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Ocean for Climate

Ocean-related Measures in Climate Strategies (Nationally Determined Contributions, National Adaptation Plans, Adaptation Communications and National Policy Frameworks)

COP25 CHILE 2019

PRINCE ALBERT II OF MONACO FOUNDATION

Because the Ocean

becausetheocean.org

With the support of:

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Acknowledgements and Thanks

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The Secretariat of the Because the Ocean initiative was coordinated by Raphaël Cuvelier (Prince Albert II of Monaco Foundation), Rémi Parmentier (The Varda Group), and with Inés de Águeda (The Varda Group) until 2018. The present report was drafted jointly by Rémi Parmentier and Kelly Rigg (The Varda Group) and Théophile Bongarts Lebbe (Ocean & Climate Platform), under the supervision of Raphaël Cuvelier. The design and lay-out are the work of Aware Moment, Madrid.

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Foreword by HSH Prince Albert II of Monaco

As highlighted in this very useful document, the ocean has a major influence on climate change. It plays an essential role in climate regulation by absorbing more than 25% of CO2 emissions and more than 90% of the excess heat due to global warming.

Therefore, there can be no action to fight climate change and limit its impacts without looking at the ocean as a whole: its functioning in the climate system; the health of its ecosystems; its relationship to coastal communities; and all the economic activities that take place in and around it.

That is why I am delighted that at the end of its 51st plenary session in Monaco at the end of September, the Intergovernmental Panel on Climate Change (IPCC) validated the Special Report on the Ocean and Cryosphere in the Context of Climate Change (SROCC).

At COP21 we launched, with our Chilean friends and some other partners, the Because the Ocean (BTO) declaration calling on the IPCC to produce this report on the ocean.

Now that scientists have fully assessed the situation and the challenges we face, it is the responsibility of states and civil society actors to seek and implement ocean-related solutions.

This is why, as early as 2016 in Marrakech when the second BTO declaration was signed (by a total of 39 countries as of 2019), we called on the parties to the UNFCCC to include ocean-related actions in their Nationally Determined Contributions (NDCs).

And I am pleased that my Foundation has supported the production of this document, which presents a range of concrete and pragmatic solutions that were developed over the course of four regional workshops attended by representatives from many BTO signatory countries.

Finally, I would like to thank the Chilean Presidency for having decided to pay particular attention to the link between climate and the ocean at COP25. I am therefore looking forward to participating in the "Blue COP" in Santiago in December 2019, and to continuing to work with Chile and all States and civil society actors resolutely committed to the fight against climate change and the protection of the ocean.

Preamble by Carolina Schmidt, Environment Minister and COP25 President, Chile

Until now, conversations have largely been focused on how to integrate the ocean within the work of the Parties to the Framework Convention and the Paris Agreement. But so far there hasn't been enough discussion on what ocean-related outcomes could be identified within the UNFCCC.

The Special Report on Oceans and the Cryosphere sends a strong message of urgency for the protection of the ocean to the effects of climate change. This special report considers scientific information on the impacts of climate change on the ocean and the cryosphere upon which all humankind depends, directly or indirectly. If we do nothing, and our greenhouse gas emissions increase, it is estimated that sea level could rise more than one meter and phenomena such as high tides and intense storms will increase in frequency. Also, acidification is one of the most worrisome effects of CO_2 emissions.

The Chilean Presidency has decided to launch the Platform of Ocean Solutions during COP25 in Santiago, with the aim of closing that gap. The Platform is a tool to stimulate our collective thinking as Parties, taking into consideration inputs from all stakeholders and using the best available science. The online Platform will remain open throughout the intersessional period leading to COP26, in order to encourage ocean action within Nationally Determined Contributions, and also within National Adaptation Plans, Adaptation Communications and other relevant national policy frameworks.

As COP25 President, I welcome the present report prepared by the Secretariat of the Because the Ocean initiative, inspired by the series of workshops organized since 2016 with the participation and support from the Ministry of Foreign Affairs of Chile. This report points us in the direction of concrete actions that Parties could envisage. It is a timely document, especially as governments finalize their updated Nationally Determined Contributions, and consider including an Ocean component as part of this exercise.

For Chile, a country with a coastline of 6,435 kilometers (length), ocean care is essential, today we have 42% of our Exclusive Economic Zone protected. And we work on their management.

As a leading member of the Because the Ocean initiative, together with the Principality of Monaco and other countries, during and beyond COP25 -- the "Blue COP" -- Chile will continue to prioritize action to mitigate both climate change and ocean change.

Acronyms and Abbreviations

ABNJ	Areas Beyond National Jurisdiction
BTO	Because the Ocean
CBD	Convention on Biological Diversity
CO2	Carbon Dioxide
COP	Conference of Parties
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization of the United Nations
GHG	Greenhouse Gas
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
LNG	Liquid Natural Gas
LSFO	Low Sulphur Fuel Oil
MDO	Marine Diesel Oil
MGO	Marine Gasoil Oil
MPA	Marine Protected Area
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NOx	Nitrogen Oxide
OES	Ocean Energy Systems
OTEC	Ocean Thermal Energy Conversion
R&D	Research & Development
RCP	Representative Concentration Pathway
SECA	Sulphur Emission Control Area Emission
SOx	Sulphur Oxide
SPM	Summary for Policymakers
SROCC	Special Report on Ocean and Cryosphere in a Changing Climate
UNFCCC	United Nation Framework Convention on Climate Change

- EXECUTIVE SUMMARY -

The Special Report on Ocean and the Cryosphere in a Changing Climate (SROCC) was published by the Intergovernmental Panel on Climate Change (IPCC) in Monaco on 25 September 2019. Nearly three quarters of the planet is covered by ocean and around 10% of the Earth's land mass is covered by glaciers or ice sheets.[1] Given the importance that ocean and ice play in regulating the global climate, the Report is a welcome and timely addition to the body of science on climate change.

The profound importance of the relationship between the ocean and the climate led governments to sign the first Because the Ocean Declaration[2] in 2015 during COP21. Since that time, the Because the Ocean initiative has continued to highlight the link between the two and to encourage ocean protection as a means of mitigating and adapting to climate change.

The present document focuses on the ocean elements of the Report. Specifically, it examines the Report's implications for ocean-based activities: those that can safely and sustainably contribute to mitigation efforts; and those that can be undertaken to increase ocean resilience. The ideas presented in this paper stem from a series of workshops organized by the Because the Ocean initiative starting in 2016, aimed at identifying the do's and don'ts of ocean-based climate action.

The following five key actions are discussed: (1) encouraging natural carbon sequestration by coastal ecosystems; (2) developing a range of sustainable ocean-based renewable energy solutions; (3) promoting adaptation and resilience solutions for vulnerable populations, ecosystems and ecosystem services threatened by climate change; (4) implementing hybrid solutions supporting both adaptation and mitigation in the fisheries and aquaculture sector; and (5) solutions in the shipping sector.

Limiting global warming to 1.5°C is imperative; already at 1°C of warming the world is experiencing major impacts from a changing climate, including notably from changes in the ocean environment. Integrating the ocean into national climate strategies is both a necessity and an opportunity. As governments prepare to update and enhance their Nationally Determined Contributions (NDCs) in 2020 – in accordance with the 2015 Paris Agreement adopted by Parties to the United Nations Framework Convention on Climate Change (UNFCCC) – the present paper aims to inspire greater attention to the role of the ocean. Specifically, its purpose is to provide encouragement and incentives for including practical and effective ocean-based measures in climate strategies, and to promote incorporation of the ocean within the scope and implementation of NDCs.

Download the IPCC Special Report on the Ocean & the Cryosphere

[1] IPCC, SROCC, 2019. Summary for Policymakers, Startup Box
[2] https://www.becausetheocean.org/first-because-the-ocean-declaration/

I. Introduction and Background

The Relationship between Climate and Ocean

The ocean regulates the climate by exchanging energy and water with the atmosphere. Through oceanic circulation, heat is distributed from the tropics to the poles and into the deep sea, determining rainfall patterns and surface temperatures, which in turn influence regional climates.

The ocean has served to limit the global impact of growing CO_2 emissions by absorbing both the CO_2 itself, and the excess heat it produces. The increase in water temperature is resulting in dramatic changes in oceanic circulation and thermal stratification, oxygen loss, melting of polar ice and glaciers, and sea level rise. And CO_2, once in seawater, forms carbonic acid. This increases acidification of seawater and, changes the chemical composition of the ocean, depleting it of the carbonate that many forms of sea life need.[3] Taken together, these phenomena are already expected to induce impacts on fisheries, aquaculture and marine ecosystems, and these impacts are expected to increase over time.[4] Urgent action is needed to mitigate and adapt to those changes, while reducing CO_2 emissions.

