



CLIMATE ACTION PATHWAY

OCEANS AND COASTAL ZONES*

Action Table

2021

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ACTION TABLE STRUCTURE AND APPROACH

Structure

The Ocean and Coastal Zones Action Table is complementing the [Ocean Vision and Summary document](#).

The Action Table highlights specific actions relevant stakeholders can take from now until 2040 to deliver the Vision for each change levers:

1. Nature-based solutions (including a section on areas beyond national jurisdiction)
2. Aquatic Food production (including a section on areas beyond national jurisdiction)
3. Zero-emission Shipping (including a section on biodiversity impacts)
4. Ocean Renewable Energy (including a section on biodiversity impacts)

It should be noted that Shipping and Ocean Renewable Energy are also partly addressed in the Action Tables of the Transport and Energy pathways.

Approach

Multiple iterations with stakeholders acting in the area of the ocean and coastal zones resulted in the presented action table, highlighting ongoing and envisaged activities crucial to achieve zero emissions to combat climate change and its impacts.

The potential of ocean-based climate solutions is high. Naturally, not only does the ocean absorb 93 percent of the additional heat from rising anthropogenic carbon dioxide (CO₂) emissions, it also absorbs approximately 25 to 30 per cent of anthropogenic CO₂ emissions that would otherwise remain in the atmosphere and increase global warming. These actions are partially due to blue carbon ecosystems (salt marshes, mangroves and seagrasses). These ecosystems sequester and store more carbon per unit area than terrestrial forests, which make them significant net carbon sinks.

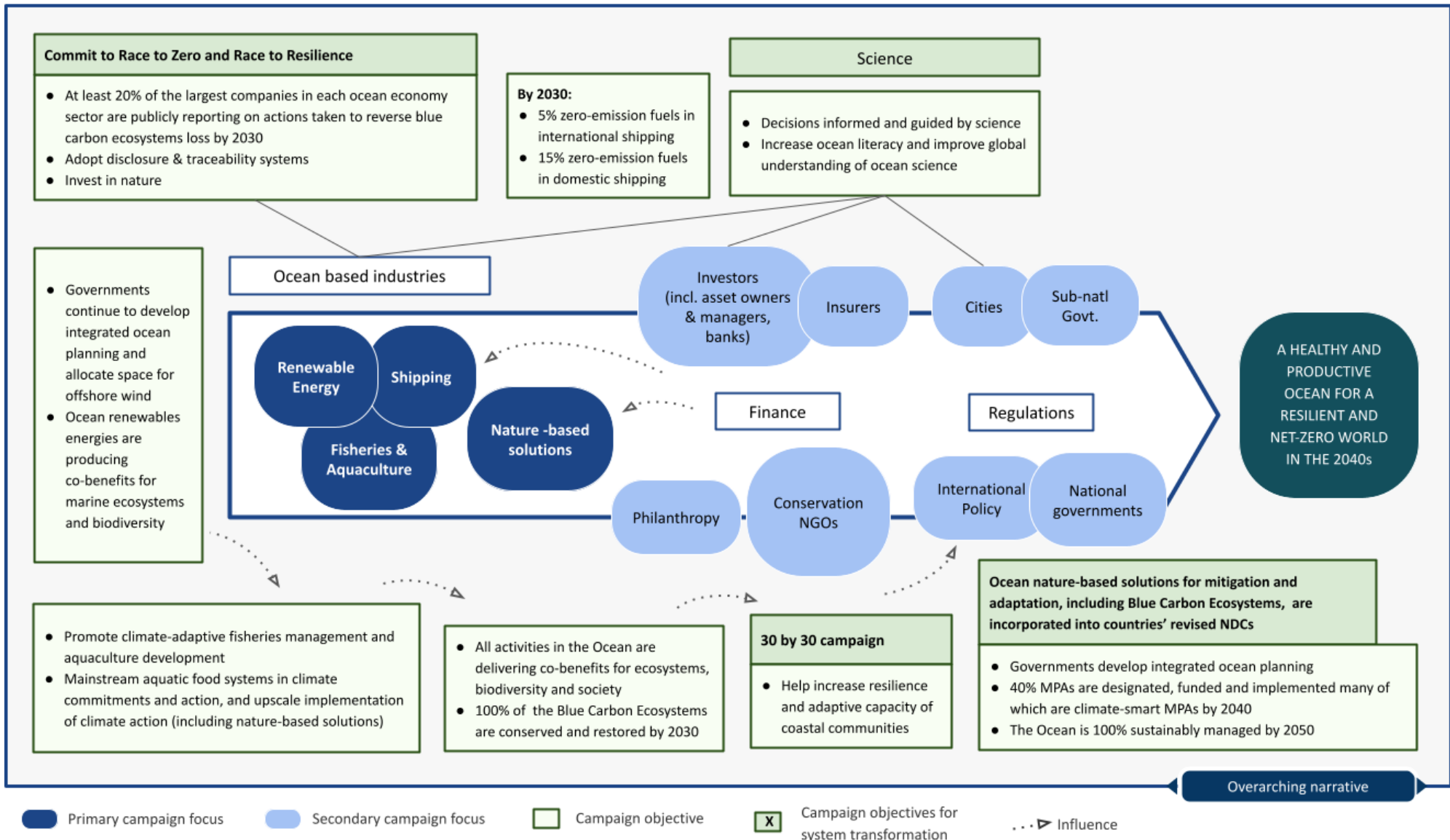
In addition, ocean-based industries can provide reliable access to climate-resilient, low-carbon food, energy and transportation for a growing world population. At the same time, all actors should help society to adapt. Measures need to be identified and implemented urgently in coastal areas, as they are at the forefront of changing ocean conditions.

The actions identified in the Action Table will be successful only if all parts of society participate and all types of knowledge, including local, indigenous and traditional knowledge, are taken into account.

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OCEAN AND COASTAL ZONES SYSTEM MAP



NATURE-BASED SOLUTIONS

Nature-based solutions provided by coastal ecosystems (such as mangroves, tidal marshes, coral reefs, sand dunes, seagrass beds and seaweed) hold **great potential for mitigation and adaptation to climate change**. According to a 2019 High Level Panel for a Sustainable Ocean Economy report,¹ protecting and restoring three coastal blue carbon ecosystems (seagrass, tidal marshes and mangroves) globally, alongside seaweed farming, could reduce emissions by as much as 1.4 billion tonnes of carbon dioxide equivalent annually by 2050. Coastal ecosystems in their entirety are also critical **‘natural infrastructure’** for climate change adaptation and resilience. Restored marine and coastal ecosystems help mitigate the impacts of weather extremes and sea-level rise, thus protecting lives and livelihoods, and reducing the economic costs of damage and recovery.

National governments should aim to include more Nature-based Solutions (NbS), and especially coastal blue carbon ecosystems, in **NDCs** for both their mitigation and adaptation components in order to achieve policy recognition, and most importantly, pave the way for action and broad-scale finance mobilization. Governments should also protect 30 per cent of the ocean by 2030, prioritizing areas for their high climate, food and biodiversity benefits. Governments can contribute to the restoration of marine ecosystems by effectively implementing climate-smart MPAs and conducting processes such as MSP and integrated coastal zone management.

Companies should – at the very least – eliminate activities in their supply chains that contribute to the destruction of marine and coastal ecosystems and identify actions to protect and restore ocean ecosystems.

Ocean ecosystems can also be included as compensation/offsetting measures, while companies transition toward a state of net-zero emissions. However, they do not replace the need to reduce value chain emissions in line with science. Any offsets used by companies are optional and additional to emission reduction targets. Offsetting should prioritize interventions with strong co-benefits and that contribute to achieving other social and biodiversity goals.

As shown in the IPCC Special Report on the Ocean and the Cryosphere in a Changing Climate (SROCC), **more concrete, evidence-based targets are needed**, in particular in nations holding a large percentage of the world’s coastal blue carbon ecosystems. International initiatives such as the United Nations Decade on Ecosystem Restoration (2021–2030) and the United Nations Decade on Ocean Science for Sustainable Development (2021–2030) can help to provide data and information on required actions by each type of actor and how to implement these. The inclusion of local communities, the equal participation of all genders, as well as the incorporation of indigenous and traditional knowledge are essential to achieve the effective implementation of sustainable nature-based approaches to conservation, protection and restoration of coastal and marine ecosystems.

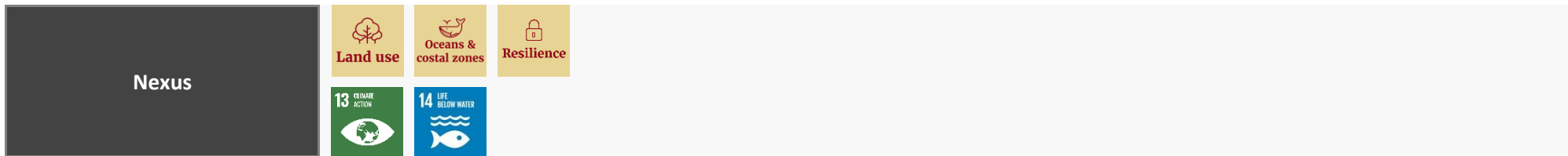
¹ Hoegh-Guldberg, O., et al. 2019. “The Ocean as a Solution to Climate Change: Five Opportunities for Action.” Report. Washington, DC: World Resources Institute. Available online at <http://www.oceanpanel.org/climate>.

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NATURE-BASED SOLUTIONS

MITIGATION & ADAPTATION/
RESILIENCE



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policy-makers (national, subnational, local levels)	<ul style="list-style-type: none"> NbS for mitigation and adaptation are incorporated into countries' new or updated NDCs NbS are included in countries' National Adaptation Plans and other relevant national strategies; Sub-national and local policies integrate NbS approaches into policies and regulations to improve community resilience, food security, water security and other co-benefits of the implementation actions; NbS are included as a core action under countries' green recovery efforts and development/recovery plans from COVID-19; Measurement, reporting and verification (MRV) systems are developed, strengthened and 	<ul style="list-style-type: none"> Continued support as part of the ambition mechanism in the Paris Agreement, to strengthen and revise NDCs that include coastal and marine NbS to climate adaptation and mitigation, as well as other sustainable ocean-related solutions. Coastal planning tools, such as ICZM and MSP, are used for holistic ecosystem approach and incorporate climate indicators for mitigation and adaptation; Guidance for climate-smart MPAs and other area-based management tools have been developed and applied; 25% MPAs are designated and implemented, including monitoring and measuring relevant climate indicators; 	<ul style="list-style-type: none"> 30% of fully and highly protected MPAs are designated and implemented. As a result of UN Decade for Ecosystem Restoration, critical ocean ecosystems for climate change mitigation and adaptation are restored. Post 2020 Global Biodiversity Framework goals and targets, which include climate related targets being achieved by Parties. Global implementation of agro-climatic and disaster risk information systems, early warning systems, and adaptive climate and disaster risk governance Revision of the IPCC's Wetland Supplement taking into account the 	<ul style="list-style-type: none"> 40% MPAs are designated and implemented many of which are climate-smart MPAs Continued support as part of the ambition mechanism in the Paris Agreement, to strengthened and revised NDCs that include coastal and marine NbS Expanded Institutional Capacity Development (ICD) to all developing countries Ensures robust protection Increased number of States parties to UNCLOS. Adaptation measures on climate impacts on biodiversity and ecosystems in polar regions are implemented
Policy-makers				

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
(national, subnational, local levels)	<p>deployed to support e.g., tracking of implementation progress and eventual accounting in GHG for the NDC/transparency reports;</p> <ul style="list-style-type: none"> Improved understanding of the ocean and coastal ecosystems existing areas within UN frameworks such as the UNFCCC, CBD and other multilateral environmental agreements MEAs; Tailored Institutional Capacity Development (ICD) in Countries identified to enable direct development and adaptive management of actions, projects and programs for ecosystem-based adaptation and mitigation to ocean and coastal climate change, including the science-policy and science-industry. 14.a, 14.3 Adopting/application of the IOC-UNESCO Criteria and Guidelines on the Transfer of Marine Technology 14.a 	<ul style="list-style-type: none"> Post 2020 Global Biodiversity Framework being implemented by Parties which includes climate related targets. UN Decade for Ecosystem Restoration being implemented to conserve ocean ecosystems for climate change mitigation and adaptation. Support measures are developed to address the climate-induced displacement and planned relocation of coastal and island populations; Other policies, with a direct and indirect impact on coastal conservation success have been reformed, e.g., on marine pollution (incl. abandoned, lost or otherwise discarded fishing gear (ALDFG)), plastic, nutrients (eutrophication) and noise, fishing and aquaculture, coastal development planning. Local Communities and Indigenous Peoples participate in integrated coastal zone management and marine spatial planning and good practices are shared Support science and innovation to increase knowledge on the role of marine areas beyond national jurisdiction for climate mitigation. 14.a., 14.3 Climate impacts on biodiversity and ecosystems in polar regions and 	<p>latest findings on blue carbon mitigation potential, and updated tiering system, if needed.</p> <ul style="list-style-type: none"> Continued support as part of the ambition mechanism in the Paris Agreement, to strengthened and revised NDCs that include coastal and marine NbS to climate adaptation and mitigation, as well as other sustainable ocean-related climate solutions. 5-year reporting on the state of the ocean via the UNFCCC Global Stocktake including the ocean-relevant Global Climate Indicators; Support measures to address the displacement of coastal and island populations because of climate change are implemented; The seven outcomes outlined in the Implementation plan of the UN Decade of Ocean Science for Sustainable Development achieved, via increased ocean observation, research, co-designed with all stakeholders meeting ecological and economical needs, addressing the impacts of climate change, such as ocean warming, deoxygenation and ocean acidification; SDG 14.a Targets of SDG14 are achieved; Mainstream source-to-sea approach to management that links governance, operations, practices and finance across marine, coastal, freshwater and terrestrial systems and stimulates 	

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
		adaptation measures are identified <ul style="list-style-type: none"> Adopting/application of the IOC-UNESCO Criteria and Guidelines on the Transfer of Marine Technology SDG 14.a 	cooperation between upstream and downstream actors as well as coordination across sectors.	
Financial Institutions	<ul style="list-style-type: none"> Notable increased interest and engagement of the private finance community on coastal and marine NbS; COVID-19 recovery plans for ODA or other financial assistance includes a green recovery component with a NbS theme/window; Increase investment in ocean science 14.a Clear business cases (return on investment) of NbS projects and facilitated access to good practices of NbS business cases; 	<ul style="list-style-type: none"> Increased financial commitments by governments and multilateral funds to support NbS projects and programmes; Improved understanding of market and non-market financing options for blue carbon ecosystems; Increased access to innovative financing approaches with clear case studies as examples, such as for Blue Bonds Improved access to microenterprises for local community members, especially within small-scale fishing communities to enable the protection of coastal ecosystems; Leverage greater private investments and create insurance products that address coastal risk and resilience; Expanded investments from all sectors, including public, into networks of local and regional observations of ocean change. Increase of companies working in the ocean sector disclosing its climate risks under the Task Force on Climate-related Financial Disclosures (TCFD) scheme. 	<ul style="list-style-type: none"> Further increase investment in ocean observation and global data sharing. 14.a 	<ul style="list-style-type: none"> Steady financial support for a network of observations of ocean change and the ocean's future role and limitations as a carbon sink, and ensure these are well incorporated into the latest IPCC reports Steady financial support for the development of ecosystem models of future change.

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Technology Providers and Innovators	<ul style="list-style-type: none"> Expansion of sustainable green/grey approaches and relative investment in the coastal zone, including inclusion of relevant capacity building and technical assistance needed noted in national reports 	<ul style="list-style-type: none"> Assess the role, magnitude, scaling potential and state of other carbon sinks and sequesters (e.g. carbon rich coastal and shelf sea sediments; large seaweeds forests); Technology development for cost-effective measurement of ocean change; Establish enhanced monitoring that can measure local variability and establish trends in ocean and coastal chemistry. Increased science and data on mitigation and adaptation value of coastal conservation efforts 	<ul style="list-style-type: none"> Improvement of data collection and real time monitoring feeding national reporting requirements for the UNFCCC and other MEAs; Development of cost-effective means to monitor MPA and OECM effectiveness for climate impacts as well as biodiversity and food security. 	
Business and Service Providers	<ul style="list-style-type: none"> NbS accepted as contributions to sustainable business activities; NbS impacts can be measured and quantified Improved understanding and complementarity with sustainable business approaches that aim to reduce coastal and marine degradation; Reduced negative impacts of supply chain activities, for biodiversity, sustainable development and climate. 14.a.14.3 	<ul style="list-style-type: none"> Actively support implementation of MPAs and other diverse area-based management tools and measures; Further reduce negative impacts of supply chain activities; Develop activities creating co-benefits to reverse biodiversity loss Manage activities to reduce co-occurring stressors that exacerbate the impacts of changing ocean conditions. 	<ul style="list-style-type: none"> Eliminate negative impacts of supply chain activities 	<ul style="list-style-type: none"> All activities in the Ocean are delivering co-benefits for ecosystems, biodiversity and society
Civil society	<ul style="list-style-type: none"> Raising awareness by the public on mitigation and adaptation potential of NbS Strengthened coordination among the Marrakech Partnership for Global 	<ul style="list-style-type: none"> Mandate for the MP-GCA is extended beyond 2025; Marine Educative Areas are implemented in collaboration with 	<ul style="list-style-type: none"> The role of the ocean and marine ecosystems in climate regulation is fully integrated into education/academic cursus worldwide. 	

