CLIMATE ACTION PATHWAY

OCEANS AND COASTAL ZONES

Action Table

2020

Global Climate Action
United Nations Climate Change

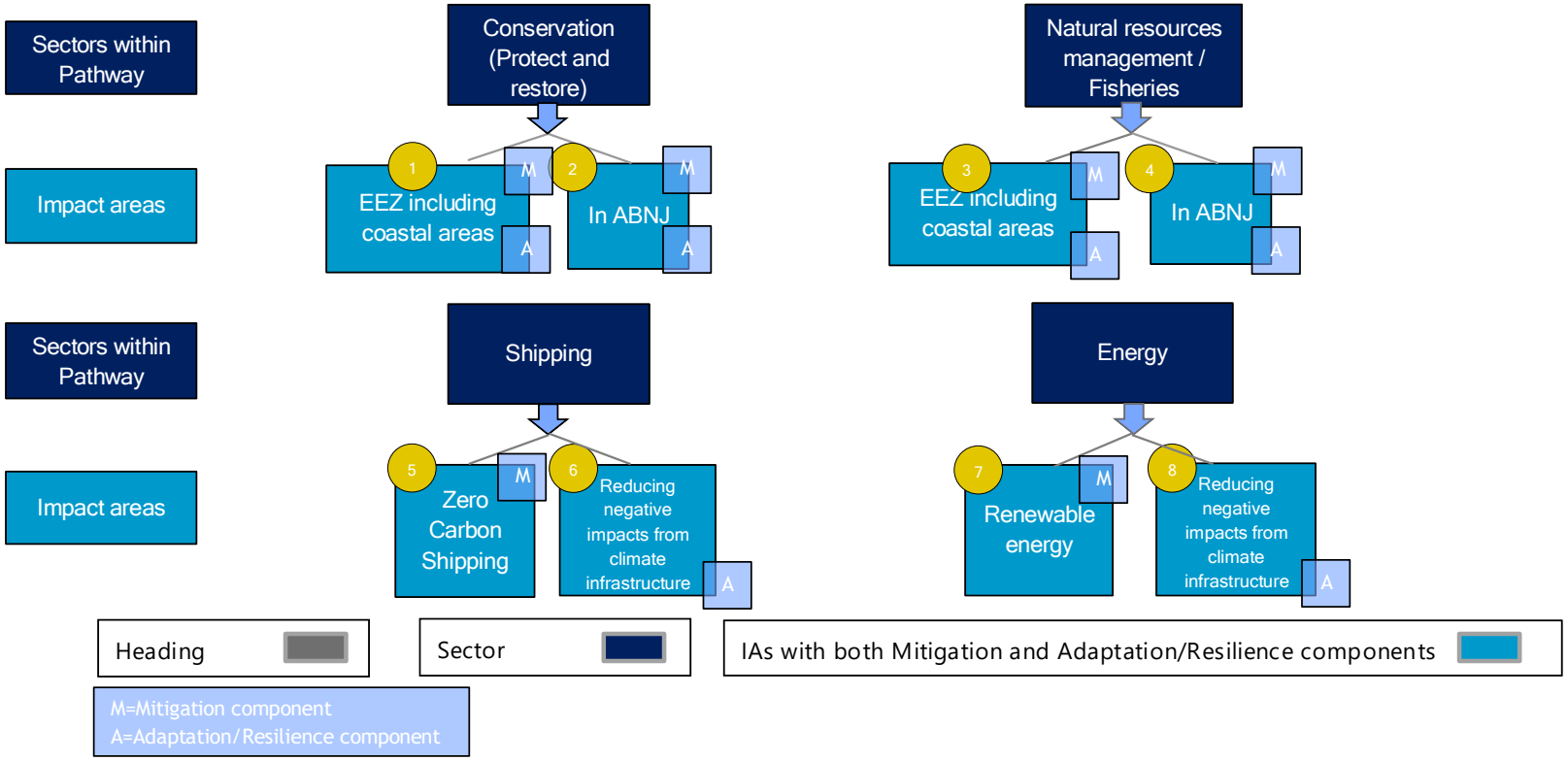
Marrakech Partnership
Global Climate Action

ACTION TABLE STRUCTURE AND APPROACH

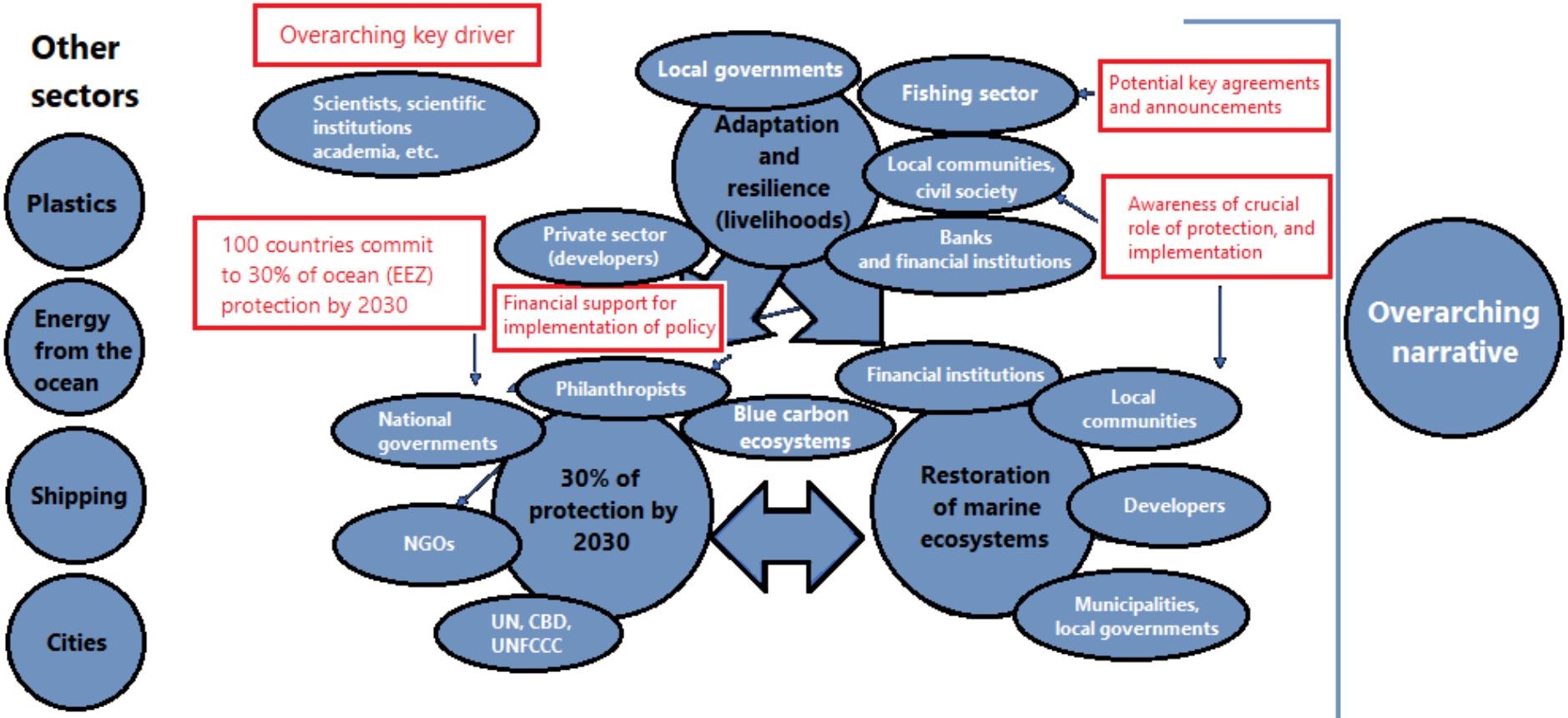
The Ocean and Coastal Zones Action Table is divided in four sectors. Two of them are specific to the Ocean and Coastal Zones, 1) Conservation (protect and restore) change levers and 2) Natural resources management and fisheries. Shipping and Energy are partly also addressed in Action Tables of the Transport and Energy pathways. The Action Table highlights specific promotable action to deliver on the protection of ocean and coastal zones, which are regulating the climate and to facilitate science-policy and science-industry communication. Mitigation of climate change by the ocean comes at a steep cost for the marine environment and only innovative actions by all actors, including policies, finance and investment, technology and innovation, business and services, and civil sector starting now can help achieve the goals set by the Paris Agreement, help society to adapt, and finally ensure that the ocean can maintain its role in regulating the climate. In summary, all actors show strong commitment to boost ocean-climate actions now and in the future.

