United Nations
Global Compact

# OCEAN STEWARDSHIP 2030

Ten ambitions and recommendations for growing sustainable ocean business

Photo Credit: CEiiA/ Cory Fults

## ABOUT THE UNITED NATIONS GLOBAL COMPACT

As a special initiative of the UN Secretary-General, the United Nations Global Compact is a call to companies everywhere to align their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption, and to take action in support of UN goals such as the Sustainable Development Goals (SDGs or 'Global Goals').

The UN Global Compact Action Platform for Sustainable Ocean Business ('the Platform') is taking a comprehensive view of the role of the ocean in achieving the 17 Global Goals. The aim is to explore attractive, viable solutions and best practices for sustainable use and management of the ocean.

By bringing together the leading industries in aquaculture, energy production, fisheries and shipping with key banks, equity funds and insurance companies, the Platform has a cross-industry, cross-UN and cross-Global Goals approach.

The Platform is designed to drive decision-making processes and catalyse partnerships to advance shared ocean priorities across all 17 Global Goals with a specific aim to scale up the commitments and performance of companies on this critical agenda.


## ACKNOWLEDGMENTS

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Writing and editing support: CMAPS Global

Special thanks to the participants of the UN Global Compact Action Platform for Sustainable Ocean Business and Global Compact Local Networks for all the valuable discussions and contributions to this report. We are also very grateful to the many reviewers who have commented on early versions of this report.


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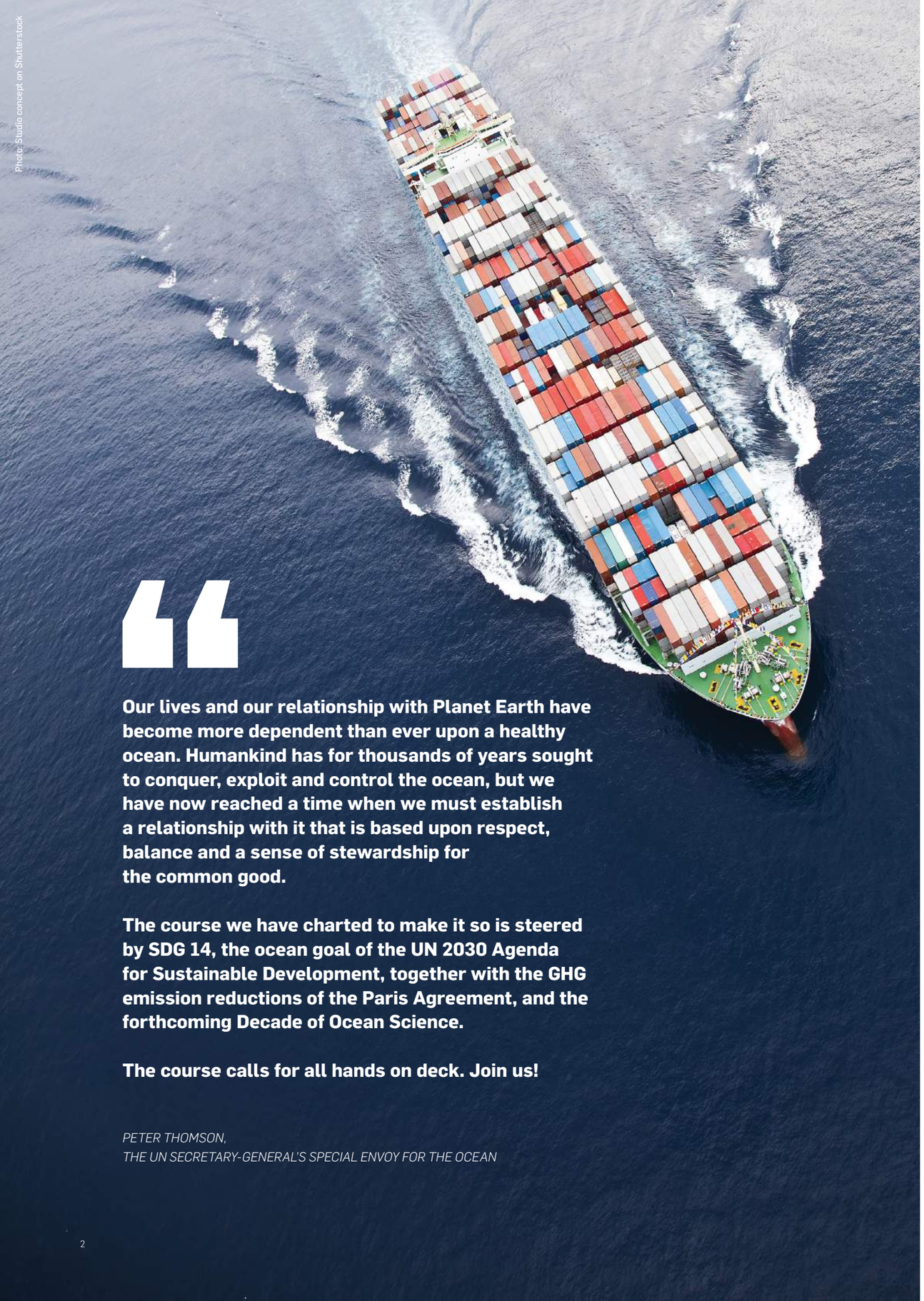

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**Our lives and our relationship with Planet Earth have become more dependent than ever upon a healthy ocean. Humankind has for thousands of years sought to conquer, exploit and control the ocean, but we have now reached a time when we must establish a relationship with it that is based upon respect, balance and a sense of stewardship for the common good.**

**The course we have charted to make it so is steered by SDG 14, the ocean goal of the UN 2030 Agenda for Sustainable Development, together with the GHG emission reductions of the Paris Agreement, and the forthcoming Decade of Ocean Science.**

**The course calls for all hands on deck. Join us!**

*PETER THOMSON,*
*THE UN SECRETARY-GENERAL'S SPECIAL ENVOY FOR THE OCEAN*





## INTRODUCING A DECADE OF ACTION TO DELIVER A HEALTHY AND PRODUCTIVE OCEAN

The UN Global Compact Action Platform for Sustainable Ocean Business has brought together ocean stakeholders worldwide to define the Sustainable Ocean Principles and five focus areas for action. These frame ten ambitions that can guide global policy making and responsible stewardship of the ocean. Achieving these ambitions will be key on the path to realize a healthy and productive ocean and delivering on the 2030 Agenda for Sustainable Development.

| FOCUS AREAS | AMBITIONS |
|---|---|
| SUSTAINABLE SEAFOOD | Ensure fully traceable seafood<br>Bridge food production and dietary needs |
| SET SAIL FOR DECARBONIZED SHIPPING | Apply international regulations to limit greenhouse gases from shipping<br>Set up an international maritime research and development fund |
| HARNESSING OCEAN ELECTRICITY | Align policy with clear and targeted strategies<br>Target market conditions and economic incentives |
| END WASTE ENTERING THE OCEAN | End plastic waste entering the ocean<br>End excessive nutrients entering the ocean |
| MAPPING THE OCEAN | Collect ocean data<br>Share and manage ocean data |

# FOREWORD
## OCEAN STEWARDSHIP – CREATING WAVES OF ACTION

Unprecedented in modern times, the COVID-19 pandemic, is impacting and infiltrating all aspects of human, social and economic life in innumerable ways. This crisis is adding to the plight of already disenfranchised people and fragile countries. It is subtracting attention and resources from longer-term priorities and investments. It is dividing nations and social groups while multiplying the need for cooperation and common solutions.

All of this makes the common quest for the future we want as laid out in the 17 Global Goals more challenging — and more important — than ever. Having just entered the Decade of Action to deliver on the 2030 Agenda, a crucial question is what will it take to make the necessary changes so that no-one is left behind? Part of the answer is both simple and compelling: the ocean!

In a previous report, 'Global Goals, Ocean Opportunities', the UN Global Compact Action Platform for Sustainable Ocean Business identified the ocean's vast untapped potential to provide sustainable economic development, improved health and better lives for a growing world population.

The report highlighted the need for strong and transparent ocean governance, protection, restoration and biodiversity. We need a clean, healthy and productive ocean to benefit from its generous services and wealth of opportunities.

In this report we take the next step by addressing the subsequent and equally pressing question: what will it take to deal with the concurrent challenges of benefitting fully from ocean industries while simultaneously improving ocean protection?

We describe five areas critical for success, suggest two ambitions per area and put forward several recommendations addressing critical dimensions of public and private governance to accelerate ocean-related solutions for the future we want.

To provide healthy food and ensure food security for a growing world population, we recommend aligning policies for sustainable seafood with dietary needs. For harnessing ocean electricity, we propose incentivizing markets through measures to accelerate deployment of sustainable solutions.

For decarbonizing shipping, we propose an industry-funded international body to support research and development to lower the sector's carbon footprint.

For ending waste entering the ocean, we suggest measures to reduce plastic and coastal run-offs of excessive nutrients. For mapping the ocean, we encourage joint public-private contributions to the UN Decade of Ocean Science for Sustainable Development (2021–2030; 'the Ocean Decade') encompassing data collection, sharing and management.

While the impacts of the pandemic are profound and wide-ranging, they nonetheless share a common denominator. The impacts all call for cooperation and commitment across national, administrative and industrial boundaries. The pandemic calls for us to mobilize our collective energy, inspiration and dedication.

The five critical areas do not allow the luxury of choice; we must succeed in achieving all of them. Just as importantly, the ocean's wealth of opportunities can be tapped only by a holistic, comprehensive approach.

In our common quest for the future we want, these will be the hallmarks of true ocean stewardship.

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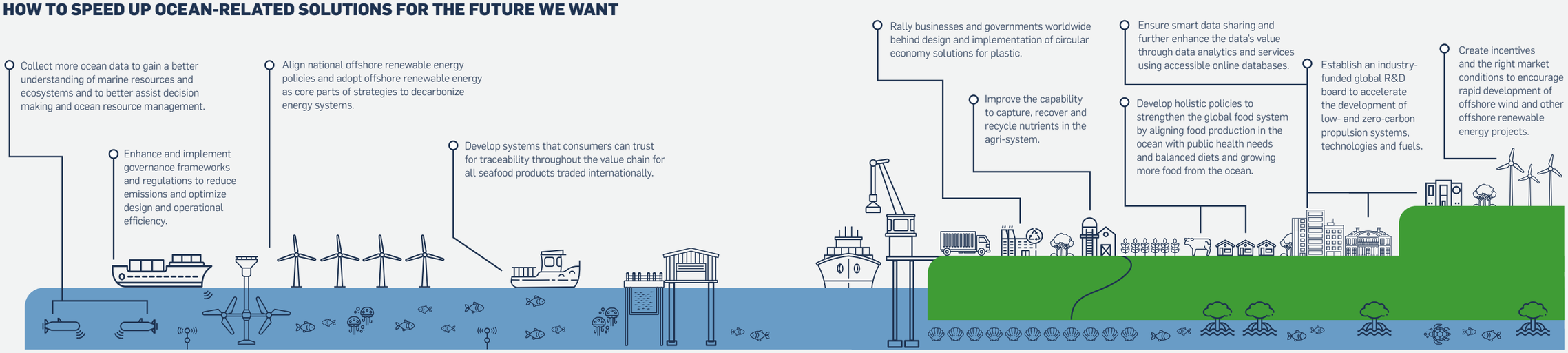
## HOW TO SPEED UP OCEAN-RELATED SOLUTIONS FOR THE FUTURE WE WANT



# THE NEED FOR LEADERSHIP BY OCEAN INDUSTRIES

The UN Global Compact emerged in 2000 from a recognition that "the spread of markets outpaces the ability of societies and their political systems to adjust to them, let alone to guide the course they take".[1] This is perhaps most apparent in the context of the ocean. An expanding landscape of governance bodies and frameworks have sought to ensure the conservation and sustainable use of the ocean and its resources (Pretlove et al.,2018). However, amplified by cumulative impacts, rapid deterioration of ocean health strongly signals that more action is urgently needed (UN, 2017).

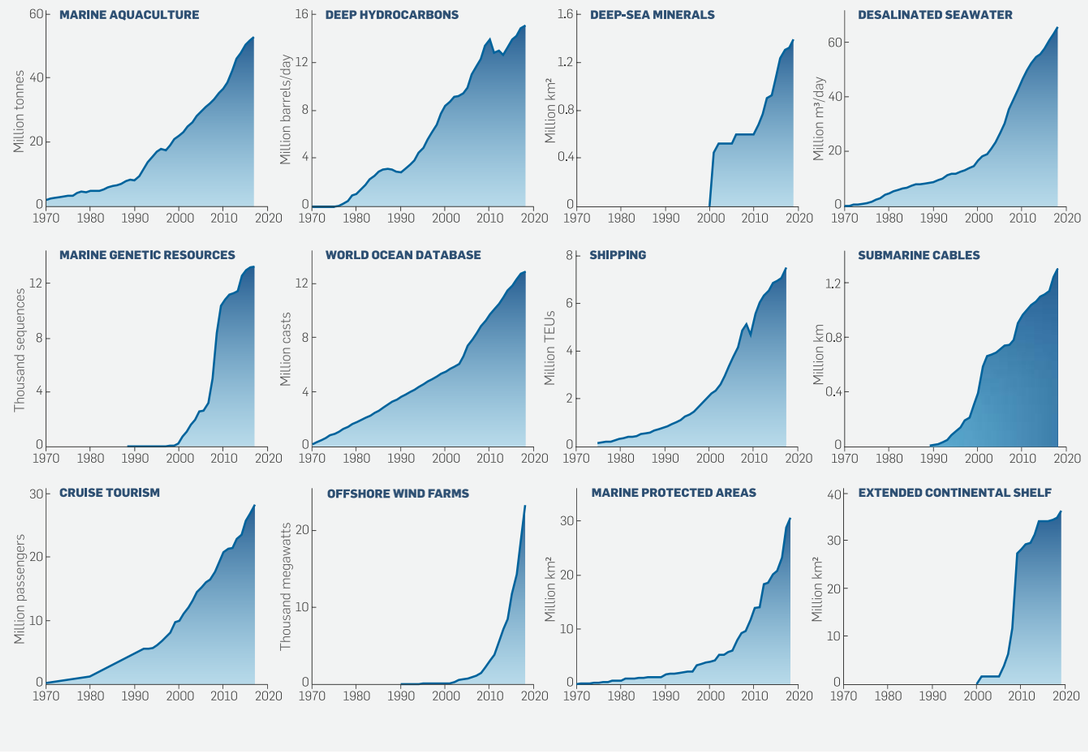
Ocean businesses have increasingly taken the initiative — often collaborating with Governments, non-governmental organizations (NGOs) and academia — to voluntarily promote best practice beyond simple compliance with existing regulations.[2] This shows that:

- International, regional and national governance frameworks are crucial, but may take many years to fully implement and enforce,[3] whereas industry actors can take the initiative, move quickly, and show where further steps are needed;
- Such actions by industry actors are not altruism, but are instead vital for the long-term viability of ocean industries; and
- The private sector can greatly influence progress towards achieving a healthy and productive ocean for current and future generations.

The goal of achieving sustainable practices in individual sectors is no longer enough — all ocean businesses operate in the same ocean, ecosystems and biosphere. Land-based industries also significantly impact on our ocean. As a result of the interconnectedness between industries and the ocean, desctructive practices by one industry can undermine others; narrow or short-term vision in one sector is a risk to others (Jouffray et al., 2020).

By bringing together ocean businesses from many sectors, supported by science, civil society and relevant UN bodies, the UN Global Compact Sustainable Ocean Business Action Platform recognizes the need for cross-sectoral, holistic responses, and elevates the ambition for industry leadership.

## BLUE ACCELERATION




(Adapted from Jouffray et al., 2020)

The intensity and diversity of interest in food, material and space provided by the ocean has accelerated dramatically since 2000.

[1] Secretary-General proposes global compact on human rights, labour, environment, in address to World Economic Forum in Davos. UN news release SG/SM/6881, 1 February 1999. www.un.org.

[2] www.keystonedialogues.earth/wp-content/uploads/2018/06/Brief2-Voluntary-Environmental-Programs.pdf.

[3] This can be due to — among other things — uneven levels of financial, technical and human capacity around the world, and a continuing need for capacity building measures.



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## IS THE CORPORATE WORLD TIPPING TOWARDS STEWARDSHIP?

Growing recognition that global environmental change threatens humanity's future has shifted mindsets among consumers, investors, shareholders and chief executives, leading to new norms among some of the largest brands. In 2017, 40 per cent of the world's largest companies were using the Global Goals in their reporting,[4] and 70 per cent by 2018.[5] A 2019 survey found that 88 per cent of chief executive officers from UN Global Compact participating companies believe that global economic systems need to be refocused on equitable growth.[6]

The increasing alignment of vision and the mainstreaming of sustainability into operations suggests a shift from corporate social responsibility to a more ambitious form of corporate stewardship directly aimed at care for the biosphere. This stems from recognition that corporations are a part of the biosphere, reliant upon it, and are a primary driver of global environmental change (Folke et al., 2019). Corporate stewardship embraces environmental and social dimensions, and may be further reinforced by shifts in consumer behaviour aimed at supporting companies that are acting ethically and sustainably.

