

# Ocean Knowledge for a Sustainable Ocean Economy

Synergies between the Ocean  
Decade and the Outcomes of  
the Ocean Panel



The United Nations  
Decade of Ocean Science  
for Sustainable Development  
**(2021–2030)**



**2021**  
**2030** United Nations Decade  
of Ocean Science  
for Sustainable Development

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# Table of contents

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List of acronyms	4
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Acknowledgements	4
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<b>1/ Introduction</b>	<b>5</b>
The ocean in 2020	6
Rationale for this report	8

---

<b>2/ Approach to the analysis</b>	<b>10</b>
------------------------------------	-----------

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<b>3/ Synergies between the Ocean Decade and the Ocean Panel</b>	<b>12</b>
A shared vision of the role of ocean knowledge in a sustainable ocean economy	13
Filling critical knowledge gaps	17
Creating an enabling environment to generate and use ocean knowledge	20

---

<b>4/ Proposals for action</b>	<b>25</b>
--------------------------------	-----------



# List of acronyms

<b>ABNJ</b>	Areas Beyond National Jurisdiction
<b>ECOPs</b>	Early career ocean professionals
<b>GOOS BioEco</b>	Biological and Ecological Panel - Global Ocean Observing System
<b>IOC-UNESCO</b>	Intergovernmental Oceanographic Commission of UNESCO
<b>LDCs</b>	Least developed countries
<b>LLDCs</b>	Landlocked developing countries
<b>NGO</b>	Non-governmental organization
<b>Ocean Decade</b>	United Nations Decade of Ocean Science for Sustainable Development
<b>Ocean Panel</b>	High Level Panel for a Sustainable Ocean Economy
<b>SDG</b>	Sustainable Development Goal
<b>SIDS</b>	Small Island Developing States
<b>OBIS</b>	Ocean Biodiversity Information System
<b>OECD</b>	Organisation for Economic Co-Operation and Development
<b>UN</b>	United Nations
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change

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A woman wearing a traditional conical hat and a red and white patterned dress is sitting in a field of green fishing nets. She is smiling and holding the brim of her hat. The background is filled with the intricate, wavy patterns of the fishing nets, creating a textured and vibrant green environment.

1

# Introduction

## The ocean in 2020

2020 was an extraordinary year for the ocean in the truest sense of the word. The beginning of the year was marked with unforeseen optimism for ocean actors across the world. It was pegged as the 'super year' for the ocean; the year of major events such as the 2020 UN Ocean Conference, the 15th Conference of Parties of the Convention on Biological Diversity, and the 26th Conference of Parties of the United Nations Framework Convention on Climate Change (UNFCCC), in which the ocean would finally achieve full recognition and visibility for its role in sustainable development.

Global awareness of the climate and biodiversity crises continued to rise, with commitments from numerous governments raising hope for progress towards goals contained in the Paris Agreement and the post-2020 Global Biodiversity Framework. 2020 also marked the eve of the start of the Decade of Action for the Sustainable Development Goals (SDGs), with the attention of the world refocused on the need to achieve rapid progress to fulfil the commitments made in 2015 across the 17 SDGs.

In parallel, two global ocean-related initiatives – the High Level Panel for a Sustainable Ocean Economy ('the Ocean Panel') and the UN Decade of Ocean Science for Sustainable Development ('the Ocean Decade') – were entering critical phases and were heralded as the forerunners of a ten-year revolution in ocean management and ocean science.

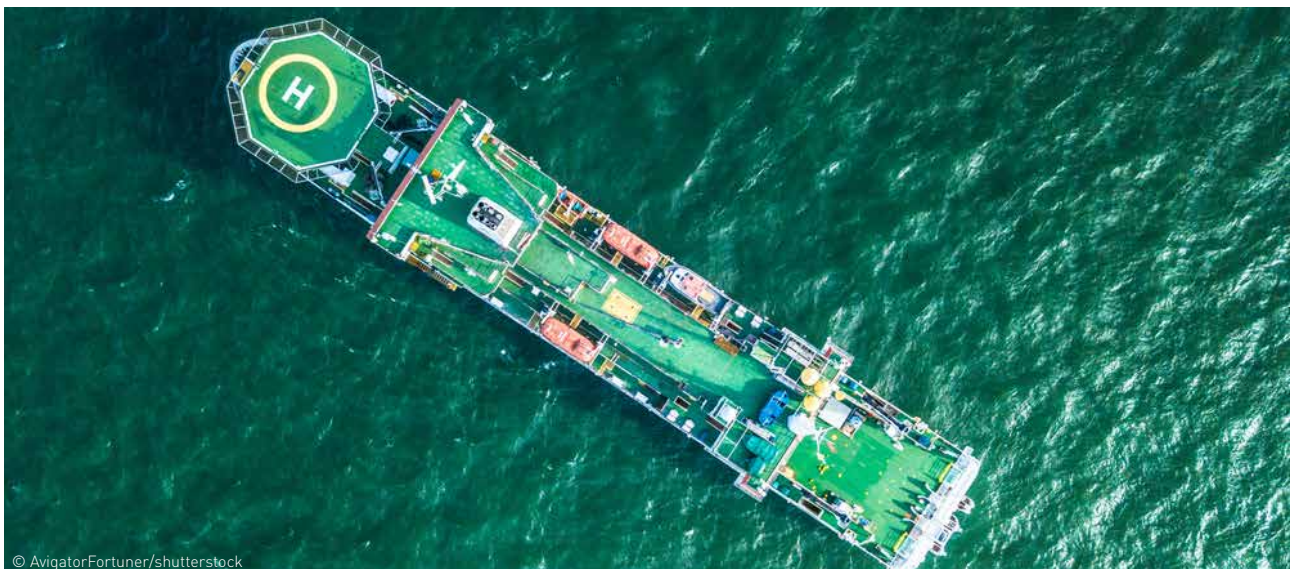
### THE OCEAN PANEL: BUILDING AN ACTION AND POLICY FRAMEWORK FOR A SUSTAINABLE OCEAN ECONOMY

The High Level Panel for a Sustainable Ocean Economy was established in September 2018 by 14 world leaders to build momentum towards a sustainable ocean economy where effective protection, sustainable production and equitable prosperity go hand in hand. The Ocean Panel aims to change the way the world thinks, acts and feels about the ocean, and inspire policies and actions at the highest levels that will catalyse the transition to a sustainable ocean economy. Key objectives of the Ocean Panel include: enhancing humanity's relationship with the ocean, bridging ocean health and wealth, working with diverse stakeholders, harnessing the latest ocean knowledge, and developing an action agenda for transitioning to a sustainable ocean economy. In the spirit of achieving the SDGs and meeting the objectives of the Paris Agreement, the Ocean Panel commissioned a comprehensive assessment of ocean science and knowledge that has significant policy relevance. This included a series of 16 Blue Papers, 3 Special Reports and a final report *Ocean Solutions that Benefit People, Nature and the Economy* that informed the Ocean Panel's action agenda 'Transformations for a Sustainable Ocean Economy' with a headline commitment to sustainably manage 100% of the ocean area and five associated pillars for action.

Figure 1. Five pillars of a new ocean agenda.