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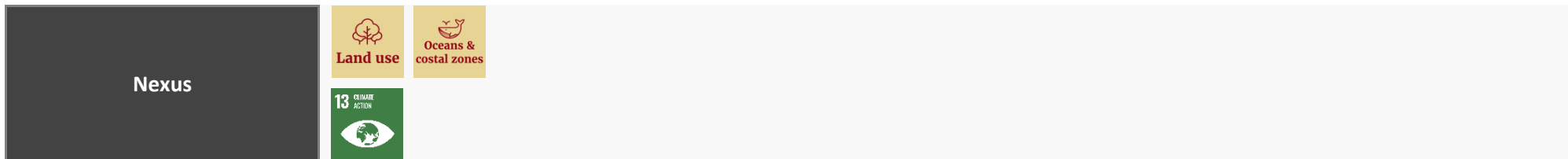
	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Civil society	<p>Climate Action (MP-GCA) on Ocean & Coastal Zones by mobilizing a broader range of actors and expertise, defining key messages to jointly amplify the voice of the ocean at COP26;</p> <ul style="list-style-type: none"> Representation from civil society at the Subsidiary Body on Science and Technological Advice (SBSTA) Ocean and Climate Dialogue and beyond; Active voice in NbS processes, from policy to projects. 	<p>local schools and communities;</p> <ul style="list-style-type: none"> Increased ocean literacy and development of ocean curricula in public education, improving global understanding of ocean science as well as the ocean and climate nexus. 14.3 14.0a Behavior-centered solutions as a tool for conservation is implemented and taught in communities for sustainable natural resource management Holding government agencies to account for commitments as included in their NDCs and promoting transparency Contributing to the development of preparedness, emergency response, and other adaptation plans Disaster management plan Implemented Giving voice to vulnerable and marginalized groups unfairly impacted by climate change, including women and children 	<ul style="list-style-type: none"> Effective mechanisms to reduce, reuse and recycle plastics by consumers Broader participation by citizens in climate actions Adaptation needs of vulnerable groups are being addressed 	

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NATURE-BASED SOLUTIONS – AREAS BEYOND NATIONAL JURISDICTION

MITIGATION & ADAPTATION/
RESILIENCE



	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	<ul style="list-style-type: none"> Contracting Parties to Regional Seas Conventions, Regional Fishery Bodies, regional political/economic bodies should increase cooperation in improving the governance of areas beyond national jurisdiction, building on existing regional institutions, international legal instruments (including UNCLOS, UNFSA), and strengthening area-based management tools such as marine spatial planning and vulnerable marine ecosystem (VME) database to promote the blue economy pathways. Ensure climate change is addressed in the ongoing negotiations of the International Legally Binding Instrument (ILBI) on Biodiversity Beyond National Jurisdiction (BBNJ) under UNCLOS 	<ul style="list-style-type: none"> Effective mechanisms put in place to facilitate climate change mitigation and adaptation. UN Decade for Ecosystem Restoration being implemented to conserve ocean ecosystems for climate change mitigation and adaptation. NDCs being updated and assessed to reach 1/4 GHG reduction targets globally. Accelerate research on climate impacts on biodiversity and ecosystems in polar regions, and adaptation measures. 	<ul style="list-style-type: none"> Significant progress achieved on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. Societal goals outlined in the Implementation plan of the UN Decade of Ocean Science for Sustainable Development achieved, via increased ocean observation and research co-designed with all stakeholders meeting ecological and economical needs, addressing the impacts of climate change, such as ocean warming, deoxygenation and ocean acidification As a result of UN Decade for Ecosystem Restoration, critical ocean ecosystems for climate change mitigation & adaptation are restored. 	<ul style="list-style-type: none"> Fully achieve conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. Ensure robust protection Including effective implementation of diverse area-based management tools in ABNJ, and enhance cooperation among global, regional and sectoral bodies. Increased number of States that are parties to or effectively implementing UNCLOS. Adaptation measures on climate impacts on biodiversity and ecosystems in polar regions are effectively implemented

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)			<ul style="list-style-type: none"> • Post 2020 Global Biodiversity Framework goals and targets, which include climate related targets being achieved by Parties. • Enforced science-policy instruments established at the national levels • Reduction of ocean stressors to ensure efficient conservation, supported by data generated from agreed increase of observation and research of impacts of stressors such ocean deoxygenation, warming and acidification resulting from increased GHG emissions. • Climate impacts on biodiversity and ecosystems in polar regions and adaptation measures are identified 	
Financial Institutions	<ul style="list-style-type: none"> • Identify opportunities to strengthen financial mechanisms for supporting sustainable provision of goods and services by healthy ocean ecosystems, in concertation with key actors. 	<ul style="list-style-type: none"> • Important investments (e.g. multilateral funds allocated to ABNJ conservation) made to support the implementation costs of area-based management tools that address climate change challenges. 	<ul style="list-style-type: none"> • Achieve sufficient finance to support climate-proofed area-based management tools, including funds from governments, public-private partnership, payment for ecosystem services and innovative financing sources (e.g. Debt for nature swap) and trust funds or coalition for private investment 	
Technology Providers and Innovators	<ul style="list-style-type: none"> • Develop innovative climate solutions based on increasing knowledge on climate impacts and risks in ABNJ and the role of ABNJ in climate change mitigation (e.g. ocean carbon uptake resulting in ocean acidification, deoxygenation and other related impacts). 	<ul style="list-style-type: none"> • Adopting/application of the IOC-UNESCO Criteria and Guidelines on the Transfer of Marine Technology • Improve capacity-development and the transfer of marine technology 	<ul style="list-style-type: none"> • Strengthen the role of Marine Genetic Resources in achieving multiple benefits including adaptation to climate change, food security and nutrition, livelihoods, and the provision of environmental services 	<ul style="list-style-type: none"> • A large network of innovative technology allowing long-term ocean observations in ABNJ, data sharing and model projections

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Technology Providers and Innovators	<ul style="list-style-type: none"> Increased long-term ocean observations in ABNJ through effective technology development 		<ul style="list-style-type: none"> Increased applications of the IOC-UNESCO Criteria and Guidelines on the Transfer of Marine Technology A growing network of innovative technology allowing long-term ocean observations in ABNJ, data sharing and model projections 	
Business and Service Providers	<ul style="list-style-type: none"> Respective roles of shipping, fisheries, cable, and tourism industries in NbS, including in high seas MPAs identified and included in respective plans. Their views are also reflected in BBNJ negotiations. 	<ul style="list-style-type: none"> Ensure that businesses and services respect existing arrangements for ABNJ, such as vulnerable marine ecosystem (VME) for fisheries and particularly sensitive sea area (PSSA). 	<ul style="list-style-type: none"> Low-carbon practices mainstreamed in businesses and services operating in ABNJ 	<ul style="list-style-type: none"> Fully comply with climate-related regulations on conservation and sustainable use of ocean
Civil society	<ul style="list-style-type: none"> Indigenous peoples and local communities well-represented in the debate about governance of ABNJ in recognition of their international rights and their role as custodians of many globally significant migratory species that travel between coasts and high seas and which are highly vulnerable to the impacts of climate change. 	<ul style="list-style-type: none"> Promote citizen science programmes that contribute knowledge and experience to the conservation of ABNJ in the face of climate change 	<ul style="list-style-type: none"> Break silos and strengthen dialogues involving all stakeholders across different sectors 	

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EXISTING INITIATIVES

<u>Energy Transition Commission</u>	<p>A global coalition of leaders from across the energy landscape committed to achieving net-zero emissions by mid-century, in line with the Paris climate objective of limiting global warming to well below 2°C and ideally to 1.5°C.</p>
<u>Blue Carbon Initiative</u>	<p>The Blue Carbon Initiative is a coordinated, global program focused on mitigating climate change through the conservation and restoration of coastal and marine ecosystems (mangroves, tidal marshes and seagrasses). The initiative is led by the IUCN, IOC/UNESCO and Conservancy International.</p>
<u>International Partnership on Blue Carbon (IPBC)</u>	<p>The Partnership brings together governments, research institutions and non-government organizations who are collaborating to enhance understanding of coastal blue carbon ecosystems. The Partnership is coordinating efforts to increase the capacity of governments and their partners to develop and implement policies and projects by building awareness in the international community, sharing knowledge and accelerating practical action.</p>
<u>Friends of Ecosystem-based Adaptation (FEBA)</u>	<p>Friends of EbA (FEBA) is an informal network of organizations with an interest in promoting collaboration and knowledge sharing on Ecosystem-based Adaptation (EbA) through joint events and initiatives, as well as the development of position papers and technical documents on EbA. This initiative is led by the IUCN.</p>
<u>The International Coral Reef Initiative (ICRI)</u>	<p>The ICRI is an informal partnership between Nations and organizations which strives to preserve coral reefs and related ecosystems around the world. Its actions have been pivotal in continuing to highlight globally the importance of coral reefs and related ecosystems to environmental sustainability, food security and wellbeing</p>
<u>Blue Solutions</u>	<p>Blue Solutions is a global project, funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), through its International Climate Initiative (ICI). It is implemented in partnership by GIZ, GRID-Arendal, IUCN and UNEP. The Blue Solutions project provides a global platform to collate, share and generate knowledge and capacity for sustainable management and equitable governance of our blue planet. It thus contributes to supporting decision makers and practitioners in applying “solutions” and achieving the Marine and Coastal Aichi Targets of the Convention on Biological Diversity.</p>
<u>Global Mangrove Alliance</u>	<p>The target of the Alliance is to increase the global area of mangrove habitat 20% over current extent by the year 2030. This target underpins and helps deliver objectives, including climate adaptation, climate mitigation, sustaining biodiversity and improving human well-being. It uses its collective strengths and partnerships to address the barriers to large-scale mangrove conservation and restoration</p>

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Save Our Mangroves Now	<p>It is a joint commitment of BMZ, IUCN and WWF to intensify efforts in mangrove conservation. It aims to upscale and focus global efforts to stop and reverse the decrease and degradation of mangrove habitats, and supports the target of the Global Mangrove Alliance to increase the global area of mangrove habitat by 20% over the current extent by 2030.</p>
Blue Nature Capital Financing Facility	<p>Blue Nature Capital projects aim to protect, restore and enhance natural ecosystems to better support climate change adaptation and mitigation efforts whilst conserving biodiversity and other vital coastal and marine natural resources. Our projects in this context aspire to use an innovative, blended financing model to access different revenue streams and attract new investors.</p>
Climate Risk and Early Warning Systems Initiative (CREWS)	<p>Mobilize USD 100 million by 2020 to significantly increase the capacity for Multi-Hazard Early Warning Systems in SIDS and LDCs</p>
Adaptation of West African Coastal Areas (WACA)	<p>Reduce coastal erosion hotspots by 30% by 2020 and by 70% by 2025 and protect 30% of the population in priority flooding areas by 2020 and 70% by 2025 in West African coastal regions</p>
High Level Panel for Sustainable Ocean Economy	<p>1) investing in nature-based solutions by restoring, protecting and managing coastal and marine ecosystems; 2) harnessing ocean-based renewable energy by scaling-up offshore and ocean-based renewable energy; 3) decarbonizing ocean industries and increasing investments in solutions to decarbonize shipping and marine transport, port infrastructure and operations, fisheries, aquaculture and tourism; and 4) advance the deployment of carbon capture and storage.</p>
Ocean Risk and Resilience Action Alliance (ORRAA)	<p>ORRAA aims to: 1) build risk-adjusted innovative and scalable products that change the risk perceptions of investing in coastal natural capital; 2) accelerate research to better understand, analyze, predict, model and manage ocean risk; and 3) advance the global narrative on ocean risk and building coastal resilience by 2023.</p> <p>ORRAA will grow through a 3- phased approach:</p> <ol style="list-style-type: none"> 1) Identify and fund development of finance products with pilot projects (2020 – 2021). 2) Assess and evaluate progress; increase breadth of products and projects across geographies. Scale funding (2021-2023). 3) Proven products and projects replicated and scaled to deliver catalytic change (2023).
Global Campaign for Nature	<p>Help conserve 30% of the Earth’s lands and oceans by 2030 and contribute to the Paris Agreement’s goals through Nature Based Solutions.</p>

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International Alliance To Combat Ocean Acidification	<p>Support governments in integrating ocean acidification into climate-ocean governance by incorporating the most current science, vulnerability assessments and actions that support mitigation, adaptation and resilience planning.</p>
Sea'ties	<p>The Sea'ties initiative aims to identify and implement adaptation solutions and responses to climate change, based on scientific synthesis, peer-to-peer learning and network sharing, in four regions (South Pacific, North & West Africa, US West Coast, and France). The project will mainly focus on medium-sized cities and explore solutions and responses adapted to different context : hard & soft responses, nature-based protection, relocation and spatial recomposition</p>
One Planet Business for Biodiversity	<p>One Planet Business for Biodiversity (OP2B) is a unique international cross-sectorial, action-oriented business coalition on biodiversity with a specific focus on agriculture, launched within French President Macron's One Planet Lab framework. Actions are focused around three pillars: scaling up regenerative agricultural practices; boosting cultivated biodiversity and diets through product portfolios; and eliminating deforestation / enhancing the management to mitigate climate change, restoration and protection high value natural ecosystems.</p>
Roadmap to Oceans and Climate Action (ROCA) Initiative	<p>Providing annual assessments of progress on ocean and climate action in six major areas: 1. Central of role of oceans in regulating climate, 2. Mitigation, 3. Adaptation and Blue Economy, 4. Displacement, 5. Financing, and 6. Capacity development, in the next 5 years; developing support for ocean-based actions in NDCs; and tracking climate financing towards ocean issues</p>
Partnership for Observation of the Global Ocean (POGO)	<p>The Partnership for Observation of the Global Ocean (POGO) was founded in 1999 by directors of oceanographic institutions around the world as a forum to promote and advance the observation of the global ocean. POGO is a UK-registered charity with member institutions from around the world, and works closely with other international and regional programmes and organisations.</p>
Global Ocean Acidification Observing Network	<p>GOA-ON is a collaborative international network to detect and understand the drivers of ocean acidification in estuarine-coastal-open ocean environments, the resulting impacts on marine ecosystems, and to make the information available to optimize modelling studies. The network is fundamental to providing early warning of the impacts of ocean acidification on natural ecosystems, wild and aquaculture fisheries, coastal protection, tourism and local economies. The network provides key input to communities, industry and governments seeking to develop action plans, best practices, and mitigation or adaptation strategies to address ocean acidification impacts.</p>
Global Ocean Oxygen Network	<p>The Global Ocean Oxygen Network (GO2NE) is an IOC Expert working group, which is committed to providing a global multidisciplinary view on deoxygenation in the open ocean and coastal with a focus on understanding its different drivers, i.e., eutrophication and climate change, its various aspects and impacts.</p>

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<p>Ocean & Climate Platform (OCP)</p>	<p>An international network of 90 members from civil society aiming to promote scientific expertise and advocate ocean-climate issues to policymakers and the great public. OCP promotes ocean-based solutions for climate mitigation and adaptation developed by its members across the globe.</p>
<p>Action Platform for Source-to-Sea Management (S2S Platform)</p>	<p>launched in 2014 as a multi-stakeholder initiative to exchange and generate knowledge, and support joint action for improved management of land, water, coastal and marine linkages. The S2S Platform has been successful in developing a shared knowledge base and in securing adoption of the source-to-sea approach in policies, strategies and funding mechanisms.</p> <p>The need for a source-to-sea approach has been highlighted in funding strategies of the Global Environment Facility (GEF) and the Swedish International Development Cooperation Agency (Sida); in operational strategies of UN Environment, UNDP Water and Ocean Governance Programme and the Swedish Agency for Marine and Water Management (SwAM); and in ministerial declarations/outcome documents from World Water Forum and the 2018 Dushanbe High-Level International Conference on the International Decade For Action "Water for Sustainable Development, 2018-2028". The German Federal Ministry for Economic Cooperation and Development (BMZ) and SwAM have funded implementation of the source-to-sea approach in countries including Viet Nam, Ethiopia, South Africa, Russia, China and Sweden.</p>

FURTHER REFERENCES

<p>World Energy Transitions Outlook: 1.5C Pathway (IRENA 2021)</p>	<p>Renewables in Cities 2021 Global Status Report (REN21 2021)</p>
<p>Net Zero by 2050: A Roadmap for the Global Energy Sector (IEA 2021)</p>	
<p>CBD, 2018: Decision 14/34 Comprehensive and participatory process for the preparation of the post-2020 global biodiversity framework.</p>	<p>https://www.cbd.int/doc/decisions/cop-14/cop-14-dec-34-en.pdf</p>
<p>Griscom et al. 2017 : Natural climate solutions. PNAS October 31, 2017 114 (44) 11645-11650.</p>	<p>https://doi.org/10.1073/pnas.1710465114</p>