The financial sector is of central importance for supporting transformative change. It has increasingly addressed the risks of unsustainable business operations in mainstream finance, and has developed innovative new financing mechanisms like blue bonds (Jouffray et al., 2019).[7] New technologies such as blockchain are enabling unprecedented levels of transparency,[8] with the potential for companies to reduce risks and contribute to norms of stewardship across complex global supply chains.

In theory, if the number of industry leaders striving to become stewards of the ocean and its resources continues to grow, a turning point will be reached. The result could bring new paradigms for responsible industry action, which could also inform the development of ocean governance frameworks — if accompanied by a concurrent reinforcement of capacity within such governance frameworks (Österblom et al., 2017).


Photo: Dean Drobot on Shutterstock

[4] The KPMG Survey of Corporate Responsibility Reporting 2017. kpmg.com.
[5] www.pwc.com/gx/en/sustainability/SDG/sdg-reporting-2018.pdf.
[6] www.unglobalcompact.org/library/5715.
[7] www.finansnorge.no/en/aktuelt/news/2018/06/a-profitable-and-sustainable-norwegian-financial-sector.
[8] www.finansnorge.no/en/aktuelt/news/2018/06/a-profitable-and-sustainable-norwegian-financial-sector.





## PRINCIPLES TO ACCELERATE ACTION TOWARDS OCEAN STEWARDSHIP

In September 2019, the UN Global Compact launched a set of Sustainable Ocean Principles (see page 42) as a framework for responsible business practices.[9] Complementing the Ten Principles of the UN Global Compact, the principles use simple language embracing the complexity faced by responsible ocean businesses seeking to expand use of the ocean while safeguarding its health and productivity.[10]

> The Sustainable Ocean Principles embrace the ambition for stewardship to go beyond sustainable management of a single resource.

The principles include a focus on restoring, protecting and maintaining ocean health and rights of stakeholders and communities across entire supply chains linking the land and the sea. For instance, ensuring that seafood is sustainable and fully traceable will help to realize the advantages of ocean food for global food systems and the biosphere (see Chapter 1). Sustainable Ocean Principle 3 reflects a commitment to stewardship that goes beyond the ocean — and beyond traditional land-sea linkages — to take action to prevent pollution that affects the ocean and atmosphere. Such actions are aimed at shifting the long-term trajectories of Earth's systems. For example, rapid technological advances are enabling the shipping industry to move towards eliminating greenhouse gas (GHG) emissions (see Chapter 2). At the same time, growing public awareness is driving global efforts to end waste entering the ocean (see Chapter 4), which requires understanding land-sea interactions, and engagement across industries.

The ocean-based renewable energy industry is a relatively new player in the ocean economy, but has significant potential to add a new low-carbon component to the global energy mix. Harnessing the potential of ocean electricity will therefore also depend on engagement by industry with Governments and stakeholders to develop standards, best practices and governance frameworks (Sustainable Ocean Principles 5 and 6; see Chapter 3).

Understanding current trajectories of ocean use, as well as the degradation or restoration of the ocean, requires not only continuous monitoring, but also clear baseline data. The ocean is famously under-studied, with the surfaces of the Moon and Mars mapped to a greater extent than the ocean floor.[11] No single state, research agency or company alone can achieve a comprehensive understanding of ocean systems. Collectively, ocean-based industries can play a crucial role here, as reflected in Sustainable Ocean Principles 8 and 9, to share relevant scientific data and be transparent about ocean-related activities and impacts (see Chapter 5).

The ocean stewardship ambitions align closely with the forthcoming UN Decade of Ocean Science for Sustainable Development 2021–2030. The Ocean Decade explicitly supports the development of partnerships needed to ensure sustainable development of the ocean. By providing the science we need for the ocean we want, this decade will also generate scientific evidence of whether stewardship ambitions are being realized.

### OCEAN STEWARDSHIP

**STEWARDSHIP IS A PROCESS OF COLLABORATIVELY ARTICULATING RESPONSIBILITY AND ETHICS THAT INCORPORATES SOCIAL AND ENVIRONMENTAL DIMENSIONS, BASED ON SCIENCE (CHAPIN ET AL., 2010). IT EXPLICITLY ACKNOWLEDGES THAT PEOPLE, NATIONS AND THE GLOBAL ECONOMY ARE INTERTWINED WITH THE BIOSPHERE AND ARE GLOBAL FORCES SHAPING IT.**

Ocean stewardship means acknowledging our responsibility to care for the ocean and its resources, and ensure just and equitable outcomes. It provides a new business logic with the purpose of safeguarding the resilience and productivity of ocean ecosystems for current and future generations' wellbeing. Ocean stewards therefore seek holistic, ecosystem-based approaches to guide their operations (Winther et al., 2020). They are visionary in fully implementing existing ocean governance frameworks and in actively seeking to promote transparency, more cooperation and greater coordination across ocean industries, scientists, Governments and civil society to eliminate negative social and environmental impacts. As a guiding principle, ocean stewardship provides unprecedented opportunities and novel pathways towards sustainable futures.

[9] The Sustainable Ocean Principles are a supplement to the Ten Principles of the UN Global Compact on human rights, labour, environment and anti-corruption and include 47 signatories as of March 2020. See www.unglobalcompact.org/docs/publications/Sustainable%20Ocean%20Principles.pdf.
[10] Practical guidance will be made available at www.unglobalcompact.org/take-action/action-platforms/ocean.
[11] Mapping our planet, one ocean at a time. (US) National Centers for Environmental Information. 21 March 2018 [online]. www.ncei.noaa.gov.

# 1. SUSTAINABLE SEAFOOD

The ocean has a critical role to play in supplying the global population with healthy food produced sustainably. Covering 71 per cent of the planet, it could produce significantly more food to support global, regional and local food security.

Recognizing that biodiversity conservation and healthy aquatic ecosystems are essential for food security, this chapter proposes two paths to sustainable growth in seafood. One is to strengthen oversight of capture fisheries to address vital issues such as overfishing and food loss.[12] The other is to develop sustainable ocean farming to produce more food through marine aquaculture.[13] Transparency and traceability, from the location of catch or harvest through to the end-user, enable both pathways.[14] Holistic policy frameworks bridging food production with dietary needs may unlock the potential of growing more healthy food in the ocean.

Sustainable seafood production depends on industry transparency across the value chain to prevent negative environmental and social impacts. Transparency and traceability together drive accountability, oversight and better sustainability performance. There is scope to improve traceability approaches, which remain fragmented across geographies, jurisdictions and market sectors (Borit, 2016).

In moving to a low-carbon future, it is already possible to farm more food in the ocean today using existing technology (Costello et al., 2020). An often-cited example is salmon farming — one of the most technologically advanced types of aquaculture. There is also significant potential in knowledge and technology transfer between regions and the farming of different species.

> Seafood can nourish a growing world population, including 820 million people who are food insecure today.[15]

The need for dietary shifts[16] is clear from the rising challenge of obesity, micronutrient deficiency and public health concerns over unbalanced diets globally. This reality is also visible in the gap between recommended dietary choices and actual food consumption. It is critical to bridge the gap between theory and practice in both dietary choices and the types of food produced. A way forward is through policy, better information and efforts to shift consumer behaviour towards expanding consumption of nutritionally beneficial aquatic foods and products.

## ONGOING GOVERNANCE AND REGULATION PROCESSES

Governance and regulation of the seafood production sector is largely under national legislations. The UN Convention on the Law of the Sea (UNCLOS) and subsequent agreements require coastal states to manage fishing activities in their exclusive economic zones and the activity of their vessels on the high seas.

Since the 1990s, a significant number of global agreements addressing fisheries management have been adopted. The Food and Agriculture Organization (FAO) Port States Measures Agreement, a binding international agreement which entered into force in 2016, has targeted Illegal, Unreported and Unregulated (IUU) fishing.

The 2012 Cape Town Agreement is a key International Maritime Organization (IMO) treaty for the safety of fishing vessels. Developments are ongoing in member states to adopt regulations related to due diligence and the respect of human rights, including the United Kingdom (UK) Modern Slavery Act.

As major importers, the European Union (EU) and the United States (US) impact global seafood trade through market-access requirements covering, among other things, food and animal health, food safety and quality assurance (André, 2018). The EU's IUU regulations lower the risk of IUU catch entering EU markets.[17]

[12] Food and Agriculture Organization (FAO) estimates that 35 per cent of fish and seafood are wasted. See www.fao.org/save-food/resources/infographic/en/
[13] Marine aquaculture is defined here as the production of aquatic resources for human consumption in the ocean.
[14] Key challenges to these pathways are the lack of regulatory enforcement in some regions as well as the lack of, or limited implementation of, adequate governance frameworks underpinned by scientific knowledge.
[15] Food insecurity is defined by the Food Insecurity Experience Scale indicator for Global Goal 2, see www.fao.org/state-of-food-security-nutrition
[16] World Health Organization (WHO) facts on obesity and overweight. www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.
[17] Commission lifts "yellow card" from Thailand for its actions against illegal fishing. European Commission press release, 8 January 2019 [online]. ec.europa.eu.



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### THE OCEAN DECADE AND SUSTAINABLE SEAFOOD

**THE OCEAN DECADE WILL CONTRIBUTE TO THE ACHIEVEMENT OF A PRODUCTIVE AND SUSTAINABLY HARVESTED OCEAN THAT WILL ENSURE THE PROVISION OF FOOD SUPPLY.**

The world population depends on the ocean for food more than ever before and this demand will rise rapidly in line with population growth. Knowledge generated through the Ocean Decade will inform decisions about improved fisheries management and support sustainable aquaculture that will be essential to meet future demand.

Examples of benefits that the Ocean Decade could generate include improved knowledge on the effects of climate change on the sustainability of commercial fish stocks, access to improved predictions of weather and climate to enhance safety of fishermen and facilitation of partnerships with industry to develop new technology to support sustainable aquaculture development.

## AMBITION 1: ENSURE FULLY TRACEABLE SEAFOOD

Given the vital role of seafood in food security globally, all seafood traded internationally in 2030 should be required by law to be accompanied by standardized traceability data that consumers can trust. This includes seafood for both human consumption and industrial uses, such as animal feed.

Statistics underline the importance of this ambition. The US National Oceanic and Atmospheric Administration (NOAA) describes seafood as the most traded food commodity in the world. More than a third (38 per cent) of global fish production was exported in 2017 at a value of US$ 156 billion (FAO, 2018). Meanwhile, seafood fraud (including mislabelling) is a significant challenge and fisheries continue to struggle with issues such as IUU fishing and human rights.

IUU catches and overfishing threaten future fisheries, food security and ocean ecosystems. The percentage of stocks fished at biologically unsustainable levels increased from 10 per cent in 1974 to around 33 per cent in 2015.[18] Hence, it is important to determine how markets can be closed to products derived from IUU fishing or overfished stocks. At the same time, the work of companies investing in responsible social and environmental practices — such as engaging in Regional Fisheries Management Organizations (RFMOs), should be acknowledged.

The business case for full-chain traceability is strengthening, particularly in industrialized nations. Progress is being driven by consumer expectations, food safety concerns and improved risk management in global supply chains, including a focus on human rights. However, costs and capacity limitations on implementing traceability systems and complex supply chains impede oversight — making it harder to detect fraud and mislabelling of products.

In the absence of regulatory frameworks and enforcement, developing systems for traceability and assisting fishermen to implement them can help the seafood industry to better identify and manage reputational, food-safety and supply-chain risks. Transparent supply chains can drive more responsible practices and concerted efforts for a sustainable development of the sector. It will also enable consumers to access the information they need to trust their seafood suppliers. Examples of traceability data obtained include the seafood's species, origin, production methods and compliance with food-safety requirements.

In 2030, companies should be able to proactively show that their products meet acceptable standards throughout the supply chain.

### THE GLOBAL DIALOGUE ON SEAFOOD TRACEABILITY

**IN 2020, THE GLOBAL DIALOGUE ON SEAFOOD TRACEABILITY (GDST) INDUSTRY FORUM LAUNCHED VOLUNTARY GLOBAL STANDARDS FOR TRACKING SEAFOOD PRODUCTS BETWEEN POINTS OF ORIGIN AND SALE.** [19]

The standards identify the minimum data elements that need documenting and transmitting for GDST-compliant supply chains and technical formats and nomenclatures for sharing data among interoperable traceability systems. The GDST is an international business-to-business platform advancing a unified framework for interoperable seafood traceability practices. It brings together seafood industry stakeholder and civil society experts from diverse regions to develop interoperable industry standards to improve reliability of seafood information, reduce traceability costs, contribute to supply-chain risk reduction and contribute to securing the long-term social and environmental sustainability of the sector.

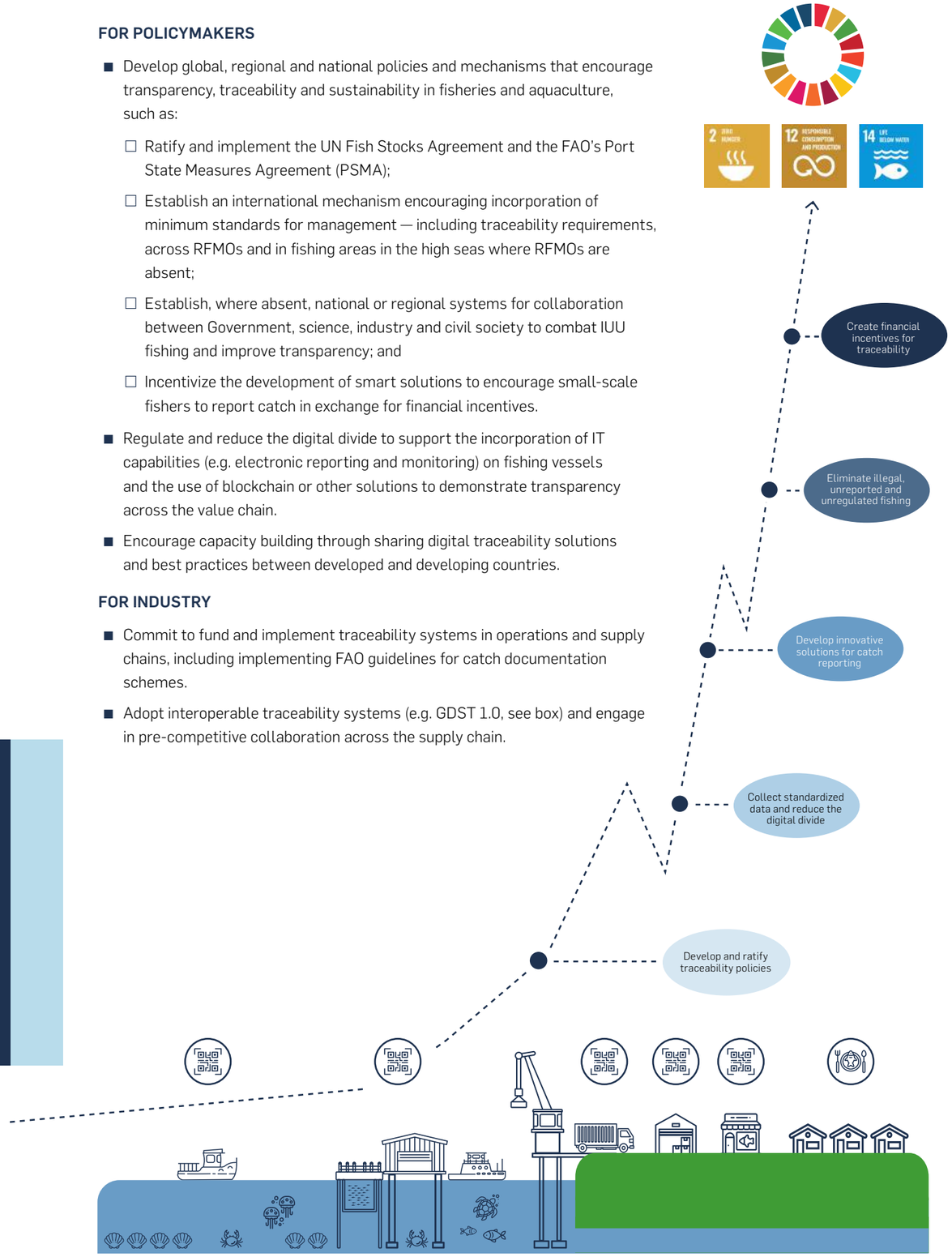
## RECOMMENDATIONS

### FOR POLICYMAKERS

- Develop global, regional and national policies and mechanisms that encourage transparency, traceability and sustainability in fisheries and aquaculture, such as:
  - ☐ Ratify and implement the UN Fish Stocks Agreement and the FAO's Port State Measures Agreement (PSMA);
  - ☐ Establish an international mechanism encouraging incorporation of minimum standards for management — including traceability requirements, across RFMOs and in fishing areas in the high seas where RFMOs are absent;
  - ☐ Establish, where absent, national or regional systems for collaboration between Government, science, industry and civil society to combat IUU fishing and improve transparency; and
  - ☐ Incentivize the development of smart solutions to encourage small-scale fishers to report catch in exchange for financial incentives.
- Regulate and reduce the digital divide to support the incorporation of IT capabilities (e.g. electronic reporting and monitoring) on fishing vessels and the use of blockchain or other solutions to demonstrate transparency across the value chain.
- Encourage capacity building through sharing digital traceability solutions and best practices between developed and developing countries.