Understanding and anticipating changes to the Earth's climate system requires paying special attention to the functioning of the ocean and the interactions of its biophysical elements and its ecosystems with the climate system. The global commitment to tackle climate change demands increased ambition to reduce greenhouse gas (GHG) emissions, and urgent adaptation and resilience measures to reduce the inevitable and growing impacts on coastal and marine ecosystems which are currently locked into the system as a result of past emissions.

Coastal and marine ecosystems often serve as the first line of defence in protecting low-lying communities from extreme weather events. And throughout the world, the ocean shapes local and national economies and livelihoods. According to the SROCC, around 28% of the global population lives on coasts.[5] It is estimated that approximately 170 million tons of seafood are caught from the ocean every year,[6] and other activities such as tourism, aquaculture, shipping, and energy production are critical to coastal economies. The ocean contributes to social well-being in other ways too, for example by providing recreational opportunities and genetic resources increasingly used for medicinal purposes. Additionally, indigenous and traditional uses of the ocean, especially important to the cultural identity of Arctic communities and Small Island Developing States (SIDS), are being compromised by climate change.

[3] IPCC, SROCC, 2019. Chapter 5, 5.2.2.3.2
[4] IPCC, SROCC, 2019. Chapters 3, 3.2, 3.3; and Chapter 5, 5.2, 5.4
[5] IPCC, SROCC, 2019. Chapter 1, 1.1
[6] FAO. 2018. The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals. Rome.

Mangrove provide coastal protection against extreme weather events. ©Parmentier

The Because the Ocean Initiative

Launched on the eve of COP21 in Paris in 2015, the Because the Ocean initiative brings together 39 countries[7] committed to reinforcing ocean resilience in the face of climate change and promoting ocean action under the UNFCCC.

The signatories underlined the importance of developing further scientific knowledge to better understand (a) the biological interactions of marine biodiversity and ecosystems with GHG emissions and the climate system, particularly with respect to mitigation opportunities, and (b) the socio-economic and environmental implications of climate change impacts on the ocean, with a view toward adaptation action.

They have agreed to encourage UNFCCC Parties to consider submitting NDCs that promote, as appropriate, ambitious climate action in order to minimize the adverse effects of climate change in the ocean and to contribute to its protection and conservation.

With this in mind, five workshops have been organized under the aegis of the Because the Ocean initiative in order to explore the extent to which ocean elements can be incorporated within NDCs, in Washington DC, USA (September 2016); Bonn, Germany (November 2017); Santiago, Chile (October 2018); Madrid, Spain (April 2019); and Suva, Fiji (May 2019).

The options outlined below build on the discussions among country representatives, academics and other experts during the five workshops. They aim to help decision-makers, including Parties to the Paris Agreement, to better understand the important role of the ocean and coastal marine ecosystems. Taking into account the latest scientific knowledge, the following sections outline examples of concrete ocean-related measures to respond to climate change impacts on the ocean, based on the effectiveness and availability of existing solutions.

[7] Signatories to the Because the Ocean Declarations at August 2019: Aruba, Australia, Belgium, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Fiji, Finland, France, Guatemala, Guinea Bissau, Haiti, Honduras, Indonesia, Italy, Jordan, Kiribati, Luxembourg, Madagascar, Marshall Islands, Malta, Mexico, Monaco, Morocco, The Netherlands, New Zealand, Norway, Palau, Peru, Romania, Senegal, Seychelles, Singapore, Spain, Sweden, Uruguay, and the UK.

Launch of the Second Because the Ocean Declaration, COP22 Marrakech, November 2016

2015

The IPCC Special Report was suggested by the First Because the Ocean Declaration.

"We pledge to support the proposal for a Special Report by the Intergovernmental Panel on Climate Change (IPCC) to address comprehensively the ocean/climate nexus."
(Operative Paragraph 1)

2016

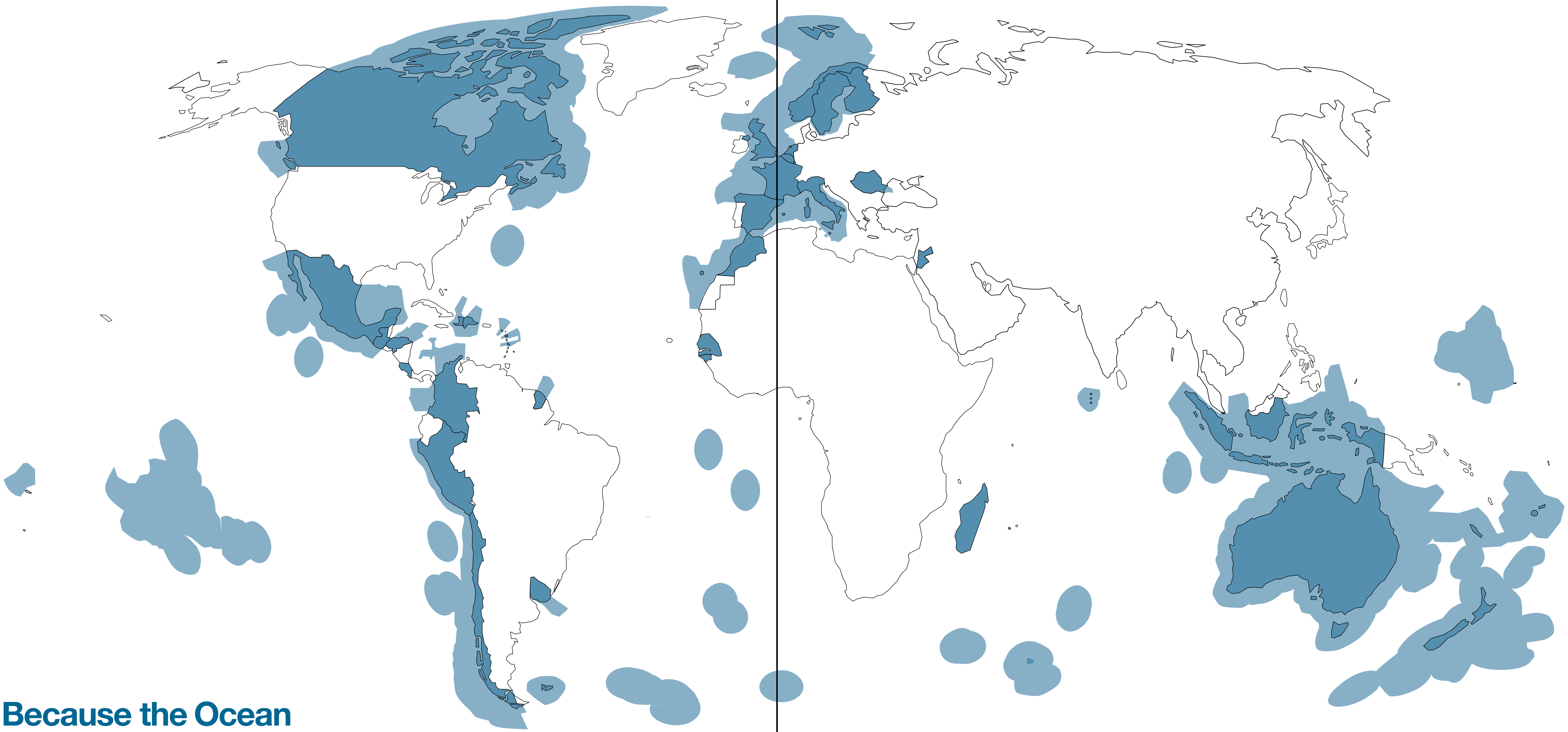
Consideration of Ocean-related NDCs was proposed in the Second Because the Ocean Declaration.

"Encourag[e] UNFCCC Parties to consider submitting Nationally Determined Contributions that promote, as appropriate, ambitious climate action in order to minimize the adverse effects of climate change in the ocean and to contribute to its protection and conservation."
(Paragraph 3)

"Because the Ocean plays an integral part in any long-term low-carbon strategy, we encourage UNFCCC Parties to include oceans in the pre-2020 ambition and the Global Stocktakes. This could include considerations for mitigation and adaptation to climate impacts on ecosystems, livelihoods and economic activities that cannot be sustainable without a climate-resilient and healthy Ocean."
(Paragraph 4)

The combined Exclusive Economic Zones of the signatories to the Because the Ocean Declarations: 68,965,000 km2 (20,106,976 nautical miles) is **equivalent to the landmass of the Americas, Europe and Russia together.**

19% of the world ocean area



Because the Ocean

Latin American workshop, Santiago, Chile. October, 2018

European workshop, Madrid, Spain. April, 2019

Pacific workshop, Suva, Fiji. May, 2019

The ocean in the UNFCCC:

1992

UNFCCC Art.4(d):
(d) Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems.