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<p>IOC-UNESCO, 2020: Version 2.0 of the Decade Implementation Plan submitted for presentation to UN Member States at the 75th session of the UN General Assembly.</p>	<p>https://www.oceandecade.org/resource/108/Version-20-of-the-Ocean-Decade-Implementation-Plan-</p>
<p>IPCC, 2018: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.</p>	<p>https://www.ipcc.ch/sr15/</p>
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<p>UN, 1982: United Nations Convention on the Law of the Sea.</p>	<p>https://www.un.org/Depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm</p>
<p>UN, 2015: Sustainable Development Goal 14 : Conserve and sustainably use the oceans, seas and marine resources for sustainable development.</p>	<p>https://sdgs.un.org/goals/goal14</p>
<p>UN, 2017: Intergovernmental Conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (General Assembly resolution 72/249).</p>	<p>https://www.un.org/bbnj/</p>
<p>UNEP/FAO, 2020: The UN Decade on Ecosystem Restoration 2021-2030 “Prevent, halt and reverse the degradation of ecosystems worldwide” : Factsheet.</p>	<p>https://wedocs.unep.org/bitstream/handle/20.500.11822/30919/UNDecade.pdf?sequence=11</p>

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[WMO, 2018: The Global Climate Indicators.](https://gcos.wmo.int/en/global-climate-indicators)

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https://library.wmo.int/index.php?lvl=notice_display&id=16507

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AQUATIC FOOD SYSTEMS CHANGE LEVERS

Aquatic food systems encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of aquatic food products that originate from fisheries and aquaculture in aquatic ecosystems (e.g., open oceans, coastal waters, wetlands, lakes, and rivers),² and parts of the broader economic, societal and natural environments in which they are embedded. Global fish³ production reached about 177.8 million tonnes in 2019,⁴ sustaining markets worth billions of United States dollars and supporting livelihoods of millions of people, mostly in Asia and Africa. World capture fisheries in marine and inland waters were 92.5 million tonnes, representing 52% of global fish production. Aquaculture⁵ supplies 85.3 million tonnes aquatic animals (48% of global fish production), and 34.7 million tonnes of aquatic plants. By rebuilding depleted marine fish stocks to sustainable levels and expanding sustainable aquaculture production, there is scope to continue expanding production to meet the world's increasing demand for aquatic food. Cultured food fish from marine and coastal waters has been increasing and reached 32 million tonnes in 2019, a new record high, amounting to 37.5% of the total cultured aquatic animals, whereas fish production in inland aquaculture reached 53.3 million tonnes in 2019. Fish accounts for about 17% of the world population's intake of animal proteins, but this share can be 50% or higher in some developing countries. Fish and fish products are important sources of nutrients and micronutrients such as vitamins, minerals (zinc, iron, iodine and selenium) and omega-3 fatty acids, and are of particularly nutritional importance in communities where few nutrient-rich alternatives are readily available. Fisheries and aquaculture assure livelihoods of 10-12 percent of the world's population, and about 60 million people were engaged in the primary sector (i.e., harvesting activities) of capture fisheries and aquaculture in 2017, with the total engagement of women across both fisheries and aquaculture being over 50% when including the secondary sector (e.g., processing and marketing). Moreover, aquatic food derived from sustainable fisheries and aquaculture has a relatively small overall carbon footprint compared with other land-based food production systems. In 2012, the estimated global emission of carbon dioxide by fishing vessels, both marine and inland, was 172.3 megatonnes, which was about 0.5% of total global emissions that year. The aquaculture industry, including the emissions involved in capturing fish for feed, was estimated to have led to the emission of 263 megatonnes of carbon dioxide in 2017, which accounted for approximately 0.49 percent of global anthropogenic GHG emissions in that year (MacLeod et al., 2020). However, the low emissions from fisheries and aquaculture should not be grounds for complacency, and there are significant opportunities for deeper decarbonisation along the value chains of fisheries and aquaculture (He et al., 2018).

² In terms of geographical locations, inland fisheries and aquaculture should fall inside the scope of the [MP Land Use Pathways](#). However, due to the great similarity of their activities with marine fisheries and aquaculture, the narratives and discussions on aquatic food systems in these [MP Ocean Pathways](#) apply to inland fisheries and aquaculture as well.

³ Unless otherwise specified, throughout this document, the term "fish" indicates fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, reptiles, seaweeds and other aquatic plants.

⁴ FAO FishStatJ - Software for Fishery and Aquaculture Statistical Time Series - v4.01.0 (March 2021). <http://www.fao.org/fishery/statistics/software/fishstati/en>

⁵ Aquaculture is the practice of culturing finfish, crustaceans, molluscs, aquatic plants and seaweeds.

Healthy coastal and marine ecosystems are critical as nursery grounds and habitats for wild fish, for some of the “seed” and much of the feed for aquaculture. Climate change is a pervasive and growing global threat to coastal and marine biodiversity and ecosystem health. In marine systems, phytoplankton is responsible for nearly all primary production and generates almost half of the total global primary production – along with half of the world’s oxygen. Phytoplankton growth rates affect CO₂ uptake from seawater and organic carbon export to the deep ocean, and also impacts fisheries productivity (Tyrrell, 2019). It is estimated that global marine primary production will decline by 6% ± 3% by 2100 (Kwiatkowski et al., 2017), but like in terrestrial systems, climate change impacts will vary regionally. Warming in temperate and tropical oceans can increase stratification, limiting upwelling of deep nutrients that stimulate new production (IPCC, 2013). In contrast, reduced ice cover at higher latitudes increases sunlight availability to the ocean surface, increasing phytoplankton growing seasons and annual primary production (Wasmund et al., 2019). Understanding how these changes impact the food web is crucial for restoring fish stocks and maintaining sustainable fisheries. Apart from changes in primary production, climate variability and change – such as changing hydrological cycle and rainfall patterns, increasing sea surface temperature (SST), growing low oxygen zones, sea level rise, ocean acidification, changes in ocean circulation as well as enhanced intensity and frequency of extreme weather events – are having significant and geographically differential impacts on the availability, processing and trade of fish and fish products, making countries and fishing communities more vulnerable to risks (Barange et al., 2018). For instance, climate change is affecting the availability, distribution, and quality of commercially important species (Kleisner et al., 2016; Peer and Miller, 2014; Pershing et al., 2015; Walsh et al., 2015; Gaines et al. 2018), which has critical ramifications for livelihoods, food security, equity concerns and international conflict. In terms of fisheries productivity, we expect a net loss of fish from the tropics, relatively stable catch (but of changing stocks) in temperate latitudes, and an overall increase in polar regions (albeit in areas with insufficient management measures). Rising ocean temperatures also decrease oxygen levels, which may reduce average fish body size by 14–24% by 2050 (Cheung et al., 2013).

Climate change impacts on aquaculture are expected to vary widely, although negative impacts likely to predominate in developing countries, as a result of a decreased productivity due to suboptimal farming conditions and other perturbations (Dabbadie et al., 2018). Aquaculture’s vulnerability to climate change can have significant geographical variability. For marine aquaculture, Norway and Chile have been identified as the most vulnerable; Vietnam, Thailand, Egypt, and Ecuador stood out in terms of brackish water production; Vietnam, Bangladesh, Laos and China were indicated as most vulnerable to impacts on freshwater production (Soto et al., 2018).

The deep sea is also experiencing an increase in temperature and a decrease in oxygen and pH. FAO (2018) provides benchmark information and findings about the impacts of climatic changes on deep-sea ecosystems and the implications for the management of deep-sea fisheries. While some large predators might benefit from the expected changes (e.g. the giant squid will have more easy access to its prey because of the expansion of the minimum oxygen zone), trophic efficiency of food webs and carbon transfer are expected to be negatively impacted. However, there is still a large number of knowledge gaps and uncertainties regarding the trend of catches of deep sea commercial species, which highlights the need of adaptive monitoring and management mechanisms to ensure deep sea fisheries are sustainable and the environment remains healthy and productive.

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The great majority of people engaged in fisheries and aquaculture harvest activities are in developing countries, and most are small-scale, artisanal fishers and aquaculture workers, about half of them women (mainly engaged in marketing and processing). The highest numbers of workers are in Asia (85 percent), followed by Africa (9 percent), the Americas (4 percent), and Europe and Oceania (1 percent each) (FAO, 2020). Small-scale fishers and fish farmers are important stakeholders as they are the local implementers and enforcers that restore and protect their natural resources, thus being vital champions for nature-based solutions to climate change. Poor fisheries management results in declines in fish stocks, and declining ecosystem services, as well as in foregone revenues of roughly US\$80 billion annually, highlighting the importance of improving the sustainability of this sector. Some studies even conclude that adaptation to climate change can result in better outcomes for almost all fisheries compared to today, when taking into account range shifts and changes in productivity (Gaines et al. 2018). In light of this, both EDF (2019) and FAO (2021) have concluded that effective fisheries management is the first foundation of climate-resilient fisheries and summarized a set of good practice adaptation measures based upon transferable experiences and lessons learned from case studies across the globe to showcase how flexibility can be introduced into the fisheries management cycle to foster resilience to climate change and related disasters (Bahri et al., 2021). Effective management is also at the heart of sustainable aquaculture development. It is not only a necessary condition for aquaculture to fully realize its potential for growth but also a basic foundation for resilience of the production system or dependent communities to absorb changes due to global warming or recover from more abrupt changes such as extreme events or disasters. Future and current ocean changes result in the need for climate-adaptive fisheries and aquaculture, which determines whether a country is likely to experience negative, positive or neutral impacts of climate change on its fish (and other) resources.

A collective response is required – governments, financial institutions, technology providers and innovators, businesses and service providers, and civil society all have a role to play in the transformational change of aquatic food systems. Protection of existing aquatic ecosystems from further adverse impacts of anthropogenic stressors (e.g., climate change, pollution, over-exploitation, and habitat modification), leading to biodiversity loss and ecosystem degradation as well as harming prospects of sustainable use of natural resources, needs to be implemented urgently and will show immediate effects. Simultaneously, restoration of aquatic ecosystems needs to be accelerated to generate adaptation and mitigation benefits to achieve the Paris Agreement. Protection and restoration of aquatic ecosystems also constitute essential pieces of nature-based solutions to tackle the current global emergencies of climate change, biodiversity loss, and pollution. These nature-based solutions could be integrated into COVID-19 response and green recovery to reinforce the urgency to address systemic risks with cascading effects among health, climate, food, and socio-economic crises across the globe. Adaptation and mitigation actions weaving throughout aquatic food systems will need to be scaled up to increase the climate resilience of both the production and consumption streams, reduce food loss and waste, and transform all supply chains making them transparent and sustainable. These four areas - (1) protect; (2) restore; (3) produce; and (4) supply chain, consumption, diets, and waste - are interconnected and in practice, a measure implemented in aquatic food systems can contribute to climate change adaptation and/or mitigation in one or more of these four areas.

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Protect

Working with nature, rather than against it, brings multiple benefits also for tackling climate change. Protecting terrestrial and marine ecosystems plays a critical role in regulating climate, as they currently absorb roughly 60 percent of global man-made carbon emissions (IPBES, 2019). Given the inextricable nexuses between the [Land Use, Water, Resilience](#) and [Oceans and Coastal Zones](#) Climate Action Pathways, it is relevant to review these four action pathways in parallel. Under the Oceans and Coastal Zones Pathways, action to protect aquatic ecosystems from further adverse impacts of multiple anthropogenic stressors consist of conserving coastal and marine areas through the use of effective and climate-proofed area-based management tools (ABMTs) (especially Marine Protected Areas, Marine Spatial Planning, and Integrated Coastal Zone Management), reducing marine pollution including land-based sources, reducing ocean acidification based on data generated from local pH monitoring sensors, eliminating overfishing and illegal, unreported and unregulated (IUU) fishing, reducing threats to biodiversity in coastal and marine ecosystems, and upscaled implementation of nature-based solutions⁶ and early action⁷ as prioritized adaptation and mitigation action at all levels especially in vulnerable developing countries such as SIDS. In addition, knowledge gaps, especially the lack of available downscaled knowledge on climate risks, vulnerability and impacts, bring the need for improved scientific research, observation, and access to information for all types of actors involved in the sector. This in turn would help adopting adaptive monitoring mechanisms (e.g., agro-climatic and disaster risk information systems, early warning systems) and adaptive climate and disaster risk governance to protect, conserve and maintain a healthy, productive environment and most of all, as resilient as possible to more abrupt changes such as extreme events or disasters, providing a solid foundation for sustainable aquatic food production and consumption.

Restore

Restored ocean and riparian ecosystems can help mitigate the impact of storm and sea level rise, saving lives and livelihoods, and would reduce economic costs of damage and recovery. For example, healthy coral reefs potentially protect up to 100 million coastal inhabitants from storm risks (Stuchtey et al., 2020). However, aquatic ecosystems are undergoing profound changes, as they are challenged by climate change, over-exploitation of resources, and changes in land and sea use (e.g., urbanization, poor upstream agriculture and extractive industry practices, and increasing sprawl of coastal infrastructure) (Rogers et al., 2020; Steven et al., 2020). There are some efforts in place to implement aquatic ecosystem restoration, including the International Coral Reef Initiative and the Blue Carbon Initiative. With the adoption of the UN Decade on Ecosystem Restoration 2021-2030, there is a renewed force to take up the challenge and implement restorative activities across

⁶ Nature-based solutions are defined as “actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits”. (IUCN, 2016).

⁷ Early action priorities may include: interventions that address existing deficits; early interventions to ensure that climate change is considered in early decisions that have long lifetimes and will be exposed to future climate change; and early steps for decisions that have long lead times, or for preparing for long-term major climate change (Watkiss, Ventura and Poulain, 2019).

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ecosystems, including aquatic ecosystems. Action to restore aquatic ecosystems include promoting sustainable fishing and restoring fish stocks, restoring habitats and biodiversity through implementation of effective and climate-proofed ABMTs (as e.g., MPAs, Marine Spatial Planning and Integrated Coastal Zone Management), and rehabilitation of critical aquatic ecosystems (e.g., mangroves, coral reefs, seagrass meadows, kelp forests) as nature-based solutions for adaptation and mitigation benefits. In the deep sea, management measures, including setting limits to fishing for the protection of vulnerable marine ecosystems (VMEs) and requiring environmental impact assessments (EIA) before proceeding with fishing outside designated Fishing Areas, are highly recommended. Many crosscutting actions and synergies exist with the [Land Use](#), [Water](#), [Resilience](#) Climate Action Pathways, particularly due to the interactions between land use and freshwater, coastal and marine ecosystems as well as the interdependencies of land to sea systems in the face of multiple risks. For instance, pollution in coastal areas originates largely from land-based sources, which can impact the ecosystem functioning and increase vulnerability.

Produce

Aquatic food production can provide abundant climate-friendly proteins for a growing population, and for that, a transition is needed to more sustainable aquatic food production systems – systems that produce more, that are resilient to the impacts of climate change, and that deliver more socio-economic benefits with less environmental consequences. On the adaptation side, a portfolio of tools and approaches recommended are currently available for fisheries and aquaculture and coastal communities that rely on the sector. The SROCC emphasizes institutional adaptation, highlights the importance of Ecosystem-based Adaptation,⁸ the use of Marine Protected Areas as adaptation measures and proposes a specific adaptation framework for sea level rise (protect, accommodate, advance, retreat). It also advocates for participatory decision-making approaches, based on scientific findings, for fisheries management and aquaculture development to address climate change impacts (e.g., emergency preparedness, early action and response, early warning systems), the use of traditional knowledge and the inclusion of other sectors to foster adaptation based on principles of the ecosystem approach to fisheries (EAF) and to aquaculture (EAA) (FAO, 2003; FAO, 2010). A broader set of adaptation measures and tools that encompass those described in the SROCC and are relevant for different scales and contexts are also available (Poulain, Himes-Cornell and Shelton, 2018). Adaptation strategies must include institutional adaptations (e.g., legislation or policy to support climate risk proofing of large-scale grey infrastructure along the aquatic food value chain), measures addressing livelihoods (e.g., livelihood diversification and alternatives to support small-scale fishers and fish farmers), and measures intended to manage and mitigate risks and thereby strengthen resilience (e.g., risk transfer mechanisms such as social protection and insurance). Adaptation solutions need political commitment, stakeholder participation, technological innovation and behavioural change to succeed. In addition, the use of economic appraisal and decision-support tools to assess the costs and benefits of adaptation options in the fisheries and aquaculture sector is key to identify the most appropriate adaptation interventions, including no- and low-regret actions, addressing potential lock-in, and early planning for long-term adaptation (Watkiss,

⁸ Ecosystem-based adaptation, defined by the CBD as “the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change”, is a nature-based approach under the umbrella of NbS (CBD, 2009).

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Ventura and Poulain, 2019). When it comes to mitigation, in the case of capture fisheries, a 10 to 30 percent reduction of vessel emissions is achievable with efficient engines and larger propellers, better vessel shape and hull modifications, and speed reductions. There are also opportunities to reduce GHG emissions in aquaculture, which include improving technological efficiency, reducing reliance on fossil fuel, replacing fish-based feed ingredients, and improving feed conversion rates. Combining these approaches would result in a reduction of 21 percent in CO₂ emission per tonne of fish produced. In addition, there is a need to strengthen methodologies for Life Cycle Emissions Assessment – including scope 3⁹ – of the aquatic food industry in order to guide companies in reducing their GHG emissions.