### FOR INDUSTRY

- Commit to fund and implement traceability systems in operations and supply chains, including implementing FAO guidelines for catch documentation schemes.
- Adopt interoperable traceability systems (e.g. GDST 1.0, see box) and engage in pre-competitive collaboration across the supply chain.




[18] IUU fishing and seafood fraud web portal. (US) National Council Committee on IUU Fishing and Seafood Fraud. www.iuufishing.noaa.gov.

[19] The Global Dialogue on Seafood Traceability. traceability-dialogue.org.

## AMBITION 2: BRIDGE FOOD PRODUCTION AND DIETARY NEEDS

We need holistic policies to strengthen the global food system by aligning food production in the ocean with public health needs and balanced diets. These policies must consider the Global Goals and the need for climate action (Willett et al., 2019).

Ocean food is important for food security and for fighting malnutrition in developed and developing countries.[20] The ocean could sustainably provide more food than it does today and theoretically, provide over two-thirds of the animal protein needed to feed the global population in 2050 (Costello et al., 2020).

The public and private sectors should incentivize development, research and innovation for growing more food from the ocean. This includes alternative aquaculture feeds to decrease dependency on: forage fisheries; growing and harvesting more sea plants; investing in unfed mariculture such as seaweed, mussels, clams and oysters; exploring unexploited or underexploited marine resources; developing new technologies for production; and reducing the environmental footprint (Costello et al., 2020).

This production must be scaled in an eco-efficient way, emphasizing a circular economy approach, incorporating elements important for food security including food safety, and striking the right balance for ocean health and productivity.

In addition, improved utilization and stability of aquatic food supply have the potential to decrease food waste and increase the nutritional value and safety of diets by utilizing all parts of the fish. Through extended shelf life, convenient and affordable seafood can be produced in times of plenty and consumed in lean seasons.

There are gaps in many countries between dietary guidelines and the food that is produced and consumed (WBCSD, 2018). Fish is often under-consumed, while there is overconsumption of foods that can lead to poorer human and planetary health, such as red meat (IPCC, 2019). Fish and aquatic food in general are important for food security and nutrition, particularly in many developing countries.[21] Essential nutrients from aquatic foods can be crucial for the most nutritionally vulnerable.

Actions should be taken to ensure that aquatic foods are reaching those who need them the most. Starting points for developing holistic policies for food production could be food and dietary recommendations from the WHO, FAO and the Committee on World Food Security. National dietary guidelines and behaviour-change communication to expand consumption of nutritionally beneficial aquatic foods and products will also be important (Willett et al., 2019).

**THE BLUE FOOD ASSESSMENT**

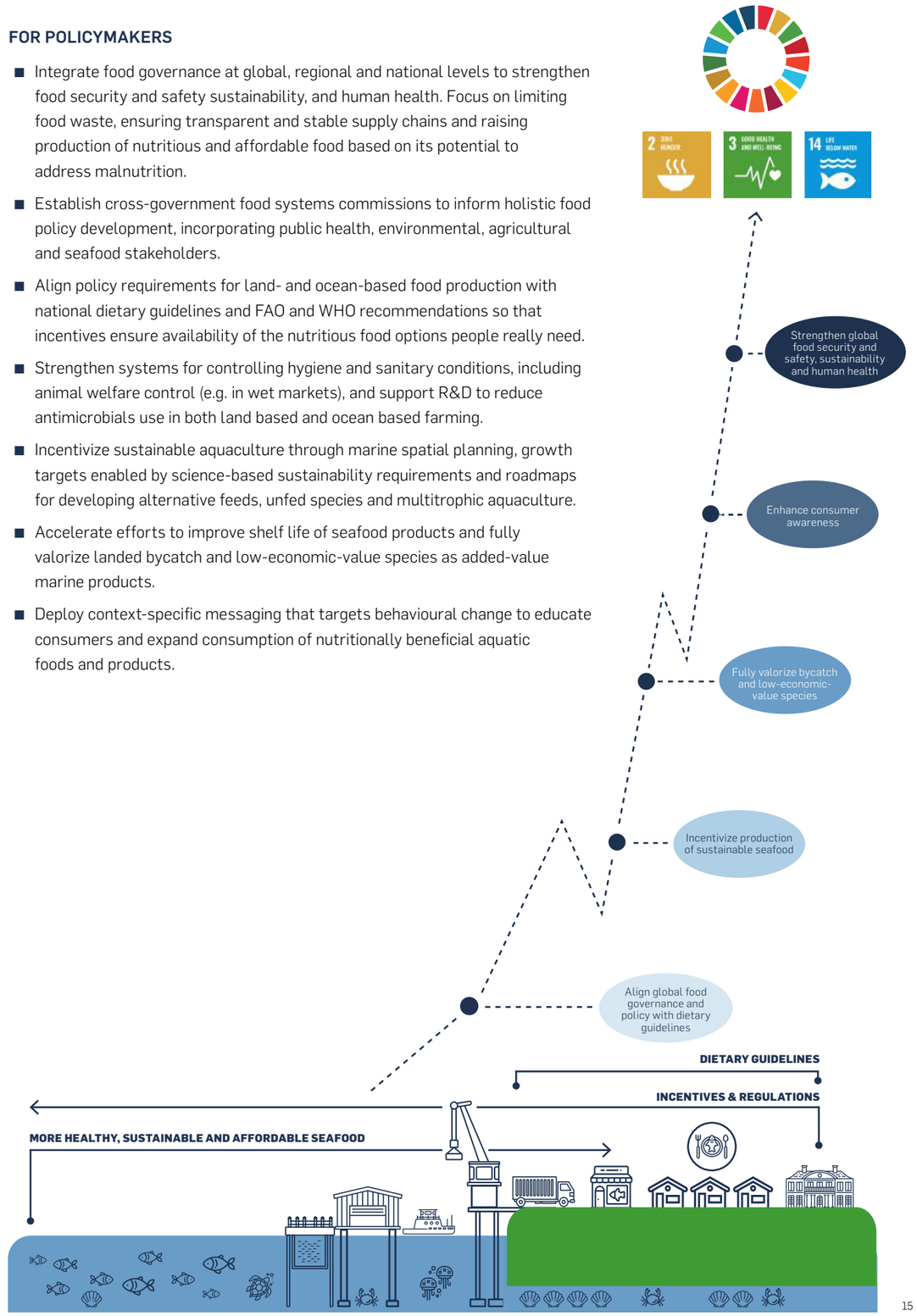
### THE BLUE FOOD ASSESSMENT: THE ROLE OF SEAFOOD IN FEEDING 10 BILLION PEOPLE BY 2050

Launched in February 2020, a coalition of international researchers led by Stockholm and Stanford Universities, is aiming to put aquatic food at the center of the global food policy agenda.[22] Building on the findings of the EAT-Lancet report (Willett et al., 2019), a key objective is to gain a deeper understanding of the role of aquatic foods in the global food system, accounting for links between aquatic and terrestrial food production. This includes effects on nutrition, environment, equity and the economy both locally and globally. Effectively, the assessment will inform global food policy leading up to the UN Secretary-General's first Global Food summit in September 2021.

## RECOMMENDATIONS

### FOR POLICYMAKERS

- Integrate food governance at global, regional and national levels to strengthen food security and safety sustainability, and human health. Focus on limiting food waste, ensuring transparent and stable supply chains and raising production of nutritious and affordable food based on its potential to address malnutrition.
- Establish cross-government food systems commissions to inform holistic food policy development, incorporating public health, environmental, agricultural and seafood stakeholders.
- Align policy requirements for land- and ocean-based food production with national dietary guidelines and FAO and WHO recommendations so that incentives ensure availability of the nutritious food options people really need.
- Strengthen systems for controlling hygiene and sanitary conditions, including animal welfare control (e.g. in wet markets), and support R&D to reduce antimicrobials use in both land based and ocean based farming.
- Incentivize sustainable aquaculture through marine spatial planning, growth targets enabled by science-based sustainability requirements and roadmaps for developing alternative feeds, unfed species and multitrophic aquaculture.
- Accelerate efforts to improve shelf life of seafood products and fully valorize landed bycatch and low-economic-value species as added-value marine products.
- Deploy context-specific messaging that targets behavioural change to educate consumers and expand consumption of nutritionally beneficial aquatic foods and products.




[20] Fish and human nutrition. FAO fact sheet. www.fao.org/fileadmin/user_upload/newsroom/docs/BlueGrowthNutritionRev2.pdf.
[21] Food security is defined as the access for all people at all times to enough food for an active, healthy life (World Food Summit, 1996).
[22] www.bluefood.earth

# 2. SET SAIL FOR DECARBONIZED SHIPPING

Enabling sustainable world trade that includes the international import and export of goods and other maritime services is vital to the global economy and future growth. Shipping moves 80 per cent of the world's goods within and between continents and nations and contributes an estimated 2 – 3 per cent of global greenhouse (GHG) emissions. Business-as-usual scenarios project these GHGs to grow significantly in the mid to long term in line with rising demand for global trade if no additional measures are taken.[23]

The maritime industry must take the lead in setting and achieving a zero-emissions future in close collaboration with related industries and the public sector. Political pressures and competing regional and national agendas may lead to overlapping international, regional and national regulatory regimes which will slow down the shift. This underlines the importance of effective implementation of the international legal regime set out in UNCLOS and IMO instruments.

Factors enabling a shift towards low- and zero-carbon shipping will first and foremost require greater use of and access (availability and affordability) to sustainable carbon-neutral fuels.

The shift will also include technological advances in vessel design and engineering, energy efficiency and digital connectivity. Emissions related to producing ships and fuels also need to be addressed. Shifting to alternative fuels can bring other benefits such as reduced air pollution.

> Zero-emission vessels and sustainable carbon-neutral fuels need to be in operation as early as 2030 to meet the IMO's 2050 ambition.

The disruptive and transformational decarbonization challenge will affect all players in the shipping industry. Collaboration and access to finance will be critical for this shift in both the ship and onshore infrastructures. Several private and public partnerships are already aiming to accelerate decarbonization, such as the Global Industry Alliance,[24] Green Shipping Programme,[25] ZEEDS[26] and the Sustainable Shipping Initiative.[27] The Poseidon Principles (see page 18) set requirements for ship owners in return for access to finance. Some maritime companies want to go beyond existing requirements and are setting decarbonization objectives for both operations and value chains within their control.

## ONGOING GOVERNANCE AND REGULATION PROCESSES

The 2018 Initial IMO Strategy on reduction of GHG emissions from vessels envisages a first-ever reduction in total GHG emissions from international shipping.[28] The strategy sets out a vision to phase out GHG emissions as soon as possible in this century, identifying three levels of ambition:

- First, the carbon intensity[29] of vessels should decline through implementing further phases of the energy-efficiency design requirements for vessels.
- Second, the carbon intensity of international shipping should decline. Taking a baseline year of 2008, the ambition is to reduce carbon emissions per transport work — averaged across international shipping — by at least 40 per cent by 2030 (thus including all existing vessels) and to pursue efforts towards a 70 per cent reduction by 2050.
- Third, GHG emissions from international shipping should peak as soon as possible and, then decline. This aims for total annual GHG emissions to be at least halved by 2050 compared with 2008.

The IMO and the shipping industry need to translate the vision and ambitions into concrete regulations for individual ships, implement policies and establish other initiatives to further encourage the development and uptake of new technologies and fuels.

[23] www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Greenhouse-Gas-Studies-2014.aspx. Note: figures are based on the Third IMO GHG Study 2014 based on shipping emissions during the period 2007–2012. The Fourth MO GHG Study will be released in 2020. Although the COVID-19 pandemic will impact the global economy and trade in the short term, we expect that the business-as-usual scenarios will still be relevant in the long term.
[24] The Global Industry Alliance (GIA) is a public-private partnership initiative of the IMO under the framework of the GloMEEP (Global maritime energy efficiency partnerships) Project of the GEF-UNDP-IMO. glomeep.imo.org.
[25] Green Shipping Programme: Norway establishes the world's most efficient and environmentally friendly shipping. www.dnvgl.com/maritime/green-shipping-programme/index.html.
[26] The ZEEDS (Zero Emission Energy Distribution at Sea) programme led by Wärtsilä.
[27] Sustainable Shipping Initiative. www.ssi2040.org.
[28] www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/GHG-Emissions.aspx.
[29] Carbon intensity is not explicitly defined in the strategy but could, for example, be measured as grammes of carbon dioxide per tonne-mile or similar indicators.



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**THE OCEAN DECADE AND DECARBONIZED SHIPPING**

**THE OCEAN DECADE WILL CONTRIBUTE TO THE ACHIEVEMENT OF A HEALTHY, RESILIENT AND SAFE OCEAN ; INCLUDING THROUGH GENERATION OF KNOWLEDGE, APPLICATIONS AND SERVICES TO REDUCE THE CARBON FOOTPRINT OF THE SHIPPING INDUSTRY.**

As an example, the Ocean Decade could contribute to the establishment of accurate and consistent quantification of shipping emissions by developing an international standard for their measurement at the data level. For shipping, this would entail providing data on cargo transportation as well as emissions from fuel-supply chains. Such standards can, for example, support decision making when purchasing fuel and enable stakeholders to accurately measure their own performance and those of their customers and suppliers. A recent example is the carbon-intensity indicators developed by the IMO, which are applied by the Poseidon Principles.

## AMBITION 1: APPLY INTERNATIONAL REGULATIONS TO LIMIT GREENHOUSE GASES FROM SHIPPING

As a global industry, shipping needs global regulations. IMO will therefore continue to play a crucial role in enhancing existing governance frameworks to address GHG emissions all within the legal framework set out in UNCLOS. In negotiations, it is of utmost importance that IMO member Governments and the industry support the principles of the strategy and proposed regulatory measures, the timelines and the proposed stringency levels.

IMO is considering regulations addressing design efficiency and operational requirements. Pending ongoing negotiations, these are expected to enter into force by 2023. If agreed, they will set the industry on a path to achieving the 2030 energy-efficiency goal as a first step towards reaching 2050 targets.

It should also be recognized that significantly tightened operational efficiency regulations can be expected to increase the turn-over rate for older, less efficient tonnage. Other possible knock-on effects would be slower sailing speeds in general and driving logistical performance enhancements in segments of the world fleet.

Furthermore, it is recognized that while design and operational energy-efficiency enhancements alone could be enough to achieve the 2030 targets, they would be insufficient to meet the 2050 goals — a shift to carbon-neutral fuels is needed. These fuels should be sustainably sourced and produced with low GHG emissions.

IMO should continue initiating capacity building and technology co-operation initiatives to help developing countries, and especially the least developed and small island developing states, to address this challenge.

Supplementing global regulations, the private sector can play a key role in the development and deployment of technologies and fuel solutions.

The Poseidon Principles, where energy-efficient performance becomes a determinant for financing and covenant obligations, highlight the importance of the private sector. Greater global application of this or similar mechanisms could significantly boost uptake of technological innovation. Marine insurance may create incentives for efficiency improvements through clauses and warranties in insurance contracts. Similar incentives could be created by other stakeholders such as the cargo owners.

Such initiatives would underpin compliance with requirements of the vessel's flag state and classification society in relation to construction, condition, fitment of the vessel, etc. These examples of governance through terms and conditions for financing, insurance and classification will require accurate and consistent quantification of emissions globally.

**THE POSEIDON PRINCIPLES**

**SIGNATORIES OF THE POSEIDON PRINCIPLES HAVE COMMITTED TO MEASURE AND REPORT ANNUALLY ON THE CARBON INTENSITY OF THEIR SHIPPING PORTFOLIOS AND TO ASSESS THEIR CLIMATE ALIGNMENT RELATIVE TO ESTABLISHED DECARBONIZATION TRAJECTORIES.**

Eleven leading banks representing about US$ 100 billion in loans together established the Poseidon Principles after a global consultation process. The signatories will make compliance with the Poseidon Principles contractual in their new business activities. Like the Equator Principles, the principles aim to create globally agreed common baselines that can act as established minimum standards.[31]

[30] The Poseidon Principles provide a framework for integrating climate considerations into lending decisions to promote international shipping's decarbonization. www.poseidonprinciples.org.

[31] The Equator Principles is a risk management framework adopted by financial institutions for determining, assessing and managing environmental and social risk in projects. equator-principles.com.