2009

First Ocean Day at UNFCCC COP (and thereafter annually Ocean Action Days & Roadmap to Ocean & Climate Action Initiative)

2014

Creation of the Ocean & Climate Platform

2015

First Because the Ocean Declaration.
Preamble to the Paris Agreement: Noting the importance of ensuring the integrity of all ecosystems, including oceans, and the protection of biodiversity, recognized by some cultures as Mother Earth, and noting the importance for some of the concept of "climate justice", when taking action to address climate change.
(COP21)

2016

Second Because the Ocean Declaration and Marrackech Climate Action Agenda
(COP22)

2017

Ocean Pathway Partnership
(COP23)

2019

IPCC Special Report on the Ocean and the Cryosphere (SROCC)
Blue COP25, Santiago, Chile.

Nationally Determined Contributions in the Climate Regime

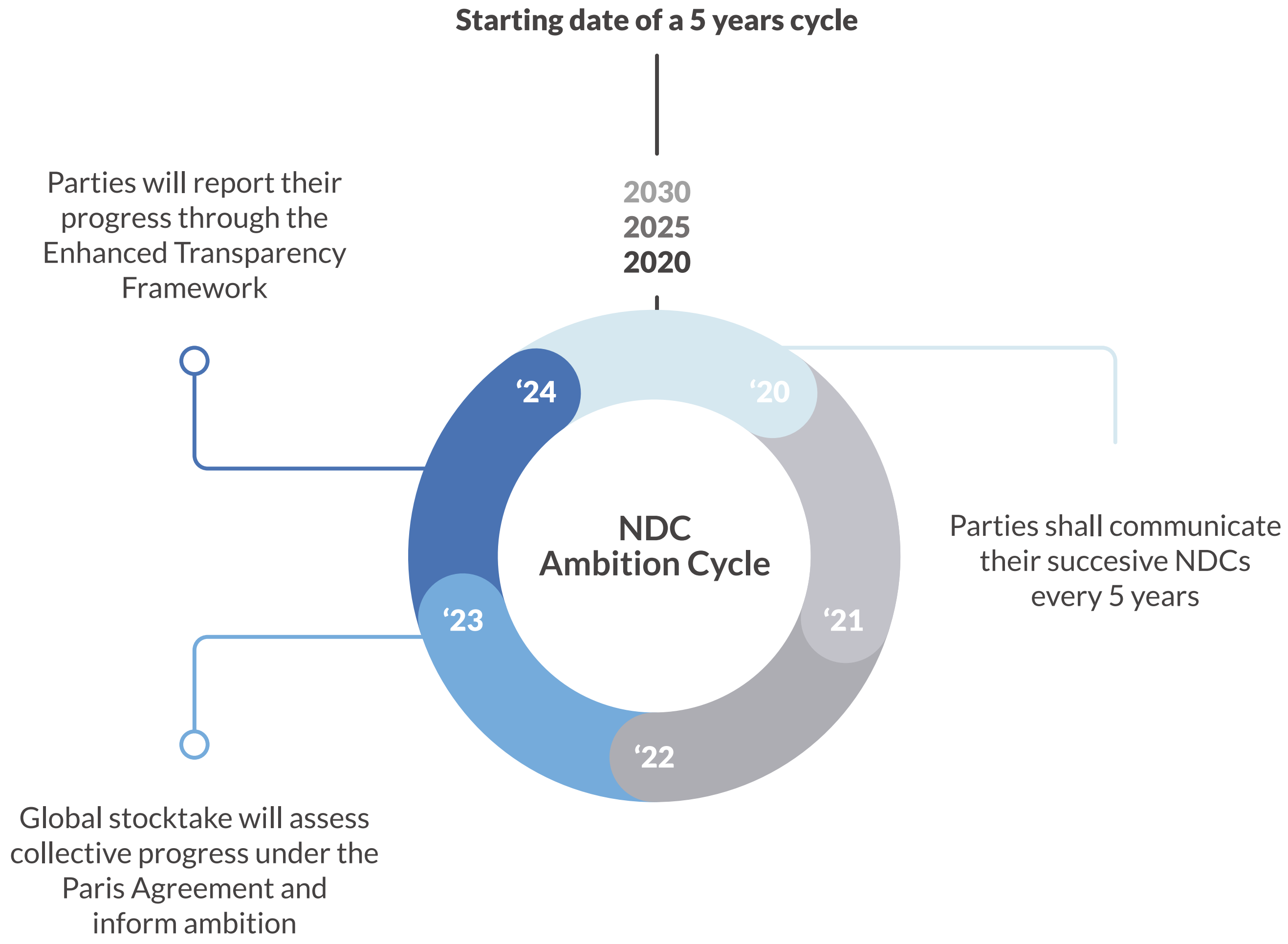
Parties to the Paris Agreement agreed to hold the increase in the global average temperature to well below 2°C and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. To meet this target, the IPCC Special Report on 1.5°C showed that a peak in global GHG emissions must be achieved as soon as possible, with a subsequent halving of emissions by 2030, and reaching net-zero GHG emissions globally by around 2070, and for CO_2 emissions earlier, around 2060.[8] Parties to the Paris Agreement are committed to communicate their Nationally Determined Contributions (NDCs) to the UNFCCC, recognizing that ambitious, transformative change would be required.[9] Action under the Paris Agreement will be assessed through the Global Stocktake in 2023, leading to updated NDCs in 2025, and this process will be repeated in a five-year ambition cycle (see figure below). Furthermore, each Party's successive NDC will represent a progression beyond the Party's then current NDC and reflect its highest possible ambition.

NDCs express Parties' efforts to mitigate climate change by reducing national net emissions and/or removals, and/or to adapt to climate change impacts. Each Party shall use the IPCC 2006 Guidelines for National GHG Inventories, and is encouraged to use the 2013 Wetland Supplement.

The first NDCs (at that time "Intended" Nationally Determined Contributions) were submitted in Paris in 2015, generally reflecting action for 2020 onwards. In light of the urgency to increase climate ambition, the "Talanoa Dialogue" was convened in 2018 to take stock of the collective efforts of Parties – as reflected in the NDCs – to achieve the long-term goal of the Paris Agreement. The resulting "Talanoa Dialogue Call for Action" emphasized the need to enhance ambition when Parties submit their revised or new NDCs in 2020, for consideration at UNFCCC COP26 (and every five years thereafter).

The Katowice climate change package[10] (adopted in 2018 at COP24 in Katowice, Poland) provides further implementation guidelines for the Paris Agreement on climate change, including procedures and mechanisms that will operationalize the Agreement. Some NDCs originally communicated only mitigation measures, many others communicated both mitigation and adaptation measures. The Paris Agreement Rulebook adopted at COP24 in Katowice makes clear that adaptation can be provided in NDCs[11] or alternatively in Adaptation Communications, National Adaptation Plans (NAPs), or Transparency reports. However, the incorporation of adaptation measures within NDCs may also bring additional benefits as it can encourage the support of potential donors, and increases the consideration of relevant marine issues within UNFCCC processes. It would also be useful to incorporate ocean-related indicators under the Global Stocktake to help inform policy choices and ensure greater consideration of ocean issues in the development of NDCs.

Graphic representation of the ambition cycle:[12]



[8] IPCC, SR1.5, 2018. Chapter 2, 2.3.3.1
[9] Paris Agreement and Decision 1/CP.21
[10] https://unfccc.int/process-and-meetings/the-paris-agreement/paris-agreement-work-programme/katowice-climate-package
[11] Katowice Decision 9/CMA.1
[12] Based on presentations by Joanna Post, UNFCCC Secretariat, at Madrid and Suva Because the Ocean Workshops. www.Because-TheOcean.org

II. Actions to Incorporate the Ocean within Climate Strategies

Marine Mitigation Measures

Blue Carbon in Coastal Areas:

The carbon stored by vegetation and benthic sediments in coastal and marine ecosystems is known as "Blue Carbon." Aquatic vegetation has the capacity to remove CO_2 from the atmosphere – and in some cases from the water column itself, transforms it into organic carbon via photosynthesis, and sequesters it in woody biomass or as marine sediment on the ocean floor; this occurs over a thousand-year timescale. Per unit area, coastal marine habitats have a more efficient sequestration capacity than terrestrial habitats,[13] and unlike terrestrial vegetation marine habitats rarely burn.

Although the open ocean hosts many marine systems and organisms[14] that serve as carbon sinks over the long-term, until now attention has been paid mostly to the opportunities provided by three key coastal ecosystems with widely recognized mitigation potential[15] and adaptation co-benefits: mangroves, tidal marshes, and seagrass meadows. However, it is worth noting that scientific knowledge on the potential of blue carbon sequestration beyond coastal waters and including within Areas Beyond National Jurisdiction (ABNJ) is expanding rapidly. Taking account of carbon sequestration in ABNJ is beyond the scope of NDCs, but measures to promote and share scientific research on high seas blue carbon by national entities would be invaluable.[16]

The three key coastal ecosystems mentioned above cover only 0.1% of the Earth's surface, but they can make an outsized contribution to the ocean carbon uptake for countries where those ecosystems are prevalent. It is thought that around 0.5% of current total emissions from all sources could be removed by coastal ecosystems.[17] Conversely, habitat destruction can lead to significant emissions being released back into the atmosphere and to the loss of their role as a buffer against extreme weather events and sea-level rise – hence the interest in protecting mangroves and other coastal sinks.

