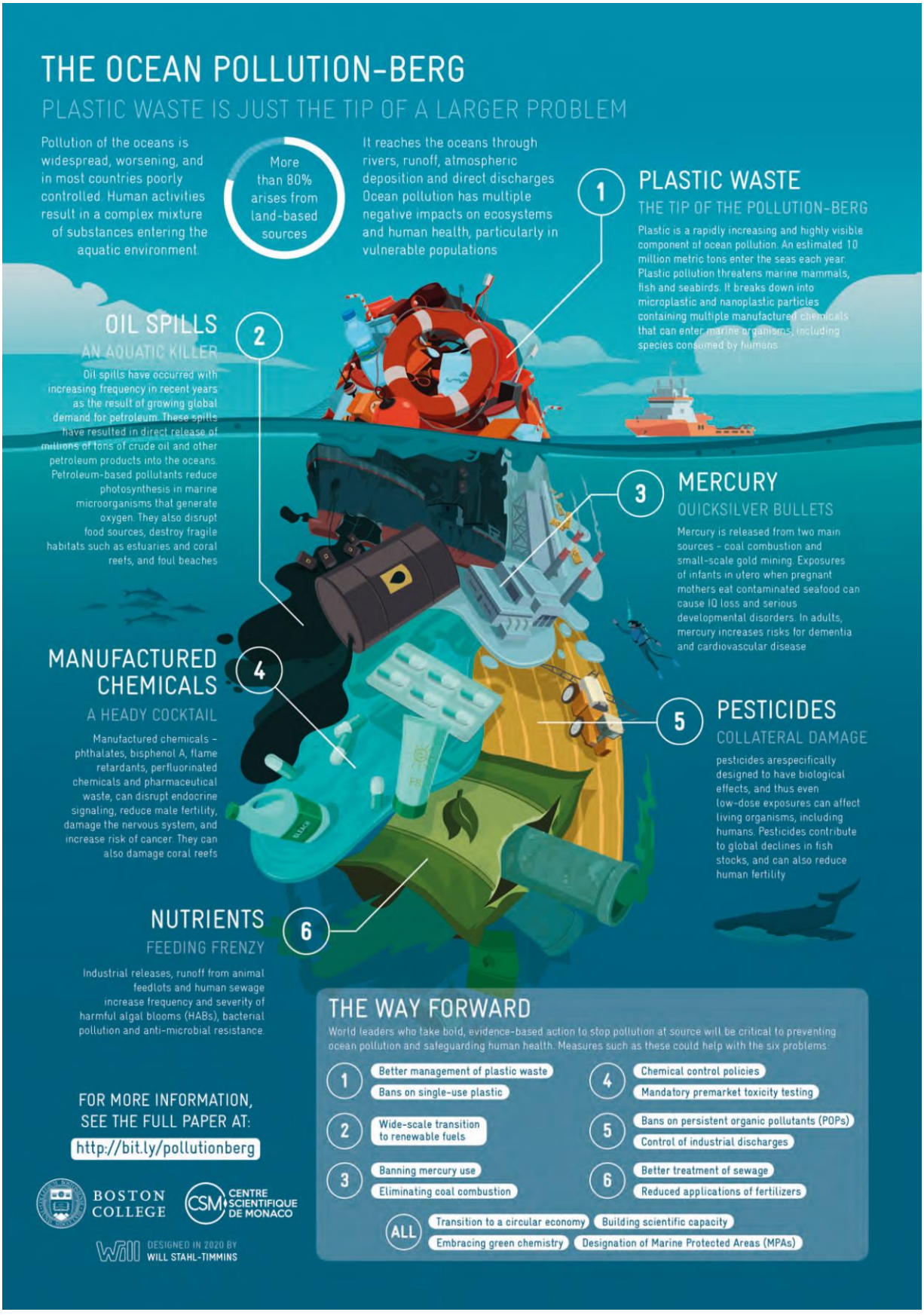
E OCEAN POLLUTION IS NOT WELL MAPPED.