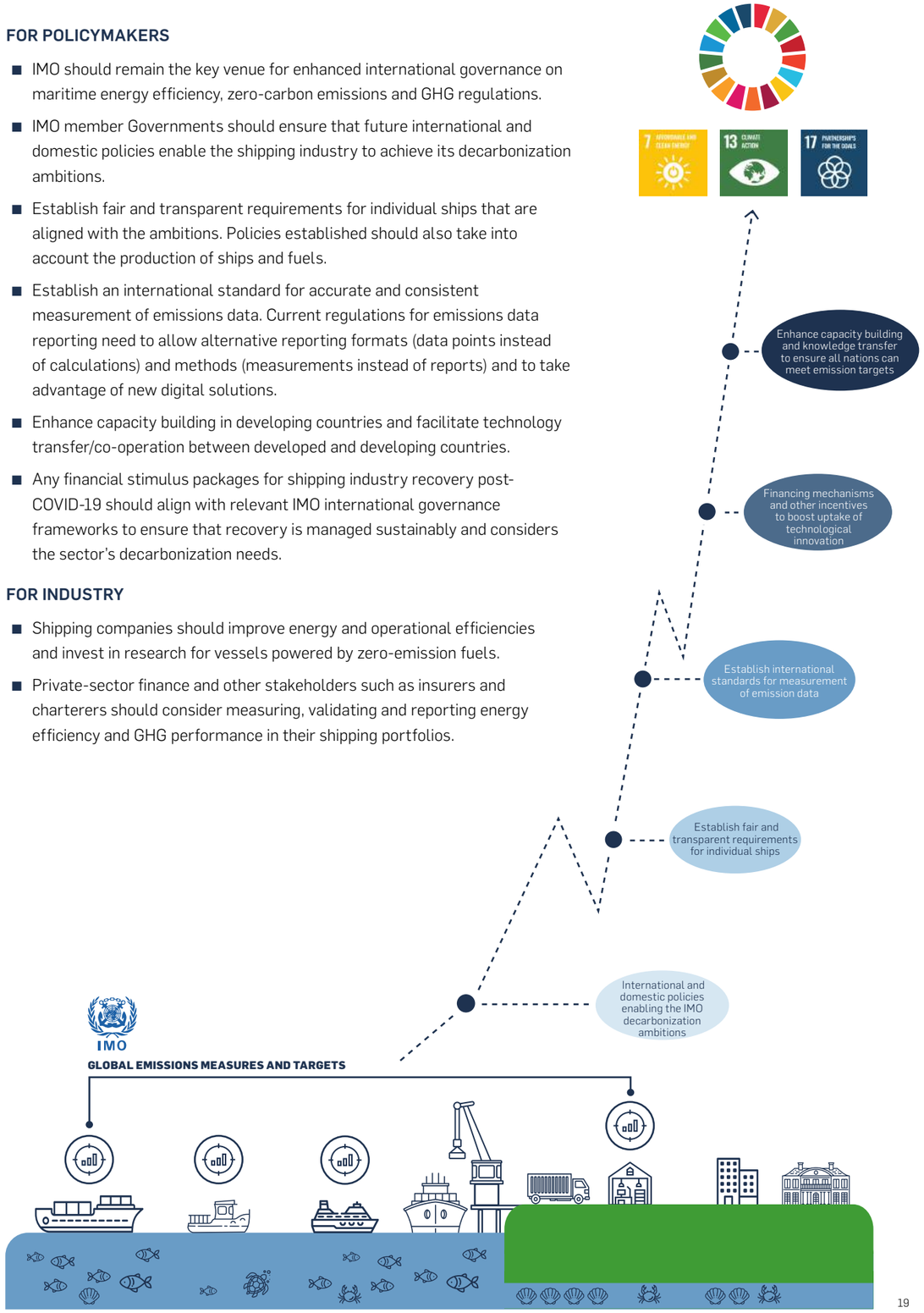
## RECOMMENDATIONS

### FOR POLICYMAKERS

- IMO should remain the key venue for enhanced international governance on maritime energy efficiency, zero-carbon emissions and GHG regulations.
- IMO member Governments should ensure that future international and domestic policies enable the shipping industry to achieve its decarbonization ambitions.
- Establish fair and transparent requirements for individual ships that are aligned with the ambitions. Policies established should also take into account the production of ships and fuels.
- Establish an international standard for accurate and consistent measurement of emissions data. Current regulations for emissions data reporting need to allow alternative reporting formats (data points instead of calculations) and methods (measurements instead of reports) and to take advantage of new digital solutions.
- Enhance capacity building in developing countries and facilitate technology transfer/co-operation between developed and developing countries.
- Any financial stimulus packages for shipping industry recovery post-COVID-19 should align with relevant IMO international governance frameworks to ensure that recovery is managed sustainably and considers the sector's decarbonization needs.

### FOR INDUSTRY

- Shipping companies should improve energy and operational efficiencies and invest in research for vessels powered by zero-emission fuels.
- Private-sector finance and other stakeholders such as insurers and charterers should consider measuring, validating and reporting energy efficiency and GHG performance in their shipping portfolios.



## AMBITION 2: SET UP AN INTERNATIONAL MARITIME RESEARCH & DEVELOPMENT FUND

Achieving the IMO's 2050 ambition and realizing the full vision of the Initial IMO Strategy requires a cohesive roadmap and a suite of low- and zero-carbon technologies and fuels on which to base the next maritime technology transition. The required technologies do not yet exist in a form or on a scale that is commercially viable for wide use by international shipping companies, especially for transoceanic voyages. The vast majority — 87 per cent — of the total capital investment needed is for land-based infrastructure and production facilities for low-carbon fuels. The remaining 13 per cent relates to the vessels themselves. The major impact for ships will be an increased fuel cost relative to other costs. For example, at US$ 350 per ton, the fuel cost can constitute up to 40 per cent of the total costs (IRENA, 2019a).

Decarbonizing shipping will thus require extensive research and innovation in energy-efficiency technologies and the development and wide deployment of new low- or zero-carbon fuels. This innovation cannot be directly mandated through regulations alone. Instead, we envisage R&D, and potentially incentives, playing key roles.

The development and deployment of new fuels will require national policies to address shipping and logistics within national and regional energy transition plans. National or regional efforts will not sufficiently transform the technology, energy and digital systems required to decarbonize the entire shipping industry.

> There is also an urgent need for international measures to accelerate R&D in developing low- and zero-carbon propulsion systems, technologies and fuels.

We therefore suggest that a global research fund be set up within the framework of the IMO. Indeed, one current industry proposal is the establishment of an International Maritime Research and Development Board (IMRB) financed by shipping companies worldwide via a mandatory contribution per tonne of marine fuel purchased.[32] Properly designed, this could provide significant funding for R&D and catalyse deployment of alternative fuel technologies and prototype infrastructure. In this context, public-private partnerships such as the Global Industry Alliance set up by the IMO could become key instruments for accelerating the development and uptake of innovative technologies.

While the shipping industry can and should contribute directly to R&D efforts that can be applied to the sector's transition, it is also important to share knowledge between industries. For example, as aviation and shipping face many of the same challenges, these industries could be expected to use similar low- or zero-carbon fuels.

### THE GREEN SHIPPING PROGRAMME

**NORWAY'S GREEN SHIPPING PROGRAMME AIMS TO FIND SCALABLE SOLUTIONS FOR EFFICIENT AND ENVIRONMENTALLY-FRIENDLY SHIPPING. IT INVOLVES INDUSTRY AND GOVERNMENT COLLABORATING IN A LONG-TERM PUBLIC-PRIVATE PARTNERSHIP.**

All significant players in the value chain contribute in the partnership, i.e. authorities, cargo owners, logistic companies, ship owners, yards, ports and vendors of electricity, gas, equipment and services. Organizations are joining the programme to learn from each other; obtain economic growth, cost savings and competitive advantages; influence future regulatory, financial and procurement policies and incentives; and to take a leading position within green shipping. The programme has so far launched some 20 large-scale pilot projects; eight of which are completed or under construction. Its studies and pilots are crucial for the phasing in of zero- and low-emission solutions in shipping towards 2030 with significant climate, environmental and public health benefits.

[32] Reduction of GHG emissions from ship. IMO MEPC 75/7/4, December 2019. www.ics-shipping.org/docs/default-source/Submissions/IMO/final-imrb-submission-to-mepc-75.pdf.

[33] The scale of investment needed to decarbonize international shipping. Global Maritime Forum. 20 January 2020 [online]. www.globalmaritimeforum.org/news.



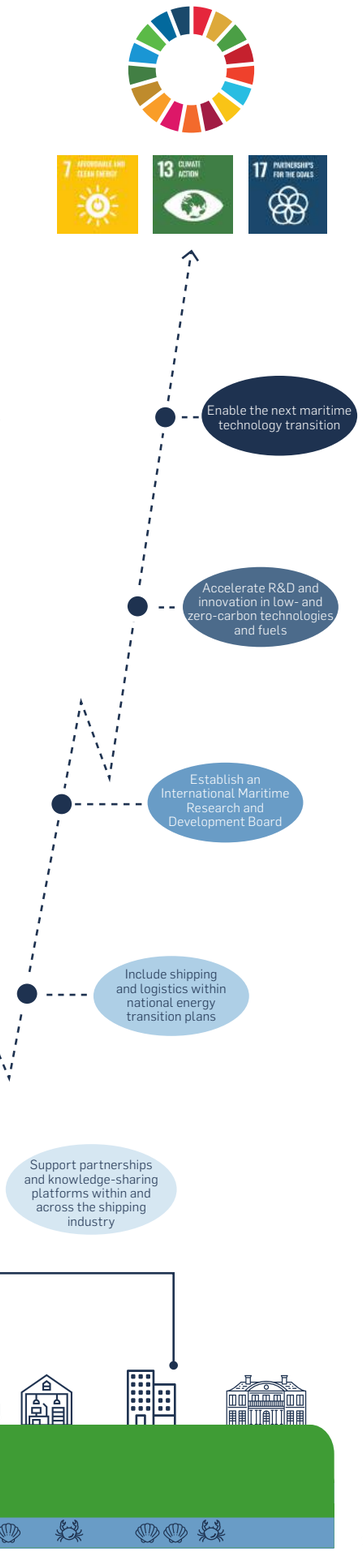
## RECOMMENDATIONS

### FOR POLICYMAKERS

- Include shipping and logistics within national energy transition plans to incentivize availability of alternative fuels and associated infrastructure development.
- Include shipping/maritime industry decarbonization needs in post-COVID-19 recovery packages.
- Establish frameworks for cross-sector transfer of developments in low- and zero-carbon propulsion systems, technologies and fuels.
- Support and urgently establish a research fund, for example the proposed International Maritime Research and Development Board (IMRB) within the framework of the IMO. A research fund should:
  - ☐ Speed development of low- and zero-carbon emission technologies and fuel systems tailored for maritime application, especially on larger transoceanic vessels;
  - ☐ Identify technical and operational innovations to reduce the high transportation costs that exist for many developing countries and other remote locations; and
  - ☐ Create a knowledge-sharing platform for actors in and beyond the shipping industry.

### FOR INDUSTRY

- Establish and engage in private and public-private partnerships in order to promote and share knowledge on technologies and solutions. Examples of existing partnerships are given in the introduction to this chapter and in the box opposite.



# 3. HARNESSING OCEAN ELECTRICITY

Offshore Renewable Energy (ORE) — including offshore wind, tidal, wave, floating solar, salinity gradient and ocean thermal energy — is starting to play an increasingly significant role in mitigating global climate change (IRENA, 2014). Offshore wind, the main focus of this chapter, is the most commercially established, while the other technologies are progressing along the technology readiness levels.

Broad-scale development of ORE requires supportive governmental and regulatory policies and appropriate market drivers to provide certainty, de-risk investment and accelerate sustainable development. Developing large-scale ORE projects as part of energy policy will support the GHG emission reductions needed by 2030 to meet the Paris Climate Agreement targets to achieve net-zero carbon by 2050.

Offshore renewables are maturing rapidly. In particular, offshore wind is being widely adopted where market conditions are favourable. For instance, technical innovation is reducing lifetime costs of the energy generated by offshore wind to levels often equal to or less than traditional forms of electricity generation (IRENA, 2019b). The cost of offshore wind fell nearly 45 per cent in Europe between 2013 and 2017 according to a report for Wind Europe (Hundleby, 2017).

Technological advances will also raise the competitiveness of tidal, wave energy[34] and floating solar. These technologies can be applied economically on a smaller scale and at a smaller overall cost. This can make them attractive to smaller coastal and island communities where energy demand is lower and the cost of entry meets budget requirements. Nonetheless, some large-scale development projects are also underway.[35]

Offshore wind development requires significant investment in specialized components and skillsets, creating a great opportunity for local economic benefits through job creation and building local supply chains. Engaging the local community in the development of ORE can better encourage a collective responsibility for ocean stewardship.

While offshore wind development has matured in some places, it remains young in many and few Governments highlight ORE as an important part of their overall energy policies. Lack of policy clarity and coordination and inconsistent regulation between and within countries creates risk for commercial investment in ORE and delays project development.

> Governments should adopt ORE as a core strategy to decarbonize energy rapidly and widely to help solve the global climate crisis.

## ONGOING GOVERNANCE AND REGULATION PROCESSES

Internationally, regulation of ocean energy generation is anchored within UNCLOS[36] where the implementation and responsibilities lie with nation states (Pretlove et al., 2018; Giannopoulos, 2019). Alignment of ORE policies across countries and regions to create an attractive environment for investment will drive the sustainable growth desired for ORE in support of the Global Goals. Integration of ORE into broader planning and governance frameworks to bring together multiple sectors — including environment, development and fisheries — is also necessary to guarantee a meaningful balance in allocating space and resources to meet the objectives of energy generation, food production and biodiversity conservation.

Commercially, market and industry initiatives are also needed, such as private governance initiatives led by industry and other non-state actors like environmental organizations (e.g. standards, best practice, certification and rules complementing public policy initiatives).

Numerous incentives and mechanisms have helped to stimulate the industry with positive governance and regulations; however, further efforts are needed. Examples of good practice include the UK Government's 2019 Sector Deal and Offshore Wind Renewable Energy Certificates (ORECs) and Production Tax Credits in the US.[37, 38, 39, 40, 41]

[34] IEA Tracking report on ocean power [online], May 2019. www.iea.org.
[35] For a recent update on ocean energy in Europe, a leading location for projects of varying scales of ambition, see March 2020 summary 'Ocean Energy Statistics: European tidal power generation jumps by 50% in 2019.' www.oceanenergy-europe.eu.
[36] UN Convention on the Law of the Sea. www.un.org.
[37] www.gov.uk/government/publications/offshore-wind-sector-deal.
[38] www.thecrownestate.co.uk/media/3321/tce-r4-information-memorandum.pdf.
[39] www.gov.uk/government/consultations/contracts-for-difference-cfd-proposed-amendments-to-the-scheme-2020.
[40] www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-Solicitations/ORECs.
[41] www.awea.org/policy-and-issues/tax-policy.



Photo: Eugene Suslo on Shutterstock

**THE OCEAN DECADE AND HARNESSING OCEAN ELECTRICITY**

**THE OCEAN DECADE WILL CONTRIBUTE TO PROMOTING A SUSTAINABLE OCEAN ECONOMY BY GENERATING KNOWLEDGE, APPLICATIONS AND SERVICES TO UNDERPIN DEVELOPMENT OF OCEAN-RELATED INDUSTRIES INCLUDING OCEAN RENEWABLE ENERGY.**

Data sharing between private entities in the ORE sector is improving and it is critical that this increases to accelerate technological development and knowledge of the ocean environment. To avoid conflicts delaying development, significant data and knowledge are required to enable efficient planning of future ORE projects that consider all stakeholders who use and operate in the ocean. Public-private collaboration in setting up appropriate management infrastructure can accelerate the industry's maturation and help communities to realize opportunities and optimize economic and societal benefits. The Ocean Decade can provide the framework for stakeholders to coordinate efforts and cooperate to accelerate ocean science as well as to develop fit-for-purpose data, information and knowledge management systems to find efficient, systematic solutions to complex challenges.

## AMBITION 1: ALIGN POLICY WITH CLEAR AND TARGETED STRATEGIES

We see a clear need for greater ambition, the alignment of national policies and the creation of coherent and targeted strategies to encourage adoption of ORE as a significant aspect of energy policy. There is also a need to share with emerging ORE markets the best practices learned from early deployments, including analysis and fair assessment of direct and induced positive and negative impacts on the environment, biodiversity, economy and communities. Recognizing that countries have different conditions and preferences, this alignment and best practice sharing can ensure maximal adoption of ORE technologies in the most appropriate locations around the globe to achieve their full potential to generate clean electricity.

Governments are encouraged to review national energy policy and adopt ORE as a core part of strategies to decarbonize energy systems while providing affordable and secure energy supplies for all. Government commitment is needed to create robust policy and relevant regulatory regimes to encourage significant ORE development.

Shaping energy policies within ocean governance frameworks to incorporate all ocean uses and to ensure full inclusion of all relevant stakeholders resolves the many potential impacts around shared ocean uses. This will also be critical to avoid conflicts and barriers to the financial success of ORE projects.

Achieving effective governance at a national level requires strong sectoral and cross-sectoral governance frameworks, clear divisions of roles and responsibilities between government ministries and cooperation and coordination between public and private sectors and with relevant stakeholders.