Finally, submerged aquatic vegetation can also help increase adaptation capacity and enhance ecosystem, biological and economic resilience due to its ability to absorb excess carbon from the water column and potentially make coastal waters less acidic.

Mangrove are protecting coastal community and sequestrating blue carbon, Fiji. ©Parmentier

[12] Based on presentations by Joanna Post, UNFCCC Secretariat, at Madrid and Suva Because the Ocean Workshops. www.Because-TheOcean.org

[13] Mateo MA, Cebrián J, Dunton K, Mutchler T. 2006. Carbon flux in seagrass ecosystems. In: Larkum AWD, Orth RJW, Duarte CM, Eds. Seagrasses: biology, ecology and conservation. Dordrecht: Springer. p 159–92.

[14] Considering krill, teleost fish systems or marine fauna, their potential for climate change mitigation through carbon sequestration is thought to be more limited. In the case of phytoplankton, current scientific understanding does not allow precise and regional measurement of biological carbon pump climate mitigation potential. Phytoplankton is short lived, thus carbon is stored in it only for a few days or weeks. Only a fraction of the carbon is sequestered when phytoplankton sinks and reaches the seafloor, and 99% of the biologically-fixed carbon returns to the atmosphere (IPCC, SROCC, 5.5.1.3). Because of the scientific uncertainties, it is difficult to base mitigation policies on these marine ecosystems, as action should not be amenable to carbon accounting within emission inventories.

[15] IPCC, SROCC, 2019. Chapter 5, 5.5.1.2

[16] An option could consist in exploring synergies with the on-going negotiations within the UN General Assembly on an international instrument for the conservation and sustainable Use of Biodiversity in Areas Beyond National Jurisdiction (BBNJ) which are also expected to bear fruits in 2020 coinciding in time with the submission of NDCs.

[17] IPCC, SROCC, 2019. Summary for Policymakers, SPM C2.4

Blue Carbon-Based Measures:

Enhance, create or regenerate blue carbon ecosystems, leading to additional carbon sequestration:

- Plant mangroves;[18]
- Foster natural regeneration of these ecosystems to increase their chances of long-term survival;
- Introduce incentives to create blue carbon ecosystems on privately owned land

Implement specific management measures to increase carbon sequestration for coastal ecosystems by improving the catchment level:

- Reinstate predators where feasible to reduce the abundance of bioturbators (plants and animals altering the soil and texture of sediment, and causing carbon losses), because by protecting higher trophic levels, predators can prevent colonization from invasive species.[19]
- Restore hydrology of the ecosystem[20] by removing, where appropriate, physical obstacles to tidal flow and water system (i.e. obsolete coastal infrastructures).

Protect existing blue carbon ecosystem:

- Take action to protect mangroves, tidal marshes and/or seagrass meadows from anthropogenic pollution and eutrophication through the creation of marine protected area (MPAs), parks or reserves;
- Minimize or eliminate anthropogenic pollutants and nutrients reaching the sea from surrounding lands to address, control and eliminate or minimize eutrophication, ocean deoxygenation and ocean acidification;
- Promote the sustainable use of living marine resources within blue carbon ecosystems, in support of local and indigenous communities' livelihoods.

Prevent carbon release due to ecosystem degradation and improve coastal ecosystem conservation through regulatory protection:

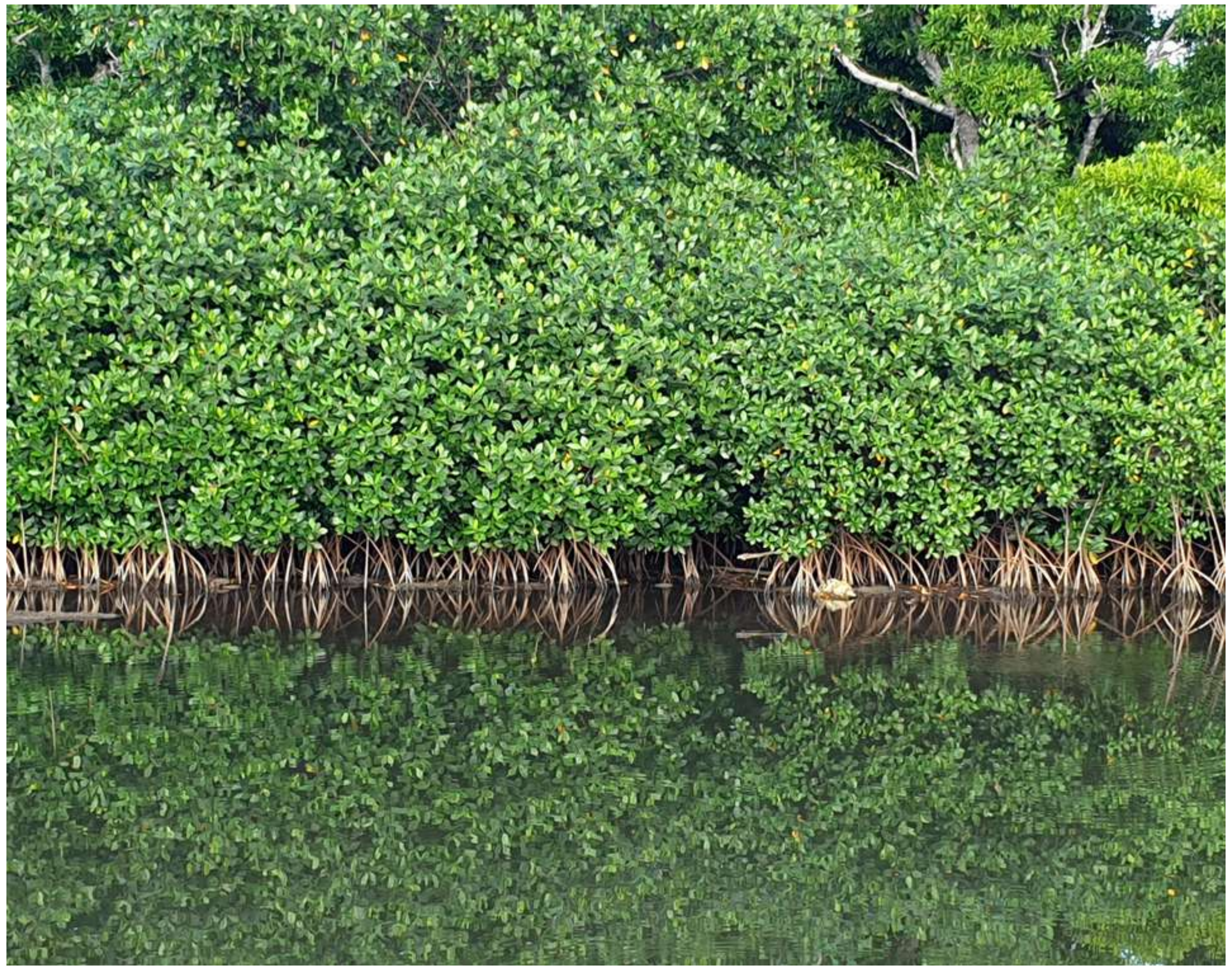
- Maintain the integrity of natural carbon stores through restoration and rehabilitation measures in coastal zones;[21]
- Create legal structures to enforce and improve regulatory protection of blue carbon ecosystems;
- Increase enforcement and implementation of management and protection measures for blue carbon ecosystem areas.[22]

Enhance MPA management to protect coastal wetlands and associated ecosystems, which store organic carbon in underlying sediment and prevent carbon dioxide from being released:

- Enhance carbon sequestration in MPAs by creating a continuum of intertidal zones and optimizing the sequestration potential of ecosystems composing it: mangroves, seagrass meadows, salt marshes connected together;[23]
- Include estuarine wetlands, salt marshes and seagrass habitats in protection measures.

Adapt economic activities, in particular fishing, to minimise their impacts on blue carbon ecosystems:

- Preserve or restore the trophic chain starting with increasing the number of predators to reduce overgrazing by herbivores, which threatens algal communities;
- Adapt fishing gear to prevent the release of carbon dioxide from sediments, and facilitate recovery of ecosystems;
- Mobile fishing gear,[24] like trawlers, should be banned from blue carbon ecosystem areas as they remobilize sediments, alter biogeochemical cycles, reduce the number of suspension feeders, and have major physical impact on seagrass and other relevant features;[25]
- Ban seabed mining within blue carbon ecosystem areas, MPAs and vulnerable habitats;
- Encourage the promotion, development and sharing of scientific knowledge on blue carbon, including in the high seas.[26]



Protecting mangroves also protects the climate. ©Parmentier

[23] IPCC, SROCC, 2019. Chapter 5, 5.5.1.2.1

[24] Auster, Peter & J. Malatesta, Richard & Langton, Richard & Watting, Les & Valentine, Page & Lee S. Donaldson, Carol & W. Langton, Elizabeth & Shepard, Andrew & G. Babb, War. (1996). The impacts of mobile fishing gear on seafloor habitats in the Gulf of Maine (Northwest Atlantic): Implications for conservation of fish populations. Reviews in Fisheries Science - REV FISH SCI. 4. 185-202. 10.1080/10641269609388584.