Supply chain, consumption, diets, and waste

This area deals with the way aquatic food is produced, stored, packed, processed, traded, distributed, marketed, consumed, and disposed of. The consumption patterns, especially those linked to diets, of nearly eight billion people worldwide are critical factors for shaping how terrestrial and aquatic food systems would transform in the future. Therefore, actions should be taken at all levels to empower consumers to make better-informed decisions that are healthier for them and for the planet. As the aquatic food carbon footprint is lower compared to other animal production systems, the sector represents a consumers' solution to shift from GHG-intensive diets to climate-friendly and sustainable diets that include more GHG-friendly aquatic food options, if those aquatic food options can be provided on a sustainable basis. The potential is high. Recent scientific research predicts that edible food from the sea could increase by 21-44 million tonnes by 2050, a 36-74% increase compared to current yields. This represents 12-25% of the estimated increase in all meat needed to feed 9.8 billion people by 2050 (Costello et al., 2020). Moreover, given that 35% of the global harvest in capture fisheries and aquaculture is estimated to be either lost or wasted every year (FAO, 2020), reducing food loss and waste in aquatic food value chains represents good potential for adaptation and mitigation co-benefits. This measure would avoid unnecessary GHG emissions and help mitigate climate change, and at the same time, it is also an adaptation measure to address climate change in a context of maximizing use of fisheries and aquaculture resources, adding value to aquatic food products, and minimizing losses.

⁹ Scope 1, Scope 2, and Scope 3 emissions are emissions responsibility as defined by the GHG Protocol, a private sector initiative. 'Scope 1' indicates direct GHG emissions that are from sources owned or controlled by the reporting entity. 'Scope 2' indicates indirect GHG emissions associated with the production of electricity, heat, or steam purchased by the reporting entity. 'Scope 3' indicates all other indirect emissions, i.e., emissions associated with the extraction and production of purchased materials, fuels, and services, including transport in vehicles not owned or controlled by the reporting entity, outsourced activities, waste disposal, etc. ([IPCC, 2018](#))

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Impact
2a

AQUATIC FOOD SYSTEMS - EEZ INCLUDING COASTAL AREAS

MITIGATION &
ADAPTATION/
RESILIENCE



	By 2021	By 2025	By 2030	By 2040
Policy-makers (national, subnational, local levels)	<ul style="list-style-type: none"> Promote recognition and inclusion of climate-proofed ABMTs in aquatic food systems Integrate climate risk and resilience into COVID-19 recovery strategy, plans and budgets (→ MP Resilience Pathways) Establish policy to support climate risk proofing of grey infrastructure along the aquatic food value chain (→ MP Resilience Pathways) Identify opportunities in existing international instruments that can guide implementation at national level (incl. FAO Declaration) 	<ul style="list-style-type: none"> Support implementation of climate-proofed ABMTs Adopt good practices of MSP and ICZM Protect and restore ecosystems (→ SDG target 14.2) Reduce marine pollution (incl. land-based sources) (→ SDG target 14.1) (→ MP Land Use Pathways) Promote climate-adaptive fisheries management (→ SDG target 14.4) Strengthen policies to 	<ul style="list-style-type: none"> Increase development and implementation of MSP and ICZM Reduce ocean acidification using data generated from local pH monitoring sensors (→ SDG target 14.3) Fully integrate climate change into adaptive fisheries management and aquaculture development practices based on principles of EAF and EAA Develop comprehensive guidance on “good practices” adaptation and mitigation 	<ul style="list-style-type: none"> MSP for all coastal countries developed and implemented, and other climate-proofed ABMTs designated and implemented Fully implement indicators in national monitoring systems (→ MP Resilience Pathways)

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	<p>for Sustainable Fisheries and Aquaculture)</p> <ul style="list-style-type: none"> Promote Blue Fishing Ports (→ MP Resilience Pathways) Strengthen and standardize methodologies for Life Cycle Emissions Assessment (including scope 3) 	<p>incentivize transformation to inclusive, sustainable and resilient aquatic food systems (→ MP Resilience Pathways) (→ MP Water Pathways)</p> <ul style="list-style-type: none"> Mainstream aquatic food systems in NDCs, NAPs, sector/ local adaptation plans Identify, assess and prioritize adaptation and mitigation measures (incl. NbS and early action) (→ MP Resilience Pathways) Develop information systems to manage downscaled knowledge on climate risks, vulnerability and impacts (→ MP Resilience Pathways) Develop indicators to monitor, track progress and evaluate success of climate adaptation and mitigation (incl. NbS and early action) (→ MP Resilience Pathways) Improve access to climate finance for implementation of climate actions including those specified in NDCs 	<ul style="list-style-type: none"> Upscale implementation of climate action (incl. NbS and early action) (→ MP Resilience Pathways) Validate indicators related to climate adaptation and mitigation (→ MP Resilience Pathways) Implement and enforce international sea law (→ SDG target 14.C) Support small scale fishers and fish farmers in access to marine resources, markets, finance, and risk transfer mechanisms (→ SDG target 14.B) (→ MP Resilience Pathways) Support measures to address climate-induced displacement of coastal populations Sustainable management of all ocean sectors within EEZs 	
Financial Institutions	<ul style="list-style-type: none"> Identify financial tools to support sustainable use of coastal and marine areas Integrate climate risk and resilience into COVID-19 recovery financing (→ MP Resilience Pathways) 	<ul style="list-style-type: none"> Improve financial literacy among local communities Leverage greater private investments and create insurance products (→ MP Resilience Pathways) Facilitate access to 	<ul style="list-style-type: none"> Improve financial literacy among all stakeholders Mainstream aquatic food systems in climate finance Provide adequate finance for upscaled implementation 	
Financial				

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Institutions	<ul style="list-style-type: none"> Provide financial incentives (e.g., lower interest rates) for operations with clear climate change adaptation and mitigation planning and disclosures 	<p>financial resources for climate actions including those specified in NDCs</p> <ul style="list-style-type: none"> Invest in aquatic food systems innovation and capital to allow small and medium enterprises to provide affordable nutrition and equitable livelihoods 	<p>of climate action incl. MSP and ICZM (→ MP Resilience Pathways)</p>	
Technology Providers and Innovators	<ul style="list-style-type: none"> Research and develop innovative feed solutions for aquaculture Experiment local strategies/ techniques that can reduce climate change impacts and GHG emissions 	<ul style="list-style-type: none"> Develop multi-hazard monitoring and early warning systems (→ MP Resilience Pathways) Develop tools applicable to data-limited, capacity-poor fisheries and aquaculture Develop new technologies that can support transformation to low-carbon aquatic food systems (incl. renewable energy) 	<ul style="list-style-type: none"> Disseminate tools affordable to local communities for improved monitoring, climate preparedness and market access Develop new and disruptive technologies for innovative fisheries and aquaculture data systems and practices to support decision making 	
Business and Service Providers	<ul style="list-style-type: none"> Integrate sustainability principles in aquatic food value chains Increase net-zero commitments through Race to Zero 	<ul style="list-style-type: none"> Implement innovative feed solutions for aquaculture to reduce reliance on wild fish as feed ingredient Disclose climate risks in company activities Experiment new technologies that can support transformation to low-carbon aquatic food systems (incl. renewable energy) 	<ul style="list-style-type: none"> Increase implementation of innovative feed solutions for aquaculture Upscale implementation of new technologies that can support transformation to low-carbon aquatic food systems (incl. renewable energy) Fully implement climate risk proofing of grey infrastructure along the aquatic food value chain (→ MP Resilience Pathways) 	<ul style="list-style-type: none"> Fully implement innovative feed solutions for aquaculture to minimize reliance on wild fish as feed ingredient The aquaculture industry has grown significantly and produces food sustainably, contributing to low-carbon and healthy diets
Business and		<ul style="list-style-type: none"> Diversify value chains 	<ul style="list-style-type: none"> Upscale 	

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Service Providers		<p>by adding value to new or currently undervalued resources</p> <ul style="list-style-type: none"> Develop ecotourism to support livelihood diversification and alternatives (→ MP Resilience Pathways) Identify adaptation and mitigation measures (incl. NbS and early action) to climate proof aquatic food value chains (→ MP Resilience Pathways) 	<p>implementation of climate action along value chain (→ MP Resilience Pathways)</p> <ul style="list-style-type: none"> Increase the economic benefits from sustainable use of marine resources (→ SDG target 14.7) Minimize food loss and waste (less than 5%) in all value chains (→ MP Resilience Pathways) All aquatic food companies are on a net-zero pathway 	
Civil society	<ul style="list-style-type: none"> Promote climate-friendly and sustainable diets and reduction of food loss and waste (→ MP Resilience Pathways) 	<ul style="list-style-type: none"> Improve knowledge of connections between biodiversity and stability of coastal and marine ecosystems Promote low-carbon aquatic food systems (incl. renewable energy) Promote citizen science programmes to provide input to agro-climatic and disaster risk information systems (→ MP Resilience Pathways) 	<ul style="list-style-type: none"> Increase scientific knowledge, research and technology for ocean health (→ SDG target 14.A) Break silos and strengthen dialogues involving all stakeholders across different sectors (→ MP Land Use Pathways) (→ MP Water Pathways) (→ MP Resilience Pathways) Promote gender-sensitive climate solutions and build on specific skills and the positive role women and youth can play 	<ul style="list-style-type: none"> Fully integrate climate justice, equity and ethical considerations in decision making on allocation of and access to fisheries resources

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Full descriptions of milestones between 2021 and 2040

Policy makers (national, subnational, local levels):

By 2021

- Promote recognition and inclusion of climate-proofed ABMTs in aquatic food systems: Promote and increase recognition and inclusion of effective area-based management tools (ABMT) in aquatic food systems that take into account climate change considerations, to incentivize integration of conservation measures in fisheries management and aquaculture development plans and provide additional effective protection of unwanted bycatch, protected species, and vulnerable habitats
- Integrate climate risk and resilience into COVID-19 recovery strategy, plans and budgets: Integrate climate risk and resilience into COVID-19 recovery strategy, plans and budgets, build-back-better programmes and investments, and shift in production and consumption of aquatic foods and services towards more climate-friendly practices in terms of greenhouse gas (GHG) emission reductions and risks (e.g., Good Life Goals) (→ [MP Resilience Pathways](#))
- Establish policy to support climate risk proofing of grey infrastructure along the aquatic food value chain: Establish policies to ensure climate change considerations are fully integrated into planning, management, maintenance and operational decision-making for critical transport, energy, processing or other infrastructure along the aquatic food value chain (→ [MP Resilience Pathways](#))
- Identify opportunities in existing international instruments that can guide implementation at national level (incl. FAO Declaration for Sustainable Fisheries and Aquaculture): Identify opportunities and challenges specified in existing international instruments to guide implementation at national level, securing the long-term sustainability of aquatic food systems, including the FAO Declaration for Sustainable Fisheries and Aquaculture
- Promote Blue Fishing Ports: Promote fishing ports in which port management and planning processes enhance the triple bottom line of fishing and commercial ports that include preserving the environment (e.g., reduced pollution, climate proofing) while fostering social benefits (e.g. decent and fair labour), and economic growth (e.g., sustained profits) (→ [MP Resilience Pathways](#))
- Strengthen and standardize methodologies for Life Cycle Emissions Assessment (including scope 3): Support standardization of methodologies for Life Cycle Emissions Assessment, including scope 3 (all other indirect emissions, i.e., emissions associated with the extraction and production of purchased materials, fuels, and services, including transport in vehicles not owned or controlled by the reporting entity, outsourced activities, waste disposal, etc.)

By 2025

- Support implementation of climate-proofed ABMTs: Support adoption and implementation of effective area-based management tools (ABMT) that take into account climate change considerations at national and local levels, including identification, reporting, assessment, and monitoring, and ensure national, subnational, and local governments have information and capacity needed

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- Adopt good practices of MSP and ICZM: Identify, adopt, and disseminate good practices of Marine Spatial Planning (MSP), Integrated Coastal Zone Management (ICZM) at national and regional levels, to ensure sustainable use of ocean resources and to increase the resilience of coastal communities to climate change
- Protect and restore ecosystems: Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans (originally, by 2020) (→ [SDG target 14.2](#))
- Reduce marine pollution (incl. land-based sources): Prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution (→ [SDG target 14.1](#)) (→ [MP Land Use Pathways](#))
- Promote climate-adaptive fisheries management: Implement climate-adaptive science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics, while effectively regulating harvesting and ending overfishing, illegal, unreported and unregulated (IUU) fishing and destructive fishing practices (originally, by 2020) (→ [SDG target 14.4](#))
- Strengthen policies to incentivize transformation to inclusive, sustainable and resilient aquatic food systems: Develop and implement policies, governance, legal and institutional frameworks to provide incentives for transformation to inclusive, sustainable and resilient aquatic food systems, including through sustainable fisheries management and aquaculture development practices and the inclusion of aquatic foods into dietary guidelines and social safety net programs, as a crucial source of micronutrients for the most vulnerable populations, such as children and pregnant women (→ [MP Resilience Pathways](#))
- Mainstream aquatic food systems in NDCs, NAPs, sector/ local adaptation plans: Promote integration and mainstreaming of aquatic food systems in nationally determined commitments, national adaptation plans, adaptation plans for the fisheries and aquaculture sector, and local adaptation plans
- Identify, assess and prioritize adaptation and mitigation measures (incl. NbS and early action): Identify adaptation and mitigation measures (including nature-based solutions and early action) for aquatic food systems at local, country, subregional and regional levels, assess resources needed and timeframe, and prioritize key measures for implementation (→ [MP Resilience Pathways](#))
- Develop information systems to manage downscaled knowledge on climate risks, vulnerability and impacts: Develop sound agro-climatic and disaster risk information systems that identify, quantify, document and manage downscaled knowledge on climate-related risks, vulnerability and impacts on aquatic food systems at local, country, subregional and regional levels (→ [MP Resilience Pathways](#))
- Develop indicators to monitor, track progress and evaluate success of climate adaptation and mitigation (incl. NbS and early action): Develop indicators and thresholds to guide climate change adaptation and mitigation action (including nature-based solutions and early action) for aquatic food systems at varying scales, through monitoring of performance, tracking of implementation progress, and evaluation of success (→ [MP Resilience Pathways](#))
- Improve access to climate finance for implementation of climate actions including those specified in NDCs: Improve access to public and private financial resources for the implementation of inclusive, integrated, sectoral, and cross-sectoral adaptation and mitigation actions including those specified in Nationally Determined Contributions (NDCs), with a focus on vulnerable coastal communities and based on principles of ecosystem approach to fisheries (EAF) and aquaculture (EAA)

By 2030

- Increase development and implementation of MSP and ICZM: Continue to support and increase development and implementation of Marine Spatial Planning (MSP), Integrated Coastal Zone Management (ICZM) at national and regional levels, to ensure sustainable use of ocean resources and to increase the resilience of coastal communities to climate change
- Reduce ocean acidification using data generated from local pH monitoring sensors: Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels and using data generated from local enhanced monitoring sensors that can measure local variability and establish trends in ocean and coastal chemistry, contributing to global monitoring networks that are supporting the ocean acidification-specific indicator as established by UN Sustainable Development Goal 14.3.1 “Average marine acidity (pH) measured at agreed suite of representative sampling stations” (→ [SDG target 14.3](#))
- Fully integrate climate change into adaptive fisheries management and aquaculture development practices based on principles of EAF and EAA: Achieve full integration of climate change into adaptive fisheries management and aquaculture development practices, based on principles of ecosystem approach to fisheries (EAF) and to aquaculture (EAA) (FAO, 2003; FAO, 2010). This can include: incorporation of climate risks, vulnerability and impacts in decision making processes; responding to climate change by improving fisheries management through the implementation of cross-sectoral, holistic and precautionary approaches that attain robustness to variability, rather than stability; and developing adaptive spatial management mechanisms that can help address shifts in species distributions and changes in the seasonality of ecological processes
- Develop comprehensive guidance on “good practices” adaptation and mitigation: Develop and disseminate comprehensive guidance for “good practices” adaptation and mitigation (including nature-based solutions) in aquatic food systems learning from examples of successful adaptation and mitigation
- Upscale implementation of climate action (incl. NbS and early action): Continue to support and upscale the implementation of adaptation and mitigation action (including nature-based solutions and early action) in aquatic food systems especially in vulnerable developing countries such as Small Island Developing States (SIDS) (→ [MP Resilience Pathways](#))
- Validate indicators related to climate adaptation and mitigation: Validate indicators that have been used in guiding climate adaptation and mitigation action in aquatic food systems for monitoring of performance, tracking of implementation progress, and evaluation of success (→ [MP Resilience Pathways](#))
- Implement and enforce international sea law: Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea (UNCLOS), which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of “The future we want” (→ [SDG target 14.C](#))
- Support small scale fishers and fish farmers in access to marine resources, markets, finance, and risk transfer mechanisms: Provide access for small-scale artisanal fishers and fish farmers to marine resources, markets, finance, and risk transfer mechanisms such as social protection and insurance (→ [SDG target 14.B](#)) (→ [MP Resilience Pathways](#))
- Support measures to address climate-induced displacement of coastal populations: Increase support for adoption and implementation of measures that address the displacement of coastal and island populations caused by climate change
- Sustainable management of all ocean sectors within EEZs: Achieve sustainable management of all ocean sectors (including the fisheries and aquaculture sector) within all exclusive economic zones (EEZs) in the world