Source: <https://oceanpanel.org/ocean-action/transformations.html>

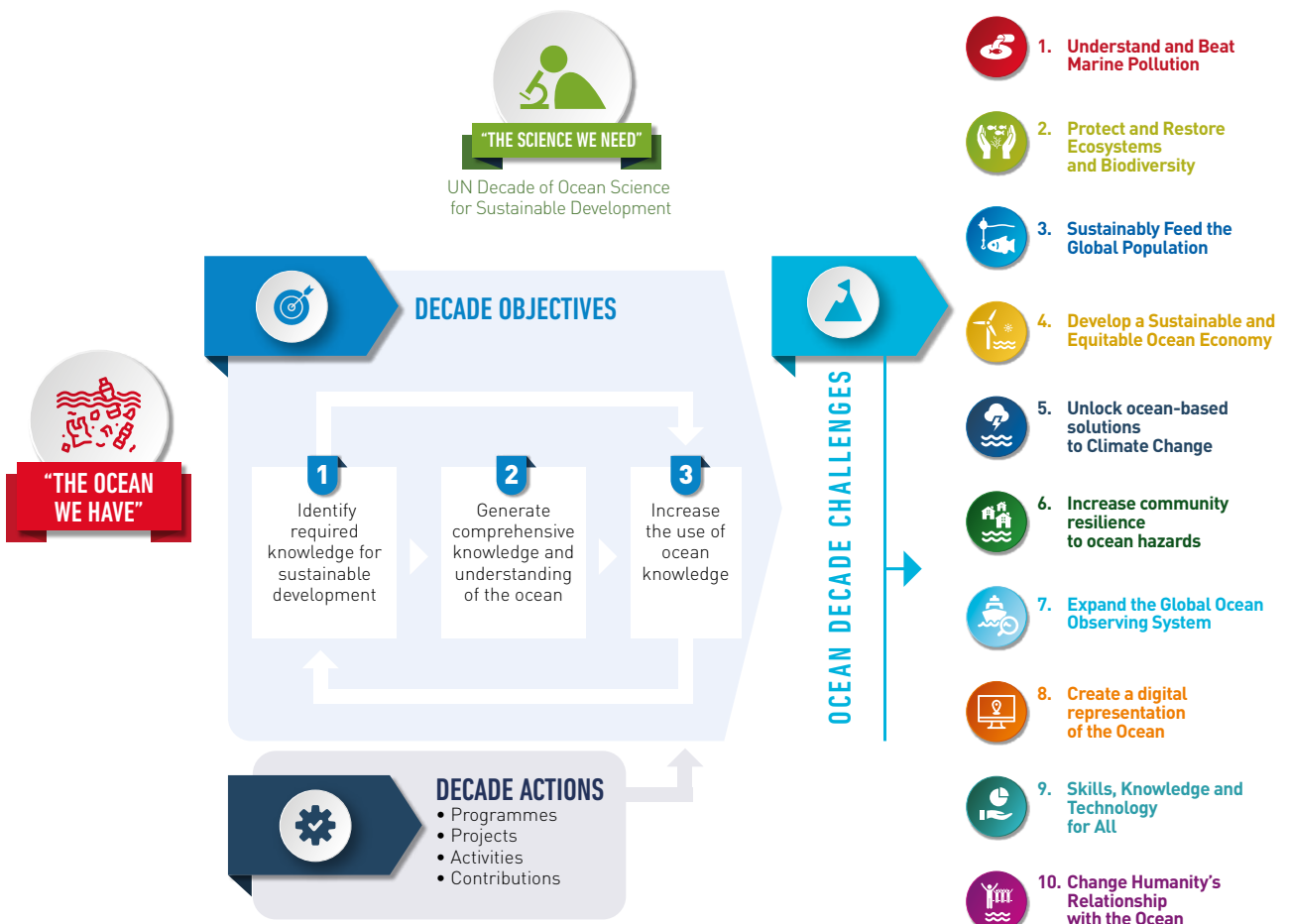


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## THE OCEAN DECADE: A FRAMEWORK FOR KNOWLEDGE GENERATION TO UNDERPIN A SUSTAINABLE OCEAN ECONOMY

The proclamation by the United Nations General Assembly in December 2017 of the United Nations Decade of Ocean Science for Sustainable Development (2021–2030) demonstrates the conviction of UN Member States that enhanced knowledge of the ocean is a prerequisite to achieving sustainable development. The Ocean Decade seeks to create a paradigm shift in the generation of priority qualitative and quantitative ocean knowledge to inform the development of solutions to contribute to the 2030 Agenda for Sustainable Development. To achieve its vision of 'the science we need for the ocean we want', the Ocean Decade – via its Implementation Plan – sets out a framework to catalyse transformative ocean science solutions for sustainable development, connecting people and the ocean. The Ocean Decade Action Framework contains ten Ocean Decade Challenges that represent the most immediate and pressing needs of the Decade, as well as three objectives that represent three critical steps in the ocean science value chain, i.e. the identification of knowledge needs, the generation of knowledge and the use of that knowledge, all supported by extensive capacity development

Figure 2. The Ocean Decade framework.



Source: IOC-UNESCO, 2020.

However, with the global spread of the COVID-19 pandemic, recognition of a new, harsh reality has set in. The COVID-19 pandemic has shed light on our unsustainable relationship with the natural world and cast significant doubts on humanity's ability to achieve sustainable and equitable development if the current situation persists. With evidence showing that biodiversity loss and intensive food systems make zoonotic diseases such as COVID-19 more likely,<sup>1</sup> humankind has been dealt a clear reminder that, when it comes to the environment, what goes around comes around.

The effects of the pandemic on the ocean economy, ocean management and ocean science have been immediate and substantial; it has exacerbated existing inequalities and created detrimental social, economic and environmental impacts that will take years to overcome or reverse. Funding sources have dried up and governments are preoccupied with the looming economic and social crises. These impacts are occurring against a backdrop of persistent, long-term threats that are ongoing. Around 34% of the world's fish stocks are overfished<sup>2</sup> and with the world's

1 EEA. 2020. *COVID-19 and Europe's Environment: Impacts of a Global Pandemic*. Briefing no. 13/2020. Available at: <https://www.eea.europa.eu/post-corona-planet/covid-19-and-europes-environment>.

2 FAO. 2020. *The State of World Fisheries and Aquaculture 2020. Sustainability in Action*. Rome, FAO. Available at: <https://doi.org/10.4060/ca9229en>

population expected to reach almost 9 billion in 2030,<sup>3</sup> the food security of millions is at risk. Pollution, global warming, acidification, habitat destruction and many other stressors are severely harming the ocean and marine ecosystems, hindering their enormous potential to sustain society.

#### THE OCEAN'S ROLE IN SUSTAINABLE AND EQUITABLE DEVELOPMENT

No matter where we live, the ocean plays a crucial role in sustainable and equitable development. Ocean-based industries directly employ more than 30 million people and benefit many hundreds of millions more, including informal or part-time workers and households who derive all or part of their livelihoods from the ocean and its resources. The economic value added generated by fisheries, shipping, offshore wind energy, recreational activities and CO<sub>2</sub> absorption was estimated at US\$ 1 trillion in 2010. Prior to the COVID-19 pandemic, this figure was expected to double by 2030. Healthy marine ecosystems also provide services that go well beyond food. Coastal ecosystems, such as coral reefs and mangrove forests, act as natural barriers against ocean hazards, such as storms and tsunamis, protecting the lives and assets of more than 600 million people worldwide. Lively reefs and coastal waters attract thousands of tourists, contributing to the growth of the local tourism sector. Flourishing seagrasses, mangroves and marshes sequester two to four times more CO<sub>2</sub> from the atmosphere than terrestrial forests, based on their area, making them one of our greatest potential solutions to climate change mitigation.

Given this new reality, the Ocean Panel and the Ocean Decade preparations have evolved and adapted to ensure a relevant and timely response to the emerging situation. The Ocean Panel – through its commissioned papers and reports, as well as its final commitment *Transformations for a Sustainable Ocean Economy*, and the Ocean Decade – through its Implementation Plan,<sup>4</sup> recognize that the key to a more resilient, healthier and more equitable future lies to a great extent in the sustainable management of the ocean, based on sound science.

Both initiatives firmly recognize the need – now more than ever – to unleash the full potential of the ocean to support sustainable and equitable development at the global, regional, national and local scales. They recognize that the economic recovery from the COVID-19 pandemic must be an opportunity to reflect on the political and economic driving forces leading to this crisis. Building back quickly from the pandemic while perpetrating unsustainable practices and environmental degradation will not be enough for the economy and society to survive future shocks. 'Building back better' through recovery policies that reduce the likelihood of these crises by promoting

more sustainable practices is the key to a more resilient economy.<sup>5</sup>

Both initiatives also recognize that the relationship of humanity and science is at a crossroads: perceptions of the interconnections between humanity and the planet have undergone a paradigm shift and the role of science in underpinning solutions for a healthy and resilient future is openly debated in diverse spheres. The COVID-19 pandemic – among all the destruction it has wrought – therefore also offers an opportunity to reboot our relationship with the ocean and harness this particular moment in history to allow the ocean to play a central role in both short-term recovery and longer term resilience building.