[25] Elliott A. Norse, Les Watling. Impacts of Mobile Fishing Gear: The Biodiversity Perspective. American Fisheries Society Symposium 22:31–40, 1999.

[26] Taking account of carbon sequestration in Areas beyond National Jurisdiction obviously cannot be part of NDCs, but nothing prevents promoting and supporting as part of NDCs scientific research by national entities on high seas blue carbon.

Blue Energy:

Policies to promote blue energy represent highly promising, concrete ocean-based mitigation measures. The ocean thus offers excellent opportunities to reduce reliance on fossil fuel consumption, especially for coastal and island communities.

At the end of 2015, the Ocean Energy Systems (OES),[27] part of the IEA Energy Technology Network, estimated the share of renewable energy in global electricity: fossil fuel and nuclear energy represented around 77% of the total energy production and renewable electricity represented only 23%. Among different sources of renewable electricity, the ocean produces less than 0.4% of power production, but installed capacity is increasing every year.

Moreover, ocean energy is an autochthonous source of energy, with the potential to reduce energy dependency from other countries and high costs (including environmental costs) of shipping. For instance, Pacific countries comprise 46% of the ocean surface, making blue energy production a considerable potential economic opportunity whose development could be incorporated as a tangible mitigation element within climate strategies.[28]

Sources of blue energy are abundant: in addition to offshore wind, which presently represents the most mature source of blue energy, tidal current, tidal range and wave energy represent the lion's share of emerging or new ocean energy. Ocean currents energy, ocean thermal energy conversion and salinity gradient are less mature technologies, but they nevertheless offer significant potential. While generally speaking these technologies differ in their degree of readiness, local conditions and economic circumstances play important part in determining suitability.

Blue energy enhancement:

- Include in climate strategies commitments to map currents, winds and other blue power resources in order to identify high potential areas while protecting sensitive habitats and economies through inclusive planning and smart siting, thereby addressing the need for the kind of hard data required to attract investments in the development of blue energy.
- Include deployment roadmaps for ocean energy technologies within NDCs.
- Establish a blue energy fund to support and accelerate the deployment of blue energy in developing countries and islands States and territories.

[27] https://www.ocean-energy-systems.org/

[28] Blue Energy, Renewables in the Pacific Ocean, Because The Ocean NDC Workshops, 2019 www.BecauseTheOcean.org

2019

The IPCC Special Report on Ocean & the Cryosphere (SROCC).

"Ocean renewable energy can support climate change mitigation, and can comprise energy extraction from offshore winds, tides, waves, thermal and salinity gradient and algal biofuels. The emerging demand for alternative energy sources is expected to generate economic opportunities for the ocean renewable energy sector (high confidence), although their potential may also be affected by climate change (low confidence)."
(Paragraph C2.5)

SIMEC Atlantis Energy. ©Ocean Energy Europe

Main Sources of Blue Energy:[29 30]

Blue Energy [31]

Offshore wind installations are currently deployed primarily in Europe and China. But in a number of respects, this technology has a strong potential to expand in other regions. New and proven technology offers the possibility to install offshore wind energy further from the shore, and in the deeper ocean. In 2018, turbines were installed 90km away from the shore at depths of up to 55 meters. Floating foundations are being developed for installation in deeper areas, eliminating the main depth constraint.[32] The size of turbines and their capacity is also growing rapidly, as shown in the Floating Offshore Vision Statement, produced by Wind Europe.[33]

As a general rule, all innovations in wind turbine technology, installation, access, system integration and economies of scale have beneficial impacts on the cost of offshore electricity, and since 2010, costs have diminished by 20%. Research programmes to identify the most suitable areas for deployment are recommended.

Tidal Range[34]

The energy potential of tidal range comes from the daily differential in sea levels as tides rise and fall – which can be more than 12 meters – functioning similarly to hydropower. This technology requires a dam to collect large quantities of water, and drive it into turbines.

The higher the tide, the more energy is produced. Tidal range technology is thus most efficient in places where tides are significant. It is usually deployed close to the shore, inside bays, lagoons, estuaries, or in shallow water of enclosed areas. In 2011, the Republic of Korea opened Sihwa Lake Tidal Power Station with a capacity of 254 MW, which is the biggest ocean energy capacity project deployed to date.

Before implementing a tidal range technology, careful attention needs to be paid to site characteristics. Even if tidal range technologies are predictable, there is still dearth of knowledge to accurately assess the potential of a site's potential for extractable energy.

Wave Energy

Wave power can be transformed by wave energy converters which capture the movement of the ocean. The potential energy produced will depend on the waves' height, frequency and intensity.

At a global scale, the biggest potentials for wave energy technology is located at high latitudes (beyond 40° N and S), and on the Eastern-margin of the continents. Technologies can be installed offshore, close to the shore, or on the shoreline.

Although there are many wave energy technologies, wave connecters are in general relatively small, intended to be deployed in significant numbers.

[29] ETIP Ocean (2019), "Powering Homes Today, Powering Nations Tomorrow"
[30] IRENA, UN Ocean Conference, Input to Concept Papers for Partnership Dialogues 5 & 6, Ocean Energy, March 2017.
[31] IRENA (2018), "Offshore innovation widens renewable energy options: Opportunities, challenges and the vital role of international co-operation to spur the global energy transformation" (Brief to G7 policy makers), International Renewable Energy Agency, Abu Dhabi.

Ocean Thermal Energy Conversion (OTEC)

The OTEC potential consists in taking advantage from the difference in temperature between deep cold water and warm surface water. Working as a heat pump, OTEC allows extraction of energy from a heat exchange. Together with offshore wind, OTEC possesses the highest potential of energy production compared to other ocean energy technologies.

To be implemented, this technology requires specific sites where the surface water is warm (around 20°C), and where cold deep ocean water (around 4°C) can be reached easily. For these reasons, OTEC has a high potential in tropical areas, due to the presence of warm surface water in areas with ocean depth exceeding 1000 meters where cold water is easily accessible.

Nevertheless, this technology is not restricted to tropical areas. As early as 1963, the Principality of Monaco installed in the Mediterranean Sea a seawater heat pump to heat or cool buildings. Nowadays, over 20% of the Principality's consumed energy comes from seawater heat pumps, and current plans to increase production are likely to be reflected in the Principality's NDC in 2020.

Ocean and Tidal Currents[29]

Ocean and tidal current technologies use turbines that are similar to those used for wind energy technologies. Since seawater density is more than 800 times higher than air density, better energy production potential exists under water than above the surface. In short, more energy can be captured at the same speed.

Two different technologies are compatible with ocean and tidal currents. Ocean currents are driven by latitudinal distribution of winds and the thermohaline circulation. They are moving slowly, at relatively shallow depth, and are unidirectional. This is not the case for tidal streams which switch direction with the tide.

When considering installing ocean or tidal current technologies, the speed of the current needs to be taken into account, knowing that the minimum current speed required to produce energy is 2 m/s (6 knots), and that currents are stronger when close to the shore.

Salinity Gradient[35]

Energy can also be extracted from salinity gradients, based on chemical pressures established by the density differences of waters. Coming from the sea, the water is dense, with a high salt concentration compared to fresh river water coming from the inland.

The highest potential of the salinity gradient technology can be reached in the mouth of rivers, where a large volume of freshwater flows into the sea. This technology is still at a conceptual stage of development, and efforts in IR&D could be incorporated in national climate strategies for implementation of NDCs.

[32] Floating foundations: a game changer for offshore wind power, IRENA, 2016
[33] https://windeurope.org/wp-content/uploads/files/about-wind/reports/Floating-offshore-statement.pdf
[34] IPCC, SROCC, 2019. SPM C2.1
[35] IRENA Ocean Energy Technology Brief 2, June 2014

Marine and Coastal Adaptation to Climate Change

Marine and coastal adaptation consists of planning and defining strategies to preserve marine, coastal and human systems from climate change impacts. Many countries, especially island nations, possess very large oceanic territories compared to their coastal areas and land mass. To give just one example, the Cook Islands' territory is made up of 236 km^2 of land area and 1,800,000 km^2 of EEZ. Whereas the ocean may be perceived as a threat to vulnerable coastal populations, it also provides opportunities to implement ecosystem-based solutions, making coastal communities more resilient in the face of climate change and maintaining nature's services.