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

These actions will be only successful if all parts of society participate, particularly women and youth, and all types of knowledge, including traditional knowledge, are taking into account


Sectors within Pathway
Impact areas
Conservation (Protect and restore)
1
EEZ including coastal areas
M
A
2
In ABNJ
M
A
Natural resources management / Fisheries
3
EEZ including coastal areas
M
A
4
In ABNJ
M
A
Sectors within Pathway
Impact areas
Shipping
5
Zero Carbon Shipping
M
6
Reducing negative impacts from climate infrastructure
A
Energy
7
Renewable energy
M
8
Reducing negative impacts from climate infrastructure
A
Heading
Sector
IAs with both Mitigation and Adaptation/Resilience components
M=Mitigation component
A=Adaptation/Resilience component

CONSERVATION (PROTECT AND RESTORE) SYSTEM MAP



CONSERVATION (PROTECT AND RESTORE) CHANGE LEVERS

Nature-based Solutions (NbS) – centred on the protection, restoration and sustainable management of the world's ecosystems – have a vitally important role to play in addressing both the causes and consequences of climate change. Recent research suggests that NbS could provide up to a third of the cost-effective mitigation that is needed if undertaken by 2030 to contribute to stabilize warming to below 2°C[1].

While the conservation and sustainable management of coastal and marine ecosystems – from mangroves to coral reefs and deep sea mountains – has clear contributions to make toward climate adaptation (coastal protection, fish nursery etc), only three main ecosystems, namely salt marshes, mangroves and seagrasses, have a quantifiable mitigation contribution with internationally-approved accounting guidance and methodologies from the IPCC. These three ecosystems are often called coastal "blue carbon ecosystems" for their ability to contribute to climate mitigation.

Furthermore, ocean sediments are major reservoirs of carbon; algae are important fixers of CO_2 and can mitigate ocean acidification locally. However most important to note is that the ocean itself is the largest reservoir of the excess heat (>90%) from global warming, takes up 25-30% of the excess CO_2 emitted to the atmosphere and all the water resulting from melting ice. In short, the ocean is mitigating climate change on a huge scale but at a great cost to its health resulting in negative consequences to coastal and island societies due to ocean warming, ocean acidification and ocean deoxygenation. Counting on the ocean – as a whole – to continue to act as an increased carbon sink, is thus not an option.

From a global perspective, a study concluded in 2016 found that 53% of 163 Nationally Determined Contributions (NDCs) reviewed included various references and actions regarding coastal 'blue carbon ecosystems' within their adaptation and/or mitigation components. This result did not reflect in more detail whether countries included quantifiable NbS-oriented targets. There is, however, an overall call that more concrete, evidence-based targets for NbS (including on coastal wetlands) are urgently needed. As the IPCC Special Report on Oceans and the Cryosphere

[1] Griscom et al. 2017 Natural climate solutions PNAS.

in a Changing Climate (SROCC) concluded, coastal blue carbon can contribute to mitigation for many nations but its global scope is modest (offset of < 0.5% of current emissions). However, for some countries such as Indonesia, Mexico or Australia with large areas of mangroves, activities to ensure the conservation and sustainable management of these systems for mitigation purposes can have a significant impact, for climate action as well as local communities and biodiversity conservation. For example, Indonesia holds roughly 17% of the coastal blue carbon ecosystems.

A crucial asset to better understanding the ocean-climate interactions, as well as take informed decisions, is science. The UN Decade of Ocean Science for Sustainable Development (2021-2030)[2] is expected to harness, stimulate and empower interdisciplinary ocean research at all levels, to support the timely delivery of the data, information and knowledge needed to address current knowledge gaps within the area of coastal blue carbon ecosystems, NbS, ocean stressors, such as ocean warming, deoxyenation, ocean acidification and beyond.

Calls by scientists, 'ocean users', international and intergovernmental organizations, as well as politicians to step up NbS actions that address climate change adaptation and mitigation as well as support sustainable development and biodiversity conservation have been manifold Improved science-policy and science-industry research development and communication would help to develop integrated climate, development and biodiversity agendas and action plans. For example, activities could prioritize ecosystem restoration that both enhances carbon storage and contributes to adaptation, and favor protecting and/or restoring biodiverse and climate-resilient natural ecosystems (as opposed to establishing plantations with single non-native species). Actions that promote such synergies should be prioritized for funding, whether direct actions or enabling conditions. A synergistic implementation, as well as development of various international agendas, especially the post 2020 Global Biodiversity Framework under the Convention on Biological Diversity is key. Furthermore, the United Nations Decade on Ecosystem Restoration (2021-2030) challenges everyone to massively scale up restoration efforts that breathe new life into our degraded ecosystems, including marine habitats.

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[2] Special relevance of the Decade Challenge 2: Understand the effects of multiple stressors on ocean ecosystems, and develop solutions to protect, monitor, manage and restore ecosystems and their biodiversity under changing environmental conditions, including climate and the Decade Challenge 5: Enhance understanding of the ocean-climate nexus and generate knowledge and solutions to mitigate, adapt and build resilience to the effects of climate change across all geographies and at all scales, and to improve services including predictions for the ocean, climate and weather.

In order to properly engage the private sector, and leverage private finance, the business case for coastal conservation and sustainable natural resources use for climate change mitigation and adaptation has to be strengthened. Demonstrating commercial viability to get access to capital is paramount while ensuring adherence to strong environmental and social safeguards.

Coastal NbS can also help to make infrastructure investments more resilient and financially more cost-effective and can be demonstrated through new and enhanced partnerships between the conservation, engineering and investment community, underpinned by enabling policy conditions. Taking a wider Source to Sea approach, and enabling holistic thinking for solutions that include upstream water and river ecosystems could bring a paradigm shift so urgently needed. Local communities should further be empowered to be leading the implementation and enforcement of sustainable nature-based approaches to protect, restore and manage coastal and marine ecosystems. Further holders of indigenous and local knowledge are essential partners of the Decade of Ocean Science and for the successful application of NbS action.

Global Climate Action
United Nations Climate Change

Marrakech Partnership

Impact 1

EEZ INCLUDING COASTAL AREAS

Conservation (Protect and restore)

MITIGATION & ADAPTATION/ RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	• Blue Carbon (Nature-based solutions-NbS- to mitigation) and Ecosystem-based Adaptation (Nature-based solutions to adaptation) are incorporated into countries revised or updated 2020 NDCs and implementation actions. • NbS are included in countries National Adaptation Plans and other relevant national reports • Sub-national and local policies integrate NbS	• Continued support as part of the ambition mechanism in the Paris Agreement, to strengthen and revise NDCs that include coastal and marine nature-based solutions to climate adaptation and mitigation, as well as other sustainable ocean related climate solutions. • 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	• Revision of the IPCC's wetland Supplement taking into account the latest findings on blue carbon mitigation potential. • Continued support as part of the ambition mechanism in the Paris Agreement, to strengthened and revised NDCs that include coastal and marine nature-based solutions to climate adaptation and mitigation, as well as other sustainable ocean related climate	• Continued support as part of the ambition mechanism in the Paris Agreement, to strengthened and revised NDCs that include coastal and marine nature-based solutions to climate adaptation and mitigation, as well as other sustainable ocean related climate solutions. • Expanded ICD to all developing countries • 40% MPAs are designated and implemented many of

approaches into policies and regulations to improve community resilience, food security, water security and other co-benefits of the implementation actions

- NbS is 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, strenghtened and deployed to support e.g. tracking of implementation progress and eventual accounting in GHG for the NDC/ transparency reports.
- Improved understanding of the ocean and coastal ecosystems existing areas within UN frameworks such as the UNFCCC, CBD and other MEAs.
- Improved understanding and solutions for Source to Sea approaches
- Reduce other non-climate anthropogenic stressors such as plastics and debris, inorganic and organic, sediment load and invasive alien species in discharge gear (ALDFG), plastic, nutrients (eutrophication) and noise); fishing and aquaculture, coastal development planning).
- Coastal planning tools, such as ICZM and MSP, are utilized for holistic ecosystem approach that also incorporate climate indicators for mitigation and adaptation
- 25% Marine protected areas are designated and implemented, including monitoring and measuring relevant climate indicators
- Support measures to address the displacement and planned relocation of coastal and island populations because of climate change are developed;
- Guidance for climate-smart MPAs has been developed and applied
- 30% MPAs are designated and implemented
- Tailored Institutional Capacity Development (ICD) in Countries 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
- Support measures to address the displacement of coastal and island populations because of climate change are implemented;
- Enforced science-policy instruments established at the national levels
- Eliminating non-climate anthropogenic threats to reduce the risk of exacerbated impacts for some marine ecosystems also under risk from climate-related threats
- 5 year reporting on the state of the ocean via the UNFCCC Global Stocktake including the ocean relevant Global Climate Indicators
- Societal goals outlined in the solutions.