## Rationale for this report

The Ocean Decade and the Ocean Panel have been developed in full recognition of their mutual importance and influence. The ultimate goal of this report is to analyse tangible ways in which the linkages between the Ocean Decade, with its vision of the 'science we need for the ocean we want', and the framework identified by the Ocean Panel, with its aims of safeguarding the long-term health and resilience of the ocean, can be optimized.

“ Ocean science encompasses natural and social science disciplines; the technology and infrastructure that supports ocean science; the application of ocean science for societal benefit, including knowledge transfer and applications in regions that are lacking science capacity; and the science-policy and science-innovation interfaces. It considers the land-sea, ocean-atmosphere and ocean-cryosphere interactions. Ocean science recognizes, respects and embraces local and indigenous knowledge.

*Source: Ocean Decade Implementation Plan. See note 4.*

This report has been prepared by the Secretariat of the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) in its role of coordinating agency of the implementation of the Ocean Decade. It represents the first attempt to explicitly analyse and document the synergies that exist and which could be developed in the future. It is a first step in a process to develop a lean, reliable guiding framework for ocean

3 UN. 2017. *World Population Prospects. 2017 revision*. Available at: [https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2020/Jan/un\\_2017\\_world\\_population\\_prospects-2017\\_revision\\_databooklet.pdf](https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2020/Jan/un_2017_world_population_prospects-2017_revision_databooklet.pdf)

4 IOC-UNESCO. 2020. *United Nations Decade of Ocean Science for Sustainable Development 2021–2030. Implementation Plan*. Paris, UNESCO Publishing. Available at: <https://www.oceandecade.org/resource/108/Version-20-of-the-Ocean-Decade-Implementation-Plan->

5 OECD. 2020. *Building Back Better: A Sustainable, Resilient Recovery after COVID-19*. Available online at: <http://www.oecd.org/coronavirus/policy-responses/building-back-better-a-sustainable-resilient-recovery-after-covid-19-52b869f5/>





action, where existing initiatives mutually reinforce each other, thus augmenting their cumulative impact.

The need to urgently build back better from the COVID-19 pandemic is recognized by governments and partners worldwide. More than ever before, the current crisis has highlighted the importance of science and knowledge for decision-making and policy. Analysing the synergies between the Ocean Decade and the Ocean Panel – one built around action-oriented knowledge creation and the other explicitly oriented towards policy – naturally responds to this emerging demand for science that is relevant to society.

This report builds on the declaration of the 14 world leaders on the Ocean Panel who commit to leveraging the Ocean Decade and the body of knowledge commissioned by the Ocean Panel to build collective understanding and knowledge of ocean sustainability, ecosystem services and functions, and to ensuring that science underpins decision-making for building a sustainable ocean economy.<sup>6</sup>

It is intended for a broad spectrum of stakeholders, including governments, policymakers, scientists, industry, funding agencies, NGOs and civil society, to raise awareness about the intersections between the action framework of the Ocean Decade and the recommendations of the Ocean Panel.

“ A sustainable ocean economy brings diverse stakeholders together to achieve common goals – the three Ps of effective protection, sustainable production and equitable prosperity. In the sustainable ocean economy paradigm, groups work together by adopting integrated and balanced management of the ocean in which each of the three Ps contributes to the other. The result is a triple win for nature, people and economy and a world where prosperity is greater and more equitably distributed than it is today.

*Source: Adapted from Stuchtey et al., 2020. See note 10.*

It speaks both to governments and partners who have committed to the Ocean Panel’s vision of protection, production and prosperity – as well as aiming to incite and catalyse action and commitments from new governments and partners. It deliberately focuses on palpable recommendations that will allow all concerned actors – including members of the Ocean Panel, Ocean Decade partners and members of the future Ocean Panel Action Coalitions – to streamline efforts and carry out effective, collective actions that will lead to sound ocean management, a sustainable ocean economy, and ultimately to achieve the ocean we want – and need – by 2030.

<sup>6</sup> The Ocean Panel Secretariat. 2020. *Transformations for a Sustainable Ocean Economy: A Vision for Protection, Production and Prosperity*. Available online at: <https://www.oceanpanel.org/ocean-action/files/transformations-sustainable-ocean-economy-eng.pdf>

# 2

## Approach to the analysis



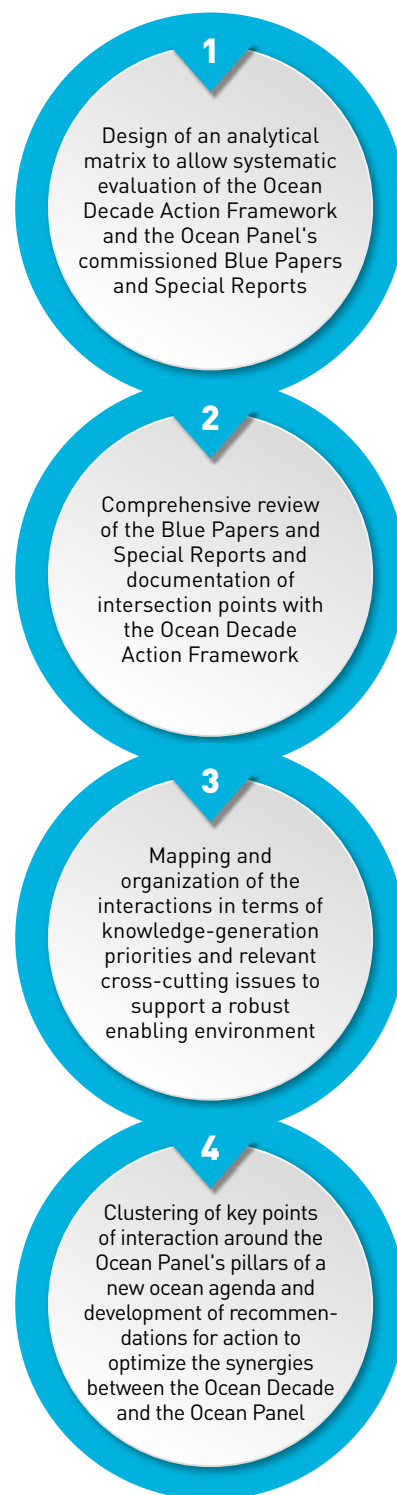
An analytical matrix approach was used to critically analyse the synergies that exist between the Ocean Decade – notably through consideration of the various elements of the Ocean Decade Action Framework – and the Ocean Panel, and thus answer the following question:

What are the priority ocean knowledge needs to fulfil the vision of the Ocean Panel for a protected, productive and prosperous ocean economy, and how could the Ocean Decade contribute to meeting these needs?

The Ocean Panel Blue Papers and Special Reports are thematic ‘deep dives’ into the pressing challenges of a sustainable ocean economy and provide a robust knowledge base to inform the Ocean Panel’s action agenda. The Blue Papers and Special Reports were all peer reviewed and shared as an independent input to the Ocean Panel process.

The analysis identifies the patterns of interaction between the Ocean Decade Framework, the Blue Papers and the Special Reports. It highlights those interactions already identified in the Blue Papers and Special Reports, as well as additional potential entry points where actions or initiatives associated with the Ocean Decade could support achievement of the Ocean Panel’s ambitious ocean agenda. The mapping allowed clustering and organization of all identified and potential interactions in terms of the headline commitment of the Ocean Panel, namely the sustainable management of 100% of national waters, as well as the five pillars of the Ocean Panel’s agenda. It has resulted in a clear picture of the complementarity of the two initiatives and the inextricable role that the Ocean Decade will have in operationalizing the framework of the Ocean Panel.