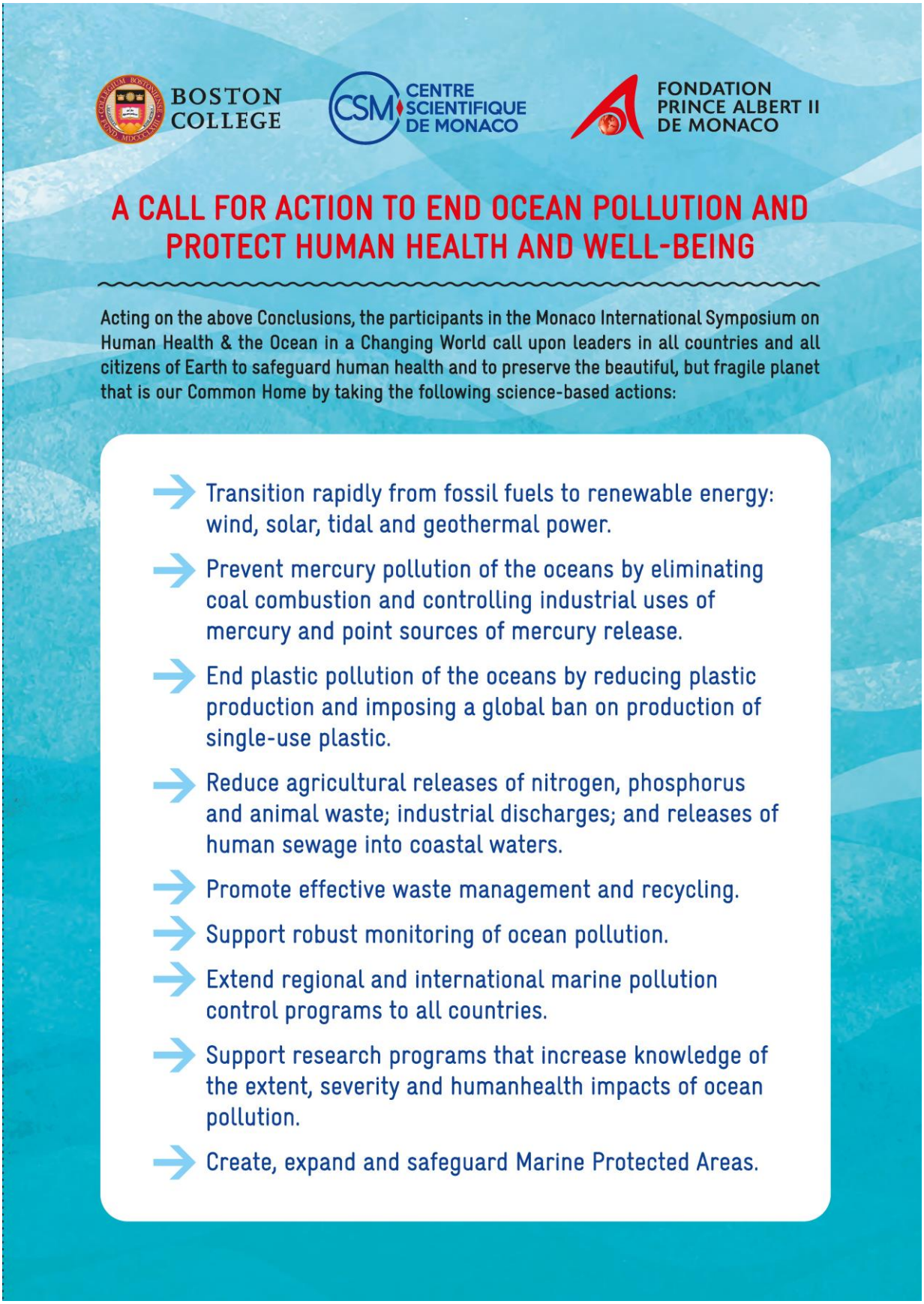
- Current knowledge of ocean pollution and its impacts on human health is incomplete.
- Information on the geographic distribution and concentrations of pollutants in the oceans and on the sizes of the human populations exposed to ocean pollution is fragmentary and confined mostly to the seas that border high-income countries.
- Conference participants note that this lack of complete information provides no excuse for delaying action to control ocean pollution.

F THE GOOD NEWS: OCEAN POLLUTION CAN BE PREVENTED AND CONTROLLED.

- Like all forms of pollution, ocean pollution can be prevented and controlled.
- The key first step is to identify and control the land-based sources that account for 80% of ocean pollution
- Targeted, data-driven strategies based on law, policy, and technology and backed by strong enforcement are essential to achieve control.
- These strategies are highly effective and have achieved significant successes against ocean pollution.
- Polluted harbors have been cleaned, estuaries rejuvenated, and coral reefs restored.
- Interventions against ocean pollution are highly cost-effective. They have boosted economies, increased tourism, and restored fisheries. These benefits will last for centuries
- Prevention and control of ocean pollution have improved human health, prevented disease and extended longevity.

World leaders and global citizens who recognize the gravity of ocean pollution, acknowledge its growing dangers, engage civil society and the global public, and take bold, evidence-based action to stop pollution at source will be critical to preventing ocean pollution and safeguarding human health.