which are climate-smart MPAs (site selection to enable them to withstand some climate change)

	from source to sea. • Adoption by the UNFCCC of the WMO Global Climate Indicators in the Global Stocktake to harmonize ocean actions more fully within the UNFCCC process.		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 • 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 cooperation between upstream and downstream actors as well as coordination across sectors	
Financial Institutions	• Interest and engagement of the private finance community on NbS • COVID-19 recovery plans for ODA or other financial assistance includes a green recovery component with a NbS (for adaptation) theme/window.	• Increased financial commitments by governments to support NbS projects and programmes • Clear business cases (return on investment) of NbS projects and facilitate access to good practices of NbS business cases • Increased access to innovative	• 250 million USD private investment into coastal NbS • Further increase investment in ocean observation and global data sharing	• 1 billion plus USD private investment into coastal NbS • Steady financial support for a network of observations of ocean change and of carbon sinks. • Steady financial support for the development of

	• Investment in ocean science, including in ocean change observation (warming, ocean acidification, oxygen and sea level) in coastal regions for future planning	financing approaches with clear case studies as examples, such as for Blue Bonds or Debt for Adaptation/Nature Swaps • Improved access to microenterprises for local community members, especially within fishing communities to enable the protection of coastal ecosystems • Improved understanding of market and non-market financing options for blue carbon 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		ecosystem models of future change
Technology Providers and Innovators	• Expansion of green/grey approaches in the coastal zone	• 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. • Increased science and data on mitigation and adaptation value	• Development of cost-effective means to monitor MPA effectiveness • Improvement of data collection and real time monitoring feeding national reporting requirements for the UNFCCC and other MEAs	

		of coastal conservation efforts • Establish enhanced monitoring that can measure local variability and establish trends in ocean and coastal chemistry.	
Business and Service Providers	• NbS accepted as contribution to sustainable business activities; NbS impacts can be measured and quantified • Reduced negative impacts of supply chain activities • Improved understanding and complementarity with sustainable business approaches that aim to reduce coastal and marine degradation	• Further reduce negative impacts of supply chain activities • Manage activities to reduce co-occurring stressors that exacerbate the impacts of changing ocean conditions. • Actively support implementation of MPAs and other measures	• Eliminate negative impacts of supply chain activities
Civil society	• Strengthened coordination among the Marrakech Partnership Ocean and Coastal Zones Group (MP Ocean and Coastal Zones) by mobilizing a broader range of actors and expertise, defining key messages to jointly amplify the voice of the ocean at COP26 • Representation from civil society at the Ocean and Climate Dialogue during SB52 and beyond. • Active voice in NbS	• 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. • Mandate for the GCA is extended beyond 2025. • Marine Educative Areas are implemented in collaboration with local schools and communities s	• The role of the ocean and marine ecosystems in climate regulation is fully integrated into education/academic cursus worldwide.

processes, from policy to projects

Impact 2

IN AREAS BEYOND NATIONAL JURISDICTION

Conservation (Protect and restore)

MITIGATION & ADAPTATION/ RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	• Contracting Parties to Regional Seas Conventions agree to cooperate in improving the governance of areas beyond national jurisdiction, building on existing regional institutions and developing area based management tools such as marine spatial planning to promote the blue economy pathways. • The ocean is recognized as a	• International Legally Binding Instrument (ILBI) on BBNJ under UNCLOS ratified. • ABMTs (Area-Based Management Tools) including MPAs modalities specified in the new ILBI on BBNJ • EIAs (Environmental Impact Assessments) modalities specified in the new ILBI on BBNJ	• ILBI on BBNJ under UNCLOS entered into force and implemented. • Marine biological diversity of areas beyond national jurisdiction conserved and sustainably used. • Societal goals outlined in the Implementation plan of the UN Decade of Ocean Science for Sustainable Development achieved, via increased ocean observation, research, co-	• ILBI on BBNJ under UNCLOS entered into force and implemented. • Marine biological diversity of areas beyond national jurisdiction conserved and sustainably used. • Increased number of States parties to UNCLOS.

	common good of humanity in the preamble of the High Seas Treaty		designed with all stakeholders meeting ecological and economical needs, addressing the impacts of climate change, such as ocean warming, deoxygenation and ocean acidification • Enforced science-policy instruments established at the national levels • Reduction of ocean stressors to ensure efficient conservation, supported via agreed increase of observation and research of impacts of stressors such ocean deoxygenation, warming and acidification resulting from increased GHG emissions.	
Financial Institutions	• Sustainable financing mechanisms for the new ILBI on BBNJ in development in concertation with key actors.	• Sustainable financing mechanisms for the new ILBI on BBNJ in place. • Important investments made to support the implementation costs of the new ILBI on BBNJ.	• Sustainable financing mechanisms for the new ILBI on BBNJ ensured.	• Sustainable financing mechanisms for the new ILBI on BBNJ ensured.
Technology Providers and Innovators	• Increased science and innovation on the role of marine areas beyond national jurisdiction for climate mitigation, including in ocean carbon uptake resulting in ocean acidification,	• Clear understanding of the role (potential and limitations) of marine areas in the BBNJ process and for climate mitigation • Capacity building and technology transfer modalities	• Role of Marine Genetic Resources in adaptation to climate change in food security and nutrition, livelihoods and the provision of environmental services • A growing network of	• A large network of innovative technology allowing long-term ocean observations in ABJN, data sharing and model projections

	deoxygenatio and other related ocean change impacts. • Increased long-term ocean observations through effective technology development in ABNJ	specified in the new ILBI on BBNJ	innovative technology allowing long-term ocean observations in ABJN, data sharing and model projections
Business and Service Providers			
Civil society	• Civil society puts greater pressure on governments to achieve an ambitious BBNJ treaty by 2021.		

EXISTING INITIATIVES SECTOR 1

Blue Carbon Initiative	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.

International Partnership on Blue Carbon (IPBC)	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.
Friends of Ecosystem-based Adaptation (FEBA)	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.
The International Coral Reef Initiative (ICR)I	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
Blue Solutions	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.
Global Mangrove Alliance	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
Save Our Mangroves Now	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.

Blue Nature Capital Financing Facility	Blue Natural 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.
Climate Risk and Early Warning Systems Initiative (CREWS)	Mobilize USD 100 million by 2020 to significantly increase the capacity for Multi-Hazard Early Warning Systems in SIDS and LDCs
Adaptation of West African Coastal Areas (WACA)	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
High Level Panel for Sustainable Ocean Economy	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.
Ocean Risk and Resilience Action Alliance (ORRAA)	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. ORRAA will grow through a 3- phased approach: 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	Help conserve 30% of the Earth's lands and oceans by 2030 and contribute to the Paris Agreement's goals through Nature Based Solutions.
International Alliance To Combat Ocean Acidification	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.

Sea'ties	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
One Planet Business for Biodiversity	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.
Roadmap to Oceans and Climate Action (ROCA) Initiative	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
Global Ocean Acidification Observing Network	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.
Global Ocean Oxygen Network	The Global Ocean Oxygen Nework (GO2NE) is an IOC Expert working group, which is committed to providing a global multidiscplinary 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.
Ocean & Climate Platform (OCP)	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.

Action Platform for Source-to-Sea Management (S2S Platform)	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. 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.

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NATURAL RESOURCES MANAGEMENT / FISHERIES AND AQUACULTURE CHANGE LEVERS

Global fish[3] production reached about 179 million tonnes in 2018 with a total first sale value estimated at USD 401 billion (FAO, 2020). World capture fisheries in marine waters were 84.4 million tonnes, representing 47% of global fish production. Aquaculture[4] supplies 82.1 million tonnes aquatic animals (46% of global fish production), 32.4 million tonnes of aquatic algae and 26000 tonnes of ornamental seashells and pearls. Aquaculture is expected to continue growing to meet the world's expanding demand for aquatic food. Cultured food fish from marine and coastal waters has been increasing and reached 30.8 million tonnes in 2018, a new record high, amounting to 38% of the total cultured aquatic animals. 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. In 2017, about 60 million people were engaged in the primary sector (i.e. harvesting activities) of capture fisheries and aquaculture, and the total engagement of women across both fisheries and aquaculture was over 50% when including the secondary sector (e.g. processing and marketing). Moreover, fisheries and aquaculture have 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 385 megatonnes of carbon dioxide in 2010 (He et al., 2018).