**Figure 3. Methodological approach**



Source: IOC-UNESCO, 2020

# 3

## Synergies between the Ocean Decade and the Ocean Panel



## A shared vision of the role of ocean knowledge in a sustainable ocean economy

**The Ocean Panel and Ocean Decade share an understanding of the importance of ocean knowledge to underpin a short-term, post-COVID-19 recovery, and for longer-term ecological, social and economic resilience to achieve a sustainable ocean economy.**

A Special Report commissioned by the Ocean Panel identifies the areas where investments will reap the greatest returns and recognizes the need to generate knowledge on the impacts of proposed recovery investments on the health of the ocean and the ocean economy.<sup>7</sup> It also identifies the need to use that knowledge to either avoid certain options or minimize their negative impacts. The Ocean Decade provides the framework for generating, managing and delivering required priority ocean knowledge to diverse actors in order to underpin these recovery investments.

The Ocean Panel's Special Report identifies five priority areas for investment that could deliver short-term economic, social and environmental benefits while building longer-term resilience, all of which require ocean knowledge to maximize their impact.<sup>8</sup> These five areas of investment are: sewerage and wastewater infrastructure for coastal communities; coastal and marine ecosystem restoration and protection; community-led, non-fed mariculture; sustainable ocean-based renewable energy; and zero-emission marine transport. Knowledge gaps exist in relation to ecosystem-based approaches to wastewater treatment from coastal communities, sustainable funding mechanisms for sanitation in coastal communities, the location and management of marine protected areas, effective funding mechanisms for long-term protection of ecosystems and restoration efforts, and knowledge to underpin blue carbon initiatives. Research is required to accelerate the development of sustainable and low-carbon alternative feed options for fed mariculture, the deployment of climate-adaptive fisheries practices, and the emergence of new industries for alternative marine fuels or ocean-based renewables beyond offshore wind. There is a strong overlap – both in terms of priority themes and in terms of the adoption of a value chain approach to knowledge generation and use – between the Ocean Panel and the Ocean Decade Action Framework (see Figure 1) that is described in the Ocean Decade Implementation Plan.<sup>9</sup> The ten Ocean Decade Challenges that represent the most immediate

priorities for action as part of the Decade, and the Decade Objectives that represent the main steps in the ocean science value chain, i.e. to identify, generate and use knowledge, will convene diverse actors in the co-design and co-delivery of ocean science over the course of the Decade. For example, the Ocean Decade Challenges can focus action over the next ten years to fill knowledge gaps, including through Ocean Decade Challenge 1, which aims to understand, map and develop solutions for land and sea-based sources of pollutants and contaminants; or Ocean Decade Challenge 2, which aims to understand the effects of multiple stressors on ocean ecosystems and develop solutions to monitor, protect, manage and restore ecosystems and their biodiversity. Ocean Decade Challenge 3 seeks to generate knowledge, support innovation and develop solutions to optimize the role of the ocean in sustainably feeding the world's population. Ocean Decade Challenge 6 seeks to enhance multihazard early warning services and infrastructure for all geophysical, ecological, biological, weather, climate and anthropogenic-related ocean and coastal hazards, and mainstream community preparedness and resilience.

**A recurrent, high-level focus of the Ocean Panel and its commissioned reports is the need for integrated and sustainable ocean management as a prerequisite for a sustainable ocean economy.**

The Ocean Decade provides the framework for the development of knowledge, as well as the services, applications and tools needed to achieve this (see Figure 1). The need for sustainable ocean management is the headline recommendation of the Transformations of the Ocean Panel, with each of the Ocean Panel countries committing to sustainably managing 100% of their national waters by 2025. It is also recognized as one of five building blocks of a new ocean narrative<sup>10</sup> and throughout many of the commissioned Blue Papers and Special Reports as vital to numerous facets of the sustainable ocean economy. Integrated ocean management – which is defined as a holistic, ecosystem-based and knowledge-based approach to planning and management of the ocean space<sup>11</sup> – is required to enhance community resilience through the improvement of coastal planning and siting of natural solutions for climate adaptation; the effective planning of sustainable aquaculture; reducing the land-based sources of pollution; planning for renewable energy infrastructure; and ensuring the protection of critical ecosystems and resources through marine protected areas.

7 Northrop, E., et al. 2020. *A Sustainable and Equitable Blue Recovery to the COVID-19 Crisis*. Washington, DC, World Resources Institute. Available online at <http://www.oceanpanel.org/bluerecovery>

8 Ibid.

9 IOC-UNESCO. 2020. *United Nations Decade of Ocean Science for Sustainable Development 2021–2030. Implementation Plan*. Paris, UNESCO Publishing. Available at: <https://www.oceandecade.org/resource/108/Version-20-of-the-Ocean-Decade-Implementation-Plan->

10 Stuchtey, M., Vincent, A., Merkl, A. and Bucher, M. (lead authors). 2020. *Ocean Solutions that Benefit People, Nature and the Economy*. Washington, DC, World Resources Institute. Available online at: <https://oceanpanel.org/ocean-action/files/executive-summary-ocean-solutions-report-eng.pdf>

11 Winther, J.-G. and Dai, M. (lead authors). 2020. *Integrated Ocean Management*. Washington, DC, World Resources Institute. Available online at: [www.oceanpanel.org/blue-papers/integrated-ocean-management](http://www.oceanpanel.org/blue-papers/integrated-ocean-management)

**Figure 4. Interaction between the pillars of a sustainable ocean economy and the Ocean Decade Challenges .**



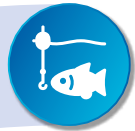
Source: IOC-UNESCO, 2021.



**1. UNDERSTAND AND BEAT MARINE POLLUTION**



**2. PROTECT AND RESTORE ECOSYSTEMS AND BIODIVERSITY**



**3. SUSTAINABLY FEED THE GLOBAL POPULATION**



**4. DEVELOP A SUSTAINABLE AND EQUITABLE OCEAN ECONOMY**



**5. UNLOCK OCEAN-BASED SOLUTIONS TO CLIMATE CHANGE**



**6. INCREASE COMMUNITY RESILIENCE TO OCEAN HAZARDS**



**7. EXPAND THE GLOBAL OCEAN OBSERVING SYSTEM**



**8. CREATE A DIGITAL REPRESENTATION OF THE OCEAN**



**9. SKILLS, KNOWLEDGE AND TECHNOLOGY FOR ALL**



**10. CHANGE HUMANITY'S RELATIONSHIP WITH THE OCEAN**

The Ocean Panel highlights the particular importance of this approach as countries seek to stimulate economic recovery from the COVID-19 pandemic and recognize the importance of aligning decisions with national priorities and with holistic prioritization processes for competing uses of the ocean. It identifies the need for increased data and knowledge across diverse issues to underpin planning and management, including the need to integrate local community knowledge and indigenous knowledge systems and stakeholders.

The Blue Papers commissioned by the Panel recognize the need to integrate ocean and coastal management into surrounding frameworks, including urban catchment and land-use planning, thus underscoring the need to engage diverse communities of practice – including urban planning and freshwater management actors – in discussions about a sustainable ocean economy and ocean knowledge.

The Ocean Decade, through Ocean Decade Challenge 4: Develop a sustainable and equitable ocean economy, Challenge 8: Create a digital representation of the ocean and Challenge 9: Skills, knowledge and technology for all, similarly recognizes the importance of co-designing and co-delivering services, applications and tools that facilitate the generation and use of data, information and knowledge for integrated ocean management and planning. Objective 3 of the Ocean Decade Action Framework provides a framework to achieve key opportunities for action identified by the Blue Paper on Integrated Ocean Management, i.e. encouraging the alignment of different knowledge systems, strengthening stakeholder engagement and stewardship, establishing partnerships between public and private actors, and ensuring that capacity development is a component of the development and delivery of such services and applications.

**Numerous Blue Papers and Special Reports commissioned by the Ocean Panel highlight the crucial role of technology and innovation to achieve a sustainable ocean economy. The Ocean Decade provides a framework for convening diverse actors to strengthen the science-innovation interface.** Priority areas for investment in technology and innovation highlighted by Ocean Panel commissioned research includes mariculture efficiency and productivity in a changing climate, ship-based oil spill technology and innovation, pollution removal and recycling techniques, offshore wind infrastructure (in particular, to make floating offshore wind cost-competitive more quickly), and other ocean-based renewable energy systems, as well as measures to facilitate decarbonization of the shipping industry. The Ocean Decade makes specific reference to the importance of strengthening the science-innovation interface and identifies several key stakeholder groups, including industry and innovation hubs that will be important partners in bringing

together the generators and users of knowledge in a co-design process to move from science to innovation and technology.