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By 2040

- MSP for all coastal countries developed and implemented, and other climate-proofed ABMTs designated and implemented: Martine Spatial Plans (MSP) are developed and implemented for all coastal countries, and other climate-proofed area-based management tools (ABMT) are designated and implemented
- Fully implement indicators in national monitoring systems: Achieve the full implementation of indicators in national monitoring systems to guide climate adaptation and mitigation in aquatic food systems (→ [MP Resilience Pathways](#))

Financial institutions:

By 2021

- Identify financial tools to support sustainable use of coastal and marine areas: Identify and adopt financial tools that can provide support to the sustainable use of coastal and marine areas
- Integrate climate risk and resilience into COVID-19 recovery financing: Integrate considerations of climate risk and resilience into COVID-19 recovery financing programmes (→ [MP Resilience Pathways](#))
- Provide financial incentives (e.g., lower interest rates) for operations with clear climate change adaptation and mitigation planning and disclosures: Create financial incentives (e.g., lower interest rates) to encourage and support operations with clear climate change adaptation and mitigation planning and disclosures

By 2025

- Improve financial literacy among local communities: Increase financial literacy among local fishing and fish-farming communities to empower them to make their own financial decisions regarding sustainable natural resource management
- Leverage greater private investments and create insurance products: Leverage greater private investments and innovate insurance products that address ocean risks and build resilience (→ [MP Resilience Pathways](#))
- Facilitate access to financial resources for climate actions including those specified in NDCs: Improve access to financial resources for climate actions including those specified in Nationally Determined Contributions (NDCs)
- Invest in aquatic food systems innovation and capital to allow small and medium enterprises to provide affordable nutrition and equitable livelihoods: Increase financial support for aquatic food systems innovation and capital to allow small and medium enterprises to provide affordable nutrition and equitable livelihoods

By 2030

- Improve financial literacy among all stakeholders: Increase financial literacy among all stakeholders involved in aquatic food systems

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- Mainstream aquatic food systems in climate finance: Promote integration and mainstreaming of aquatic food systems in climate finance, ensuring that aquatic food systems are adequately represented in climate finance portfolios
- Provide adequate finance for upscaled implementation of climate action incl. MSP and ICZM: Ensure that there is adequate finance for upscaled implementation of climate action including Marine Spatial Planning (MSP), Integrated Coastal Zone Management (ICZM) (→ [MP Resilience Pathways](#))

Technology providers and innovators:

By 2021

- Research and develop innovative feed solutions for aquaculture: Conduct research to explore and develop innovative feed solutions for aquaculture, including replacing fishmeal and oil with alternative proteins ranging from plant-based meal and plant oil to terrestrial by-products and microbial ingredients
- Experiment local strategies/ techniques that can reduce climate change impacts and GHG emissions: Experiment strategies that help reduce ocean change impacts on fisheries and aquaculture, foster adaptation and reduce greenhouse gas (GHG) emissions, e.g., waste shell dissolution, aeration, buffering local sea water to reduce acidity

By 2025

- Develop multi-hazard monitoring and early warning systems: Develop and improve multi-hazard monitoring and early warning systems that provide integrated information and decision-making support (→ [MP Resilience Pathways](#))
- Develop tools applicable to data-limited and capacity-poor fisheries and aquaculture: Develop new tools and technologies that contribute to stock assessments and monitoring in data-limited and capacity-poor fisheries and aquaculture, to make them climate-resilient
- Develop new technologies that can support transformation to low-carbon aquatic food systems (incl. renewable energy): Develop new technologies that have potential to support transformative changes including the transition to low-carbon aquatic food systems and create new opportunities for underrepresented groups including women in aquatic food systems. These new technologies could include those that aim to increase moving aquaculture into land-based recirculating systems (using recirculating aquaculture systems (RAS); offshore aquaculture systems using marine net pens; multitrophic aquaculture installations), and those that aim of reducing energy use and power aquatic food systems with renewable energy

By 2030

- Disseminate tools affordable to local communities for improved monitoring, climate preparedness and market access: Develop and disseminate tools (e.g., new and better sensors, artificial intelligence, cheaper and faster internet) that are affordable to local communities in key areas, including improved monitoring and tracking of fish catch, increased preparedness to climate change, and better access to markets

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- Develop new and disruptive technologies for innovative fisheries and aquaculture data systems and practices to support decision making: Develop new and disruptive technologies for innovative data systems and practices to significantly improve the availability and use of fishery and aquaculture data, statistics, and information in supporting decision making. These new and emerging technologies include high-resolution satellite imagery, the Automatic Identification System (AIS), cameras and in situ sensors, deoxyribonucleic acid (DNA), and genetic profiling, blockchain, the Internet of Things (IoT), big data, artificial intelligence (AI) and machine learning

Business and service providers:

By 2021

- Integrate sustainability principles in aquatic food value chains: Promote integration of sustainability principles in aquatic food value chains, including reducing marine pollution, avoiding overfishing, eliminating illegal, unreported and unregulated (IUU) fishing, contributing to restoration of fish stocks and of aquatic ecosystems etc.
- Increase net-zero commitments through Race to Zero: Increase number of companies that make net-zero commitments through the Race to Zero campaign

By 2025

- Implement innovative feed solutions for aquaculture to reduce reliance on wild fish as feed ingredient: Encourage and increase implementation of innovative feed solutions for aquaculture to reduce reliance on wild fish as feed ingredient
- Disclose climate risks in company activities: Encourage seafood companies to disclose its climate risks under the Task Force on Climate-related Financial Disclosures (TCFD) scheme
- Experiment new technologies that can support transformation to low-carbon aquatic food systems (incl. renewable energy): Experiment the implementation of new technologies that have potential to transform systems and support the transition to low-carbon aquatic food systems, including renewable energy
- Diversify value chains by adding value to new or currently undervalued resources: Diversify value chains in aquatic food systems, by adding value to new or currently undervalued resources, and promote market diversification to avoid weak links that result in low resilience to changes and shocks
- Develop ecotourism to support livelihood diversification and alternatives: Develop ecotourism which supports local communities by providing an alternative source of livelihood to the local community that is more sustainable, climate-friendly, conserves resources, maintains biological diversity and promotes the sustainable use of resources, thus enabling climate-friendly tourism while at the same time reducing greenhouse gas (GHG) emissions, conserving the ecological functions, of the environment and providing economic benefits (→ [MP Resilience Pathways](#))
- Identify adaptation and mitigation measures (incl. NbS and early action) to climate proof aquatic food value chains: Identify and adopt adaptation and mitigation measures (incl. nature-based solutions and early action) that contribute to climate proofed aquatic food value chains (→ [MP Resilience Pathways](#))

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By 2030

- Increase implementation of innovative feed solutions for aquaculture: Continue to support and increase implementation of innovative feed solutions for aquaculture
- Upscale implementation of new technologies that can support transformation to low-carbon aquatic food systems (incl. renewable energy): Continue to support and upscale implementation of new technologies that have potential to transform systems and support the transition to low-carbon aquatic food systems, including renewable energy, based on data and lessons learnt from the experiment phase
- Fully implement climate risk proofing of grey infrastructure along the aquatic food value chain: Achieve full and effective implementation of climate-proofed grey infrastructure along the aquatic food value chain (→ [MP Resilience Pathways](#))
- Upscale implementation of climate action along value chain: Continue to support and upscale implementation of climate action along the value chain (→ [MP Resilience Pathways](#))
- Increase the economic benefits from sustainable use of marine resources: Achieve more economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism (→ [SDG target 14.7](#))
- Minimize food loss and waste (less than 5%) in all value chains: Ensure there is minimal food loss and waste (less than 5%) in all aquatic food value chains (→ [MP Resilience Pathways](#))
- All aquatic food companies are on a net-zero pathway: Ensure that all aquatic food companies are committed to a net-zero pathway

By 2040

- Fully implement innovative feed solutions for aquaculture to minimize reliance on wild fish as feed ingredient: Achieve full and effective implementation of innovative feed solutions for aquaculture to minimize reliance on wild fish as feed ingredient
- The aquaculture industry has grown significantly and produces food sustainably, contributing to low-carbon and healthy diets: Ensure that the aquaculture industry has grown significantly and produces food in a sustainable manner, contributing to low-carbon and healthy diets

Civil society:

By 2021

- Promote climate-friendly and sustainable diets and reduction of food loss and waste: Promote and contribute to increased adoption of climate-friendly and sustainable diets and the reduction of food loss and waste (→ [MP Resilience Pathways](#))

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By 2025

- Improve knowledge of connections between biodiversity and stability of coastal and marine ecosystems: Improve knowledge and public awareness of the connections between reduced threats to biodiversity and the stability of coastal and marine ecosystems through cross-cutting objectives: better science, climate-smart biocommerce, improved governance mechanisms and sustainable landscapes
- Promote low-carbon aquatic food systems (incl. renewable energy): Enhance social and economic development of Small Island Developing States (SIDS) and coastal nations by promoting the low-carbon aquatic food systems, including renewable energy, while addressing livelihoods, culture and traditional knowledge and actively engaging local communities
- Promote citizen science programmes to provide input to agro-climatic and disaster risk information systems: Promote and develop citizen science programmes that contribute to agro-climatic and disaster risk information systems (→ [MP Resilience Pathways](#))

By 2030

- Increase scientific knowledge, research and technology for ocean health: Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries ([SDG target 14.A](#))
- Break silos and strengthen dialogues involving all stakeholders across different sectors: Increase dialogues involving all stakeholders across different sectors to discuss matters such as the sustainable use and conservation of aquatic ecosystems and their natural resources in the face of climate change (→ [MP Land Use Pathways](#)) (→ [MP Water Pathways](#)) (→ [MP Resilience Pathways](#))
- Promote gender-sensitive climate solutions and build on specific skills and the positive role women and youth can play: Encourage and promote increased adoption and implementation of gender-sensitive climate solutions that account for differences in terms of vulnerability and build on the specific skills and the positive role women and youth can play, including women's equal participation in decision-making processes, digitalization and artificial intelligence and scenarios to strengthen women's empowerment and gender equality

By 2040

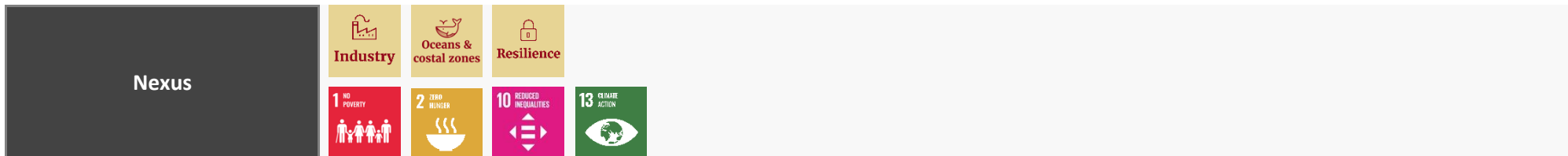
- Fully integrate climate justice, equity and ethical considerations in decision making on allocation of and access to fisheries resources: Ensure that climate justice, equity and ethical considerations are fully integrated into decision making on allocation of and access to fisheries resources

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Impact
2b

AQUATIC FOOD SYSTEMS - AREAS BEYOND NATIONAL JURISDICTION

MITIGATION &
ADAPTATION/
RESILIENCE



	By 2021	By 2025	By 2030	By 2040
Policy-makers (national, subnational, local levels)	<ul style="list-style-type: none"> Ensure climate change is addressed in ongoing BBNJ negotiations Address climate change in identification and designation of MPAs or other ABMTs in ABNJ Align and reconcile the objectives and application of different ABMTs applied to ABNJ (e.g., VME, APEI, PSSA, MPA) across agencies, incorporating the concepts of climate refugia & changing habitat suitability 	<ul style="list-style-type: none"> Mainstream climate change in the development of MPAs or other ABMTs in ABNJ Promote climate-adaptive fisheries management in ABNJ (incl. highly migratory species, straddling stocks and high seas fish stocks) (→ SDG target 14.4) Identify, assess and prioritize adaptation and mitigation measures (incl. NbS and early action) in ABNJ (→ MP Resilience Pathways) 	<ul style="list-style-type: none"> Ensure MPAs or other ABMTs in ABNJ contributing to the “30 by 30” target are climate-proofed Achieve societal goals outlined in the implementation plan of the UN Decade of Ocean Science Promote good practices of EIAs in ABNJ, and ensure EIAs incorporate climate change in ABNJ baseline and risk assessments 	<ul style="list-style-type: none"> Fully implement good practices of EIAs in ABNJ Effectively enforce climate-related regulations on conservation and sustainable use of ocean through an integrated governance structure

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	<ul style="list-style-type: none"> Promote climate-related good practices among RFMO/As Include climate considerations when assessing cumulative impacts of multiple stressors on the ABNJ 	<ul style="list-style-type: none"> Develop observation and information systems to increase and manage knowledge on climate risks, vulnerability and impacts in ABNJ (→ MP Resilience Pathways) Work within the UN Decade for Ocean Science to prioritize ocean observations/ monitoring and modelling that identify carbon stocks, fluxes and sinks, improve climate models, and inform RFMO decision making Adopt ecosystem-based management practices that conserve carbon reservoirs and sinks, and reduce the carbon footprint of fishing Expand blue carbon concepts to embrace, conserve and manage the ABNJ carbon stocks, including fish carbon 	<ul style="list-style-type: none"> Increase implementation of climate action (incl. NbS and early action) to reduce stressors and sustain natural resources in ABNJ (→ MP Resilience Pathways) Increase cooperation on climate change issues among sectorial organizations Create a formal, coherent governance mechanism for climate in ABNJ so that carbon footprints and climate consequences of all activities are addressed Consider developing a voluntary commitment mechanism for ABNJ, co-designed by ISA, FAO, IMO, and other organizations with relevant jurisdiction 	
Financial Institutions	<ul style="list-style-type: none"> Identify opportunities to improve financing mechanism(s) for climate-proofed MPAs or other ABMTs 	<ul style="list-style-type: none"> Strengthen financing mechanism(s) for climate-proofed MPAs or other ABMTs 	<ul style="list-style-type: none"> Achieve sufficient finance for climate-proofed MPAs or other ABMTs 	
Technology Providers and Innovators		<ul style="list-style-type: none"> Develop cutting-edge technologies to improve climate data in ABNJ, including climate variables that influence fish distributions 	<ul style="list-style-type: none"> Innovate technologies to monitor climate variables and evaluate impacts on aquatic resources inside and adjacent to areas subject to ABMTs 	
Business and	<ul style="list-style-type: none"> Contribute to 	<ul style="list-style-type: none"> Identify adaptation and 	<ul style="list-style-type: none"> Achieve low-carbon 	<ul style="list-style-type: none"> Fully comply with

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Service Providers	<p>generation of data needed for improved climate models and climate-adaptive resource management</p> <ul style="list-style-type: none"> Commit to source materials (e.g., seafood, minerals) from ABNJ only if providers commit to full transparency and traceability 	<p>mitigation measures (incl. NbS and early action) related to ABNJ to climate proof aquatic food value chains (→ MP Resilience Pathways)</p> <ul style="list-style-type: none"> Develop business-academic partnerships that promote ocean observing and data collection that informs climate models and ecosystem modelling under climate change, and develop a UN Decade Community of Practice focused on this 	<p>sustainable businesses and services generated from ABNJ</p>	<p>climate-related regulations on conservation and sustainable use of ocean</p>
Civil society	<ul style="list-style-type: none"> Improve climate literacy on ABNJ, including understanding of climate impacts and ABNJ roles in climate solutions 	<ul style="list-style-type: none"> Promote citizen science programmes to provide input to agro-climatic and disaster risk information systems for ABNJ (→ MP Resilience Pathways) Ensure transparency for ABNJ activities affecting the carbon cycle and climate, and develop mechanisms for civil society to have input in decision making 	<ul style="list-style-type: none"> Disseminate good practices of EIAs in ABNJ Break silos and strengthen dialogues involving all stakeholders across different sectors (→ MP Land Use Pathways) (→ MP Water Pathways) (→ MP Resilience Pathways) 	

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Full descriptions of milestones between 2021 and 2040

Policy makers (national, subnational, local levels):

By 2021

- Ensure climate change is addressed in ongoing BBNJ negotiations: Make sure that climate change is addressed in the ongoing negotiations of the International Legally Binding Instrument (ILBI) on Biodiversity Beyond National Jurisdiction (BBNJ) under the United Nations Convention on the Law of the Sea (UNCLOS)
- Address climate change in identification and designation of MPAs or other ABMTs in ABNJ: Take into account and address climate change impacts in the identification and designation of marine protected areas (MPA) or other area-based management tools (ABMT) in areas beyond national jurisdiction (ABNJ)
- Align and reconcile the objectives and application of different ABMTs applied to ABNJ (e.g., VME, APEI, PSSA, MPA) across agencies, incorporating the concepts of climate refugia and changing habitat suitability: Increase alignment and reconciliation of the objectives and application of different area-based management tools (ABMT) applied to areas beyond national jurisdiction (ABNJ) across agencies, incorporating the concepts of climate refugia and changing habitat suitability. These ABMTs include vulnerable marine ecosystem (VME), areas of particular environmental interest (APEI), particularly sensitive sea area (PSSA), and marine protected areas (MPA)
- Promote climate-related good practices among RFMO/As: Promote good practices on climate change adaptation and mitigation and lessons learnt from fisheries management practices among Regional Fisheries Management Organizations/Arrangements (RFMO/A)
- Include climate considerations when assessing cumulative impacts of multiple stressors on the ABNJ: Integrate climate considerations in assessing cumulative impacts of multiple stressors on the areas beyond national jurisdiction (ABNJ) and also in subsequent recommendations, including reducing the number of impact sources and the combination of impacts to alleviate detrimental threats to the marine biological diversity such as marine corridors