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. Phytoplankton

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

growth rates affect CO_2 uptake from seawater and organic carbon export to the deep ocean, and also impacts fisheries productivity (Tyrrell, 2019). Based on the most recent understanding of tropical ocean primary production, it is estimated that global marine primary production will decline by 6% ± 3% by 2100 (Kwiatkowski et al., 2017). Like terrestrial systems, climate change impacts on marine primary production 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 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). Rising ocean temperatures also decrease oxygen levels, which may reduce average fish body size by 14–24% by 2050 (Cheung et al., 2013).

In terms of aquaculture, climate-driven changes in temperature, precipitation, ocean acidification, incidence and extent of hypoxia and sea level rise, among others, could result in favorable, unfavorable or neutral changes, with 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 (Soto et al., 2018). Deep sea oceans are 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 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.

Most people engaged in fisheries and aquaculture harvest activities are in developing countries, and most are small-scale, artisanal fishers and aquaculture workers. 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 also important stakeholders are 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, bycatch species and ecosystem effects, as well as in foregone revenues of roughly US$80 billion annually, highlighting the importance of improving the sustainability of this sector. 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 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, 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 to address climate change impacts, the use of traditional knowledge and the inclusion of other sectors to foster adaptation. 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 et al., 2018). Adaptation strategies must include institutional and management adaptations, measures addressing livelihoods and, measures intended to manage and mitigate risks and thereby strengthen resilience. Adaptation solutions need political commitment, stakeholder participation, technological innovation and behavioural change to succeed.

Global Climate Action
United Nations Climate Change

Marrakech Partnership

Impact 3

EEZ INCLUDING COASTAL AREAS

Natural resources management / Fishing

MITIGATION & ADAPTATION/ RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	• Support countries in identifying and quantifying specific climate-related risks and impacts on the fisheries and aquaculture sector, as well as in identifying, assessing and prioritizing adaptation and mitigation measures (including nature-based solutions) in relevant national frameworks. • Continues support to strengthened and revised NDCs that include coastal and marine nature-based	• Continue to support and upscale the implementation of adaptation and mitigation action (including nature-based solutions) in the fisheries and aquaculture sector especially in vulnerable developing countries such as SIDS. • Development/implementation of policies to prohibit improve fisheries and aquaculture management practices overfishing – addressing the impact of multiple stressors affecting removing the pressure	• Develop and disseminate comprehensive guidance for "good practices" adaptation and mitigation (including nature-based solutions) in the fisheries and aquaculture sector. • Support measures to address the displacement of coastal and island populations because of climate change; • Increase the development and implementation of Martine Spatial Planning, Integrated Coastal Zone Management at	• Elimination of ocean stressors to sustain natural resources, supported via agreed increase of observation and research of impacts of stressors such ocean deoxygenation, warming and acidification resulting from increased GHG emissions. • MSP exist for all coastal countries and climate smart MPAs are designated and implemented

solutions to climate adaptation and mitigation, as well as other sustainable ocean related climate solutions, as it relates to natural resource management and fisheries

- Supporting the growing momentum in implementing the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines)
- Access to public and private financial resources for the implementation of inclusive, integrated, sectoral and cross-sectoral adaptation and mitigation actions, with a focus on vulnerable coastal communities and based on principles of Ecosystem Approaches.
- Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts of climate change overexploitation of marine resources, including by strengthening their resilience and take action for their restoration in order to achieve healthy and

of industrial activity on aquatic systems and their resilience to an environment that is already threatened by a changing climate;

- Increasing resilience and adaptive capacity of ocean-dependent coastal communities: fisheries and aquaculture.
- Incorporate indicators and thresholds to guide adaptive management action for species and places at varying scales.
- Conduct national or regional vulnerability assessment to identify the risks changing ocean conditions poses to marine resources and economies. This should include improving knowledge of biological impacts to marine species within the region.
- Establish pH monitoring sensors that can measure local variability and establish trends in ocean and coastal chemistry.
- Contribute 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

national and regional levels to ensure sustainable use of ocean resources to increase the resilience of coastal communities to climate change

- Societal goals 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
- Enforced science-policy instruments established at the national levels
- Reduction of ocean stressors to sustain natural resources, supported via agreed increase of observation and research of impacts of stressors such ocean deoxygenation, warming and acidification resulting from increased GHG emissions.

productive ocean (SDG target 14.2)

- Effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement 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 (SDG target 14.4)
- Prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation (SDG target 14.5)

of representative sampling stations."

Financial Institutions	• Access public and private financial resources for the implementation of inclusive, integrated, sectoral and cross-sectoral adaptation and mitigation actions, with a focus on vulnerable coastal communities (especially small-scale fishing and fish farming communities in developing countries) and based on principles of Ecosystem Approaches.	• Improved financial literacy among local fishing communities to empower them to make their own financial decisions regarding sustainable natural resource management • Increased investment in sub-national and national programs to empower small-scale fishers to protect and conserve their coastal ecosystems for improved food security and other climate adaptation and resilience benefits • Support vulnerability assessment to identify the risks changing ocean conditions are posing to marine resources and economies. • Leverage greater private investments and create insurance products that address ocean risk and build resilience.	• Improved financial literacy among all fisheries and aquaculture stakeholders • Support the UN Decade of Ocean Science for Sustainable Development to develop new innovative strategies and methodologies to improve the use of ocean resources	
Technology Providers and Innovators	• Enable local fishing communities to improve their monitoring and tracking of fish catch and biomass with innovative technologies.. • Experiment strategies that help to reduce ocean change impacts on shellfish and fisheries through techniques	• New developments in digitalization and artificial intelligence have a great potential to transform systems and support the transition to a low-carbon economy – and create new opportunities for underrepresented groups including women in this sector	• Develop new technologies to increase moving aquaculture into land-based recirculating systems using recirculating aquaculture systems (RAS); offshore aquaculture systems using marine net pens; multitrophic aquaculture installations;	• Implement new technologies to increase moving aquaculture into land-based recirculating systems using recirculating aquaculture systems (RAS); offshore aquaculture systems using marine net pens; multitrophic

	like waste shell dissolution, aeration, buffering local sea water to reduce acidity and identify resilient families and stocks.	and helping to build a more diverse and representative community of women leaders (including women). • Establish local enhanced monitoring sensors that can measure local variability and establish trends in ocean and coastal chemistry. • Contribute 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."	• Develop new technologies to reduce energy use and power aquatic food production with renewable energy.	aquaculture installations; • Implement new technologies to reduce energy use and power aquatic food production with renewable energy.
Business and Service Providers	• Collaborate with fishing communities, First Nations and indigenous, industry and aquaculture partners to experiment with and implement strategies that help to reduce climate change impacts on shellfish and fisheries.	• Increase of companies working in the ocean sector disclosing its climate risks under the Task Force on Climate-related Financial Disclosures (TCFD) scheme. • Invest in 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	• Application of SSF guidelines and implement regulated harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement 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 • increase the economic benefits to small island	

		travellers to experience nature while at the same time reducing GHG emissions, conserving the ecological functions, of the environment and providing economic benefits.	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) • Enforce moving aquaculture into land-based recirculating systems using recirculating aquaculture systems (RAS); offshore aquaculture systems using marine net pens; multitrophic aquaculture installations; and investing in renewable energy sources to power aquaculture. • Invest in 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 travellers to experience nature while at the same time reducing GHG emissions, conserving the ecological functions, of the environment and providing economic benefits.

Civil society

- Enhancing social and economic development of SIDS and coastal nations by promoting the low-carbon Blue Economy while addressing livelihoods, culture and traditional knowledge and actively engaging local communities.
- reduce the threats to biodiversity in coastal-marine ecosystems through cross-cutting objectives: better science, climate-smart biocommerce, improved governance mechanisms and sustainable landscapes.
- Women's equal participation in decision-making processes: Digitalization and artificial intelligence and scenarios to incorporate commitments to women's empowerment and gender equality.