**Similarly, several of the Ocean Panel's commissioned Blue Papers and Special Reports emphasize the need for robust policy and regulatory reform to support a sustainable ocean economy. The Ocean Decade will convene diverse disciplines and policymakers to co-design and co-deliver the knowledge required for this framework.** The Ocean Panel highlights that knowledge is needed to develop a robust policy and regulatory framework, and to ensure that it is effectively implemented. Examples of knowledge gaps that could be filled through the Ocean Decade in order to achieve a policy and regulatory framework that supports a sustainable ocean economy include: knowledge on blue carbon under a changing climate; knowledge on market failures and other impediments to technological innovations in mariculture feed, husbandry or farm design; and increased understanding of the most effective financial incentives for investments in ocean science and a sustainable ocean economy. The Ocean Panel recognizes the need for ocean research to engage with disciplines outside its usual partners and actively promote knowledge generation related to economic, financial or political science. The Ocean Decade provides the necessary framework to bring together diverse disciplines within the research community and to link these disciplines to regulators and policymakers who can identify the evidence and knowledge they need for effective policy and regulation.

**The Ocean Panel's comprehensive analysis of the multiple facets of a sustainable ocean economy will deepen and broaden the way in which the Ocean Decade addresses and monitors progress towards the sustainable ocean economy ambition.** Explicit reference is made to a sustainable ocean economy in Ocean Decade Challenge 4: Develop a sustainable and equitable ocean economy. However, the Ocean Panel's extensive analysis of the elements of a sustainable ocean economy, and its identification of the diverse range of preconditions to achieve a sustainable ocean economy, highlights that achievement of all the other Ocean Decade Challenges will generate essential knowledge and/or facilitate development of components of the enabling environment needed for a sustainable ocean economy. An initial mapping of the interplay between key elements of a sustainable ocean economy and the Ocean Decade Challenges is provided in Figure 4. A full understanding of this interplay will assist in tracking the contribution of the Ocean Decade to the achievement of a sustainable ocean economy, as well as assisting in the identification of new stakeholders to engage in the Decade, either as part of the co-design process, as contributors of resources or as users of Decade-generated knowledge.





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## Filling critical knowledge gaps

### **The Ocean Decade has the potential to provide knowledge that will optimize the role of ocean-based solutions in mitigating climate change and in developing a climate-resilient ocean economy.**

Climate-induced declines in ocean health will cost the annual global economy US\$428 billion by 2050 and an estimated US\$1.98 trillion by 2100.<sup>12</sup> A Blue Paper commissioned by the Ocean Panel analysed risks from climate change to three major ocean industries, including coral reef tourism, wild fisheries and mariculture. It concluded that significant and unequal impacts were likely across all three sectors. It recognizes that additional knowledge was needed to fully characterize and ultimately minimize such impacts, including knowledge on changes to distribution of marine species and fisheries, climate-resilient models for mariculture, and information to strategically site tourism activities to minimize negative interactions.

The Special Report entitled 'The Ocean as a Solution to Climate Change' commissioned by the Ocean Panel recognized that the ocean is not simply a victim of climate change but also a source of impactful potential solutions. The analysis identified five principal areas of action that, combined, could reduce the emissions gap by up to 21% on a 1.5 °C pathway and up to 25%

on a 2 °C pathway. These are: ocean-based renewable energy; ocean-based transport; coastal and marine ecosystems; fisheries, aquaculture and dietary shifts; and carbon storage in the seabed. The analysis identified knowledge gaps and research needs to support these actions, including research to support restoration, to promote the wider use of seaweed for fuel, food and feed, and to develop environmentally acceptable technology for carbon storage in the seabed.

Climate change is one of the major focus areas of the Ocean Decade. The ocean-climate nexus is an integral part of the Ocean Decade outcomes which describe the desired characteristics of a healthy, resilient and safe ocean in 2030, i.e. an ocean that plays a central role in climate adaptation and mitigation. It is also reflected in the dedicated Ocean Decade Challenge 5, which aims to understand the ocean-climate nexus and generate knowledge and solutions to mitigate, adapt and build resilience to the effects of climate change. Climate change is recognized by the Ocean Decade as having an influence on the successful fulfilment of other Challenges, including Challenges 2 and 3 related to ecosystem restoration and ensuring food security under a changing climate, and Challenge 6 related to community resilience to ocean-based hazards. The Ocean Decade can provide a platform for increasing awareness and knowledge about the ocean-climate

12 IPCC. 2019. *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*. H.-O. Pörtner, D. C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama and N. M. Weyer (eds).



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nexus. It can develop priority knowledge – including in relation to the issues identified in the Blue Paper and Special Report – as well as tools for analysing climate-related hazards, assess their impacts, create awareness and offer solutions to mitigate the impacts and protect the resilience and livelihoods of coastal communities.

**The Ocean Decade provides an ideal framework for a coordinated approach to ocean biodiversity knowledge generation and monitoring.** A Blue Paper commissioned by the Ocean Panel recognizes not only the importance of producing significant new data on species and habitat distribution in the ocean but also the importance of the management and use of that data to support action, such as the designation and management of marine protected areas or the wide adoption of ecosystem-based fisheries management. Actors, including intergovernmental organizations, biodiversity monitoring networks, ocean observations infrastructure managers and philanthropic partners involved in gathering and making ocean data available for management purposes, require a coordinated approach to face the challenge of comprehensive and global monitoring of biodiversity. These organizations, through the framework of the Decade and via the coordination of Decade governance and coordination structures, have the potential to collectively increase knowledge on habitat extent and environmental drivers to identify conflicts and gaps in knowledge, including in the distribution of marine habitats, technological limitations and solutions with explicit

goals, and institutions/organizations assigned to meeting the goals. These efforts should include multidisciplinary teams of scientists, including, but not limited to, marine, artificial intelligence and data experts. The Ocean Panel's commissioned Blue Paper entitled 'Critical Habitats and Biodiversity: Inventory, Thresholds and Governance' envisages that this work could culminate in collaborative research platforms where global habitat maps and data can be compiled and visualized and be made publicly available in a way that facilitates ecosystem-based management of human activities in the ocean, while enabling biodiversity conservation. It further recommends linkages to novel technological developments to develop high quality annual maps of habitat extent and impacts. It recognizes the importance of equipping all countries with the tools necessary to sustainably manage and map the ocean and to act upon biodiversity data for meeting international targets and ocean management needs. Such knowledge would form an important contribution to the creation of a digital representation of the ocean, which is envisaged as part of the Ocean Decade Challenges.

**Restoration of marine ecosystems is seen as an essential element of a sustainable ocean economy, including as a means of improving coastal resilience for human and natural systems.** The Ocean Panel's commissioned Blue Papers and Special Reports related to coastal resilience, the role of biodiversity and climate action recognize the need for restoration solutions to be based on innovative science, research

and integrated management through inclusive coordination and partnerships. The Ocean Decade can both generate knowledge to improve the benefits of restoration and make links to other global initiatives, including the UN Decade of Ecosystem Restoration.