Stakeholder harmony around ocean use in areas where ORE can be developed is critical to provide stable and supportive market parameters. Industry can assist Governments to identify the most attractive locations for ORE while considering negative and positive impacts regarding safety, economic effects, air quality, wildlife impacts, community concerns and other uses of the sea. Close collaboration is required to find reasonable solutions around marine spatial planning issues and coexistence across industries.

Collaboration is critical for acceptance of what is to many a new technology and fresh way of thinking. Businesses, particularly those involved in the development of offshore wind and other ORE technologies, can provide Governments with a clear understanding of the financial benefits of adopting ORE in national energy portfolios. Presentation of the positive financial return on the policy investment made, increase in jobs and local economic benefits and reduced emissions from energy production will validate the inclusion of ORE in energy portfolios.

### UK SECTOR DEAL FOR OFFSHORE WIND

**THE UK GOVERNMENT AND OFFSHORE WIND INDUSTRY HAS AGREED ON A SECTOR DEAL; SECURING OFFSHORE RENEWABLES AT THE HEART OF THE UK'S FUTURE ENERGY MIX AS A LARGE-SCALE, LOW-CARBON FORM OF ELECTRICITY GENERATION.**

The deal includes a 30-gigawatt target for offshore wind installed capacity by 2030 — providing 30 per cent of the UK's electricity. It aims to create 20,000 new skilled jobs and industry is expected to invest £250 million to develop the supply chain. The deal will mean more electricity coming from renewables than fossil fuels with 70 per cent of UK electricity predicted to be from low-carbon sources by 2030. This supports several Global Goals highlighted in this report.

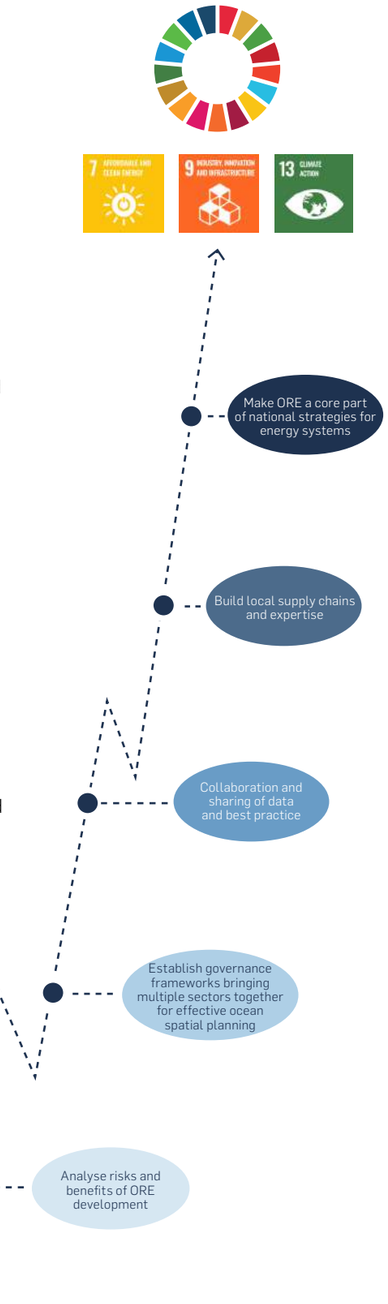
## RECOMMENDATIONS

### FOR POLICYMAKERS

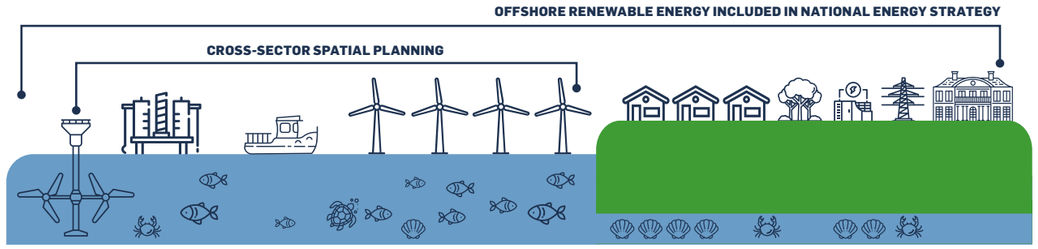
- Analyze the risks and benefits of ORE development as part of overall national energy policy.
- Create transparent regulatory processes for identifying potential sites, conducting site assessment activities and engaging stakeholders in the decision process through comprehensive and effective ocean spatial planning.
- Establish governance frameworks ensuring that ocean sectors can coexist safely and successfully, but accompanied by regulatory regimes that allow projects to be permitted in a timely manner.
- Policy should consider building on experiences from the industry and should be integrated into broader planning and governance frameworks that bring multiple sectors together.[42]
- Establish investment policies encouraging projects to invest locally to build local supply chains and expertise to maximize local economic benefits.
- Develop data strategies for sharing experience and knowledge between stakeholders.

### FOR INDUSTRY

- Acknowledge the importance of building local supply chains and expertise and use project development capital to bring local business into the industry.
- Developers are encouraged to participate in the development and implementation of relevant ocean governance processes at the national and regional levels.
- Share current industry knowledge of the interplay between offshore wind installations and stakeholders (e.g. the fishing industry) with the goals of preserving stocks and minimizing impacts on fishermen.




[42] For example, the 2020 Work Programme of the North Seas Energy Cooperation countries broadened goals for offshore wind and decarbonization. It states that 230 to 450 gigawatts of offshore wind will be needed to deliver climate neutrality by 2050, a technologically feasible goal.



## AMBITION 2: TARGET MARKET CONDITIONS AND ECONOMIC INCENTIVES

Initially, there needs to be a clear and coordinated regulatory environment in place followed by long-term commitments through stable policy. Ultimately, the industry needs a pathway to market. Governments working in partnership with industry can create the right market conditions to encourage rapid development of offshore wind and other ORE projects.

Investment in ORE technology will accelerate reductions in the cost of producing energy from these sources, which in turn, will create the favourable economic conditions needed for wider adoption. For instance, reductions in the cost of offshore wind has accelerated its development in early-adopter countries and these benefits can be realized in other geographies (IEA, 2018).

Vehicles and policy tools to achieve the right market condition include relevant Government agencies, robust Power Purchasing Agreements (PPAs), reliable judiciary systems, stimulation schemes and incentives.

Creating a transparent route to market is essential, as is enabling financeable projects. With these economic goals in mind, Government are encouraged to develop explicit Government agency responsibilities and competence, produce clear legal requirements and establish regulatory and governance frameworks that reduce uncertainty for the industry. Such frameworks can include spatial planning and revenue-support mechanisms to encourage the development of necessary infrastructure and the supply chain, including education and skills training.

Governments can learn from early-adopter countries and experienced ORE developers who can bring scale to emerging markets. Policymakers can also review policies in other sectors (fishing, shipping, tourism, etc.) to ensure that these do not inhibit, but instead promote development and coexistence. This cross-sectoral approach is a critical element of an effective ocean governance framework. It will also be important to incentivize and foster the development of new business models for ORE technologies by coupling these with aquaculture, ocean observation, desalination plants, water vehicle charging, power generation for ports, etc.

In parallel with the development of offshore energy projects, good collaboration between industry players and the application of emerging technology are needed to create an efficient and far-reaching energy network and grid structure that can store and distribute electricity where and when demand requires it.

Businesses should encourage the sharing of data and information among private sector players and beyond through initiatives that create mutual benefit. Companies should advise Governments on the development of favourable regulatory frameworks that de-risk ORE projects, attract investment and future-proof development of ORE projects and associated infrastructure.

### BRAZIL ASSESSING ORE POTENTIAL AND DEVELOPING A ROADMAP

**BRAZIL BEGAN ITS OFFSHORE WIND INITIATIVE IN 2018 THROUGH ITS ENERGY RESEARCH OFFICE (EPE). THE EPE MAPPED THE OFFSHORE WIND POTENTIAL OF THE ENTIRE ATLANTIC COAST FOR THE COUNTRY AS PART OF ITS NATIONAL ENERGY PLAN FOR 2050.**

This early predictive planning uncovered possible barriers and challenges to the development of offshore wind and provided developers and stakeholders with an opportunity to make recommendations and provide input in the energy planning process. The input triggered discussions concerning efficient and productive development of offshore wind and created a foundation on which clean energy planning for the country could be built.

This led to the EPE publishing a roadmap for the country for offshore wind potential. The roadmap laid out the technological aspects and costs of offshore wind power, grid connections and the legal, regulatory and environmental framework for offshore wind development.[43] As of January 2020, Brazil had six wind farms in licensing phase with a combined capacity of 9 gigawatts.[44]

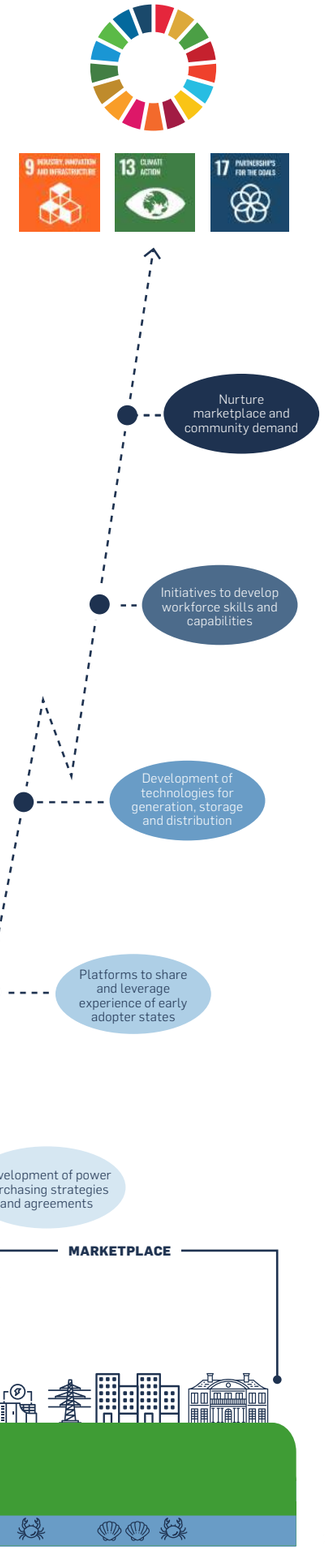
## RECOMMENDATIONS

### FOR POLICYMAKERS

- Policies need to be transparent and provide a clear route to market so that industry can confidently invest in ORE projects. Businesses need clarity on how markets work in different geographies.
- Develop policies that enable financial channels and support mechanisms that consider a full range of market sizes, such as through programmes with financial institutions, grants, R&D budgets and incentives.
- Policy and market alignment must ensure that small island nations and developing communities can access ORE. Being unable to aggregate demand, many such entities currently rely on higher-carbon energy.
- Establish regional co-operation as well as energy sharing and/or trading so that nations and communities with lower energy demand can work together to create enough market potential for large-scale ORE.
- Create a transparent and competitive market approach for the procurement of ORE, including the establishment of objective evaluation criteria where developers of ORE can compete to supply energy.
- Enact policies and market support to accelerate development of large-scale energy storage mechanisms for energy production to better match variable load and demand.
- Consider grid and transmission requirements as part of the identification of development areas to ensure that infrastructure upgrades match the development timescales of projects.
- Assist shore-side grid operators to upgrade infrastructure so land-based power grids can connect ORE electricity to inland communities without coastal resources.

### FOR INDUSTRY

- Consider ORE integration with energy-storage systems and load-based energy distribution systems and take into account the variable, but predictable generation from ORE into broader energy-system planning.
- Incorporate electrical-output and grid-reliability best practice and industry-leading technology to optimize power delivery.




[43] Brazilian Offshore Wind Roadmap. Empresa de Pesquisa Energética (Energy Research Office). 17 February 2020. storymaps.arcgis.com.
[44] Brazil has offshore wind generation potential of 700 GW – EPE. Morais, L., Renewables Now [online], 27 January 2020. renewablesnow.com.

# 4. END WASTE ENTERING THE OCEAN

Marine litter and pollution, atmospheric deposition and nutrient over-enrichment endanger ocean health and productivity (WOR, 2015; UN, 2017). This chapter focuses on two of the many pressures: plastic waste and excess nutrients from farms and wastewaters. Both are receiving increased public attention while several initiatives are aiming to help through innovation and driving change.

Plastics are of concern due to environmental risks, effects on wildlife and their potential to affect the food chain, human health, tourism and recreation (Walkinshaw et al., 2020; Health Canada, 2020). Plastic litter of varying size is visible along coasts and underwater. Stopping plastic waste entering the ocean depends primarily on how we handle plastics on land (Veiga et al., 2016).

Organic and mineral fertilizers containing the essential plant nutrients nitrogen and phosphorus can contribute to productive soils and healthy crops. However, excessive, non-optimal fertilization methods and practices may lead to nutrients not consumed by plants entering water streams.

This can result in eutrophication in which overgrowth of algae leads to oxygen-depleted zones incapable of sustaining life, particularly in areas with limited water exchange (HELCOM, 2018).

Inadequate industrial and urban wastewater treatment also contributes to the problem, which can be compounded by rising water temperatures due to climate change.

Some 150 million tonnes of plastic waste are already circulating in the ocean (Jambeck at al., 2015) and an estimated 8 million tonnes more is added annually. If waste keeps entering the ocean at current rates, it will significantly harm ocean health and productivity and human and planetary health (Ocean Conservancy, 2015). Population and consumption growth certainly indicate the need to improve the management of waste and nutrient run-offs.

Deep understanding of links between subsidy schemes and environmental impacts is also required to clarify which initiatives can drive changes needed to secure a healthy and productive ocean.

> Despite the scale and complexity of the challenge, we can end waste entering the ocean by 2030. The solutions involve financing, giving waste a value and public-private partnerships supported by Government policies.

## ONGOING GOVERNANCE AND REGULATION PROCESSES

UNCLOS offers broad guidance, but lacks the detail to govern complex issues such as marine litter (Vince, 2018). Several UN Environment Assembly (UNEA-4) resolutions cover marine plastic and microplastic litter, but global initiatives have not yet galvanized levels of action, detail and capital needed to end waste entering the ocean. Within UNCLOS's legal framework, IMO has set detailed requirements for the shipping industry to manage waste. However, availability of adequate waste reception facilities at ports and terminals varies greatly.[45]

International bodies acting on UNCLOS rely on regional, national and municipal laws for full implementation.

Several regional bodies actively recommend policies, regional action plans,[46] minimum standards and guidance for tackling waste problems. Several jurisdictions, including the EU, are phasing out unnecessary single-use plastic or the manufacture of certain plastic products.[47, 48, 49, 50, 51]

EU regulations to avoid marine eutrophication are regarded as best practices. Several EU member states want measures promoting balanced nutrition and efficient nutrient use in agriculture included in the Common Agricultural Policy by 2021. The EU Nitrates Directive defines a maximum level of manure to avoid nutrients reaching surface waters and groundwaters, but it is insufficiently enforced.

[45] International Chamber of Shipping overview of action and its guidance on plastics from shipping. Access at www.ics-shipping.org/docs/default-source/key-issues-2019/action-on-plastics-(june-2019).pdf.
[46] GRID-Arendal science-based graphics on regional action plans on marine litter. Accessed at www.grida.no/resources/6928.
[47] ec.europa.eu/environment/waste/pdf/single-use_plastics_factsheet.pdf.
[48] US submission to Asia-Pacific Economic Co-operation, Lima, Peru. November 2016. Accessed at www.mddb.apec.org/Documents/2016/SOM/CSOM/16_csom_010.pdf.
[49] Basel Convention overview of plastic waste. Access at www.basel.int/Implementation/Plasticwastes/Overview/tabid/6068/Default.aspx.
[50] The Ocean Plastics Charter endorsed by 25 nations, the EU, and 69 businesses and organizations by May 2020. Accessed at www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/international-commitments/ocean-plastics-charter.html.
[51] European Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources. Accessed at www.ec.europa.eu/environment/water/water-nitrates/index_en.html.