Global Climate Action
United Nations Climate Change

Marrakech Partnership

Impact 4

IN AREAS BEYOND NATIONAL JURISDICTION

Natural resources management / Fishing

MITIGATION & ADAPTATION/ RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	• International Legally Binding Instrument (ILBI) on BBNJ under UNCLOS is in place • There is a strong mechanism for including MPAs in areas beyond national jurisdiction • Best practices and lessons learnt promoted among Regional Fisheries Management Organizations/Agreements (RFMO/As) in ABNJ • Information on fisheries and fishing resources regarding highly migratory species,	• Areas for High Seas MPAs are identified and designated and or in the process of being designated. • There has been at least one successful COP to the ILBI (frequency to be determined) • Fishing activities in ABNJ are regulated • RFMO/As are coordinating their efforts to combat IUU fishing in ABNJ • Relationship and linkages between the new ILBI on BBNJ and the FSA clarified.	• MPAs in ABNJ have successfully contributed to the achievement of the 30% of the ocean conserved and managed by 2030. • The number of designated MPAs has increased significantly and under proper management significantly contributing to a global ocean whose marine biological diversity in BBNJ are conserved. • Highly migratory species, straddling stocks and high	• The number of identified and designated MPAs in the ABNJ are has increased and match the areas identified by scientists for their value. • A best practice of EIAs has 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 if/when applicable. • Activities that are in direct

	straddling stocks and high seas fish stocks are improved to aid the evaluation of the performance of the UN Fish Stock Agreement (FSA).	• Increased cooperation among sectorial management organizations for exploitation of resources in ABNJ (International Maritime Organization (IMO), International Seabed Authority (ISA), etc.)	seas fish stocks, are exploited sustainably. • Societal goals outlined in the Implementation plan of the UN Decade of Ocean Science for Sustainable Development achieved, via increased ocean observation, research, are co-designed with all stakeholders meeting ecological and economical needs, addressing the impacts of climate change, such as ocean warming, deoxygenation and ocean acidification • Enforced science-policy instruments established at the national levels • Reduction of ocean stressors to sustain natural resources, supported via agreed increase of observation and research of impacts of stressors such ocean deoxygenation, warming and acidification resulting from increased GHG emissions.	conflict with the conservation and sustainable use of the ocean are not permitted to occur. • The ocean-climate intersect is recognized and taken into consideration when assessing cumulative impacts on the ocean and subsequent recommendations include reducing the number of impact sources and or the combination of impacts to alleviate detrimental threats to the marine biological diversity - which includes marine corridors – in ABNJ. • Highly migratory species, straddling stocks and high seas fish stocks are sustainably managed.
Financial Institutions	• Financing for MPAs has been discussed and a sustainable financing mechanism/s has been identified and agreed to. • The financing mechanism has a built-in system that ensures	• Sustainable financing mechanism/s for MPAs in ABNJ is created. • MPAs in ABNJ are able to access sufficient finance to desigate, enforce and carry out M&E of the MPAs.	• Increased financing for MPAS in BBNJ has been identified and applied	• Financing for the designation of MPAs has been established

	it is fair and equitable. • Fisheries subsidies that contribute to overcapacity and overfishing are prohibited, subsidies that contribute to IUU fishing are eliminated, (SDG target 14.6).			
Technology Providers and Innovators	• Space is created to include Technological advancements and innovation that may not yet be available. • Cutting-edge technology to visualize, track and share data about global fishing activity, in ABNJ, in near real-time is promoted and supported.	• Both have designated funding and are discussed and have increased the ability to monitor and evaluate the MPAs, areas just outside MPAs as well as all other areas of the high seas. • New developments in digitalization and artificial intelligence have a great potential to transform systems and support the transition to a low-carbon economy – all while creating new opportunities for women in this sector and helping to build a community of women leaders.	• There is innovative ways of tracking movements of activity into and out of the designated area. • Both contribute significantly to improvements in efficiencies in the EIA process as well as the need for EIS	• Both have significantly advanced and as such subsequently impacted the quality of MPAs and surrounding areas resulting in the successful conservation and sustainable use of marine biological diversity in ABNJ.
Business and Service Providers	• There is agreement that business generated from ABNJ is sustainable in the true sense of the world.	• Business generated from ABNJ is sustainable in the true sense of the world. • Services emanating from ABNJ benefit equally and equitably all of humankind.	• Business engaged in BBNJ as well as the services provided by those businesses are actively contributing to the conservation and sustainable use of the ocean in such a way that ensures thriving biodiversity of the ocean alongside the developing ocean economy (blue	• Business and service go hand in hand with ensuring that the marine biological diversity of the ocean is conserved into perpetuity by financially contributing to the effective management of not only MPAs but all of the ocean as well.

			economy).	
Civil society	• Builds awareness	• Successful in building awareness and driving momentum that contributes to increased scientific research and monitoring	• Successful in building support for the proper identification and designation of MPAs in ABNJ resulting in increased public-private support for MPAs on the high seas. • Also resulting in increased funding for MPAs and proper wholistic ocean governance	• Continues to advocate strongly for continued M&E, robust EIAs and research -the recommendations of which are adopted including the implementation of iterative approaches when necessary.

EXISTING INITIATIVES SECTOR 2

Adaptation of West African Coastal Areas (WACA)	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
Blue Growth Initiative	Reduce CO2 emissions by 10% in 5 years and 25% in 10 years and reduce overfishing by 20% in 5 years and 50% in 10 years in 10 developing countries
Too Big To Ignore	A global research network and knowledge mobilization partnership that focuses on addressing issues and concerns affecting viability and sustainability of small-scale fishers
High Level Panel for Sustainable Ocean Economy	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.

WorldFish	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
World Trade Organization	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.
Ocean Risk and Resilience Action Alliance (ORRAA)	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. ORRAA will grow through a 3- phased approach: 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).
The Ocean Forum by the United Nations Conference on Trade and Development UNCTAD	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

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SHIPPING CHANGE LEVERS

In 2014 the IMO estimated that for the period 2007-2012, shipping emitted about 1,000 Mt CO_2 per year, equaling approximately 3.1% of annual global CO_2 emissions. Recent projections estimate that shipping emissions will increase by up to 120% by 2050 if other sectors decarbonize successfully. Under a business-as-usual scenario and if other sectors of the economy reduce emissions to keep the global temperature increase below 2 degrees Celsius, shipping could represent some 10% of global GHG emissions by 2050.

Shipping also contributes to climate change through emissions of Black Carbon, tiny black particles, produced by combustion of marine fuel. The highest amounts of black carbon particles are produced by ships burning heavy fuel oil. Black carbon accounts for 21% of CO_2-equivalent emissions from ships, making it the second most important driver of shipping's climate impacts after carbon dioxide. Currently there are no regulations controlling black carbon emissions from shipping.

So while shipping, especially with more fuel efficient and alternative energy, can have a significant impact emission reduction, current, and potential increased ship track is and will likely have an increasing impact on animal species in the ocean.

Climate-related changes in marine and coastal ecosystems are already affecting fish, seabirds, and marine mammals. While the eventual magnitude of these climate-driven impacts remains unknown, alteration of oceanographic conditions and processes from global climate change are expected to profoundly influence ecosystems and marine mammals in the foreseeable future – and be of great relevance to planning process for shipping lanes. As marine habitats undergo change, efforts to conserve marine mammals and manage marine ecosystems would benefit from the ability to anticipate likely responses of marine mammals to these changes[5].

All actions listed in the impact area tables 5 and 6 require further consultations/alignment with related conservation and biodiversity actions, treaties and conventions to assess appropriate tradeoffs.

[5] *Report of a Workshop on Best Approaches and Needs for Projecting Marine Mammal Distributions in a Changing Climate*. Available from: https://www.researchgate.net/publication/303444938_Report_of_a_Workshop_on_Best_Approaches_and_Needs_for_Projecting_Marine_Mammal_Distributions_in_a_Changing_Climate [accessed Sep 24 2020].

Impact 5

ZERO CARBON SHIPPING

Shipping

MITIGATION

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	• Enhance engagement & promote strategic partnerships across stakeholders: Stakeholders associated with the shipping sector must be mapped out, fully engaged and working towards the establishment of strategic partnerships. Decarbonisation goals must be thoroughly socialised across stakeholders	• Foster the competitiveness of renewable fuels with a carbon levy system: Need to increase competitiveness of carbon-zero fuels, hence the importance of implementing an effective carbon levy system which discourages the use of fossil fuels while making the use of renewable fuels more cost competitive.[6]	• Boost the adoption of energy efficiency practices and renewable fuels: Tighten carbon intensity indexes to ensure that the global fleet implements energy efficiency practices and shifts towards renewable fuels, hence rapidly displacing the use of fossil fuels.	• Achievement of IMO GHG target is on track: The achievement of IMO GHG reduction targets is on track and even beyond the initial ambition. The world sails towards a complete decarbonisation of the shipping sector by 2050.