**Increased knowledge of issues surrounding deep-sea mining is a specific area of knowledge generation where the Ocean Decade can play a significant role.** The Blue Paper commissioned by the Ocean Panel relating to ocean energy and mineral resources recognizes that the development of many forms of renewable energy may increase demand for minerals found in the deep seabed. However, the analysis expresses concern that such mining has poorly understood environmental impacts, and that a lack of baseline data is a key limitation when evaluating impacts of deep-sea mining. It recommends that deep-seabed mining should be approached in a precautionary and adaptive manner and that the Ocean Decade be used to provide a framework for the establishment of international research agenda and timeline, to collect and synthesize high-quality deep-sea scientific data to fill identified gaps in knowledge required for decision-making and environmental management, before any deep-seabed mining takes place. It identifies the need for baseline research on species abundance and distribution over annual cycles, population structures and status, as well as assessment of ecosystem dynamics in deep-sea environments. It recommends increased understanding of impacts to ecosystem services, such as to fisheries, climate regulation, detoxification and nutrient cycling, as well as analyses of the scale and duration of impacts on biological communities affected by deep-seabed mining. The Blue Paper notes that little cost-benefit analysis has been done for deep-seabed mining projects, and that there is a need for research and long-term planning with attention focused on Life Cycle Sustainability Analysis approaches. It furthermore recommends the strengthening of research to scale up the development of a less mineral-intensive global energy system, including less mineral-intensive ocean-based renewable energy. The role of the Ocean Decade as a framework for research around deep-sea mining is already in evidence with the development of an Ocean Decade Action Plan that was recently adopted by the International Seabed Authority.<sup>13</sup>

**Preserving the ocean genome and ensuring that it is used in a sustainable, fair and equitable manner is also critical to a sustainable ocean economy.** The current pandemic has spotlighted the role of the ocean genome, defined as the ensemble of genetic material present in all marine biodiversity, including

both the genes and the information they encode, for human health as well as food security, and the ability of ocean ecosystems to fight climate change.<sup>14</sup> Significant efforts are needed to increase knowledge of the ocean genome, support greater equity in genomics research, promote inclusive and responsible research and innovation, and coordinate funding and provision of resources. The Ocean Panel's commissioned Blue Paper on the ocean genome recognizes the role of the Ocean Decade in such efforts and recommends that work on the ocean genome should be a key element of the UN Decade of Ocean Science for Sustainable Development.<sup>15</sup>

**Reducing pollution will lead to healthy ecosystems and human communities that can play a role in sustainable and equitable development.** The Ocean Decade aims to contribute to the achievement of a clean ocean where sources of pollution are identified and reduced or removed by 2030. The final report on ocean solutions to benefit people, nature and the economy and the Blue Paper on ocean pollution, both commissioned by the Ocean Panel, recognize the role of a clean ocean in a sustainable ocean economy. They advocate for the need to better understand the common pathways and root causes of pollution – including river-based and land-based sources – and highlight the opportunity to capitalize on the attention focused on plastic pollution to galvanize action on other pollutions and create long-lasting behaviour change. It recognizes the need to convene actors across sectors in bold measures, and advocates for a range of actions to reduce pollution and its impacts, including research and innovation for new materials and recycling technology; and coastal zone management and planning to reduce pollution at the source. Through Ocean Decade Challenge 1, the Decade aims to convene diverse actors to develop knowledge and solutions to understand and map land- and sea-based sources of pollutants and contaminants, along with their potential impacts on human health and ocean ecosystems, and to develop solutions to remove or mitigate them.

**Food security of a growing global population is a key pillar of a sustainable ocean economy.** The Ocean Decade aims to contribute to a productive and sustainably harvested ocean that will support sustainable food supply by generating knowledge to inform solutions for different ocean food sectors. Several of the Ocean Panel commissioned Blue Papers discuss challenges of food security across several of its commissioned Blue Papers and identifies a range of knowledge gaps related to fisheries management practices and the optimal siting of aquaculture, policy reform and regulatory frameworks, and the need for

13 ISBA. 2020. *Report of the Secretary-General on the Contribution of the International Seabed Authority to the United Nations Decade of Ocean Science for Sustainable Development*. Kingston, ISBA. Available at: [https://isa.org.jm/files/files/documents/ISBA\\_26\\_A\\_4-2007068E.pdf](https://isa.org.jm/files/files/documents/ISBA_26_A_4-2007068E.pdf)

14 Blasiak, R., Wynberg, R., Grorud-Colvert, K. and Thamnissety, S. (lead authors). 2020. *The Ocean Genome: Conservation and the Fair, Equitable and Sustainable Use of Marine Genetic Resources*. Washington, DC, World Resources Institute. Available online at: <https://www.oceanpanel.org/blue-papers/ocean-genome-conservation-and-fair-equitable-and-sustainable-use-marine-genetic>

15 Ibid.

increased innovation and technology, e.g. in relation to mariculture feed. Ocean Decade Challenge 3 aims to convene actors to generate knowledge, support innovation and develop solutions to optimize the role of the ocean in sustainably feeding the world's population under changing environmental, social and climate conditions. The Ocean Decade can fulfil priority knowledge needs of the different food sectors, including sustainable solutions to expand aquaculture, promoting sustainable fisheries management practices, tools to support the recovery of wild fishery stocks and the technological needs of emerging industries.

## Creating an enabling environment to generate and use ocean knowledge

**The Ocean Decade has the potential to create a robust enabling environment for the generation and use of knowledge needed for a sustainable ocean economy.** Based on the analysis of the Blue Papers and Special Reports commissioned by the Ocean Panel, the critical components of the enabling environment, i.e. coordination, data, capacity development, inclusivity and investment, are discussed below.

**The Ocean Decade will act as a framework to bring together generators and users of ocean science and advance ocean science priority actions in the quest for a sustainable ocean economy.** The Blue Papers and Special Reports commissioned by the Ocean Panel collectively recognize the role of the Ocean Decade to facilitate international coordination and cooperation in marine science and provide a convening and coordination framework to connect generators and users of required ocean knowledge, through processes of co-design and co-delivery of priority, solutions-oriented research, services and applications. They recognize that this role will be important at the global, regional and national levels. The Blue Papers identify the Ocean Decade as an appropriate coordination platform for engaging different stakeholders to define, develop and promote a global ocean science research agenda in relation to a number of specific domains, including, among others, deep-sea mining, the ocean genome, scaling up of ecosystem restoration and sustainable ocean management. They also recognize a role for the Ocean Decade in providing a coordination interface with global water, food, climate and energy initiatives in order to promote source-to-sea approaches that consider the impact of terrestrial

activities on the ocean. Through the convening activities of the Decade Coordination Unit, the decentralized coordination structures and the Global Stakeholder Forum, the Ocean Decade can provide an enabling environment for generating multidisciplinary knowledge and capacity to cause a transformative change in ocean governance by strengthening the science-to-policy interface and facilitating actions that would create an enabling environment for transformative governance.<sup>16</sup> The Ocean Decade has a potential role through enhanced discourse, sharing best practices on inclusive governance, identifying transferable lessons on ocean stewardship and promoting ocean knowledge commons that offer access to governance.

The Ocean Decade aims to transform how scientific cooperation is organized through efficient models where the science value chain is closely linked to economic reality. The aim of these models is not the privatization of science but to create a more virtuous circle where investment in knowledge generation increases as a public good, and also because it sustains marketable applications that support the sustainable economy. The Ocean Decade can play a role to help highlight or strengthen these issues, e.g. through creating links between Ocean Decade coordination structures, stakeholder groups and the work of the Action Coalitions or by generating tools, knowledge and experiences that Action Coalitions can use. By engaging private sector and industry partners, the Ocean Decade can also help promote the role of science, innovation and technology as an economic sector per se which is projected to grow (according to the OECD), thus creating a self-perpetuating cycle to achieve the actions identified by the Blue Papers and Special Reports.