In addition to climate impacts, ecosystems and ecosystem services are under threat from human activities. Pollution, overfishing and coastal construction, to name a few, pose serious risks for ecosystem functioning.[36] The preservation and restoration of marine and coastal ecosystems depend on governments taking the necessary steps to prevent pollution and physical degradation. Marine Protected Areas (MPAs), parks, reserves and sanctuaries are adaptation tools designed to improve the long-term conservation of marine ecosystems and their biodiversity.[37] They also can provide co-benefits to climate mitigation where they protect or enhance blue carbon systems.

[36] IPCC, SROCC, 2019. Chapter 5, 5.3
[37] J. Claudet and al., Ecological effects of marine protected areas: conservation, restoration, and functioning, in Marine Protected Areas, EBC, Cambridge, 2011
[38] David Johnson, Ellen Kenchington, Should potential for climate change refugia be mainstreamed into the criteria for describing EBSAs?, Conservation Letters, 2019
[39] Marine Protected Areas, Because The Ocean NDC Workshops, 2019 www.BecauseTheOcean.org
[40] IPCC, SROCC, 2019. SPM C2.1
[41] Sri Lanka's INDC: "*Survey and map coastal habitats (coral, sea grass, mangroves and sand dunes) in the entire coastal region, based on a method that is compatible with the survey department methods (...) [In order to] scientifically identify suitable sites for conservation, rehabilitation and restoration*".

Reduce local anthropogenic disturbances and support co-benefit opportunities

Act to reduce local inputs and contributions to climate-related stressors within nearshore ecosystems (which notably have co-benefits):

- Reduce land-based pollutants like wastewater and agricultural discharges that cause damage to critical marine habitats and ecosystems;
- Reduce the impact of local inputs and nutrients that can exacerbate ocean eutrophication and ocean acidification impacts nearshore, in estuaries and in coral reefs.
- Build local capacity to preserve, protect, and restore submerged aquatic vegetation like mangroves and seagrass that can help sequester carbon in the water column and reduce biophysical changes nearshore and in estuaries.

Develop innovative climate-smart MPAs and support R&D

Incorporating existing and projected climate impacts into criteria for designating "Climate-smart" MPAs can enhance their use as climate refugia,[38] their role in promoting climate resilience of marine ecosystems, and their sustainability in the face of anticipated environmental change.

- Include "Climate-smart"[39] criteria for MPAs linking biodiversity conservation and economic performance, combining climate change mitigation and adaptation for NDC implementation;
- Designate and manage networks of interconnected MPAs which are shown to have a more positive impact on biodiversity conservation and help maintain existing ecosystem services.[40] For example, taking account of poleward movements of marine organisms occurring in response to climate and temperature changes.
- Provide research case studies on protection and restoration through ecosystem-based management and pollution abatement.[41]

Hybrid Solutions to Respond to Climate Change

According to the IPCC, climate resilience depends on combining mitigation and adaptation. Since mitigation reduces the rate as well as the magnitude of warming, it also increases the time available for adaptation to a particular level of climate change, potentially by several decades. Delaying mitigation actions may thus reduce options for both mitigation and adaptation in the future, as greater rates and magnitude of climate change increase the likelihood of exceeding adaptation limits. Successful adaptation in the longer term, therefore, depends on effective mitigation.

Artesanal fisher women, Moon Reef, Fiji. ©Parmentier

Sustainable Fisheries and Aquaculture:

Rising ocean temperatures, more stratified and acidic waters, and excess discharges of nutrients from agriculture and wastewater are creating oxygen-depleted zones that threaten primary production projected to decrease by 4% to 11% under a high emission scenario (IPCC's Representative Concentration Pathway - RCP8.5 - by the end of the century.) Of particular concern is the shift of high productivity fishing areas towards higher latitudes, and the resulting impacts on economies as well as livelihoods and food security in communities near traditional fishing grounds.[43]

Mainly driven by low primary production, in a business-as-usual scenario, average catches are projected to decline up to 25.5% in 2100 compared to 2000 levels (RCP8.5), especially in tropical waters.[44] More specifically, changes will be particularly severe in the western part of the Central Pacific Ocean, the Eastern Central Atlantic Ocean and the western part of the Indian Ocean. In contrast, Arctic catch potential could increase, led by elevated temperature as well as disappearing sea ice that could allow additional access to vessels.

The disruption of ocean functioning will also decrease the productivity of aquaculture. Water warming and acidification are expected to increase some species' stress, and may reduce the feed efficiency.[45] The number of annual harvests may be reduced in line with general lower global production. In this context, the range of species that can be farmed is expected to shrink, and some species may even no longer be farmed, at least in some locations. Potential impact on pathogen's distribution and disease susceptibility unknown at this stage. Aquaculture infrastructure is also at risk by sea-level rise and extreme weather events.[46] Nonetheless, so far aquaculture has not been adequately considered in climate change mitigation and adaptation strategies, and requires further attention.[46]

Together, fisheries and aquaculture represent around 1.5% of global GHG emissions[46] as a result of fuel consumption, loss of refrigerant gases and other non-fuel use processes. In aquaculture, the main sources of emissions are associated with the production of feed materials and their transportation. Many of these emissions can be mitigated quickly and effectively.

[43] IPCC, SROCC, 2019. Summary for Policymaker, SPM B.8
[44] IPCC, SROCC, 2019. Chapter 5, 5.4.1
[45] Impacts of Climate Change in Fisheries and Aquaculture, FAO, 2018, http://www.fao.org/policy-support/resources/resources-details/en/c/1152846/
[46] FAO, Because The Ocean NDC Workshops, 2019 www.BecauseTheOcean.org

Impacts of climate change on fisheries and aquaculture are directly associated with high levels of vulnerability, but adaptation measures are available:

- Restore and sustain coastal fisheries through sustainable, ecosystem-based and more inclusive fisheries management, taking account of the circumstances of small-scale artisanal fisheries and cumulative impacts;
- Promote climate adaptation of industrial, large-scale fisheries, artisanal fisheries and local aquaculture companies and operations:
- Enhance monitoring for oxygen and pH/carbonate saturation and develop predictive forecasting models to inform decision-making;
- Maintain and enhance genetic diversity of native flora and fauna;
- Use conservation hatchery techniques, and select climate tolerant fish species;
- Improve management of land-based activities liable to adversely affect the most vulnerable and economically or culturally significant marine species;
- Reduce the impact of the fishmeal industry by replacing conventional fuels by renewables.

Improving fuel efficiency of fishing gears:

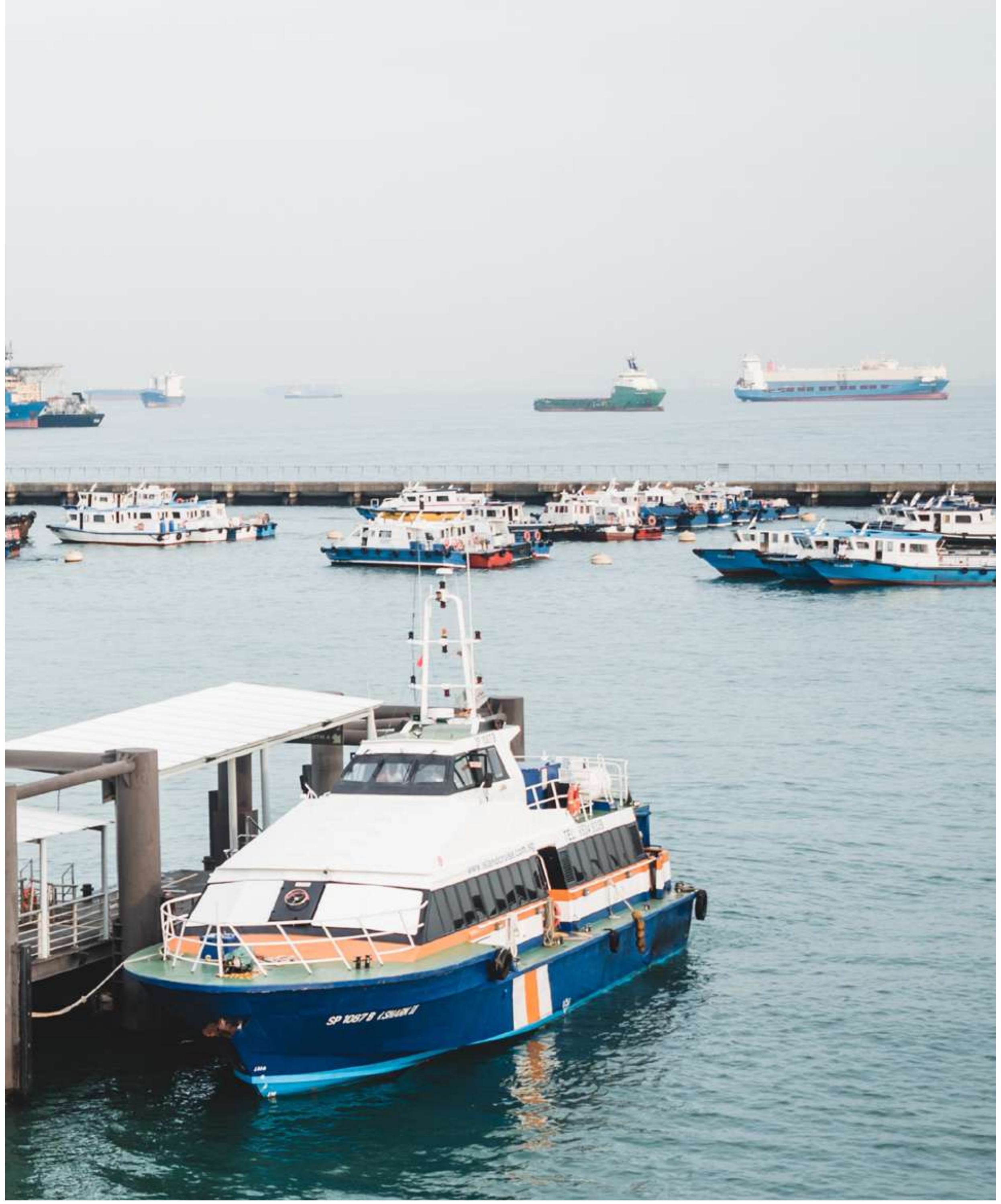
In both fisheries and aquaculture, shifting to clean energy sources on vessels can provide some of the best opportunities to reduce GHG emissions. The incorporation of the following measures in climate strategies could be envisaged.