By 2025

- Mainstream climate change in the identification, designation, and implementation of MPAs or other ABMTs in ABNJ: Continue to support a mechanism to mainstream climate change considerations in the identification, designation, and implementation of marine protected areas (MPA) or other area-based management tools (ABMT) in areas beyond national jurisdiction (ABNJ)
- Promote climate-adaptive fisheries management in ABNJ (incl. highly migratory species, straddling stocks and high seas fish stocks): Implement climate-adaptive science-based management plans including for highly migratory species, straddling stocks and high seas fish stocks, while effectively regulating harvesting and ending overfishing, illegal, unreported and unregulated (IUU) fishing and destructive fishing practices in areas beyond national jurisdiction (ABNJ) (→ [SDG target 14.4](#))
- Identify, assess and prioritize adaptation and mitigation measures (incl. NbS and early action) in ABNJ: Identify adaptation and mitigation measures (including nature-based solutions and early action) for areas beyond national jurisdiction (ABNJ), assess resources needed and timeframe, and prioritize key measures for implementation (→ [MP Resilience Pathways](#))

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- Develop observation and information systems to increase and manage knowledge on climate risks, vulnerability and impacts in ABNJ: Develop sound agro-climatic and disaster risk observation and information systems that manage and increase knowledge on climate-related risks, vulnerability and impacts on aquatic food systems in areas beyond national jurisdiction (ABNJ), to improve information on climate change impacts on fisheries and fishing resources regarding highly migratory species, straddling stocks and high seas fish stocks, and aid the evaluation of the performance of the UN Fish Stock Agreement (FSA) (→ [MP Resilience Pathways](#))
- Work within the UN Decade for Ocean Science to prioritize ocean observations/ monitoring and modelling that identify carbon stocks, fluxes and sinks, improve climate models, and inform RFMO decision making: Work within the framework of the UN Decade for Ocean Science to prioritize ocean observations/ monitoring and modelling (e.g. seafloor mapping, climate change variables, fish distributions), contributing to identifying carbon stocks, fluxes and sinks, improving climate models, and informing decision making of Regional Fisheries Management Organizations (RFMOs)
- Adopt ecosystem-based management practices that conserve carbon reservoirs and sinks, and reduce the carbon footprint of fishing: Support ecosystem-based management practices that contribute to conservation of carbon reservoirs/ sinks and reduced carbon footprint of fishing
- Expand blue carbon concepts to embrace, conserve and manage the ABNJ carbon stocks, including fish carbon: Broaden the scope of blue carbon concepts to embrace, conserve and manage the carbon stocks, including fish carbon, in areas beyond national jurisdiction (ABNJ)

By 2030

- Ensure MPAs or other ABMTs in ABNJ contributing to the “30 by 30” target are climate-proofed: Ensure that marine protected areas (MPA) or other area-based management tools (ABMT) in areas beyond national jurisdiction (ABNJ) contributing to the achievement of the 30% of the ocean conserved and managed by 2030 are identified, designated, and implemented taking into account of climate change considerations, and that the number of climate-proofed MPAs or other ABMTs has increased significantly and are under adequate management that can significantly contribute to a global ocean whose marine biological diversity in BBNJ are conserved
- Achieve societal goals outlined in the implementation plan of the UN Decade of Ocean Science: Contribute to the achievement of societal goals as outlined in the Implementation plan of the UN Decade of Ocean Science for Sustainable Development, via increased ocean observation and research co-designed with all stakeholders meeting ecological and economical needs, addressing the impacts of climate change such as ocean warming, deoxygenation and ocean acidification
- Promote good practices of EIAs in ABNJ, and ensure EIAs incorporate climate change in ABNJ baseline and risk assessments: Promote good practices based on lessons learnt from environmental impact assessments (EIA) that have been carried out on the ground in areas beyond national jurisdiction (ABNJ), and ensure EIAs incorporate climate change in ABNJ baseline and risk assessments
- Increase implementation of climate action (incl. NbS and early action) to reduce stressors and sustain natural resources in ABNJ: Continue to support and increase implementation of climate action (including nature-based solutions and early action) to reduce stressors and their adverse impacts (including ocean deoxygenation, warming and acidification resulting from increased greenhouse gas emissions) and sustain natural resources in areas beyond national jurisdiction (ABNJ) (→ [MP Resilience Pathways](#))
- Increase cooperation on climate change issues among sectorial organizations: Enhance cooperation among sectorial organizations to adequately include climate change considerations in management of resource exploitation and the use of areas beyond national jurisdiction (ABNJ), including International Seabed Authority (ISA), Food and Agriculture Organization of the United Nations (FAO), International Maritime Organization (IMO), Regional Fisheries Management Organizations/Arrangements (RFMO/A) etc.

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- Create a formal, coherent governance mechanism for climate in ABNJ so that carbon footprints and climate consequences of all activities are addressed: Establish a formal, coherent governance mechanism for climate change matters in areas beyond national jurisdiction (ABNJ) to ensure that carbon footprints and climate consequences of all activities are addressed
- Consider developing a voluntary commitment mechanism for ABNJ, co-designed by ISA, FAO, IMO, and other organizations with relevant mandates: Consider the development of a voluntary commitment mechanism based on principles of Nationally Determined Contributions (NDC) for areas beyond national jurisdiction (ABNJ), co-designed by International Seabed Authority (ISA), Food and Agriculture Organization of the United Nations (FAO), International Maritime Organization (IMO), and other organizations with relevant mandates

By 2040

- Fully implement good practices of EIAs in ABNJ: Achieve full implementation of good practices of environmental impact assessments (EIA), and ensure that EIAs have become the norm and are triggered at appropriate times as well as undertaken in thorough yet efficient ways that ensure the polluter pays principle is invoked when applicable
- Effectively enforce climate-related regulations on conservation and sustainable use of ocean through an integrated governance structure: Achieve effective enforcement of climate-related regulations on conservation and sustainable use of ocean through an integrated governance structure, ensuring that activities in direct conflict with the conservation and sustainable use of the ocean are not permitted to occur

Financial institutions:

By 2021

- Identify opportunities to improve financing mechanisms for climate-proofed MPAs or other ABMTs: Carry out substantive discussions to identify opportunities of improving financing mechanisms to support the integration of climate change considerations into the designation and implementation of marine protected areas (MPA) or other area-based management tools (ABMT) in areas beyond national jurisdiction (ABNJ)

By 2025

- Strengthen financing mechanisms for climate-proofed MPAs or other ABMTs: Reach agreement and establish new or strengthen existing financing mechanisms for mainstreaming climate change consideration in the designation and implementation of marine protected areas (MPA) or other area-based management tools (ABMT) in areas beyond national jurisdiction (ABNJ), with a built-in system that ensures the mechanism concerned is fair and equitable

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By 2030

- Achieve sufficient finance for climate-proofed MPAs or other ABMTs: Ensure that there is adequate finance in place for the designation and implementation of marine protected areas (MPA) or other area-based management tools (ABMT) in areas beyond national jurisdiction (ABNJ) that account for climate change impacts on aquatic food systems

Technology providers and innovators:

By 2025

- Develop cutting-edge technologies to improve climate data in ABNJ, including climate variables that influence fish distributions: Support the development of cutting-edge technologies to visualize, track and share near real-time data about climate variables that influence fish distributions in areas beyond national jurisdiction (ABNJ)

By 2030

- Innovate technologies to monitor climate variables and evaluate impacts on aquatic resources inside and adjacent to areas subject to ABMTs: Develop innovative technologies to monitor climate variables and evaluate climate change impacts on aquatic resources inside and adjacent to areas that are subject to area-based management tools

Business and service providers:

By 2021

- Contribute to generation of data needed for improved climate models and climate-adaptive resource management: Support the generation of data needed for improved climate models and climate-adaptive resource management, and work within the framework of the UN Decade for Ocean Science
- Commit to source materials (e.g., seafood, minerals) from ABNJ only if providers commit to full transparency and traceability: Commit to source materials (e.g., seafood, minerals) from areas beyond national jurisdiction (ABNJ) only from providers who commit to full transparency and traceability

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By 2025

- Identify adaptation and mitigation measures (incl. NbS and early action) related to ABNJ to climate proof aquatic food value chains: Identify and adopt adaptation and mitigation measures (incl. nature-based solutions and early action) related to areas beyond national jurisdiction (ABNJ) that contribute to climate-proofed aquatic food value chains (→ [MP Resilience Pathways](#))
- Develop business-academic partnerships that promote ocean observing and data collection that informs climate models and ecosystem modelling under climate change, and develop a UN Decade Community of Practice focused on this: Promote and strengthen business-academic partnerships that contribute to ocean observing and data collection, which informs climate models and ecosystem modelling under climate change, and develop a UN Decade Community of Practice focused on this

By 2030

- Achieve low-carbon sustainable businesses and services generated from ABNJ: Business engaged in areas beyond national jurisdiction (ABNJ) as well as the services provided by those businesses minimize their carbon footprint while actively contributing to the conservation and sustainable use of the ocean in such a way that ensures low carbon emissions and thriving biodiversity of the ocean alongside the development of ocean economy

By 2040

- Fully comply with climate-related regulations on conservation and sustainable use of ocean: Businesses and services fully comply with climate-related regulations on conservation and sustainable use of ocean

Civil society:

By 2021

- Improve climate literacy on ABNJ, including understanding of climate impacts and ABNJ roles in climate solutions: Advocate for the improvement of climate literacy concerning areas beyond national jurisdiction (ABNJ) across different stakeholders at all levels, including: building awareness and driving momentum that contributes to increased scientific research and monitoring; building support for the proper identification and designation of climate-proofed marine protected areas (MPA) or other area-based management tools (ABMT) in ABNJ resulting in increased public-private support for climate-proofed MPAs on the high seas and also resulting in increased funding for climate-proofed MPA or other ABMTs and proper holistic ocean governance; and continuing to advocate strongly for continued monitoring & evaluation (M&E), robust environmental impact assessments (EIA) and research, the recommendations of which are adopted including the implementation of iterative approaches when necessary

By 2025

* unedited version

- Promote citizen science programmes to provide input to agro-climatic and disaster risk information systems for ABNJ: Promote and increase support for citizen science programmes that contribute to agro-climatic and disaster risk information systems for areas beyond national jurisdiction (ABNJ) (→ [MP Resilience Pathways](#))
- Ensure transparency for ABNJ activities affecting the carbon cycle and climate, and develop mechanisms for civil society to have input in decision making: Increase transparency for ABNJ activities affecting the carbon cycle and climate, and develop mechanisms for civil society to participate in and contribute to decision making

By 2030

- Disseminate good practices of EIAs in ABNJ: Disseminate and promote increased adoption and implementation of “good practices” of environmental impact assessments (EIA) in areas beyond national jurisdiction (ABNJ)
- Break silos and strengthen dialogues involving all stakeholders across different sectors: Increase dialogues involving all stakeholders across different sectors to discuss matters such as the sustainable use and conservation of aquatic ecosystems and their natural resources in the face of climate change (→ [MP Land Use Pathways](#)) (→ [MP Water Pathways](#)) (→ [MP Resilience Pathways](#))

EXISTING INITIATIVES

<p>Adaptation of West African Coastal Areas (WACA)</p>	<p>Reduce coastal erosion hotspots by 30% by 2020 and by 70% by 2025 and protect 30% of the population in priority flooding areas by 2020 and 70% by 2025 in West African coastal regions</p>
<p>Too Big To Ignore</p>	<p>A global research network and knowledge mobilization partnership that focuses on addressing issues and concerns affecting viability and sustainability of small-scale fishers</p>
<p>Food and Agriculture Organization of the United Nations (FAO)</p>	<p>FAO is mandated to support sustainable aquatic food production in the face of climate change. FAO is the UN agency in charge of ending hunger and poverty, with responsibility to support the sustainable use of resources from open ocean, coastal ecosystems, and inland systems for global food and nutrition security and for socio-economic development. FAO implements a range of activities aimed at supporting Member Countries and partners to effectively mitigate and adapt to the impacts of climate change. These include a comprehensive review of the impacts of climate change on fisheries and aquaculture and guidance on mitigation and adaptation released in 2018, as well as a number of field programmes and projects implemented in collaboration with governments and with the full involvement of local communities in more than 30 countries. FAO also combines disaster risk reduction and management (including emergency preparedness and response) and climate change adaptation approaches to develop a suite of actions that aim to build the resilience of the fishery and aquaculture sector to climate and non-climate risks and impacts.</p>
<p>Friends of Ocean Action</p>	<p>Friends of Ocean Action is a coalition of over 65 ocean leaders who are fast-tracking solutions to the most pressing challenges facing the ocean. Its members – the Friends – come from business, civil society, international organizations, science and technology. On aquatic foods the coalition is working on: Eliminate harmful fisheries subsidies through work to ensure a binding global agreement via WTO negotiations; Bring aquatic foods into the heart of policy dialogues on the future of food; Combat illegal, unreported and unregulated (IUU) fishing through the effective implementation of port state measures across the Pacific, based on the principles of the FAO Port State Measures Agreement; Improve transparency, environmental sustainability, and social responsibility in seafood supply chains through the 2025 Pledge towards Sustainable Tuna</p>
<p>High Level Panel for Sustainable Ocean Economy</p>	<p>1) investing in nature-based solutions by restoring, protecting and managing coastal and marine ecosystems; 2) harnessing ocean-based renewable energy by scaling-up offshore and ocean-based renewable energy; 3) decarbonizing ocean industries and increasing investments in solutions to decarbonize shipping and marine transport, port infrastructure and operations, fisheries, aquaculture and tourism; and 4) advance the deployment of carbon capture and storage.</p>
<p>WorldFish</p>	<p>The WorldFish mission is to strengthen livelihoods and enhance food and nutrition security by improving fisheries and aquaculture. It pursues this through research partnerships focused on helping those who stand to benefit the most—poor producers and consumers, women and children</p>

* unedited version

<p>World Trade Organization</p>	<p>Sustainable development and protection and preservation of the environment are fundamental goals of the WTO. The WTO contributes to the protection and preservation of the environment through its objective of ensuring sustainable development and avoiding protectionism, through its rules and enforcement mechanism, and through work in different WTO bodies.</p>
<p>Ocean Risk and Resilience Action Alliance (ORRAA)</p>	<p>ORRAA aims to: 1) build risk-adjusted innovative and scalable products that change the risk perceptions of investing in coastal natural capital; 2) accelerate research to better understand, analyze, predict, model and manage ocean risk; and 3) advance the global narrative on ocean risk and building coastal resilience by 2023.</p> <p>ORRAA will grow through a 3- phased approach:</p> <ol style="list-style-type: none"> 1) Identify and fund development of finance products with pilot projects (2020 – 2021). 2) Assess and evaluate progress; increase breadth of products and projects across geographies. Scale funding (2021-2023). 3) Proven products and projects replicated and scaled to deliver catalytic change (2023).
<p>Rise up</p>	<p>The RISE UP Blue Call to Action is a joint call by civil society, fisherfolk, Indigenous peoples and philanthropic organisations to governments and corporations to join us and agree to bold action to safeguard the ocean. One of the goals is to “restore ocean life” by (i) sustainably manage the world’s fisheries and safeguard the livelihoods they support; (ii) stop overfishing and destructive fishing; and (iii) protect and restore threatened and endangered species, habitats and ecological functions.</p>
<p>The Ocean Forum by the United Nations Conference on Trade and Development UNCTAD</p>	<p>The forum, organized by UNCTAD, FAO and UNEP, looks at trade-related fisheries targets in the 2030 Agenda for Sustainable Development. UNCTAD is supporting developing countries to identify the opportunities and challenges that the oceans economy can bring. It supports countries in creating policies that promote the development and emergence of sustainable oceans economic sectors, including fisheries</p>
<p>Seabos</p>	<p>SeabOS is a unique collaboration between scientists and leading seafood companies across the wild capture, aquaculture and feed production sectors, seeking to lead a global transformation towards sustainable seafood production and a healthy ocean.</p>
<p>UN Global Compact</p>	<p>The UN Global Compact is mobilizing aquaculture and fisheries companies, scientists and UN experts to guide seafood business in meeting the net-zero target and identify key actions seafood companies can take to adapt to a changing climate and for more resilient communities</p>

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SHIPPING CHANGE LEVERS

In shipping, the lack of regulation and growing demand from customers as well as a fragmented industry, excess capacity and short investment horizons have led to the industry showing limited progress in decarbonization so far. There is growing evidence that green ammonia produced from green hydrogen is the most feasible candidate for deep-sea shipping. However, the industry has yet to reach consensus on the decarbonization pathway, and zero-carbon vessel technology is still in early stages of development.