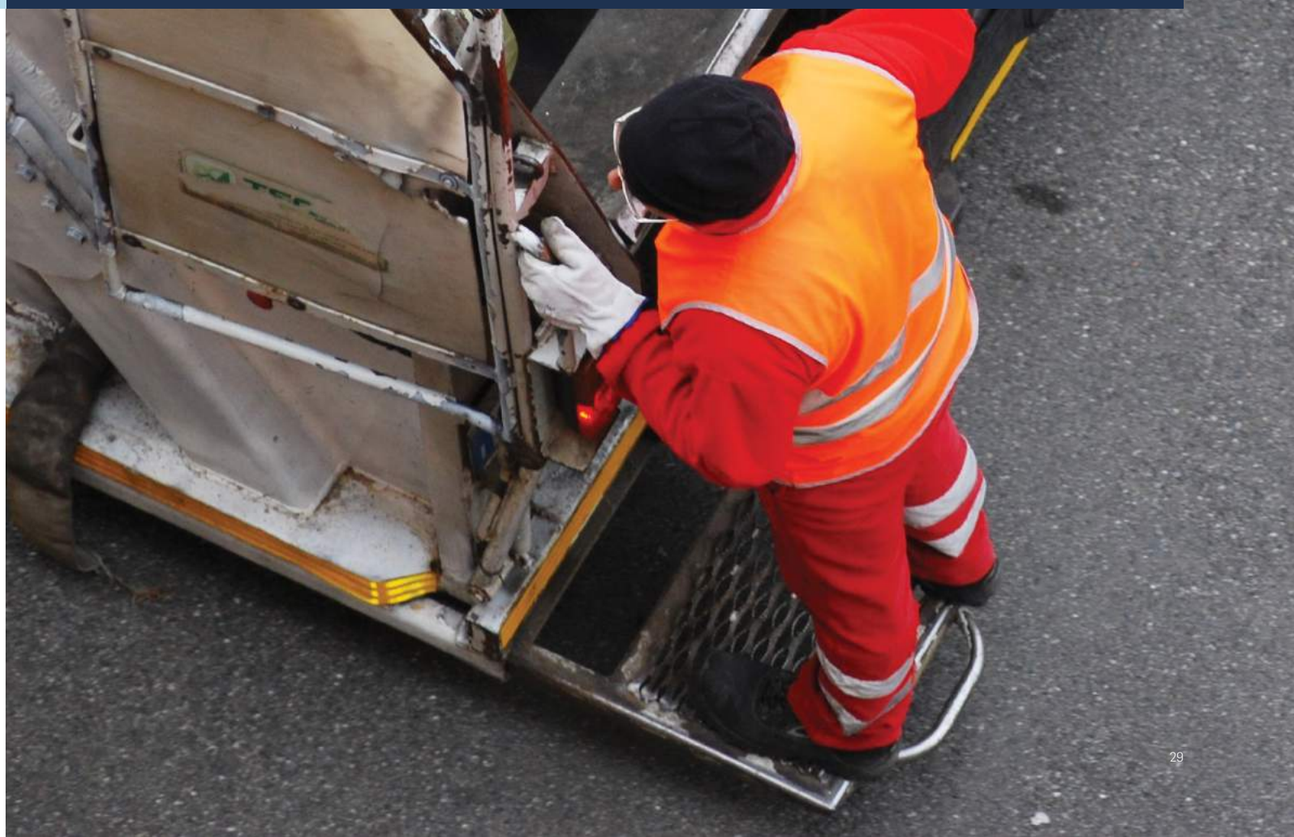
Photo: ilegetzica on Shutterstock

### THE OCEAN DECADE AND ENDING WASTE ENTERING THE OCEAN

**THE OCEAN DECADE WILL CONTRIBUTE TO ACHIEVING A CLEAN OCEAN WHERE SOURCES OF POLLUTION ARE IDENTIFIED AND REMOVED. KNOWLEDGE GENERATED THROUGH THE OCEAN DECADE CAN REVEAL THE CAUSES AND SOURCES OF POLLUTION, AND HELP TO PRIORITIZE AND INFORM THE MOST EFFICIENT AND EFFECTIVE INTERVENTIONS TO ELIMINATE OR REDIRECT HARMFUL ACTIVITIES.**

The Ocean Decade can contribute to the development of scientifically-proven methods to assess the impacts of different pollutants on human health and ecosystems and can facilitate collaborations with industry to develop the technology needed to remove pollutants from the ocean. The Ocean Decade can also contribute to the generation of services and applications that can assist industry to quantify and reduce the pollutant load. This could include, for example, farm sustainability tools to manage nutrient pollution (such as Farm Sustainability Tool for Nutrients, FaST) that will enable farmers to fertilize more precisely, thus reducing run-offs and emissions.[52]

[52] Isidro Campos, European Commission, 2020. CAP reform post-2020.



## AMBITION 1: END PLASTIC WASTE ENTERING THE OCEAN

Governments, industry, civil society and citizens should collaborate to invest in universal access to effective waste management systems to capture plastic waste from land and ocean activities. The keys are appropriate education and incentives to encourage participation, better-designed materials and solutions and business models facilitating a circular economy in plastics.

The requirements are improved collection infrastructure, sorting, and reprocessing systems delivering effective results for investors, governments, communities and the environment.

Adding incentives and stimulating end markets for plastics will further these ambitions (Ocean Conservancy, 2017). Preventing waste generation through effective and innovative plastic material design will also become increasingly important. This will help reduce plastic use where unnecessary; for example, stopping the use of excessive packaging. Government and industry should support the development of open standards and common solutions that will catalyse circular solutions and designs that will reduce and improve classification, sorting and traceability of plastic waste.

Together, we must enable inter-industry and inter-sectoral collaborations and partnerships pursuing six broad strategies simultaneously.

**Strategy 1:** Rally businesses and Governments worldwide behind design and implementation of circular economy solutions for plastic.

**Strategy 2:** Minimize inadequate disposal methods such as open burning, open dumping and unsecured dumpsites.

**Strategy 3:** Reduce dumping into waterways and discarding directly into oceans.

**Strategy 4:** Improve collection, sorting and processing systems.

**Strategy 5:** Improve effectiveness and livelihoods for waste collectors.

**Strategy 6:** Enable growth in sustainable markets for processed material streams.

Global and regional partnerships and innovative business-led initiatives are forming across the plastic value chain in order to find solutions and accomplish these objectives. For example, profitable business models improving livelihoods in Mexico (Cámara-Creixell,2019; ECOCE[53]) and South Africa (PETCO, 2019) have been found by boosting PET[54] plastics collection and post-consumer recycling.

UN agencies have also joined forces. For example, IMO and FAO have developed GloLitter Partnerships (GLP),[55] a global programme to build partnerships to assist developing countries addressing the issue of marine litter from the shipping and fisheries sectors.

There is an urgent need to further accelerate and scale these business actions and collaborative efforts.

### COLLABORATION FOR ENDING PLASTIC WASTE

**THE ALLIANCE TO END PLASTIC WASTE IS A GLOBAL NOT-FOR-PROFIT ORGANIZATION WITH MORE THAN 40 MEMBER COMPANIES PARTNERING WITH GOVERNMENT, DEVELOPMENT NGOS AND COMMUNITIES.**

It represents unique expertise and brings solutions in infrastructure, innovation, education and clean-up projects addressing the challenge to end plastic waste in the environment.[56] It has already funded and initiated infrastructure, innovation, education and clean-up projects that address the ambition in Asia and Africa. The alliance is, for example, one of Project STOP's strategic partners. STOP supports cities in Southeast Asia with technical expertise to achieve zero leakage of waste and create more circular systems that increase the value generated from waste.
This will provide economic sustainability and open benefits for the local community by creating new jobs in the waste management system and reducing the impacts of mismanaged waste on public health, tourism and fisheries.[57]

[53] ECOCE, a non-profit civil association created and sponsored by the consumer products industry for the proper management of packaging and packaging waste in Mexico, unites efforts of companies, government and civil society to create environmental sustainability. Access at www.ecoce.mx.
[54] Polyethylene terephthalate (PET) is part of the polyester family and is used for, among others, clothing and containers, such as plastic bottles, for liquids and foods such as plastic bottles.
[55] Global project launched to tackle plastic litter from ships and fisheries. IMO briefing 34, 5 December 2019 [online]. www.imo.org/en/MediaCentre.
[56] Alliance to End Plastic Waste. www.endplasticwaste.org.
[57] Stop Ocean Plastics (STOP). www.stopoceanplastics.com.



## RECOMMENDATIONS

### FOR POLICYMAKERS

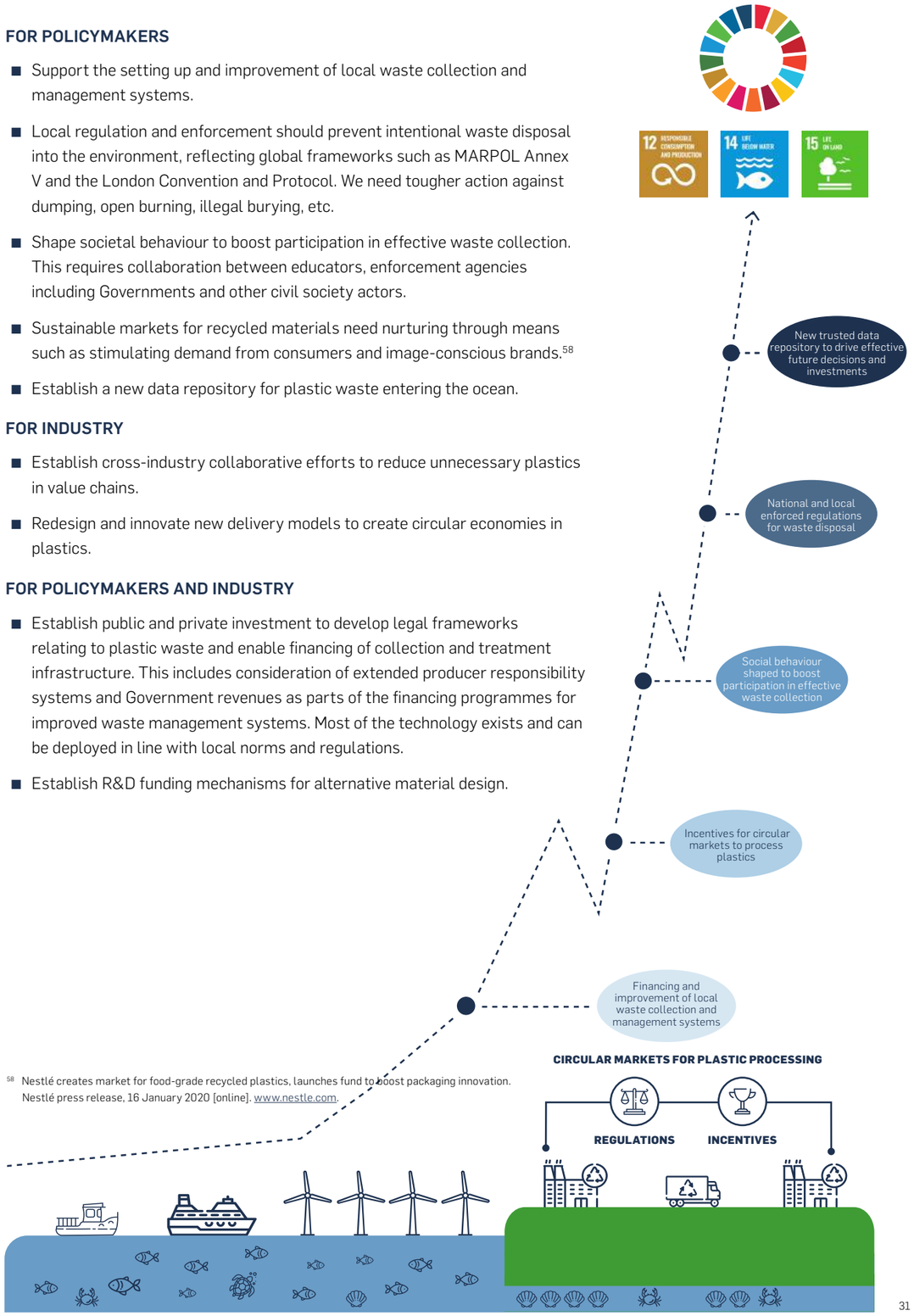
- Support the setting up and improvement of local waste collection and management systems.
- Local regulation and enforcement should prevent intentional waste disposal into the environment, reflecting global frameworks such as MARPOL Annex V and the London Convention and Protocol. We need tougher action against dumping, open burning, illegal burying, etc.
- Shape societal behaviour to boost participation in effective waste collection. This requires collaboration between educators, enforcement agencies including Governments and other civil society actors.
- Sustainable markets for recycled materials need nurturing through means such as stimulating demand from consumers and image-conscious brands.[58]
- Establish a new data repository for plastic waste entering the ocean.

### FOR INDUSTRY

- Establish cross-industry collaborative efforts to reduce unnecessary plastics in value chains.
- Redesign and innovate new delivery models to create circular economies in plastics.

### FOR POLICYMAKERS AND INDUSTRY

- Establish public and private investment to develop legal frameworks relating to plastic waste and enable financing of collection and treatment infrastructure. This includes consideration of extended producer responsibility systems and Government revenues as parts of the financing programmes for improved waste management systems. Most of the technology exists and can be deployed in line with local norms and regulations.
- Establish R&D funding mechanisms for alternative material design.




[58] Nestlé creates market for food-grade recycled plastics, launches fund to boost packaging innovation. Nestlé press release, 16 January 2020 [online]. www.nestle.com.

## AMBITION 2: END EXCESSIVE NUTRIENTS ENTERING THE OCEAN

Nutrients, pesticides, salts, sediments and organic matter are major agricultural contributors to water pollution (Mateo-Sagasta et al., 2017). This chapter focuses on excessive nutrients. While run-off with mineral and organic nutrients needs to be reduced, a balance needs to be struck with food supply security as mineral fertilizers contribute to some 50 per cent of global food production (Erisman et al., 2019). In addition, fertilizer-enhanced crop productivity reduces land-use change, leading to greenhouse gas savings (Burney et al., 2010).

The optimal approach would be to improve nutrient-use efficiency (NUE) and the sustainable intensification of food production by promoting sustainable farming practices (IFA, 2018). This aligns with the science-based '4R' farming principles i.e. apply the right source of nutrients, at the right rate for the crop, at the right location in the field and at the right time to match evolving nutrient requirements over time. The most impactful measures are to avoid run-offs and to control and capture waste streams and recycle the nutrients.

Avoiding run-offs is best achieved through crop- and site-specific fertilizer best management practices, optimizing fertilizer application to only what the plants take up. Practices that improve NUE and effectiveness prevent both nutrient run-offs and GHG emissions. Maximizing crop nutrient uptake also improves the livelihoods of large and small farms.

Efficient use of nutrients and water are linked. Applying fertilizers with irrigation water raises plant uptake of nutrients. Precise placement and timing optimize overall consumption of water and fertilizer. Precision farming is not only solving the problem of nutrient leaching and water scarcity, but can also contribute to avoiding run-off of pesticides into nature. Conservation practices such as crop rotation, reduced tillage, mulching and cover cropping are also good ways to reduce nitrogen losses to the environment while boosting soil health and productivity.

> We must improve our capability to capture, recover and recycle nutrients of the right quality in the agri-system.

Excess nutrients in the sea also originate from industrial and urban wastewaters. Nutrient elements can be recovered from sources such as wastewater, processed manure, food industry waste and household biodegradable waste. The agricultural value chain, including food companies and retailers, needs to redesign its supply chains for a circular economy approach that revalorizes waste.

More efficient and innovative partnerships are needed to promote new nutrient-recycling models to connect the start and the end of the food value chain and to create profitable business.

### CIRCULAR AGRICULTURE MODEL

**TO MOVE TOWARDS A ZERO-WASTE SOCIETY, WE NEED SMARTER USE AND REUSE OF THE PLANET'S RESOURCES. COMPANIES CAN DRIVE THIS THROUGH BETTER RESOURCE USE AND EFFICIENCY PRACTICES. NEW PARTNERSHIP TYPES ARE NEEDED TO CONNECT THE END AND BEGINNING OF TODAY'S LINEAR FOOD VALUE CHAIN.**

For example, the crop nutrition company Yara is partnering with waste management company Veolia in developing a strategic vision towards circularity based on hands-on, business-driven projects.[59] The partnership is creating circularity by connecting the beginning of the value chain — recovery of nutrients from waste-streams — with the end, revalorization of recovered nutrients in agriculture. The companies are jointly developing new circular agriculture models by recycling nutrients from urban, agricultural and industrial waste into high-quality fertilizers. This is reducing global resource depletion and nutrient loss — and giving waste a value.

[59] Veolia and Yara partner to propel European circular economy. Joint press release, 21 January 2019 [online]. globenewswire.com.

## RECOMMENDATIONS

### FOR POLICYMAKERS

- Require development and implementation of nutrient management plans for farms and target measures at NUE with target values based on farming system, regions and soil types.
- Provide available digital farm sustainability tools for nutrients to support precision farming.
- Educate consumers about products with reduced environmental impacts and reward producers of such products.
- Incentivize processing of specific waste streams, such as sewage sludge and manure, aligned with the European Commission's Circular Economy Package.[60]
- Establish development programmes to construct proper wastewater treatment in developing economies.