- Promote efficient and mature renewable energy systems that can be used for shipping, including wind and solar propulsion, can be compatible with fishing vessels and support vessels, with a strong potential to minimize fuel consumption;
- Use of fishing gear that require less fuel for harvesting, which may significantly reduce GHG emissions. For instance, restrictions on some bottom trawling metiers can provide environmental co-benefits.
- Minimize or avoid the use of bottom fishing gear liable to disrupt habitats that contain sequestered carbon.

Improving fuel efficiency by implementing non-propulsion innovations:

Solutions proposed to mitigate carbon emissions in shipping (see Greening Shipping, below), are also applicable to reduce carbon emissions from fishing vessels. According to the UN Food and Agriculture Organization (FAO), a reduction of fishing vessel emissions by 10 to 30% can be achieved by improving non-propulsion equipment efficiency, by using less fuel-consuming engines and larger propellers, and by improving the design of vessel shapes and hulls.

- Increase fuel efficiency based on engineering and management improvements, e.g. optimized vessel resistance which increases with hull speed, length, shape, underwater area, and weight;
- Improve fisheries management measures that can reduce fishing effort, in order to reduce the amount of fuel used both in fisheries and in aquaculture operations. Improved fisheries management also enhances the health of fish stocks, resulting in increased fishing efficiency, reduction of fishing effort, and thus reductions in GHG emissions;
- Minimize losses and improve the use of inputs, water quality, fish stocking density and the use of medicines in the aquaculture sector;
- Replace fish-based feed ingredients by less energy-intensive feeds with a view to significantly reduce GHG emissions;
- Encourage local fish consumption as refrigerated transportation of fresh and frozen fish over long distances has high environmental impact.[47]



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[47] Avadí, A., Fréon, P. & Quispe, I. 2014. Environmental assessment of Peruvian anchoveta food products: is less refined better? International Journal of Life Cycle Assessment, 19(6): 1276–1293.

Greening Shipping:

At present, around 90% of globally traded commodities transit across the ocean. Although shipping is considered less polluting than aviation and road transportation, the International Maritime Organization (IMO) reports in its Third GHG Study 2014 that shipping represents 2.2% of anthropogenic CO_2 emissions worldwide. And with the growth in international trade, emissions are projected to increase between 50% and 250% by 2050. 85% of emissions come from large vessels of 5,000 gross tonnage and above. An economy-wide target would need to include the shipping sector given its role in global trade.

International shipping is regulated by the IMO, the UN-Specialized Agency headquartered in London.[48] The IMO sets targets for reduction in total GHG emissions from ships with a view to reach the peak in emissions as soon as possible, and decrease by 50% annual GHG emissions no later than 2050 compared to 2008 levels. However, a case can be made for the inclusion within NDCs of measures to control and mitigate GHG emissions from shipping within domestic waters; the IMO's mandate covers emissions from international shipping, but nothing prevents governments from determining nationally their own targets for the transport by sea of goods and passengers within national boundaries, in coastal areas and within island States.

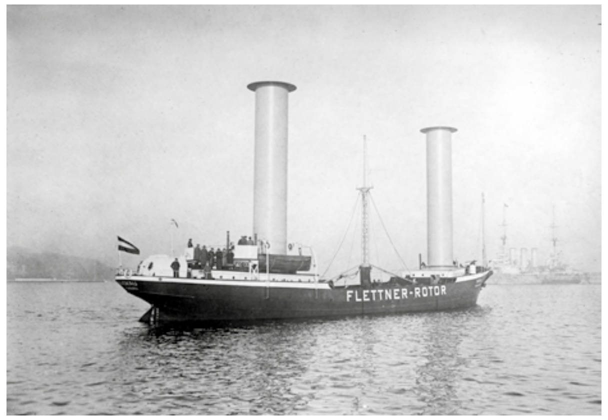
Contributions at the national level, for example those affecting infrastructure in ports and harbours, or speeding progress in the deployment of renewable energy and alternative fuels for vessel propulsion, can have co-benefits for international shipping operations. Technical innovation is useful regardless of whether it was originally designed for domestic or international operations.

Even today, zero-emission shipping could be envisaged in a not too distant future as a valid target that governments could encourage by making it an integral part of the implementation of their NDCs. Just as mass producing electricity from the sun and from wind was widely seen as unrealistic only a few decades ago, green shipping represents an important opportunity for climate mitigation that should not be underestimated;[49]

- Include mitigation measures within national climate strategies to regulate inter-island and coastal shipping within national boundaries,
- Improve fuel quality and support the transition to alternative fuels and renewable energy-based propulsion systems;
- Adapt and equip maritime ports and harbours to that effect.

[48] http://www.imo.org/en/MediaCentre/HotTopics/Pages/Reducing-greenhouse-gas-emissions-from-ships.aspx
[49] If one googles the words "zero emission shipping," one sees that already today, the decarbonization of the shipping sector (using wind energy, innovative sails, solar, hydrogen, etc.) is underway, and that now it is up to governments to apply the fiscal and other incentives to accelerate the process.

1925



The Bukao crosses the Atlantic

2017

Maersk Tankers / Norsepower

Banks and the financial sector recently launched the Poseidon Principles initiative to limit lending to companies that do not reduce their emissions to fit with new environmental standards.

The Rottor-Flettner wind turbine is an efficient system that benefits from wind-assisted propulsion, using wind energy to activate engines. It requires adapting shipping routes to prevailing winds to optimize its potential.

The Rottor-Flettner wind engine was invented in the early part of the 20th Century roughly when the steam engine took off but an adverse choice was made at the time, in favour of the steam engine. This serves as a reminder that the transition to zero-emission shipping is more than a technical challenge – it requires political ambition to create the necessary incentives.

Solar energy is less efficient than wind, and it cannot move a heavily-loaded ship. Nonetheless, solar energy is complementary to wind energy, and can be used to supply electrical systems on board, at sea and in ports.

Emissions from shipping are not restricted to CO_2. Other air pollutants include sulphur oxide (SO_x), nitrogen oxide (NO_x), and fine particles, all of which affect the global climate system. Among others, a new IMO regulation is due to enter into force on January 1st, 2020, aiming to significantly reduce SO_x emissions from 3.5% m/m (mass by mass) sulphur content to date to 0.5% m/m.[50] The choice for ship owners using heavy fuel will be between equipping their aging vessels with expensive scrubbers to filter SO_x, or adapting them by using heavy fuel low in sulphur (LSFO), light fuel (MDO or MGO), liquefied natural gas (LNG) or clean and renewable energies.

Given the average life of commercial vessels – 20 to 25 years – it would be wise to accelerate the transition to green shipping in order to bring the sector in line with the goals of the Paris Agreement. In this context, fuel prices are projected to rise in the next years, and renewable energy sources are thus likely to become more attractive.

- Include incentives for the phasing out of fossil fuels in the shipping sector with the aim of achieving net-zero emissions;
- Identify fiscal incentives as part of climate strategies to encourage ship owners to invest in renewable energy propulsion systems, and support the adaptation of new and old vessels to new requirements;
- Implement, in co-operation with the private sector, a "blue shipping" label to certify low GHG emissions during transport to increase the demand and support from consumers for net-zero shipped goods.