THE OCEAN POLLUTION-BERG
PLASTIC WASTE IS JUST THE TIP OF A LARGER PROBLEM
Pollution of the oceans is widespread, worsening, and in most countries poorly controlled. Human activities result in a complex mixture of substances entering the aquatic environment
More than 80% arises from land-based sources
It reaches the oceans through rivers, runoff, atmospheric deposition and direct discharges. Ocean pollution has multiple negative impacts on ecosystems and human health, particularly in vulnerable populations
1
PLASTIC WASTE
THE TIP OF THE POLLUTION-BERG
Plastic is a rapidly increasing and highly visible component of ocean pollution. An estimated 10 million metric tons enter the seas each year. Plastic pollution threatens marine mammals, fish and seabirds. It breaks down into microplastic and nanoplastic particles containing multiple manufactured chemicals that can enter marine organisms, including species consumed by humans
2
OIL SPILLS
AN AQUATIC KILLER
Oil spills have occurred with increasing frequency in recent years as the result of growing global demand for petroleum. These spills have resulted in direct release of millions of tons of crude oil and other petroleum products into the oceans. Petroleum-based pollutants reduce photosynthesis in marine microorganisms that generate oxygen. They also disrupt food sources, destroy fragile habitats such as estuaries and coral reefs, and foul beaches
3
MERCURY
QUICKSILVER BULLETS
Mercury is released from two main sources - coal combustion and small-scale gold mining. Exposures of infants in utero when pregnant mothers eat contaminated seafood can cause IQ loss and serious developmental disorders. In adults, mercury increases risks for dementia and cardiovascular disease
4
MANUFACTURED CHEMICALS
A HEADY COCKTAIL
Manufactured chemicals – phthalates, bisphenol A, flame retardants, perfluorinated chemicals and pharmaceutical waste, can disrupt endocrine signaling, reduce male fertility, damage the nervous system, and increase risk of cancer. They can also damage coral reefs
5
PESTICIDES
COLLATERAL DAMAGE
pesticides arespecifically designed to have biological effects, and thus even low-dose exposures can affect living organisms, including humans. Pesticides contribute to global declines in fish stocks, and can also reduce human fertility
6
NUTRIENTS
FEEDING FRENZY
Industrial releases, runoff from animal feedlots and human sewage increase frequency and severity of harmful algal blooms (HABs), bacterial pollution and anti-microbial resistance
THE WAY FORWARD
World leaders who take bold, evidence-based action to stop pollution at source will be critical to preventing ocean pollution and safeguarding human health. Measures such as these could help with the six problems:
1 Better management of plastic waste
Bans on single-use plastic
2 Wide-scale transition to renewable fuels
3 Banning mercury use
Eliminating coal combustion
4 Chemical control policies
Mandatory premarket toxicity testing
5 Bans on persistent organic pollutants (POPs)
Control of industrial discharges
6 Better treatment of sewage
Reduced applications of fertilizers
ALL Transition to a circular economy
Building scientific capacity
Embracing green chemistry
Designation of Marine Protected Areas (MPAs)
FOR MORE INFORMATION, SEE THE FULL PAPER AT:
http://bit.ly/pollutionberg
BOSTON COLLEGE
CSM CENTRE SCIENTIFIQUE DE MONACO
WILL DESIGNED IN 2020 BY WILL STAHL-TIMMINS


BOSTON COLLEGE
CSM CENTRE SCIENTIFIQUE DE MONACO
FONDATION PRINCE ALBERT II DE MONACO
A CALL FOR ACTION TO END OCEAN POLLUTION AND PROTECT HUMAN HEALTH AND WELL-BEING
Acting on the above Conclusions, the participants in the Monaco International Symposium on Human Health & the Ocean in a Changing World call upon leaders in all countries and all citizens of Earth to safeguard human health and to preserve the beautiful, but fragile planet that is our Common Home by taking the following science-based actions:
Transition rapidly from fossil fuels to renewable energy: wind, solar, tidal and geothermal power.
Prevent mercury pollution of the oceans by eliminating coal combustion and controlling industrial uses of mercury and point sources of mercury release.
End plastic pollution of the oceans by reducing plastic production and imposing a global ban on production of single-use plastic.
Reduce agricultural releases of nitrogen, phosphorus and animal waste; industrial discharges; and releases of human sewage into coastal waters.
Promote effective waste management and recycling.
Support robust monitoring of ocean pollution.
Extend regional and international marine pollution control programs to all countries.
Support research programs that increase knowledge of the extent, severity and humanhealth impacts of ocean pollution.
Create, expand and safeguard Marine Protected Areas.

CONTRIBUTORS

This statement was prepared by the members of the Monaco Commission on Ocean Pollution and Human Health, whose work was the subject of a special report published in the journal "Annals of Global Health" on 3 December 2020.

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