By 2030, the industry should aim to achieve 5 per cent of propulsion energy from zero-carbon fuels for international shipping through a combination of container routes, niche vessel types (e.g. green ammonia and liquefied petroleum gas tankers) and niche routes (e.g. to Australia and Japan, which both plan for significant green ammonia production). For domestic shipping, the target should be 15 per cent, which can be reached by 32 developed nations (which account for 50 per cent of domestic emissions), thus achieving 30 per cent decarbonization. This level of zero-carbon fuel penetration is deemed to be the tipping point required to enable rapid adoption in the following years. A critical step on this path is to have industrial-scale zero-carbon ship demonstration projects implemented by 2025, with each project consisting of at least two ports with the necessary bunkering and refueling infrastructure and at least one zero-carbon vessel in operation between the ports.

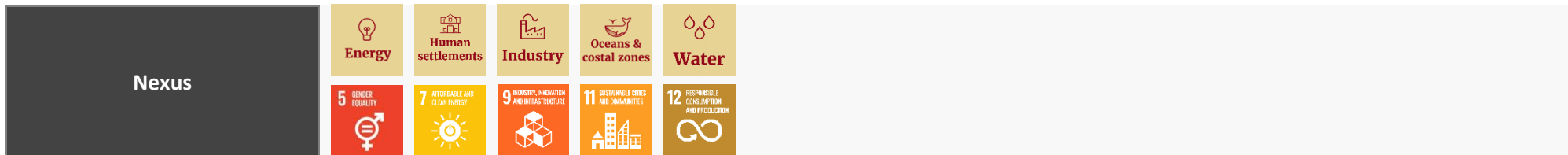
Further to transitioning to zero-emission energy, the shipping sector **must assess, reduce and avoid its negative impacts on marine biodiversity**. Shipping can have a direct impact on marine biodiversity as it can be a vector for non-indigenous and potentially invasive marine species, be a source of pollutants and noise, and collide with marine life and habitats.

More detailed information about shipping change levers to achieve zero-carbon shipping can be found in the [Transport Action Table](#) (p. 45).

Impact
3a

ZERO CARBON SHIPPING

ADAPTATION/
RESILIENCE



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	<ul style="list-style-type: none"> Step up support for research and roll out demonstration projects for low-carbon fuels. Facilitate smoother maritime supply chains to reduce idling times through cooperation in the supply chain. Tighten the Efficiency Design Index (EEDI) and start working to make sure that it accounts for well to wheel emissions rather than just tank-to-wheel. Start developing sustainability criteria for low-carbon shipping fuels. Encourage ports to increase the availability of alternative energy supplies for shipping and port activities. 	<ul style="list-style-type: none"> Increase enforcement and stringency of mandatory operational goal-based measures with carbon intensity targets at the ship level. Develop a concrete proposal at the IMO to adopt market-based measures in the form of a carbon levy, an emissions trading scheme, a low-carbon fuel standard or a hybrid form. Redesign the Energy Efficiency Design Index (EEDI) formula to ensure that vessel design is optimized for minimized fuel consumption in real operation at sea and it does not contain a positive bias for fuels with low-carbon intensity only on a tank-to-wake basis (by 2023). 	<ul style="list-style-type: none"> Introduce an international carbon price to the order of USD 50-100/ton CO₂ to generate sufficient uptake of alternative fuels or renewable energy sources. Introduce blending mandates. Develop an International CO₂ Fund for shipping, with proceeds directed to further development of zero-carbon solutions. Fast-track regulations to allow safe and efficient bunkering of alternative low-carbon and zero-carbon fuels at main ports. Adopt environmental requirements for procurement of public services and electrify public ferry routes where technically feasible. 	<ul style="list-style-type: none"> Allow safe and efficient bunkering of zero-carbon fuels at all ports. Develop trade agreements based on environmentally led paradigms and specifically address GHG impacts.

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	<ul style="list-style-type: none"> • Include carbon targets in port terminal concessions. • Develop data and methods for assessing impacts on states (necessary to operationalize CDDRRC). • Develop policy mechanisms that can address impacts on states (necessary to operationalize CDDRRC). • Include shipping into regional policy packages (including EU ETS), with no/limited grandfathering, and revenues raised reinvested back into the sector's decarbonization. • Develop policies for enhanced mandatory operational goal-based regulation on carbon intensity of ships calling at regional ports. • Ten national governments with action plans to decarbonize shipping including national incentives (Sweden, Norway, Denmark, UK and Netherlands have published by 2020). • Align shipping activities more closely with other transport modes. 	<ul style="list-style-type: none"> • Adopt policy measures to go beyond Ship Energy Efficiency Management Plan (SEEMP) to incentivize the maximization of operational efficiency of new and existing ships, by formulating carbon intensity targets per ship (by 2023). • Adopt measures to reduce all GHG emissions of shipping, on a well to wake basis (e.g. methane, instead of only CO₂) and accounting for sustainability criteria. Adopt carbon intensity indicators, which factor in well-to-tank emissions (by 2023). • Commit to the timetable for shipping's transition to low- and zero-carbon fuels. • Guarantee shore power supply at main ports from renewable sources. • Promote modal shift from road to rail or water, and from air to rail and water, depending on commodity type. • Forty national governments with action plans to decarbonize shipping including national incentives. • Roll out environmentally differentiated port pricing factoring in both air pollutants & GHG emissions. • Government committed support for system demonstration projects (USD 2-4 billion). • EU Emissions Trading System for shipping operational. 	<ul style="list-style-type: none"> • Ensure all direct and indirect subsidies for maritime transport are made conditional to environmental outcomes and phase out fossil fuel subsidies and tax breaks. • Support ship speed optimization and of port calls including removal of barriers to large-scale uptake of just-in-time arrival of ships. • Thirty-two developed nations use zero-emission fuels/electrification for 30 per cent of propulsion energy for domestic shipping (corresponds to 3 per cent of total shipping emissions). • High-and middle-income countries step up support to low-income countries, such as small island developing states, to decarbonize maritime transport, including compensating aid for carbon pricing effects on trade. 	

* unedited version



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Financial Institutions	<ul style="list-style-type: none"> • Leverage the framework provided by the Poseidon Principles to scale up responsible Paris compliant financing in the maritime sector. • Package investment in new green tech in a manner that meets institutional investment criteria with regard to investment fund structure diversification. • Engage sovereign-backed or supranational investors (e.g. BBB, IFC) to provide capital to seed investment for e.g. new Green Tech and encourage investment from other external sources. 	<ul style="list-style-type: none"> • Tighten the ambition of instruments aiming to steer investment in the shipping sector towards assets that are compatible with the Paris agreement and the IMO GHG emission reduction strategy. • Redirect investments towards more energy efficient ships and infrastructure in ports (e.g. shore power facilities and bunkering facilities for lower carbon energy supplies). • Improve transparency in ship financing process and increase adoption of Environmental, Social and Governance (ESG) standards by ship owners and charterers. • Develop framework for risk-sharing for investments in new ships and retrofits between institutional investors, lenders, ship owners, governments and charterers. • Structure investments in zero-emission vessels with a guaranteed return over a longer period, e.g. with some form of residual value risk capping, government-related guarantees etc. • Incorporate the concept of stranded carbon assets into shipping finance. • Banks phase out investments in fossil fuel assets. 	<ul style="list-style-type: none"> • Steer investment in the shipping sector towards assets that are compatible with the Paris agreement and the IMO GHG emission reduction strategy. • Total committed/ realized investment of ~USD 390 billion (20 per cent of USD 1.9 trillion needed by 2050 to succeed in reaching 20 per cent zero-emission fuels by 2035). 	<ul style="list-style-type: none"> • Total committed/realized investment of ~USD 1.6 trillion (85 per cent of USD 1.9 trillion need by 2050 to succeed in reaching 85 per cent zero-emission fuels by 2045).

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Financial Institutions		<ul style="list-style-type: none"> • Industry and finance committed support for system demonstration projects (USD 3-6 billion). • Total committed investment of ~USD 80 billion. 		
Technology Providers and Innovators	<ul style="list-style-type: none"> • Ensure continuous research on ship design, including hull forms and propulsion, with a focus on reducing energy usage per freight unit transported. • Increase focus on utilization of wind, waves, ocean currents, and sun to reduce use of externally provided energy, i.e., both the carbon and non-carbon-based fuels carried on board. • Conduct research and development for new shipping technologies and fuels including: electric/hybrid powertrains, wind power, and powertrains using ammonia, hydrogen or sustainable biofuels. • Commitment for industry, finance and governments for at least 10 large scale, cross-industry demonstration projects. • Continued investment and development of zero-emission fuel production. • Scaling up and expansion of low-carbon hydrogen production in existing applications (e.g. fertilizers) leading to reduction in electrolysis costs. 	<ul style="list-style-type: none"> • Complete demonstration of new powertrain technologies and fuels, e.g. ammonia engines for ships. • Safety approval processes for low-carbon fuels are in process at IMO covering both storage and handling as well as in internal combustion engines and fuel cells. • Accelerate IGF code expansion for low and zero-carbon fuels. • Scale up adoption of wind assistance and energy efficiency technologies. • Develop more advanced weather routing systems to better utilize wind, waves, ocean currents, and tides to reduce the use of both carbon and non-carbon fuel carried on board. • Scale up production of zero-carbon fuels from renewables with target of achieving electrolysis costs at USD 2/kg of green hydrogen. • At least ten industrial-scale zero-carbon ship demonstrations projects in the water. Each project consisting of at least two ports with bunkering and refueling infrastructure, fuel production and at least one zero-carbon vessel. 	<ul style="list-style-type: none"> • Additional scale up of zero-carbon fuels from renewables with target of reaching electrolysis costs of USD 1/kg of green hydrogen and zero-emission fuel availability 0.90 EJ (corresponding to 7 per cent of UMAS projection of total shipping energy need of 12.9 EJ in 2030. Targets for domestic and international shipping add up to 7 per cent of total emissions). • 5 per cent of propulsion energy coming from zero-emission fuels for international shipping through a combination of container routes, niche vessel types, e.g. green ammonia and LPG tankers, and niche routes, e.g. to Japan and to Australia who both plan for significant green ammonia production. (corresponds to 4 per cent of total shipping emissions). 	<ul style="list-style-type: none"> • Total ~80 per cent zero-emission shipping.

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Business and Service Providers	<ul style="list-style-type: none"> • Twenty shipping actors committed to zero emissions by 2050 (4 in 2020: Maersk, CMB, CMA CGM and Port of Rotterdam). • Top 20 container, bunker and tanker freight purchasers commit to supporting transition to zero-emission fuels by committing to participate in industry demonstrations and to pay a premium for zero-emission fuels. • Shipping companies increase the use of slow steaming to reduce emissions. • Shipping companies commit to increasing efficiency of operations e.g. through optimal voyage planning, weather routing, optimized port operation and speed reduction or optimization, among other measures. The Ship Energy Efficiency Management Plan (SEEMP) adopted by the IMO can serve as guidance for shipping companies. • Targeted actions on improving working conditions for women, among shipping companies to increase share of women in global maritime workforce. 	<ul style="list-style-type: none"> • Top one hundred shipping owners/operators by tonnage, committed to zero emissions by 2050. • Freight customers push decarbonization of the transport chain. • Top twenty container, bulk and tanker freight purchasers actively participating in demonstrations and paying premium for zero-emission fuel. • Top fifty container, bulk and tanker freight purchasers commercialize zero-emission shipping to end customers. • Shipping actors engage in voluntary schemes to share best practices, and to develop uniform tracking and accounting of fuel consumption and emissions and increases in efficiency. • Maritime transport actors engage in supply chain collaboration with the aim to create seamless maritime logistics chains. • Allow smooth data exchange and integration of ICT and planning systems of all stakeholders in the maritime supply chain, e.g. including Internet of Things (IoT) or Blockchain, single logistic windows and integrated data platforms. • Charterers and freight customers demand more energy efficient ships & agree on incentives with ship owners. 	<ul style="list-style-type: none"> • Classification societies actively push and develop standards for zero-emission ships, individual technologies and fuels in cooperation with regulators and companies. 	

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
		<ul style="list-style-type: none"> Shipping actors modernize charter contracts to reduce roadblocks to adopting energy efficient ships. 		
Civil society	<ul style="list-style-type: none"> Key labor organizations (ITF and MFS) voice support for decarbonization. Increased safety requirements would require higher qualifications and training for crew which they would benefit from. NGOs and researchers publish research and policy advice detailing pathways to reach zero-carbon shipping by 2050. 	<ul style="list-style-type: none"> Civil society develops internationally recognized awards and certificates to acknowledge shipping actors' decarbonization progress, e.g. through voluntary eco-rating schemes of ships or accounting of emissions. 		

* unedited version

EXISTING INITIATIVES

ITF Decarbonising Transport Initiative	<p>The Decarbonising Transport Initiative promotes carbon-neutral mobility to help stop climate change. It provides decision makers with tools to select CO2 mitigation measures that deliver on their climate commitment.</p>
Getting to Zero Coalition	<p>Cross-industry initiative aiming to have zero-emission vessels in commercial operation by 2030.</p>
Poseidon Principles	<p>Initiative to get lenders to include climate considerations into lending decisions to promote decarbonization in line with IMO targets.</p>
Climate Bonds Initiative	<p>Set criteria by which bond-issuers financing green new builds and retrofits of ships can seek Climate Bond Certification.</p>
Sea Cargo Charter	<p>The Sea Cargo Charter provides a global framework for aligning chartering activities with responsible environmental behavior to promote international shipping's decarbonization.</p>
International PtX Hub Berlin	<p>Center for technological innovation, creativity, and political leadership located in Berlin that believes that PtX can help defossilise a range of industries as well as modes of transport such as planes and ships that cannot directly use renewable electricity.</p>
Mission Possible Partnership (MPP)	<p>The Mission Possible Partnership (MPP) is an alliance of climate leaders focused on supercharging efforts to decarbonize some of the world's highest emitting industries in the next 10 years. It builds on the foundation laid by the Mission Possible Platform, launched in 2019 by the Energy Transitions Commission and the World Economic Forum, by expanding and accelerating the work of seven nascent industry working groups in aluminum, aviation, cement and concrete, chemicals, shipping, steel, and trucking.</p>

* unedited version



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* unedited version



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Nexus

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	<ul style="list-style-type: none"> • Ensure relevant federal, state, and provincial governments responsible for the conservation of living marine resources (LMR) coordinate with appropriate agencies for maritime transport and marine spatial planning • Pursue conservation approaches that are responsive and flexible to address the changing climate and developments in the shipping sector • Ensure robust crisis management and incident response measures are in place, in the event that emergency situations should arise. • Shipping industry to continue its journey of becoming proficient in ballast water and sediment management practices that will ensure compliance with regulations. 	<ul style="list-style-type: none"> • Ensure relevant federal, state, and provincial governments responsible for the conservation of living marine resources (LMR) coordinate with appropriate agencies for maritime transport and marine spatial planning • Pursue conservation approaches that are responsive and flexible to address the changing climate and developments in the shipping sector • Encourage thorough environmental impact studies for port development & expansion works, particularly when these take over sensitive inshore habitats such as mudflats, seagrass meadows, and mangrove swamps. • Although not the biggest contributor to plastic pollution, sea based sources are still significant (particularly from 	<ul style="list-style-type: none"> • Ensure relevant federal, state, and provincial governments responsible for the conservation of living marine resources (LMR) coordinate with appropriate agencies for maritime transport and marine spatial planning • Pursue conservation approaches that are responsive and flexible to address the changing climate and developments in the shipping sector • Collaborate on circular economy policies to assist in the synchronicity of local legislation and development of clear, well-aligned mechanistic frameworks. 	