**The importance of improved collection, management and use of ocean data is a central priority for the Ocean Decade and the Ocean Panel.** More ocean-related data was collected in 2018 than was gathered in the entire twentieth century.<sup>17</sup> This massive volume of data creates enormous potential for improved decision-making, management, policy, planning and innovation. However, for a number of reasons, data is not being used to its full potential to achieve transformative ocean action. The Ocean Panel's commissioned report on ocean solutions that benefit people, nature and the economy identifies the use of data to drive decision-making as one of five building blocks for a new ocean vision.<sup>18</sup> The Panel's commissioned Blue Paper on ocean data and the Ocean Decade recognize the need to overcome barriers that are stymying the full and effective use of ocean data. On the side of data generators and

16 Swilling, M., Ruckelshaus, M. and Brodie Rudolph, T. (lead authors). 2020. *The Ocean Transition: What to Learn from System Transitions*. Washington, DC, World Resources Institute. [www.oceanpanel.org/blue-papers/ocean-transition-what-learn-system-transitions](http://www.oceanpanel.org/blue-papers/ocean-transition-what-learn-system-transitions)

17 Brett, A., Leape, J., Abbott, M., Sakaguchi, H., Cao, L., Chand, K., Golbuu, Y., Martin, T. J., Mayorga, J. and Myksovoll, M. S. 2020. Ocean data need a sea change to help navigate the warming world. *Nature*, Vol. 582, No. 181–183. <https://media.nature.com/original/magazine-assets/d41586-020-01668-z/d41586-020-01668-z.pdf>

18 Stuchtey, M. et al. 2020. See note 10.



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managers, barriers include siloing of data, inability or unwillingness to share data, data format and quality, and data fragmentation. On the side of data users, barriers include a lack of capacity or access to technology to analyse and use data, and a lack of mechanisms to facilitate exchanges with data generators and managers to ensure development of needed tools, services and applications.

The Ocean Panel's commissioned Blue Paper identifies three areas of action to improve the sharing and use of ocean data, namely the creation of shared and automated data access systems, including federated data networks, adoption of open data principles and policies that harness data and technology for better ocean management, and development and communication of incentives and business models to encourage data sharing. The latter includes recommendations that improved sharing of data by private sector and government agencies, as a condition of blue recovery financial incentives and debt relief, could provide multiple short-term and long-term benefits.<sup>19</sup> It identifies the Ocean Decade as the key mechanism to leverage technological developments and make ocean data widely visible, accessible and utilized. The Blue Papers identify that such a role by the Ocean Decade should include building on existing

efforts to establish global standards for metadata, query and data tagging that allow interconnection and accessibility between existing datasets (Challenges 8 and 9). Promoting interconnection between existing datasets is expected to directly contribute to the achievement of Ocean Panel outcomes. For example, in addressing Decade Challenges 7, 8 and 9, the Blue Papers note that ensuring the interconnection between IOC-UNESCO's biodiversity monitoring networks (GOOS BioEco, GEO BON/MBON) and databases (e.g. OBIS) is expected to enhance the accessibility of ocean biodiversity data, to inform sustainable ocean management and planning.<sup>20</sup> Collecting new data and evidence for specific sectors and initiatives was noted as another area where the Ocean Decade can make a contribution. For instance, deep-sea scientific data was identified as one such area, where an international research agenda, pilot cases and guidance about applying a precautionary approach can be established through the Ocean Decade.

The Blue Paper's vision and suggested role for the Ocean Decade align closely with those of the Decade, which recognizes that digitization, sharing and management of data, information and digital knowledge are cornerstones for its success. In this domain, the Ocean Decade's vision, as described in the

<sup>19</sup> Northrop, E., et al. 2020. See note 7.

<sup>20</sup> Rogers, A. and Aburto-Oropeza, O. (lead authors). 2020. *Critical Habitats and Biodiversity: Inventory, Thresholds and Governance*. Washington, DC, World Resources Institute. Available online at : [www.oceanpanel.org/blue-papers/critical-habitats-and-biodiversity-inventory-thresholds-and-governance](http://www.oceanpanel.org/blue-papers/critical-habitats-and-biodiversity-inventory-thresholds-and-governance)

Implementation Plan, is that the ocean community – including both generators and users of data – will rally their capacities to collectively co-design and construct a distributed digital system capable of: (i) holistically representing the complex socio-ecological ocean system at global, regional or local scales; and (ii) representing the ocean’s role in sustainable development across scales. Stakeholders must be able to access, use and contribute to this digital ecosystem through multiple interfaces tailored to their needs and capacities. No one system or central infrastructure will be able to implement the vision above; instead, Ocean Decade stakeholders will need to contribute to the development of a distributed, robust and collaborative ‘digital ecosystem’ of interoperating parts, which leverages open, scalable, easily implementable and responsive digital management frameworks. The Ocean Decade foresees the emergence of a community of practice of data generators, managers and users who are collectively addressing this challenge. An Ocean Decade Data Coordination Platform is being established to this end. The Decade Coordination Unit and decentralized coordination structures will facilitate exchange and collaboration between stakeholders via this platform, as well as via the Ocean Decade Global Stakeholder Forum, and will actively facilitate links and synergies with partners working on ocean data initiatives.

**Capacity development for ocean science and increased inclusivity in who is carrying out, accessing and using ocean knowledge is essential to the achievement of a sustainable ocean economy.** The technical capacity to carry out ocean science remains unequally distributed across geographies, genders and generations.<sup>21</sup> The Ocean Decade and the Blue Papers commissioned by the Ocean Panel recognize the importance of building capacity across diverse facets of the sustainable ocean economy. Collectively, the Blue Papers commissioned by the Ocean Panel indicate a role for the Ocean Decade in identifying and fulfilling capacity needs related to ocean knowledge, promoting ocean literacy to increase understanding of the value of the ocean, and enabling people to acquire the necessary skills and capacity to participate in a sustainable ocean economy. They advocate for the development of regional cooperation and sharing of experience, and highlight the distinct needs of SIDS, LDCs and LLDCs as well as and early career ocean professionals.

Specific areas where the Blue Papers recognize that ocean-science-related capacity development is required include: integrated ocean planning and management; ocean accounting; data gathering, management and processing; fisheries and mariculture; nature-based solutions and green infrastructure; links between water, urban and climate

initiatives; and ocean financing. The Blue Papers and Ocean Decade both recognize that a broader vision for capacity development is needed for ocean science than the current one. Capacity development for ocean science needs to extend beyond the capacity to *do* science, to include the capacity to influence the design and implementation of science and to access, interpret and use the resulting data and knowledge. The Ocean Decade incorporates a comprehensive set of principles and a strategic framework for ocean science capacity building that aligns closely with the vision presented in the Blue Papers. It recognizes that capacity needs assessments should be developed to identify priority areas of action, and highlights the role of the Global Ocean Science Report in monitoring the achievements of the Ocean Decade in relation to ocean science capacity.

**Improved ocean literacy that allows people across the globe to understand the significance of the ocean on their well-being, and the influence of their activities on the ocean, is a joint aim of the Ocean Panel and the Ocean Decade.** The Ocean Panel’s Transformations commitment references the role of the Ocean Decade in enhancing ocean literacy worldwide so that people understand the value of the ocean and have the skills and knowledge to participate in the sustainable ocean economy.<sup>22</sup> Enhanced ocean literacy – coupled with mechanisms to ensure inclusivity in the development of a sustainable ocean economy – will ensure that a wide set of visions and values inform ocean planning and decisions. An Ocean Literacy Strategy has been developed for the Ocean Decade to coordinate collective action around four priority areas: mainstreaming ocean literacy in education policy formulation; enhancing formal education of ocean literacy; mobilizing corporate action around ocean literacy; and increasing community engagement on ocean literacy. The Ocean Decade governance and coordination structures will play a role in engaging stakeholders around the world to contribute to the aims of the strategy via the development and implementation of Decade Actions. The Ocean Decade Global Stakeholder Forum will provide a platform for exchange and collaboration between actors engaged in ocean literacy efforts.

**Enhanced inclusivity and equity in ocean science, including through the integration of natural and social science disciplines, ensuring geographic, gender and generational diversity, and the embracing of indigenous knowledge, will ensure that knowledge is complete and representative of different values and knowledge systems.** The Blue Papers foresee the Ocean Decade playing a role in developing collaborations, building capacities, fostering mentorships for the use of local and traditional knowledge, increasing research on marine

21 IOC-UNESCO. 2020. *Global Ocean Science Report 2020 – Charting Capacity for Ocean Sustainability*. K. Isensee (ed.). Paris, UNESCO Publishing. Available at: <https://unesdoc.unesco.org/ark:/48223/pf0000375147>

22 The Ocean Panel Secretariat. 2020. See note 6.

social science and raising awareness that people are part of the ocean. The Ocean Decade has a strong focus on ensuring Decade Actions engage and benefit stakeholders across geographies, genders and generations (with a particular emphasis on the role of indigenous knowledge), the need for interdisciplinary approaches and the need to ensure SIDS, LDCs and LLDCs are privileged partners of the Ocean Decade.