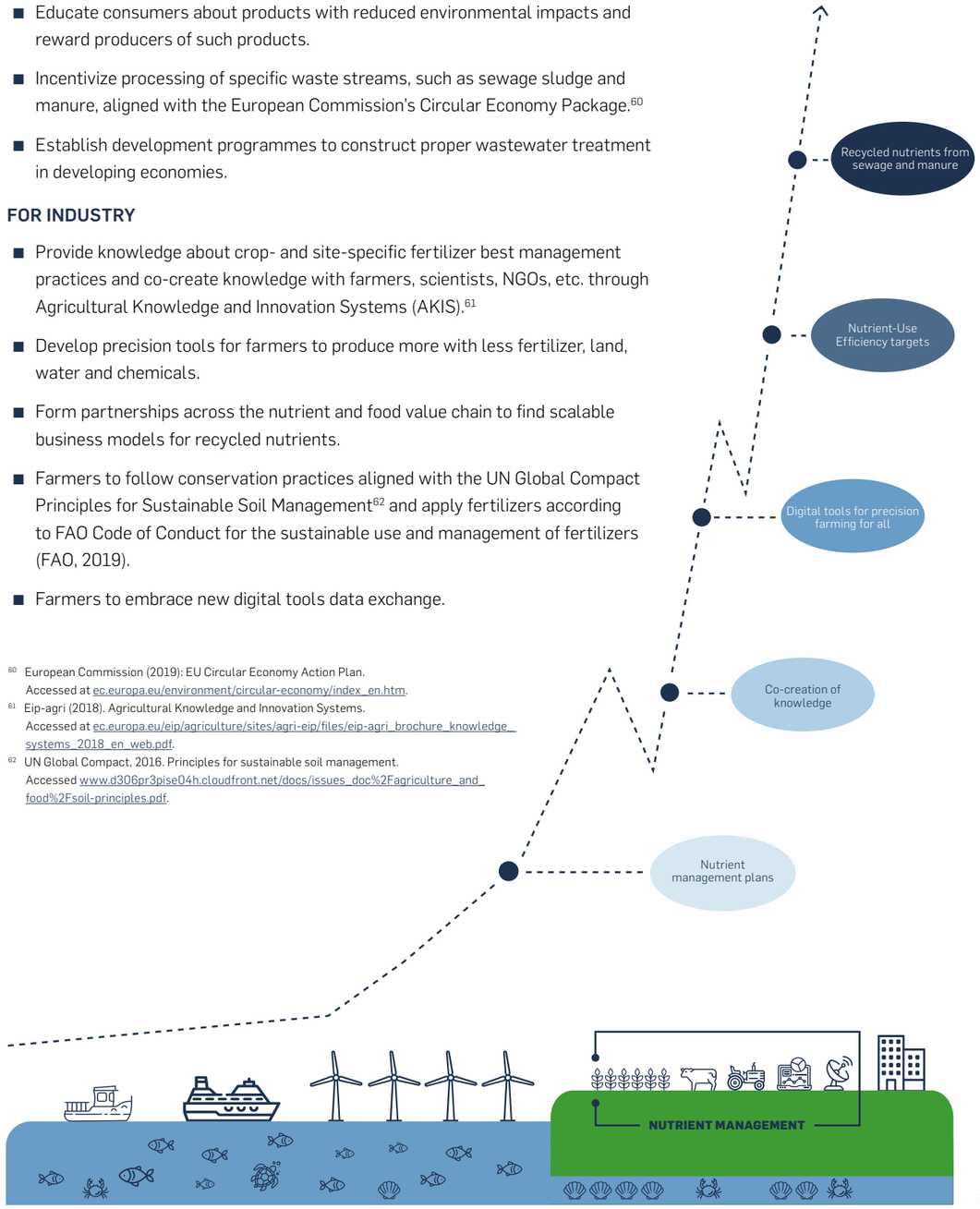
### FOR INDUSTRY

- Provide knowledge about crop- and site-specific fertilizer best management practices and co-create knowledge with farmers, scientists, NGOs, etc. through Agricultural Knowledge and Innovation Systems (AKIS).[61]
- Develop precision tools for farmers to produce more with less fertilizer, land, water and chemicals.
- Form partnerships across the nutrient and food value chain to find scalable business models for recycled nutrients.
- Farmers to follow conservation practices aligned with the UN Global Compact Principles for Sustainable Soil Management[62] and apply fertilizers according to FAO Code of Conduct for the sustainable use and management of fertilizers (FAO, 2019).
- Farmers to embrace new digital tools data exchange.

[60] European Commission (2019): EU Circular Economy Action Plan. Accessed at ec.europa.eu/environment/circular-economy/index_en.htm.

[61] Eip-agri (2018). Agricultural Knowledge and Innovation Systems. Accessed at ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_brochure_knowledge_systems_2018_en_web.pdf.

[62] UN Global Compact, 2016. Principles for sustainable soil management. Accessed www.d306pr3pise04h.cloudfront.net/docs/issues_doc%2Fagriculture_and_food%2Fsoil-principles.pdf.

# 5. MAPPING THE OCEAN

Large parts of our ocean and seabed remain relatively unexplored. The vastness, remoteness and harshness of the ocean combined with technological limitations and costs in acquiring data have limited marine research and mapping. International law requires collaboration and data sharing, but because ocean mapping has often historically been funded by specific hypothesis-driven science, coordination of mapping activities is often lacking. Government, defence, academic, non-governmental and private sector actors in different countries do not always share datasets and, when they do, the datasets are not always compatible or comparable. Global databases of ocean-related data consequently struggle to realize their full potential, resulting in fragmented understanding of the ocean and its processes.

Understanding human impacts on ocean health, and how ocean ecosystems are changing over time, is crucial for ocean stewardship and sustainable management of its resources. Such an understanding requires baseline data at appropriate scales and levels of resolution, continuous monitoring and fit-for-purpose tools and services to generate knowledge and support sound decision making.

The First World Ocean Assessment (WAIO; UN, 2016) is an example of such a baseline state of the world's ocean on the global scale. The assessment is the outcome of the first cycle of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment.[63] Ocean-based industries have an important role to play alongside Government, academic, defence and non-governmental communities in collecting and mutually sharing information. Multiple industries operating in the ocean space have already significant stores of mapping and biogeographic data which they increasingly share with scientists. A commitment to transparency and sharing of data is one of three core areas for business action in the UN Global Compact Sustainable Ocean Principles.[64]

Industry can engage with the ocean science community to better understand what is known collectively, identify critical gaps and develop innovative solutions.

Collaboration and co-design from the very start will be needed to fill the gaps, avoid duplication of effort and agree on common standards for data collection and dissemination to maximize the utility of data.

## ONGOING GOVERNANCE AND REGULATION PROCESSES

As a framework convention, implementation of the provisions in UNCLOS is the responsibility of states and falls within the mandate of several international bodies. This leads to considerable variation in approaches to conservation and sustainable use of the ocean and its resources. Several governance and regulatory processes are ongoing to address this.

The purpose of the UNESCO Intergovernmental Oceanographic Commission (IOC),[65] for example, is to promote international co-operation and to coordinate several programmes to understand and effectively manage the resources of the ocean and coastal areas.

The Ocean Decade is an important initiative in this respect (see Box on the right).

Important regulatory negotiations are ongoing for a new, international, legally binding instrument under UNCLOS on the conservation and sustainable use of BBNJs, marine biological diversity in areas beyond national jurisdiction (Pretlove et al., 2018). This includes issues relating to Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs).

The international community through the International Seabed Authority (ISA) has also adopted rules, regulations and procedures for effective and responsible resource exploration.[66] These sets of legislation include recommendations and guidelines for environmental baseline studies, including long-term monitoring of multiple environmental variables, EIAs, reporting and obligations for exploration contractors to collect ocean data and share it with ISA.

[63] The Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, was established by the UN General Assembly to contribute to the strengthening of the regular scientific assessment of the state of the marine environment in order to enhance the scientific basis for policymaking. It will be a key framework to be followed to support the strengthening of linkages between the industry/policymaking and the scientific community.

[64] UN Global Compact Sustainable Ocean Principles. www.unglobalcompact.org.

[65] Intergovernmental Oceanographic Commission. www.unesco.org/new/en/natural-sciences/ioc-oceans/about-us.

[66] The Mining Code, International Seabed Authority. www.isa.org/mining-code.



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**THE OCEAN DECADE AND MAPPING OF THE GLOBAL OCEAN**

**THE OCEAN DECADE WILL CONTRIBUTE TO ACHIEVING A PREDICTABLE OCEAN WHERE SOCIETY HAS THE CAPACITY TO UNDERSTAND CURRENT AND FUTURE OCEAN CONDITIONS.**

The Ocean Decade will support high-resolution mapping at all depths of the global ocean and its ecosystems to understand the operating environment and support sustainable and responsible resource management. Private companies, international authorities, NGOs, research institutions, academia and national authorities will collaborate to coordinate data collection and sharing, knowledge generation and co-design of solutions. For example, large amounts of data are being collected from ocean industries under ISA's regulatory regime for seabed resources exploration. ISA is talking with the Secretariat of the Intergovernmental Oceanographic Commission of UNESCO to ensure compatibility and possible data migration between ISA's DeepData database and IOC's Ocean Biogeographic Information System (OBIS).

## AMBITION 1: COLLECT OCEAN DATA

Ocean data collection will provide information on marine resources and ecosystems, including the seabed, which could affect how future generations will interact with the ocean to sustainably produce food, energy, minerals, water, leisure and new medicines.

Ocean data provides information and knowledge for safer shipping; laying cables and pipelines; installing offshore wind turbines, identifying energy, mineral and fisheries resources; weather and climate modelling; and tsunami and flood inundation modelling. This data helps improve science-based marine spatial planning and the design of policies to minimize and mitigate anthropogenic and multi-stressor impacts. There needs to be a concurrent reinforcement of capacity-building in these fields as this remains one of the major barriers to effective science as well as governance. The outcome is an ocean that is healthier, safer and more resilient.

Several industries interact with the ocean, primarily by using vessels and/or platforms, and some already contribute to the data collection efforts. For example, long term environmental studies are a requirement for seafloor mineral exploration and production. The associated data is submitted annually to the ISA and efforts are also being made to share the data more broadly.

There is a need, however, to accelerate technology development and innovative partnerships with ocean-based industries and more can be done to incentivize data availability and usability without creating risk for those providing it.[68]

Advances in communications, remote command and control, automation, artificial intelligence and machine learning will all improve the way the ocean is mapped. Measuring and monitoring technologies can be attached to submarine cables and shipping and fishing vessels to enhance ocean science and data collection.

As a first step, it is vital that all relevant stakeholders, and especially policymakers, understand the critical gaps in ocean knowledge. This understanding combined with a demonstration of support and prioritization by national Governments will create further market opportunities and demand. Where possible, coordination of data collection to fill these gaps is needed and data should be collected according to set standards.

There is a need to accelerate industry and inter-sectoral collaborations and partnerships to focus on solutions to collect standardized data (at all levels) on agreed parameters. Examples include bathymetry and ocean health indicators (such as temperature, salinity, acidity [pH], reactive nitrogen, phosphorus, chlorophyll-a and microplastics). A system for ensuring the quality of data should be developed within the same partnerships.

### THE NIPPON FOUNDATION-GEBCO SEABED 2030 PROJECT

**THE SEABED 2030 PROJECT IS A COLLABORATION BETWEEN THE NIPPON FOUNDATION AND THE GENERAL BATHYMETRIC CHART OF THE OCEANS (GEBCO).**

The project aims to inspire the complete mapping of the world's ocean by 2030 and to compile all bathymetric data into the freely available GEBCO Ocean Map. Seabed 2030 will incorporate all currently available data into its global grid and will identify existing data not currently in publicly available databases. It will seek to make this data available and identify areas for which no data exists to encourage data collection in these zones. All gathered data will be used to create new bathymetric data products. The core product is a digital grid of the world ocean bathymetry and an updated grid will be released every year.

## RECOMMENDATIONS

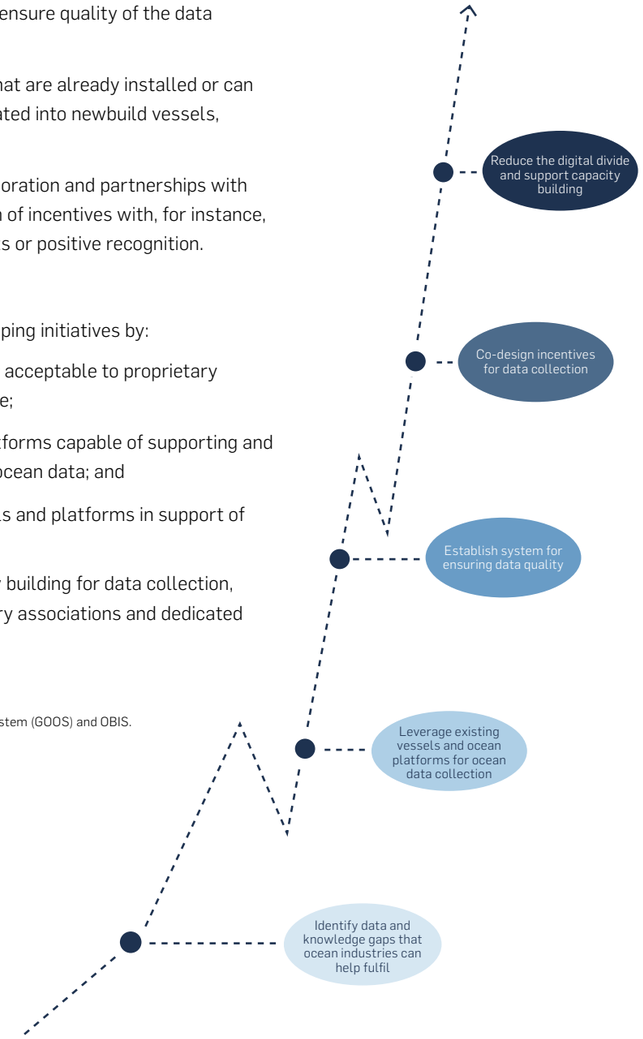
### FOR POLICYMAKERS

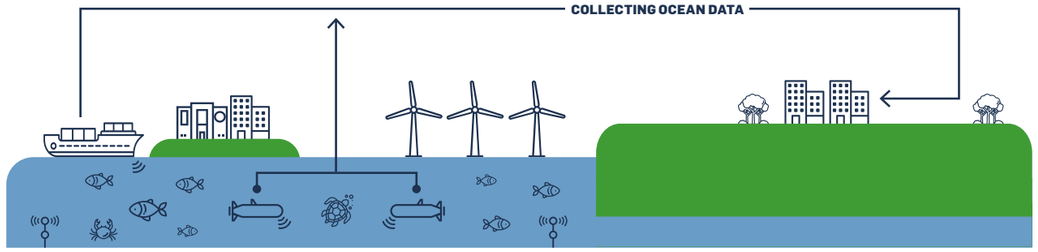
- Engage with all stakeholders and accelerate efforts to identify:
  - ☐ Existing ocean data and research efforts, ocean-related databases and ongoing initiatives;[69]
  - ☐ Gaps in ocean data and related capacity to develop a list of 'knowledge/ research priorities' that ocean industries can help fulfil;
  - ☐ Parameters to be studied and a system to ensure quality of the data collected; and
  - ☐ Sensors and other equipment/platforms that are already installed or can be installed on existing vessels and integrated into newbuild vessels, cables, ROVs, etc.
- Create the right enabling conditions for collaboration and partnerships with broad industry involvement through co-design of incentives with, for instance, banking and insurance, Government tax credits or positive recognition.

### FOR INDUSTRY

- Actively support and participate in ocean mapping initiatives by:
  - ☐ Sharing existing ocean data at a resolution acceptable to proprietary interest to help fill current gaps in coverage;
  - ☐ Leveraging existing vessels and ocean platforms capable of supporting and hosting appropriate equipment to acquire ocean data; and
  - ☐ Incorporating sensors into newbuild vessels and platforms in support of ocean data collection.
- Reduce the digital divide and support capacity building for data collection, sharing and exchange via, for example, industry associations and dedicated working groups.

[69] Examples include the ISA DeepData, The Global Ocean Observing System (GOOS) and OBIS.




[68] UN Global Compact, 2019. 'Global Goals, Ocean Opportunities'.

## AMBITION 2: SHARE AND MANAGE OCEAN DATA

Collecting, sharing and managing data are closely integrated, but can often involve several different stakeholders along the data 'value chain'. Having successfully collected the data, we need to ensure smart data sharing. Data value can be further enhanced through data analytics and services that will increase knowledge and support decision making. This will help to maintain and improve ocean health, resilience and productivity in support of the Global Goals.

Challenges for data sharing and management include scale and complexity; diversity of differing global interactions with environments, cultures, industries and regulatory barriers; and scientific and technological silos.

Results and data are published in scientific journals, used to support their mission or provided to regulators, but are not always entered into globally accessible databases. Even when they are, several ocean databases exist for different types of information and uses.[70] Many databases are standalone; i.e. they do not 'talk' to each other.

Furthermore, some databases are accessible online while others are not. International efforts are being made to address this; for example, the International Oceanographic Data and Information Exchange (IODE) programme of the IOC is in the process of launching an Ocean Infohub. This will develop a clearing house mechanism to significantly increase accessibility and collation of all different data sources for different users. It will also provide matchmaking services for access to marine technology and capacity development.

Innovative digital solutions will be key to progress. In this age of big data, cloud computing, artificial intelligence and its subset machine learning, there are tremendous opportunities for industry participation in the management, knowledge extraction and sharing of ocean mapping data. The challenge is less about establishing databases and is more about connecting and effectively combining and using data available in existing databases — turning existing data into useful information.