[6] IRENA (2019). Navigating the way to a renewable future: Solutions to decarbonise shipping.

and clear roles and action set for policy makers, shipowners, ship operators, port authorities, renewable energy developers and utilities.

- Invest significant efforts towards the development of a decarbonisation roadmap for the shipping sector:
  Prompt the sector to work towards the development of an integral and participative planning exercise comprising a roadmap centred on short, medium and long-term strategies on how to meet the International Maritime Organisation (IMO) decarbonisation targets; where stakeholders agree on a global strategy for reaching zero GHG emission by 2050.
- Promote the establishment of a carbon levy:
  Inform stakeholders and socialise among them the relevance of a carbon levy system, negotiate and agree on the terms and conditions
- Promote local regulations to limit airborne emissions at ports:
  Encourage the establishment of local regulations focused on limiting airborne emissions at ports by enforcing vessels to plug-in into the local electricity grid during docking operations.[7]

[7] IRENA (2019). Navigating the way to a renewable future: Solutions to decarbonise shipping.

	associated to such a mechanism.		
Financial Institutions	• Commit technical assistance and finance on R&D focused on the production and utilisation of renewable fuels: Prompt investors, international financial institutions, philanthropists and impact investors to allocate funds on technical assistance and finance on R&D focused on the production and utilisation of renewable fuels. • Invest resources in structuring the value chain of renewable fuels for shipping: Fund technical studies focused on analysing and structuring the value chain of renewable fuels and how to improve it in order to bring down the cost associated to production and utilisation of carbon-zero fuels. • Invest resources in the development of an effective carbon levy system: Fund the development of an	• Establish a trust fund to foster the development of carbon-zero infrastructure: Employ carbon levies to set a trust fund focused in the development of carbon-free infrastructure • Facilitate lines of credit for the development of carbon-zero vessels and port infrastructure: Prompt banks and financial institutions to facilitate suitable lines of credit focused in the development of carbon-zero vessels and port infrastructure, while encouraging developers and shipbuilders to rapidly adapt existent infrastructure, develop new infrastructure and build vessels capable of harnessing renewable fuels. • Increase availability and accessibility to funds: Fuel the total transformation towards a carbon-free sector by enhance partnership and cooperation between carbon levy trustees, banks and	• Ensure an accumulated investment bordering the USD 1.65 trillion: Guarantee that accumulated global investment is bordering the USD 1.65 trillion[8]; where such investment has been employed on efficiency technologies, engines & storage, infrastructure for low-carbon fuels and production of renewable fuels.

[8] UMAS - University Maritime Advisory Services (2020). Aggregate investment for the decarbonisation of the shipping industry.

	effective carbon levy system; which ensures the financial viability of renewable fuels in the short and medium term. is explored in detail.	financial institutions, therefore enhancing the already existent lines of credit for shipowners, ship builders, cargo companies and infrastructure developers.		
Technology Providers and Innovators	• Ensure sustainability of carbon-zero fuel by promoting R&D focused on life cycle analysis: Prompt R&D institutions to analyse the upstream dynamics of renewable fuel production for shipping including the GHG life cycle analysis of the different fuels but also the potential and production limits of renewable fuels i.e. biofuels and green hydrogen-based fuels. • Devote significant efforts towards the development of sectorial roadmap and global strategy: Ensure cohesion and technical cooperation among stakeholders on the development of a roadmap and global strategy which clearly defines the volume of	• Promote the adoption of carbon-zero solutions: Enhance the adoption of sustainable clean fuel alternatives for decarbonising the shipping sector among shipowners and operators; while actively supporting the commercial deployment of carbon-zero engines.	• Curve final energy consumption on the shipping sector: Secure the rapid implementation of energy efficiency practices to allow for the global final energy consumption to fall while removing large amounts of CO2 from the atmosphere i.e. between 180 and 240 million tonnes of CO2 annually.[10]	• Foster the deployment of renewable energies to meet the increasing demand of renewable fuels: Promote systemic approaches to boost the deployment of renewable energy technologies.

[10] IMO - International Maritime Organization (2020). Energy Efficiency Design Index (EEDI) - rational, safe and effective.

	renewable fuels required to decarbonise the shipping sector and the implications that such volume would have in terms of renewable energy deployment and required levels of investment. • Remove between 45 and 50 million tonnes of CO2 annually following the Energy Efficient Design Index (EEDI9).			
Business and Service Providers	• Increase private sector pledges on zero deforestation commitments in their supply chain. • Companies to take action to eliminate deforestation in their supply chains by incorporating supplier data in procurement decisions. • Companies mainstream the application of high carbon stock and high-conservation value approaches by producers and the use of nature-based solutions to achieve science-based emission reduction targets • Companies invest in	• Companies pledge on carbon neutral value chain of their commodity production. • Companies reinforce positive action and collaborate on mutually beneficial policy measures by articulating "downstream" and "upstream" stakeholders within producer and consumer countries. • Private sector engagement on reducing deforestation increases through implementation of jurisdictional approaches in relevant upstream supply chain productive regions. Includes functionality of the Jurisdictional	• Increase the use of renewable energy in large commodity production value chain. • Establish supply chain transparency, equity, procurement policies and commodity certification. • Large scale companies reach the target of reducing emissions from livestock (enteric fermentation and manure) by 20 percent and from rice paddies by 20 per cent. • Improve synthetic fertilizer production and efficiency and reduce emissions by ~180 million tons of carbon dioxide	• Large scale companies reach the target of reducing emissions from livestock (enteric fermentation and manure) by 30 percent and from rice paddies by 70 percent. • Improve synthetic fertilizer production and efficiency and reduce emissions by ~200 Mt CO2 per year.

[9] IMO - International Maritime Organization (2020). Energy Efficiency Design Index (EEDI) - rational, safe and effective.

	restoration projects and REDD+ projects and earn benefits for this. • Establish a global monitoring system to track large scale commodity production value chains on deforestation. • Companies developing proactive role in helping shape public policy through advancing collective voice through the Forest Positive coalition.	Exchange Network (JEN). • Measure and report transparently on deforestation in production supply chain. • Develop producer – consumer countries partnerships including governments, industry, farmers and civil society to accelerate sector transformations towards nature-positive models.	(Mt CO2) per year.
Civil society	• Liaise with civil society and inform them about the environmental impacts of the shipping sector in terms of climate change and present them with the potential decarbonisation solutions.	• Promote the availability of sustainably shipped goods • Encourage businesses to demand sustainable shipping options from cargo companies and offer civil society the possibility of purchasing sustainable shipped goods where the civil society understands the value behind the need to pay an incremental cost for such goods. • Implement a labelling system for sustainably shipped goods: • Establish a labelling system to enable the end-consumer to take well informed purchase decisions in a daily basis.	

Global Climate Action
United Nations Climate Change

Marrakech Partnership

Impact 6

REDUCING NEGATIVE IMPACTS FROM CLIMATE

Shipping

ADAPTATION/ RESILIENCE

NEXUS

Energy | Industry | Oceans & costal zones | Transport

1 NO POVERTY | 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE | 11 SUSTAINABLE CITIES AND COMMUNITIES | 12 RESPONSIBLE CONSUMPTION AND PRODUCTION | 13 CLIMATE ACTION

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	• 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 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 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	

Financial Institutions			• Investment plans for a climate resilient blue economy, with emphasis on low-carbon solutions and ensuring economic benefits to developing countries and SIDS (following SDG target 14.7);	
Technology Providers and Innovators	• Better modeling of changing marine mammal distributions with changing climate: • Certain species (e.g., those already vulnerable, ice-affiliated species, those already impacted by human activities, and those with limited ranges) would be expected to be impacted the most and should be closely watched. • High latitude ecosystems are changing most rapidly and species there may be most affected.	• Better modeling of changing marine mammal distributions with changing climate	• Better modeling of changing marine mammal distributions with changing climate	• Better modeling of changing marine mammal distributions with changing climate
Business and Service Providers	• Shipping sector to cooperate with agencies responsible for the conservation of living marine resources (LMR)			
Civil society				

EXISTING INITIATIVES SECTOR 3

High Level Panel for Sustainable Ocean Economy	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.
Ocean Forum by UNCTAD	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.
The United Nations Global Compact	The UN Global Compact is working on decarbonizing shipping, key in reaching the Global Goals through increasing sustainable global trade. It has two critical ambitions: 1. Apply international regulations to limit greenhouse gases from shipping. 2. Set up an international maritime research and development fund

FURTHER REFERENCES SECTOR 3

IRENA (2019). Navigating the way to a renewable future: Solutions to decarbonise shipping**.**	**IMO - International Maritime Organization (2020).** Energy Efficiency Design Index (EEDI) - rational, safe and effective.
IRENA (2019). Hydrogen: A renewable energy perspective.	**UMAS - University Maritime Advisory Services (2020).** Aggregate investment for the decarbonisation of the shipping industry.