From 2020 onward, in keeping with IMO GHG regulations, ships will be required to collect and report consumption data. The following measures can be implemented to reduce the carbon intensity of shipping, and GHG emissions:

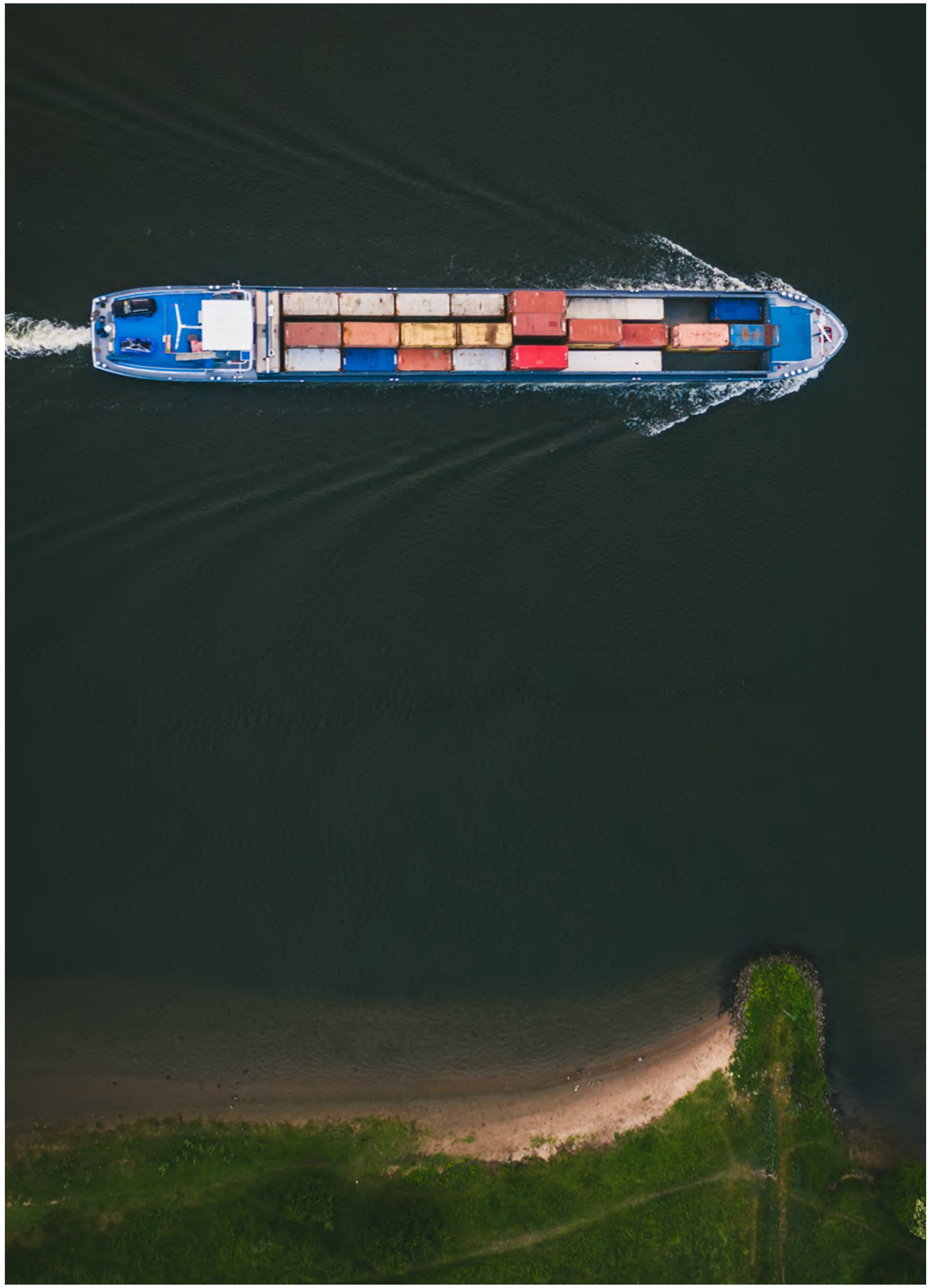
- Apply speed reduction measures ("slow steaming") within territorial and jurisdictional waters, which can diminish fuel consumption.[52] This is particularly relevant for SIDS and archipelagos to reduce emissions from inter-island traffic;[53]
- Improve logistics to optimize maritime transportation to reduce carbon intensity, combined with speed reduction/slow steaming;
- Designate new Sulphur Emission Control Areas (SECA zones) which countries or groups of countries may decide to implement as part of their NDCs, which has the co-benefit of significantly reducing black carbon emissions.

Adapt port infrastructures

When docked, in most cases ships (including cruise ships) continue to burn fuel to operate their electrical systems, causing air pollution hazards in port cities as well as contributing to climate change.

- Ensure access to the electricity grid for vessels in ports and harbours as a key ocean-related measure that would combine climate mitigation and urban air pollution abatement.

[50] IMO, Resolution MEPC.280(70)
[51] https://www.poseidonprinciples.org/
[52] A coastal State can impose speed restrictions on all ships within its territorial waters, and it can further prescribe speed restrictions on foreign flagged vessels travelling through its EEZ. Such restrictions cannot be enforced within Areas Beyond National Jurisdiction (the high seas) as this would interfere with the exclusive jurisdiction the flag State enjoys under customary international law and UNCLOS. Nor can such speed restrictions be enforced within the EEZ unless the enforcement is consistent with the relevant provisions of UNCLOS. However, such measures in the high seas or the EEZ can be imposed as conditions for entry into a port of a coastal State and can be enforced on the basis of the presence of the ship in that port.
[53] The Republic of Marshall Islands is exploring establishing such speed limits to reduce GHG emissions from domestic ocean-based transport.



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List of Presentations made at the Because the Ocean Workshops and Events

Meeting of the Friends of the Ocean and Climate, UNFCCC, SBSTA, Bonn (June 2019)
- The Because the Ocean Initiative Workshops Series - Key Outcomes and Takeaways - Rémi Parmentier, Secretariat Coordinator, Because the Ocean Initiative

Fiji Workshop Presentations (May 2019)
- State of Knowledge, from Climate Change to Ocean Change – Morgan Wairiu & Elisabeth Holland – The University of the South Pacific
- NDC & Ocean – Sylvie Goyet, Pacific Community
- Oceans and Climate Mitigation, Blue Carbon in NDCs — Emily Pidgeon, Conservation International with Kate Davey, IUCN
- The Ocean and Coastal Zones under the UNFCCC, Joanna Post, UNFCCC Secretariat.
- Climate Change in Fisheries and Aquaculture Adaptation Options for NDCs — Tarûb Bahri, UN FAO
- [AUDIO] Climate Change in Fisheries and Aquaculture Adaptation Options for NDCs — Tarûb Bahri, UN FAO
- Pacific Fisheries & Aquaculture Adaptation to Climate Change — Timothy Pickering, Pacific Community
- Blue Energy: Renewables in the Pacific Ocean — Adrien Lauranceau-Moineau, Pacific Community
- NDCs, An Opportunty to enhance Mitigating GHG Emissions from Shipping? Ore Toua, Maritime Technology Cooperation Centre – Pacific Community.
- Ocean Acidification From Threat to Opportunity – Susan Ruffo, Ocean Conservancy
- Strategic Coherence & Alignment — Peni Suveinakama, OPOC, Pacific Islands Forum Secretariat
- Pacific Ocean Finance — Riibeta Abeta, OPOC, Pacific Islands Forum Secretariat

Madrid Workshop Presentations (April 2019)
- Discussion Paper for the Madrid Workshop
- Before the Blue COP – Take Aways
- State of Knowledge from Climate Change to Ocean Change – Iñigo Losada, IH Cantabria
- Ocean and coastal zones under the UNFCCC – Joanna Post, UNFCCC Secretariat
- Climate Change in Fisheries and Aquaculture, Adaptation Options for NDCs – Manuel Barrange, UN FAO
- OSPAR regional work on climate and ocean acidification – Susana Salvador, OSPAR Commission
- The UN Barcelona Convention Responding to Climate Change in the Mediterranean Region – Gaetano Leone, UNEP-MAP
- Blue carbon and NDCs – Dorothée Herr, IUCN
- Blue Energies A big challenge for Europe, APPA Marina
- Climate Change in the Seas of Spain Impacts, Vulnerability and Adaptation – Diego K. Kersting, Freie Universität Berlin
- Marine Protected Areas and climate action – Itziar Martín, Ministry for the Ecological Transition, Spain
- Marine Protected Areas – Gemma Harper, DEFRA, UK
- Ocean Acidification From Threat to Opportunity – Sarah Cooley, Ocean Conservancy

Santiago Workshop (October 2018):
- Presentation to the Because the Ocean COP24 Side Event: Incorporating the Ocean in NDCs- December 2018
- CR2 organiza taller sobre la Contribución Nacional Determinada sobre Océanos
- Presentaciones: Taller NDCs y Océanos

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