Again, with a demonstration of support and prioritization by national Governments towards ocean mapping and ocean science; market opportunities and demand will be created to help solve these challenges.

### THE EUROPEAN MARINE OBSERVATION AND DATA NETWORK (EMODNET)

**THE EUROPEAN MARINE OBSERVATION AND DATA NETWORK (EMODNET) HAS DEVELOPED A NETWORK OF ORGANIZATIONS SUPPORTED BY THE EU'S INTEGRATED MARITIME POLICY.**

These organizations work together to observe the sea, process the data according to international standards and make that information freely available as interoperable data layers and data products through EMODnet. The shared data benefits all marine data users, including policymakers, scientists, private industry and the public. It has been estimated that such an integrated marine data policy will save at least €1 billion per year as well as open up new opportunities for innovation and growth.

[70] Examples include the GEBCO for global ocean bathymetry; the International Hydrographic Organization (IHO) Data Centre for Digital Bathymetry (DCDB) for crowdsourced bathymetry data; NOAA's World Ocean Database (WOD) for plankton and ocean profile data; OBIS for marine biodiversity; and, the ISA's DeepData database for all geological and environmental data collected by national governments and/or exploration contractors in the Area.

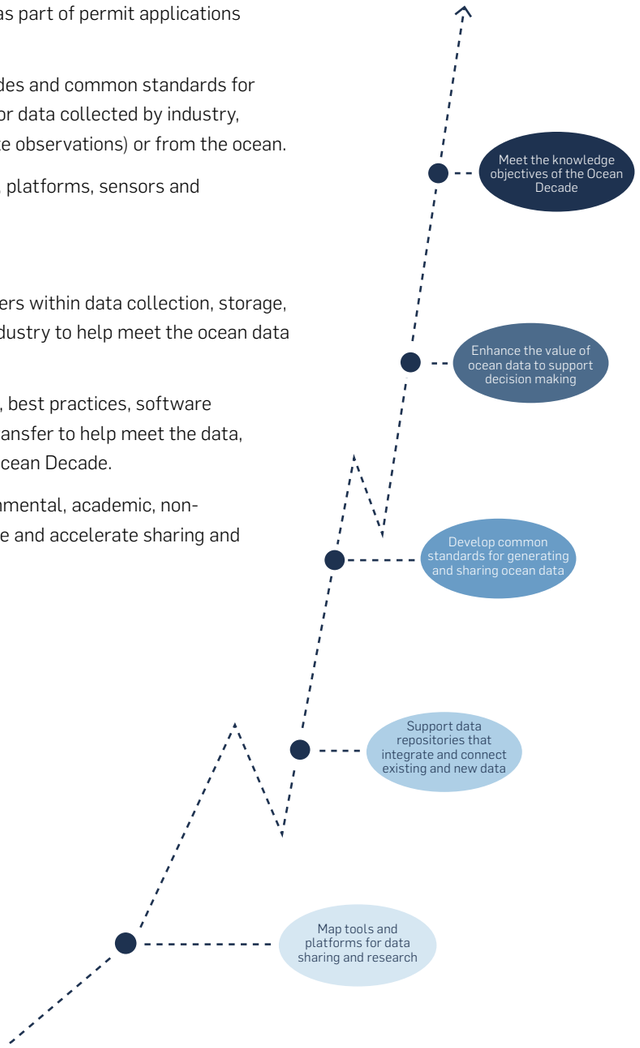
## RECOMMENDATIONS

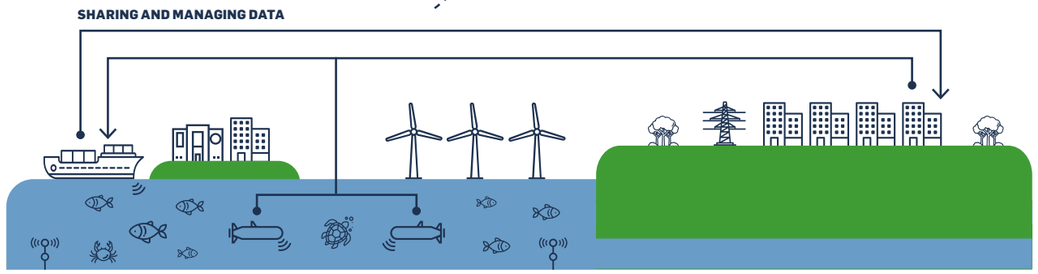
### FOR POLICYMAKERS

- Improve collaboration to co-design and share decision-support tools and platforms for ocean and coastal data.
- Support open-source, reliable and trusted data repositories and reference networks that integrate and connect existing and new data.
- Develop a globally accessible digital framework for sharing ocean data that has been provided by industries to regulators as part of permit applications or other regulatory requirements.
- Encourage the development of responsible codes and common standards for generating and sharing ocean data, including for data collected by industry, whether it is collected from space (e.g. satellite observations) or from the ocean.
- Promote the use of standardized technologies, platforms, sensors and interoperable protocols.

### FOR INDUSTRY

- Identify and share information on the key barriers within data collection, storage, use and/or sharing that need addressing for industry to help meet the ocean data demand.
- Share IT infrastructure, open-source software, best practices, software development capacity and allow technology transfer to help meet the data, information and knowledge objectives of the Ocean Decade.
- Actively seek partnerships with various governmental, academic, non-governmental and industry partners to improve and accelerate sharing and management of ocean data.

# REFERENCES


André, V., 2018. Good Practice Guidelines (GPG) on National Seafood Traceability Systems. FAO Fisheries and Aquaculture Circular No. 1150, Rome, Italy.

Borit, M., Olsen, P., 2016. Seafood traceability systems: Gap analysis of inconsistencies in standards and norms. FAO Fisheries and Aquaculture Circular No. 1123, ISBN 978-92-5-109337-5.

Burney, J.A., Davis, S.J., Lobell, D.B., 2010. Greenhouse gas mitigation by agricultural intensification. Proceedings of the National Academy of Sciences, Jun 2010, 200914216. doi.org/10.1073/pnas.0914216107.

Cámara-Creixell, J., Scheel-Mayenberger, C., 2019. PetStar PET bottle-to-bottle recycling system, a zero-waste circular economy business model. In: Franco-García, M.L., Carpio-Aguilar, J., Bressers, H. (eds) Towards Zero Waste. Greening of Industry Networks Studies, vol 6. Springer, Cham. ISBN [online] 978-3-319-92931-6. doi.org/10.1007/978-3-319-92931-6_10.

Chapin III, F.S., Carpenter, S.R., Kofinas, G.P., Folke, C., Abel, N., Clark, W.C., Olsson, P., Smith, D.M.S., Walker, B., Young, O.R. and Berkes, F., 2010. Ecosystem stewardship: sustainability strategies for a rapidly changing planet. Trends in Ecology & Evolution, 25(4), pp.241–249.

Costello, C., L. Cao, Gelcich, S., et al., 2019. The future of food from the sea. High Level Panel for a Sustainable Ocean Economy, Washington, DC: World Resources Institute. www.oceanpanel.org/future-food-sea.

Erisman, J., Sutton, M., Galloway, J., et al., 2008. How a century of ammonia synthesis changed the world. Nature Geosci 1, 636–639 (2008). doi.org/10.1038/ngeo325.

FAO, 2018. The State of World Fisheries and Aquaculture 2018 – Meeting the sustainable development goals. FAO, Rome. Licence: CC BY-NC-SA 3.0 IGO.

FAO, 2019. The International Code of Conduct for the Sustainable Use and Management of Fertilizers. Food and Agriculture Organization of the United Nations, Rome. ISBN 978-92-5-131705-1. www.fao.org.

Folke, C., et al., 2019. Transnational corporations and the challenge of biosphere stewardship. Nature Ecology & Evolution, 3(10), pp.1396–1403.

Giannopoulos, N., 2019. Global environmental regulation of offshore energy production: Searching for legal standards in ocean governance. RECIEL. 2019; 28: 289–303. doi.org/10.1111/reel.12296.

Health Canada, 2020. Draft Science Assessment of Plastic Pollution: Environment and Climate Change Canada. Health Canada, Government of Canada, January 2020 [online]. www.canada.ca.

HELCOM, 2018. State of the Baltic Sea – Second HELCOM holistic assessment 2011–2016. Baltic Sea Environment Proceedings 155. ISSN 0357–2994.

Hundleby, G., Freeman, K., 2017. Unleashing Europe's offshore wind potential: A new resource assessment. BVG Associates for Wind Europe. June 2017. windeurope.org.

IEA, 2018. World Energy Outlook 2018. IEA, Paris. doi.org/10.1787/weo-2018-en.

IFA, 2018. The fertilizer industry submission to the consultation on the Koronivia joint work on agriculture of the SBSTA. International Fertilizer Association. March 2018. www.fertilizer.org.

IPBES, 2019. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondizio, E.S., Settele, J., Díaz, S., H. T. Ngo (eds). IPBES secretariat, Bonn, Germany.

IPCC, 2019. Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. Shukla, P.R., et al. (eds.). www.ipcc.ch.

IRENA, 2014. Ocean energy: Technology readiness, patents, deployment status and outlook. Mofor, L., Goldsmith, J., Jones, F. International Renewable Energy Agency, Abu Dhabi. www.irena.org/publications.

IRENA, 2019a. Navigating to a renewable future: Solutions for decarbonising shipping, preliminary findings. International Renewable Energy Agency, Abu Dhabi. www.irena.org/publications.

IRENA, 2019b. Renewable power generation costs in 2018. International Renewable Energy Agency, Abu Dhabi. ISBN 978-92-9260-126-3. www.irena.org/publications.

Jambeck, J.R., et al., 2015. Plastic waste inputs from land into the ocean. Science 13 Feb 2015: Vol. 347, Issue 6223, pp. 768–771. doi.org/10.1126/science.1260352.

Jouffray, J.B., et al, B., 2019. Leverage points in the financial sector for seafood sustainability. Science Advances, 5(10), p.eaax3324.

Jouffray, J.B., et al. 2020. The blue acceleration: The trajectory of human expansion into the ocean. One Earth, 2(1), pp.43–54. doi.org/10.1016/j.oneear.2019.12.016.

Mateo-Sagasta, J., Zadeh. S.M., Turral, H., 2017. Water pollution from agriculture: A global review. FAO, Rome, and the International Water Management Institute. www.fao.org/3/a-i7754e.pdf.

Ocean Conservancy, 2015. Stemming the tide: Land-based strategies for a plastic-free ocean. Ocean Conservancy and McKinsey Center for Business and Environment.

Österblom, H., et al., 2017. Emergence of a global science – business initiative for ocean stewardship. Proceedings of the National Academy of Sciences, 114(34), pp.9038–9043.

Ocean Conservancy, 2017. The next wave: Investment strategies for plastic free seas. Ocean Conservancy. 2017. oceanconservancy.org.

PETCO, 2019. Building a collective focus: Review of PETCO activities 2018. PETCO SA. June 2019 [online]. petco.co.za/wp-content/uploads/2019/06/PETCO-2018-Annual-Review_FINAL.pdf.

Pretlove, B., Blasiak, R., 2018. Mapping ocean governance and regulation: Working paper for consultation for UN Global Compact Action Platform for Sustainable Ocean Business. DNV GL, 24 September 2018. www.unglobalcompact.org.

UN, 2016. The First Global Integrated Marine Assessment: World Ocean Assessment I. Group of Experts of the Regular Process. UN. www.ipcc.ch.

Veiga, J.M., Fleet, D., et al., 2016; Identifying Sources of Marine Litter. MSFD GES TG Marine Litter Thematic Report; JRC Technical Report; EUR 28309. doi:10.2788/018068.

Vince, J., Hardesty, B.D., 2018. Governance solutions to the tragedy of the commons that marine plastics have become. Frontiers in Marine Science, Vol. 5, 19 June 2018. doi.org/10.3389/fmars.2018.00214. ISSN=2296-7745.

Walkinshaw, C., et al., 2020. Microplastics and seafood: lower trophic organisms at highest risk of contamination. Ecotoxicology and Environmental Safety, Vol.190, 1 March 2020. doi.org/10.1016/j.ecoenv.2019.110066.

WBCSD, 2018. Sustainable and healthy diets: Reviewing existing dietary guidelines and identifying gaps for future action. FReSH insight report, World Business Council for Sustainable Development. October 2018. www.wbcsd.org.

Willett, W., et al., 2019. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. The Lancet Commissions, Vol. 393, Issue 10170, pp.447–492, February 02, 2019.

Winther, J-G., M. Dai, et al., 2020. Integrated Ocean Management. High Level Panel for a Sustainable Ocean Economy, Washington, DC: World Resources Institute. www.oceanpanel.org/future-food-sea.

WOR, 2015. World Ocean Review 2015. Publ. maribus, Germany. worldoceanreview.com.

# Sustainable Ocean Principles

The ocean is vital to the wellbeing and prosperity of humankind. To achieve the world community's ambitions as laid out in the Sustainable Development Goals, there is a need to expand our use of the ocean to produce food, energy, raw materials and transportation. Carrying out these activities in a sustainable manner will contribute to reducing global warming and environmental degradation. Ensuring a healthy ocean provides significant opportunities for business and global economic growth.

As described in Sustainable Development Goal 14 on Life Below Water, there is an urgent need to protect and restore the health of the ocean, which is rapidly deteriorating due to increasing temperatures, acidification, depletion of natural resources and pollution from land and sea. Businesses have a shared responsibility, alongside Government and civil society, to take necessary actions to secure a healthy ocean.

These Sustainable Ocean Principles provide a framework for responsible business practices across sectors and geographies. They build upon and supplement the Ten Principles of the United Nations Global Compact on human rights, labour, environment and anti-corruption. We, as signatories of these principles, recognize the urgency and global importance of a healthy ocean, and will take action to promote the well-being of the ocean for current and future generations. As relevant to their business, we believe that companies should:

### OCEAN HEALTH AND PRODUCTIVITY

**Principle 1:** Assess the short- and long-term impact of their activities on ocean health and incorporate such impacts into their strategy and policies.

**Principle 2:** Consider sustainable business opportunities that promote or contribute to restoring, protecting or maintaining ocean health and productivity and livelihoods dependent on the ocean.

**Principle 3:** Take action to prevent pollution affecting the ocean, reduce greenhouse gas emissions in their operations to prevent ocean warming and acidification, and work towards a circular economy.

**Principle 4:** Plan and manage their use of and impact on marine resources and space in a manner that ensures long-term sustainability and take precautionary measures where their activities may impact vulnerable marine and coastal areas and the communities that are dependent upon them.

### GOVERNANCE AND ENGAGEMENT

**Principle 5:** Engage responsibly with relevant regulatory or enforcement bodies on ocean-related laws, regulations and other frameworks.

**Principle 6:** Follow and support the development of standards and best practices that are recognized in the relevant sector or market contributing to a healthy and productive ocean and secure livelihoods.

**Principle 7:** Respect human-, labour- and indigenous people's rights in the company's oceanrelated activities, including exercise appropriate due diligence in their supply-chain, consult and engage with relevant stakeholders and communities in a timely, transparent and inclusive manner, and address identified impacts.

### DATA AND TRANSPARENCY

**Principle 8:** Where appropriate, share relevant scientific data to support research on and mapping of relevance to the ocean.

**Principle 9:** Be transparent about their ocean-related activities, impacts and dependencies in line with relevant reporting frameworks.

## THE TEN PRINCIPLES OF THE UNITED NATIONS GLOBAL COMPACT

### HUMAN RIGHTS

**1** Businesses should support and respect the protection of internationally proclaimed human rights; and

**2** make sure that they are not complicit in human rights abuses.

### LABOUR

**3** Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;

**4** the elimination of all forms of forced and compulsory labour;

**5** the effective abolition of child labour; and

**6** the elimination of discrimination in respect of employment and occupation.

### ENVIRONMENT

**7** Businesses should support a precautionary approach to environmental challenges;

**8** undertake initiatives to promote greater environmental responsibility; and

**9** encourage the development and diffusion of environmentally friendly technologies.

### ANTI-CORRUPTION

**10** Businesses should work against corruption in all its forms, including extortion and bribery.

The Ten Principles of the United Nations Global Compact are derived from: the Universal Declaration of Human Rights, the International Labour Organization's Declaration on Fundamental Principles and Rights at Work, the Rio Declaration on Environment and Development, and the United Nations Convention Against Corruption.

### ABOUT THE UNITED NATIONS GLOBAL COMPACT

As a special initiative of the UN Secretary-General, the United Nations Global Compact is a call to companies everywhere to align their operations and strategies with ten universal principles in the areas of human rights, labour, environment and anti-corruption. Launched in 2000, the mandate of the UN Global Compact is to guide and support the global business community in advancing UN goals and values through responsible corporate practices. With more than 10,000 companies and 3,000 non-business signatories based in over 160 countries, and more than 60 Local Networks, it is the largest corporate sustainability initiative in the world.

For more information, follow **@globalcompact** on social media and visit our website at **unglobalcompact.org**.

United Nations Global Compact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