ENERGY CHANGE LEVERS

Energy production and use ought to be changed in order to achieve zero emissions and to sustainable use ocean resources. Ocean energy refers to all forms of renewable energy derived from the sea. There are four main types of ocean energy: wind, wave, tidal and ocean thermal.

The latter three are still at an early stage of commercialization, offering great opportunities, commercially and environmentally. To date wave energy remains more costly than the other ocean technologies. Tidal range has been deployed in locations globally where there is a strong tidal resource (for example La Rance in France, Sihwa in South Korea), while tidal stream has been demonstrated only at pilot scale. Wave energy is generated by converting the energy within ocean waves (swells) into electricity. There are many different wave energy technologies being developed and trialed to convert wave energy into electricity. Tidal energy comes in two forms, both of which generate electricity: 1) Tidal range technologies harvest the potential energy created by the height difference between high and low tides. Barrages (dams) harvest tidal energy from different ranges. 2) Tidal stream (or current) technologies capture the kinetic energy of currents flowing in and out of tidal areas (such as seashores). Tidal stream devices operate in arrays, similar to wind turbines. Ocean thermal energy is generated by converting the temperature difference between the ocean's surface water and deeper water into energy. Ocean thermal energy conversion (OTEC) plants may be land-based as well as floating or grazing.

Ongoing efforts and future actions need to improve the competitiveness of renewable energy technologies and increase the supply of renewable energy through innovation that benefits consumers and businesses. By connecting investment, knowledge and people to deliver energy innovation, the foundation of a renewable energy ecosystem can be established.

Marine renewable energy promises to assist in the effort to reduce carbon emissions worldwide. As with any large-scale development in the marine environment, however, it comes with uncertainty about potential environmental impacts, most of which have not been adequately evaluated—in part because many of the devices have yet to be deployed and tested.

The most common environmental impacts encountered with renewable ocean energies were the loss of habitat integrity and connectivity; changes in nutrient availability and ecological interactions; modification of coastline dynamics and water column physicochemical properties; an

increase of noise and vibrations; loss of recreational activities, fishing opportunities, scenic value and mental health issues arising from conflicts with local communities.

All actions listed in the impact area tables 7 and 8 require further consultations/alignment with related conservation and biodiversity actions, treaties and conventions to assess appropriate tradeoffs.

Impact 7

RENEWABLE ENERGIES

Energy

MITIGATION

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational,	• Promote R&D roadmaps and strategies: facilitate an offshore RE roadmap for national research and industry development institutions. • Explore how offshore RE	• Build marine spatial knowledge and evaluate its impact: Countries must consider adequate and comprehensive marine spatial planning to enable a successful roll out of technologies. Governments	• According to IRENA's analysis aligned to the achievement of the global climate goals, offshore wind capacity could reach 228 GW by 2030, as innovation continues, and the industry evolves.	• For 2050, offshore wind would increase substantially, with total offshore installation nearing 1 000 GW globally. Asia would take the lead in the coming decades with more

local levels)

could deliver co-benefits for ecosystems, biodiversity and society.

- Emphasise Stakeholder Partnerships and build international cooperation: emerging continental economies and islands may be in the need of financial resources and business development analysis. Equally important is to strengthen international technology cooperation; policy makers, industry, academia and users of OE technologies should share existing information and collaborate in a organised manner. Front runner countries can encourage knowledge transfer to locations were OE is still in early stages of development.
- Forster the legal framework for, develop and implement Marine Spatial Planning (MSP) in countries;
- Developing national targets to increase the share of renewable energy in the national energy mix;
- Identifying which functions and activities are well should plan the spatial requirements for the blue economy in advance, reserving a space for R&D and commercialisation purposes of Technologies. In addition, marine spatial planning should go hand in hand in hand with social, economic and environmental impact assessments.
- Developing national targets to increase the share of renewable energy in the national energy mix;
- Providing a stable economic and regulatory framework to stimulate investments in required infrastructure for an accelerated deployment of sea-based energy systems.
- Developing strategic national roadmaps for zero-carbon economy in 2050;
- Identifying which functions and activities are well combined, including studying regulatory and policy approaches towards multi-use - for the purposes of providing green energy, meeting fisheries needs in a sustainable and low carbon way, cables transporting energy and information, low carbon and efficient transport in the
- According to IRENA's analysis ocean energy (includes: tidal, wave, OTEC, salinity, ocean current) should reach 10 GW of installed capacity by 2030.
- Continue to forster the legal framework for, develop and implement Marine Spatial Planning (MSP) in countries;
- Providing a stable economic and regulatory framework to stimulate investments in required infrastructure for an accelerated deployment of sea-based energy systems.
- Incorporating marine aspects under the NDC Ambition Cycle to help inform policy choices and ensure greater consideration of marine issues in the development of NDCs by countries and sea basins, including marine mitigation measures such as offshore wind installations, hybrid solutions to respond to Climate Change including sustainable fisheries and aquaculture, as well as greening shipping.

than 60% of global installations by 2050, followed by Europe (22%) and North America (16%).

- Incorporating marine aspects under the NDC Ambition Cycle to help inform policy choices and ensure greater consideration of marine issues in the development of NDCs by countries and sea basins, including marine mitigation measures such as offshore wind installations, hybrid solutions to respond to Climate Change including sustainable fisheries and aquaculture, as well as greening shipping.

	combined, including studying regulatory and policy approaches towards multi-use - for the purposes of providing green energy, meeting fisheries needs in a sustainable and low carbon way, cables transporting energy and information, low carbon and efficient transport in the highly utilized areas, etc. -	highly utilized areas, etc. – • Incorporating marine aspects under the NDC Ambition Cycle to help inform policy choices and ensure greater consideration of marine issues in the development of NDCs by countries and sea basins, including marine mitigation measures such as offshore wind installations, hybrid solutions to respond to Climate Change including sustainable fisheries and aquaculture, as well as greening shipping	
Financial Institutions	• Foster risk assessments of projects and unlock research, development and deployment (R&D&D) funding: project risk assessment should create awareness on the technology reliability and raise trust among investors, who may be reluctant to provide financing in this sector. Ocean Energy technologies are in major need of funds in order to push technologies towards the commercial stage. • Funding based on the Technology readiness level (TRL): establish funding	• Access to finance for SIDS: innovative financing schemes is key to promote OE in SIDS, risks are still perceived around the technology, hindering to the access to financing. Islands could be seen as new OE 'small' markets, which can be used as testing hubs before moving to larger markets.	• 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.

	programs that consider the different TRL stages and remunerate projects based on stage completion. Technologies close to commercialisation with a functional full-scale prototype face a lack of financial support when trying to deploy the technology in the water and generate electricity.		
Technology Providers and Innovators	• Promote R&D strategies and build offshore knowledge: T&I to codesign R&D roadmaps together with the marine sector, essential topics needed to advance the sector further environmental assessment and impact, electrical safety, mooring and anchoring systems, project development knowledge for offshore conditions. • Developing marine research (ocean science) and technology programmes (Ocean Decade) – e.g. in terms of research: understanding the impacts of fixed and floating offshore wind installations on marine biodiversity; undertaking a	• Develop innovative hybrid RE systems: Promoting systemic approaches for OE is crucial to decrease the levelized cost of electricity for OE technologies. Due to the good predictability, OE technologies can provide baseload power and stabilise the grid and are therefore ideally suited to be developed in harmony with other renewables, offshore as well as onshore. This is particularly interest in coastal regions and islands where a mix of energies is needed due to land limitations and high shares of renewables are present. • Developing marine research (ocean science – Ocean Decade) and technology – e.g.	• Push innovation into colocation of renewable offshore technologies: These technologies can benefit from spatial colocation, enhance the water space use and at the same time enable a more stable power generation in the grid. • 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. • Develop technologies of the potential for installing large scale installations at sea, and advancing technology that can move technologies into

detailed mapping of global renewable energy resources and technical potential) and technology, e.g. advance storage capacity and design; improving performance, reliability, and survivability, while reducing costs research.