* unedited version



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	Encourage collaboration between industry, treatment system manufacturers and policymakers to encourage feedback on use of management systems (to support improvements) and streamline approval processes.	<p>fishing gear). Better understanding of distribution, abundance and impacts of lost fishing gear, and encouraging reporting of lost gear) can focus efforts in high risk areas. Exploring availability and adequacy of port reception facilities can also inform management strategies.</p> <ul style="list-style-type: none"> • Encourage implementation of an effective biofouling management plan, following the IMO 2011 Guidelines (currently under review) for the control and management of ships' biofouling. Suitable, environmentally acceptable antifoulings should be used as part of these management plans. 		
Financial Institutions		<ul style="list-style-type: none"> • Funding mechanisms, coordinated partnerships and engagement platforms to support recycling potential e.g. investment in storage infrastructure at ports. • Market based instruments and incentives to encourage high sustainability practices or development of new technologies. 		
Technology Providers and Innovators Technology	<ul style="list-style-type: none"> • Better modelling of changing marine mammal distributions with changing climate: • Certain species (e.g., those already vulnerable, ice-affiliated species, those already impacted by human activities, 	<ul style="list-style-type: none"> • Better modeling of changing marine mammal distributions with changing climate • Mitigate the risk of spills and leakages through detection and prevention monitoring and the use of best 	<ul style="list-style-type: none"> • Better modeling of changing marine mammal distributions with changing climate • Ship maintenance and recycling facilities should ensure transparent and environmentally responsible ship 	<ul style="list-style-type: none"> • Better modeling of changing marine mammal distributions with changing climate

* unedited version



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Providers and Innovators	<p>and those with limited ranges) would be expected to be impacted the most and should be closely watched.</p> <ul style="list-style-type: none"> Share best practices in ship design and maintenance, making adaptations to reduce risks of ship strikes (e.g. hull shape at forward end of the vessel). Developing marine mammal detection and monitoring tools (e.g. hydrophone networks) and mapping of ship traffic to inform measures to mitigate risks of ship strikes to avoid transiting ocean biodiversity sensitive areas. This would aim to minimize the risk of casualties or take additional protective measures when transiting migratory paths and breeding areas of cetaceans and marine mammals. Additional measures such as reducing speed, quietening measures, or re-routing shipping lanes can reduce the risk of marine mammals strikes and impacts from noise and vibration on mammal behaviours. 	<p>available technology that is regularly maintained and operated effectively. Promoting navigational safety and seafarer health and wellbeing contributes to reducing risks of collisions/oil spills.</p> <ul style="list-style-type: none"> Limit or avoid the potential effects of damaging biodiversity from legal discharges to marine sensitive or protected areas such as sewage, grey water and exhaust gas cleaning system discharges. 	<p>recycling policies and procedures are in place, adopting measures (consistent with any national and local laws and regulations) to ensure that pollutants are not released into the local environment</p>	
Business and Service Providers	<ul style="list-style-type: none"> Shipping sector to cooperate with agencies responsible for the conservation of living marine resources (LMR) Guidelines adopted by IMO recommend that "all shipowners and operators should minimize taking on board material that could become garbage". Shipping companies should consider means to reduce single-use plastics in operations such as using 		<ul style="list-style-type: none"> Ship maintenance and recycling facilities should ensure transparent and environmentally responsible ship recycling policies and procedures are in place, adopting measures (consistent with any national and local laws and regulations) to ensure that pollutants are not released into the local environment 	

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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Business and Service Providers	<p>supplies that come in recyclable packaging, avoiding disposable utensils etc.</p> <ul style="list-style-type: none"> Educational outreach programmes and ocean literacy initiatives to raise environmental awareness (e.g. to promote UN Sustainable Ocean Principles.) 			
Civil society		<ul style="list-style-type: none"> Liaise with civil society to promote holistic approaches to environmental management and consider complementary actions and not just address impacts individually. Improved education throughout the marine sector on plastics pollution and its impacts on the environment throughout the marine sector. Promote circular economy strategies. 		

* unedited version

EXISTING INITIATIVES

<p>High Level Panel for Sustainable Ocean Economy</p>	<p>1) investing in nature-based solutions by restoring, protecting and managing coastal and marine ecosystems; 2) harnessing ocean-based renewable energy by scaling-up offshore and ocean-based renewable energy; 3) decarbonizing ocean industries and increasing investments in solutions to decarbonize shipping and marine transport, port infrastructure and operations, fisheries, aquaculture and tourism; and 4) advance the deployment of carbon capture and storage.</p>
<p>Ocean Forum by UNCTAD</p>	<p>The Oceans Forum is a unique global platform to take stock, exchange experiences and present options for the implementation of trade-related targets of SDG 14 (Targets 4, 6, 7 and b) through the involvement of leading United Nations Agencies, regional bodies, government institutions and civil society organizations. This includes transport, for example fishing vessels.</p>
<p>UN Global Compact</p>	<p>The UN Global Compact is working on decarbonizing shipping, key in reaching the Global Goals through increasing sustainable global trade. It has 2 main objectives: drive systemic change for the industry to align with the Paris Agreement and 1.5 and that this alignment with 1.5c is inclusive and just, created through a legislative level playing field and market-based mechanisms</p>

FURTHER REFERENCES

<p>IRENA (2019). Navigating the way to a renewable future: Solutions to decarbonise shipping.</p>	<p>IMO - International Maritime Organization (2020). Energy Efficiency Design Index (EEDI) - rational, safe and effective.</p>
<p>IRENA (2019). Hydrogen: A renewable energy perspective.</p>	<p>UMAS - University Maritime Advisory Services (2020). Aggregate investment for the decarbonisation of the shipping industry.</p>
<p>Practical Guidance for the UN Global Compact Sustainable Ocean Principles - Shipping</p>	<p>https://www.unglobalcompact.org/take-action/practical-guidances-for-the-un-global-compact-sustainable-ocean-principles</p>

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OCEAN RENEWABLE ENERGY CHANGE LEVERS

Many technologies are currently being assessed for their ability **to harvest renewable energy from the ocean**. As of today, **bottom-fixed offshore wind** represents the largest part of the renewable energy production from the Ocean, with 35.3 gigawatts (GW) of installed capacity as of 2020,¹⁰ due to its mature technology, scalability and rapid cost reduction over the last decade. Floating offshore wind is expected to reach widescale commercialization closer to 2030. In addition, technologies to extract energy from waves and tides are progressing. Energy within the ocean can also be extracted from salinity and temperature gradients. Lastly, floating solar photovoltaic systems are beginning to emerge in marine environments.

More research is required to predict the future contribution of close-to-shore offshore wind sites to the global energy production, as numbers differ depending on the estimation approach. For example, the World Bank Group reports over 71,000 GW of offshore wind potential globally using current technology,¹¹ while the International Energy Agency (IEA) estimates that offshore wind could generate 18 times the world's current electricity demand.¹² The Ocean Renewable Energy Action Coalition (OREAC) envisioned that 1,400 GW of offshore wind is possible by 2050.¹³

In any case, the **potential of offshore wind is high**. This potential is supported by positive market conditions; over the past decade, cost per megawatt-hour (MWh) of installed capacity has fallen and the capacity factors (ratio between realized energy output and theoretical maximum output) for new installations are stronger than any other renewable energy,¹⁴ especially in the floating sector. In addition, increased offshore wind targets in Europe, the United States of America and key markets in Asia such as Japan and the Republic of Korea are also triggering new scales of development. The expected commercialization and industrialization of floating wind in this decade can also accelerate the global energy transition.

During the energy transition, offshore wind represents a **business opportunity for a series of actors**. In particular, oil and gas companies, while shifting their portfolio to renewable energy, can use their expertise and knowledge for large-scale marine engineering and fabrication of offshore energy infrastructure. Under enabling policy conditions, offshore wind is also expected to play a key role in powering the production of green hydrogen.¹⁵

¹⁰ GWEC – Global Wind Report 2021.

¹¹ <https://datacatalog.worldbank.org/dataset/global-offshore-wind-technical-potential>.

¹² <https://www.iea.org/reports/offshore-wind-outlook-2019>.

¹³ OREAC – The power of our Ocean – December 2020.

¹⁴ <https://www.iea.org/data-and-statistics/charts/average-annual-capacity-factors-by-technology-2018>.

¹⁵ International Energy Agency (IEA), Net Zero by 2050 A Roadmap for the Global Energy Sector, 2021.

In the process of scaling up ocean energy production, especially to deeper waters and new sites, all **actors must consider their impacts on marine ecosystems**, such as noise pollution, heat production and other effects on the marine environment. Rigorous, proactive and concerted MSP and environmental impact assessments will be needed when establishing offshore infrastructure to minimize impacts on sensitive habitats, species and ecological processes and to ensure it is compatible with other ocean activities.

The potential is immense, but **governments must provide the enabling environment** to realize the development of offshore wind. This includes actions such as: developing the appropriate national vision, policy and legislation to procure and legislate ocean-based renewable energy; mapping and allocating sites for offshore wind development; and convening rigorous MSP and stakeholder consultation processes. As a broader step, governments can ensure that national targets and strategies (including NDCs) target specific increases of the share of ocean-based renewable energy in the national energy mix.

Governments should also consider various approaches for the **sustainable multi-use of sea space areas and infrastructures**, supported by ocean science and observation. New developments could combine two or more activities in windfarm areas such as seafood production, tourism, environmental restoration and facilitation of transit routes of smaller vessels. Multi-use infrastructures for renewable energy production and desalination combined with floating refueling stations are current pioneering technologies in the energy transition.¹⁶

The new value chain of offshore renewable energy will require enhanced cooperation between governments, science and industries as well as cross-industry collaboration in the short- to medium-term on the way towards a net-zero 2050.

¹⁶ https://www.h2020united.eu/images/Webinar_Reports/UNITED-2020-06-03-Webinar_PRESENTATION_MUSICA_project_DALTON.pdf.

* unedited version

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OCEAN RENEWABLE ENERGIES

ERGY



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	<ul style="list-style-type: none"> • Increase recognition of offshore wind in coastal states' NDCs • Develop strategic national roadmaps for zero-carbon economy in 2050 which include integration of large shares of ocean-based renewable energy; • Develop integrated ocean planning and allocate space for offshore wind • Build international cooperation to support developing economies and islands • Strengthen resource capacity in regulatory institutions 	<ul style="list-style-type: none"> • Develop national targets to increase the share of ocean-based renewable energy in the national energy mix • Develop integrated ocean planning and allocate space for offshore wind • Build marine spatial knowledge and evaluate its impact • Providing a stable economic and regulatory framework to stimulate investments • Increase support for ports transformation to deliver large-scale offshore wind projects 	<ul style="list-style-type: none"> • Support the development of multi-use infrastructures are scaling up • Develop comprehensive labour strategies which can support the movement of dislocated workers from oil and gas companies into the offshore renewables sector 	<ul style="list-style-type: none"> • Ocean Renewable Energies are an important part of the global energy mix and continue to grow • Offshore wind would increase substantially. Asia and Europe would be home to the largest share of global installations, followed by North America • Significant offshore wind build is also seen in Africa, Latin America and the wider Pacific region.

* unedited version



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	<ul style="list-style-type: none"> Foster the legal framework to develop and implement Marine Spatial Planning (MSP) in countries; Facilitate dialogue on multi-use concepts to guide Marine Spatial Planning by setting up stakeholder fora involving all ocean-based industries, civil society and different governmental departments involved For relevant countries, facilitate a roadmap to support a mass labour transition from the oil and gas sector to renewables like offshore wind 			
Financial Institutions	<ul style="list-style-type: none"> Foster risk assessments of projects and unlock research, development and deployment (R&D&D) funding Funding based on the Technology readiness level (TRL): establish funding programs that consider the different TRL stages and remunerate projects based on stage completion. 	<ul style="list-style-type: none"> Access to finance for SIDS through innovative financing schemes, such as Blue Bonds. Benchmark and expand ‘onshore’ PV financial mechanisms: Current successful financial practices from ‘onshore’ Solar PV can be used as a baseline and incorporated for floating PV technologies, in particular the inland PV sector have built experience in feed-in-tariffs, renewable energy certificates, carbon pricing and green bonds. 		
Technology Providers and Innovators	<ul style="list-style-type: none"> Promote R&D strategies and build offshore knowledge: T&I to codesign R&D roadmaps together with the marine sector Developing marine research and technology programmes Technological developments to utilize 	<ul style="list-style-type: none"> Develop innovative hybrid RE systems and promote systemic approaches for OE to decrease the levelized cost of electricity Developing marine research and technology programmes Explore research and technologies in 	<ul style="list-style-type: none"> New ocean renewable energies are entering the market (energy extracted from waves and tides) Push innovation into colocation of renewable offshore technologies: 	

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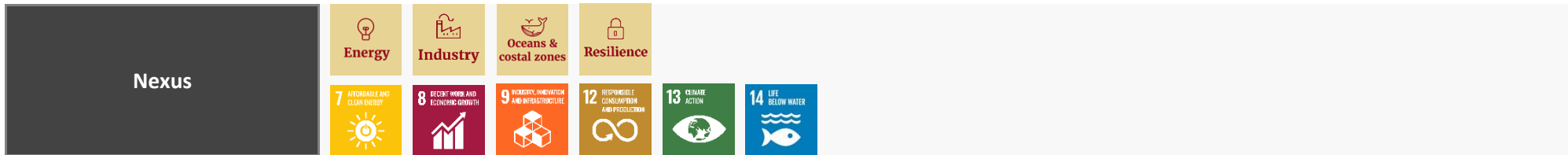
	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Technology Providers and Innovators	<p>the limited space in the sea basins, approaches such as multi-use</p> <ul style="list-style-type: none"> Further exploring technologies in terms of the potential for installing large scale installations at sea, and advancing technology that can move technologies into deeper water sites, e.g., development of floating offshore wind technologies 	<p>marine fields for developing strategic national roadmaps for zero-carbon economy in 2050.</p> <ul style="list-style-type: none"> Addressing bigger use of data in the maritime planning process for critical infrastructure on a basin-scale (not only national). Develop technologies of the potential for installing large scale installations at sea, and advancing technology that can move technologies into deeper water sites 	<ul style="list-style-type: none"> Improve existing infrastructure along with building a high-voltage grid, or super grid: will help to transport electricity to other regions and avoid renewable energy curtailment. 	
Business and Service Providers	<ul style="list-style-type: none"> Collaboratively, define a S-Curve / Pathway to scale up offshore wind by 2050 and identify tipping points Identify different multi-uses to maximize the possibilities for energy transition and use of the sea space by various sectors. 	<ul style="list-style-type: none"> Floating offshore wind technologies are mature Bolster and enhance skills in the workforce Repurposing the sea infrastructures to serve energy transition Different multi-uses to maximize the possibilities for energy transition and use of the sea space by various sectors. 	<ul style="list-style-type: none"> Oil & Gas companies are significantly investing and operating offshore wind plants 	
Civil society	<ul style="list-style-type: none"> Early education programmes: and sufficient training and programmes 	<ul style="list-style-type: none"> Take actions to encourage and support significant shift from fossil fuels to renewable energy 		

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4b

OCEAN RENEWABLE ENERGY – BIODIVERSITY IMPACTS

ENERGY



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)	<ul style="list-style-type: none"> • Early identification of risks to ecosystems and biodiversity, through screening as part of project planning • Explore how offshore RE could produce co-benefits for ecosystems, biodiversity and society. For example, production of artificial reefs, creating habitats, shellfish aquaculture within wind turbine settings 	<ul style="list-style-type: none"> • Provide a framework / tool for cumulative impact assessment • Provide a framework for the delivering of net zero, enhanced coastal community resilience and biodiversity improvements • Identification of Go areas where co benefits can flourish • SEAs, including land use planning, are of particular importance in identifying appropriate sites for renewable development. ESIs provide the main legislative instrument for approving developments and enforcing mitigation practice. • Integrating landscape zoning into the 		

* unedited version



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Policymakers (national, subnational, local levels)		<p>energy planning process also provides opportunities to influence the energy mix and the potential environmental impacts of the renewable energy transition.</p> <ul style="list-style-type: none"> Nature based solutions are used to enhance biodiversity as part of the infrastructure maintenance 		
Financial Institutions	<ul style="list-style-type: none"> Risk screening of all projects Define no go investment policies 			
Technology Providers and Innovators		<ul style="list-style-type: none"> Minimizing of noise associated to pile driving Innovation in monitoring techniques to better understand impacts on birds 		
Business and Service Providers		<ul style="list-style-type: none"> Prioritize impact reduction through site selection, which should be informed by existing spatial plans developed before permitting starts. Identify sites based on sensitivity mapping and risk screening. Particularly sensitive areas to consider during project design include: Implement the mitigation hierarchy. Open and transparent communication and sharing of monitoring results 	<ul style="list-style-type: none"> Wind energy developments provide opportunities to go beyond traditional mitigation practice and create further/additional biodiversity benefits, for example through on-site habitat enhancement. 	
Civil society		<ul style="list-style-type: none"> Wider acceptance of OE Educate civil society through community engagement and scientific research 		

* unedited version

EXISTING INITIATIVES

High Level Panel for Sustainable Ocean Economy	<p>1) investing in nature-based solutions by restoring, protecting and managing coastal and marine ecosystems; 2) harnessing ocean-based renewable energy by scaling-up offshore and ocean-based renewable energy; 3) decarbonizing ocean industries and increasing investments in solutions to decarbonize shipping and marine transport, port infrastructure and operations, fisheries, aquaculture and tourism; and 4) advance the deployment of carbon capture and storage.</p>
SIDS Lighthouses Initiative	<p>The SIDS Lighthouses Initiative (LHI) launched at the United Nations Climate Summit in 2014, aims to support SIDS in their energy transformation. As a framework for action, it addresses all elements of the energy transition, from policy and market frameworks to technology options and capacity building. The Initiative which is being coordinated by IRENA facilitates coordinate support fro SIDS, primarily through partnerships with public, private, intergovernmental and non-governmental stakeholder organisations.</p>
UN Global Compact	<p>The UN Global Compact is working with stakeholders globally to set the framework for Climate-Smart Marine Spatial Planning to meet 1.5 and define a roadmap to accelerate development of offshore renewable energy.</p>

FURTHER REFERENCES

<p>GWEC – Global Wind Report 2021</p>	<p>https://gwec.net/global-wind-report-2021/</p>
<p>OREAC – The power of our Ocean – December 2020</p>	<p>https://gwec.net/oreac/</p>
<p>Practical Guidance for the UN Global Compact Sustainable Ocean Principles – Ocean Renewable Energy</p>	<p>https://www.unglobalcompact.org/take-action/practical-guidances-for-the-un-global-compact-sustainable-ocean-principles</p>

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CONTRIBUTIONS

Under the leadership of the High-Level Climate Champions and through the Marrakech Partnership for Global Climate Action, the development of this Climate Action Pathway was led by the Ocean Lead for the High Level Climate Champions, IUCN, IOC-UNESCO, The Food and Agriculture Organization of the United Nations (FAO), Conservation International and the Ocean and Climate Platform.