- Technological developments to utilize the limited space in the sea basins, approaches such as multi-use, for the purposes of providing green energy, meeting fisheries needs in a sustainable and low carbon way, cables transporting energy and information, low carbon and efficient transport in the highly utilized areas, etc.
- 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, in order to open access to larger areas of energy resources

in terms of research: understanding the impacts of fixed and floating offshore wind installations on marine biodiversity; undertaking a detailed mapping of global renewable energy resources and technical potential) and technology (e.g. advance storage capacity and design; improving performance, reliability, and survivability, while reducing costs research.

- Explore research and technologies in marine fields for developing strategic national roadmaps for zero-carbon economy in 2050.
- Addressing bigger use of data in the maritime planning process for critical infrastructure on a basin-scale (not only national).
- Bridging the gap between different stakeholders of the various sectors, encouraging cooperation and making future projections – e.g. for the authorities to have an overview of the demands for space and the type of space / water depths needed for the activities, where the technical community will have to be stimulated to come up with innovative ways

deeper water sites, e.g., development of floating offshore wind technologies, in order to open access to larger areas of energy resources. (Ocean Decade)

		to combine use. • Development of 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, in order to open access to larger areas of energy resources	
Business and Service Providers	• Couple blue economy sectors with OE: The blue economy is expected to grow, and in doing so, OE is well placed as a potential solution to decarbonise sectors such as desalination, space cooling, shipping, and tourism, as well as emerging sectors such as aquaculture, green hydrogen generation, ocean observation (to power environmental equipment for monitoring) and underwater vehicle charging. • Identify different multi-uses to maximize the possibilities for energy transition and use of the sea space by various sectors.	• Bolster and enhance skills in the workforce: There is a growing need to increase the number of professionals with knowledge and skills in offshore renewable energy technology development and deployment. Different methods can refine the needed capacities for the future, including: i) Exchange knowledge between offshore renewables (e.g.: in terms of materials, technology installation in waters, turbines design, ports and vessels logistics, etc.); ii) Facilitate reskilling of the work force from the fossil fuel industry to renewables; iii) work closely with academia and younger generations to align curricula with sector jobs.	

		• Technological marine innovation to preserve crucial infrastructure to accelerate the energy transition: offshore wind farms powering the nearby offshore oil platforms that turn demineralized water into hydrogen using electrolysis as part of hydrogen production, • Repurposing the sea infrastructures to serve energy transition, such as storing carbon in depleted offshore fields and producing green hydrogen powered by offshore wind. (Platforms serve the energy transition by storing captured CO2 emissions and functioning as hubs for hydrogen power networks in the proximity of the offshore wind turbines.) • Different multi-uses to maximize the possibilities for energy transition and use of the sea space by various sectors.		
Civil society	• Early education programmes: Sufficient training and programmes from an early stage of education are essential to improve renewable energy knowledge and understanding; this calls	• Significant shift from fossil fuels to renewable energy at the population level.	• Early education programmes: Sufficient training and programmes from an early stage of education are essential to improve renewable energy knowledge and understanding; this calls	• Significant shift from fossil fuels to renewable energy at the population level.

for a strong focus on education in science, technology, engineering and mathematics (STEM) education that can help increase technical capacity and technological learning.

for a strong focus on education in science, technology, engineering and mathematics (STEM) education that can help increase technical capacity and technological learning.

** Reference: IRENA forthcoming report OFFSHORE RENEWABLES FOSTERING A BLUE ECONOMY*

Impact 8

REDUCING NEGATIVE IMPACTS FROM CLIMATE INFRASTRUCTURE

Energy

ADAPTATION/ RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	• Early identification of risks to ecosystems and biodiversity, through screening as part of project planning • Explore how offshore RE could deliver co-benefits for ecosystems, biodiversity and society. For example, production of artificial reefs, creating habitats, shellfish aquaculture within wind turbine settings	• Identification of No Go areas (areas that due to their conservation values should not be used for offshore wind projects). • SEAs, including land use planning, are of particular importance in identifying appropriate sites for renewable development away from areas of high biodiversity sensitivity. ESIAs provide the main legislative instrument for approving developments and enforcing mitigation practice.		

- Integrating landscape zoning into the energy planning process also provides opportunities to influence the energy mix and the potential environmental impacts of the renewable energy transition. This involves evaluating the environmental and system cost implications of siting policies and energy procurement standards. Often conducted at the national or sub-national jurisdictional level, capacity expansion models typically determine targets for particular energy types, translating into subsequent decisions on individual projects.
- Identification of potentially suitable offset sites including those already identified as national conservation priorities (e.g. the National Biodiversity Strategy and Action Plans (NBSAPs) or international conservation priorities, particularly World Heritage Sites, Ramsar Sites and Key Biodiversity Areas Offsets may also operate at a broader scale or at policy level rather than being strictly site-based (e.g. powerline retrofitting to reduce bird of prey mortality, or

		improved regulation and enforcement to reduce seabird or cetacean bycatch in fisheries)	
Financial Institutions	• Risk screening of all projects • Define no go investment policies	• Nature based solutions are used to enhance biodiversity as part of the infrastructure maintenance	
Technology Providers and Innovators		• Minimizing of noise associated to pile driving • Minimizing of collisions with birds	
Business and Service Providers		• prioritize impact avoidance through site selection, which should be informed by existing spatial plans developed before permitting starts. In the absence of specific guidance from policy makers, biodiversity sensitivity maps can help identify sites to avoid. • Identify sites based on sensitivity mapping and risk screening. Particularly sensitive areas to avoid during project design include: • Marine Protected Areas and other relevant types of exclusion	• Wind energy developments provide opportunities to go beyond traditional mitigation practice and create further/additional biodiversity benefits, for example through on-site habitat enhancement.

zones or controlled areas, Important Marine Mammal Areas, Key Biodiversity Areas (KBAs), Ecologically or Biologically Sensitive Areas (EBSAs);

- Areas that are known to support threatened ecosystems or species (e.g. offshore foraging areas, breeding grounds and areas on migration routes);
- Areas along migratory corridors that support high concentrations of birds (including the main migratory route and coastal staging areas/stopover sites and coastal 'bottleneck' areas), marine mammals and fish;
- Important nesting, roosting, foraging and overwintering areas for birds and bats (e.g. in coastal areas where the offshore wind farm cable makes landfall, or offshore areas of seasonally important foraging habitat);
- Features that concentrate species' movements, such as sandbanks (coastal and offshore – birds and marine mammals), coastal wetlands and marshes and coastal areas of high relief

(e.g. ridges, cliff edges – birds) and heavily forested coastal areas (bats);

- Other features and important sites that people value or depend on for delivery of ecosystem services such as important fishing grounds and natural sites of aesthetic value or cultural significance.
- Once site has been selected Carry out ESIAs and Cumulative Impact Assessments (CIA).
- Implement the mitigation hierarchy. This is a central element of good practice for managing and mitigating impacts on biodiversity and ecosystem services. It prioritizes prevention over remediation through rigorous application of the mitigation hierarchy to avoid and minimize to the fullest extent feasible.
- Environmental and social issues need to be considered together. Local people may derive many benefits from their environment. A project's approach to biodiversity mitigation (and especially biodiversity offsets) needs to ensure that the livelihoods and well-being of dependent people

		are not negatively impacted. In addition, all development should aim and ensure projects result in just outcomes, where those with the least prospects are not marginalised. • Renewable energy projects for which there is potential for adverse impacts on communities or indigenous groups also have heighted reputational risk, which many financial institutions will be sensitive to. In some cases, projects may need to provide alternative livelihood opportunities or compensation. • Open and transparent communication and sharing of monitoring results will not only help developers comply with regulations but is increasingly recognised as good practice that can help generate credibility and support for their project with stakeholders and help contribute to wider conservation efforts.	
Civil society	• 7.		• 8.

EXISTING INITIATIVES SECTOR 4

High Level Panel for Sustainable Ocean Economy	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.
SIDS Lighthouses Initiative	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.

FURTHER REFERENCES SECTOR 4

IRENA forthcoming report "Offshore renewables fostering a blue economy"	

CONTRIBUTIONS

[Sample] *Under the leadership of the High-Level Champions and through the Marrakech Partnership for Global Climate Action, the development of this Climate Action Pathway was led by the International Renewable Energy Agency (IRENA) in collaboration with the International Chamber of*

Commerce (ICC), International Energy Agency (IEA), REN21, Sustainable Energy for All (SEforAll), The Climate Group, UN Environment Programme (UNEP) and World Business Council For Sustainable Development (WBCSD).