### ENGAGING EARLY CAREER OCEAN PROFESSIONALS IN THE OCEAN DECADE

As part of the preparation for the Ocean Decade Implementation Plan, an Informal Working Group on Early Career Ocean Professionals (ECOPs) was established. Surveys and consultations were used to gather their perspectives about priority areas for Decade Actions and capacity needs. The first Global Planning Meeting of the IOC-UNESCO in Copenhagen, Denmark, saw a self-organized group of ECOPs come together to discuss their vision for the future engagement of ECOPs in the Ocean Decade and beyond. These platforms and other Ocean Decade Actions, projects and programmes offer practical opportunities to engage with ECOPs to generate knowledge to inform a sustainable ocean economy.

*Source:* IOC-UNESCO. 2019. *Summary Report of the First Global Planning Meeting: UN Decade of Ocean Science for Sustainable Development*. Paris, IOC-UNESCO. <https://www.oceandecade.org/resource/58/Summary-Report-of-the-First-Global-Planning-Meeting-UN-Decade-of-Ocean-Science-for-Sustainable-Development-Copenhagen-13-15-May-2019>

**The need for investment in a sustainable ocean economy is clearly recognized by the Ocean Panel and investment in ocean science is a crucial part of this investment.** The Special Report on a 2050 ocean economy concludes that ocean-based solutions have the potential to generate benefits that are far greater than investments.<sup>23</sup> It is estimated that investing US\$1 in key ocean actions can yield at least US\$5 in global benefits. Conservation and restoration of mangroves, scaling up of offshore wind production, decarbonization of offshore shipping and increasing sustainable food production are all areas where the economic returns are expected to be significantly higher than the investments. However, these estimates are based on conservative information, with many data gaps, such as: knowledge related to impacts on marine biodiversity from offshore wind farming and other renewable energies; the costs and benefits of restoration of diverse types of marine ecosystems, including salt marshes and seagrasses; improved survival rates at scale of mangrove restoration under a changing climate; behaviour change strategies and policies to value nature-based solutions; sustainable aquaculture systems and wild fisheries management; incentives to shift behaviour from land-based high

carbon protein to ocean-based low carbon protein; and increased knowledge of the costs and benefits of renewable ocean energy systems beyond wind energy.

Ocean science that fills such knowledge gaps can trigger and expand the scope and scale of benefits, minimize risks and accelerate future investments in ocean-based solutions. It is therefore essential to include investment in ocean knowledge generation as a critical part of the business case for a sustainable ocean economy. The *2020 Global Ocean Science Report*<sup>24</sup> indicates that, on average, only 1.7% of national research budgets are allocated to ocean science; a drop in the ocean compared to the economic benefits that could be generated by a sustainable ocean economy.

### **Private sector and industry engagement in investment for a sustainable ocean economy transition remain a challenge, and innovative incentives and measures to minimize risks are needed.**

The same is true for investment in ocean knowledge generation, despite the numerous potential advantages and entry points for industry engagement. The Ocean Decade aims to actively engage industry and private sector partners in support of ocean knowledge generation.<sup>25</sup> It recognizes the need to clearly articulate the value proposition for industry partners, including quantitative data on the return on investment. This position is reinforced by the Blue Paper on ocean finance commissioned by the Ocean Panel, which recognizes that the success of the Ocean Decade would be enhanced through the broad adoption of a common implementation framework and guidance that aligns with the Sustainable Blue Economy Principles, as well as common and robust metrics to measure the return on investment. This Blue Paper also recognizes a need for increased capacity and skills in ocean finance in SIDS and LDCs.

### **The philanthropic sector is also a key partner in ocean science investment and support for a sustainable blue economy.**

The Ocean Decade has documented the potential role of philanthropic Foundations in supporting the Ocean Decade.<sup>26</sup> Several of the Ocean Panel Blue Papers also recognize the Ocean Decade's role in increasing alignment between philanthropic actors to finance the implementation of research, e.g. in relation to the ocean genome, biodiversity and Areas Beyond National Jurisdiction (ABNJ) agreements. Although the Ocean Decade is not a financing mechanism, it seeks to coordinate and establish new partnerships between philanthropic partners towards common efforts with a focus on ocean science priorities and geographical differences

23 See Konar, M. and Ding, H. 2020. *A Sustainable Ocean Economy for 2050. Approximating its Benefits and Costs*. Washington, DC, World Resources Institute. Available online at: <http://www.oceanpanel.org/economicanalysis>

24 See note 21.

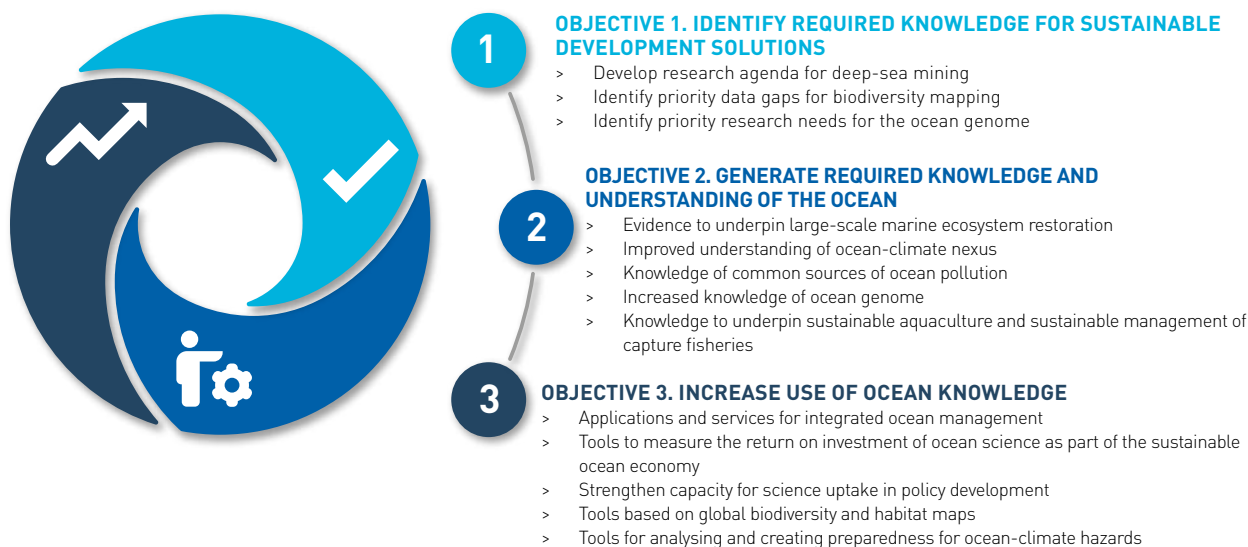
25 IOC-UNESCO. 2020. *Advancing Science for Sustainable Ocean Business : An Opportunity for the Private Sector*. Paris, UNESCO Publishing. Available at: <https://unesdoc.unesco.org/ark:/48223/pf0000373595>

26 IOC-UNESCO. 2020. *The Transformative Role of Foundations in the Ocean Decade*. Paris, UNESCO Publishing. Available at: <https://www.oceandecade.org/resource/148/The-transformative-role-of-Foundations-in-the-Ocean-Decade>

for greater impact. This includes the development of the Ocean Decade Alliance – a major resource mobilization network for the Decade that will facilitate the creation of partnerships between resource

providers, multiply and leverage available financing, and create opportunities to develop innovative and blended funding mechanisms for seed funding or higher-risk, proof of concept funding.

**Figure 5. Alignment of Ocean Decade objectives with priority ocean knowledge needs for a sustainable ocean economy.**



Source: IOC-UNESCO, 2021.

**The Ocean Panel and the Ocean Decade recognize the potential contribution of ocean accounting as a means of guiding the development of sustainable ocean economies.** The Ocean Panel commissioned research further highlights the importance of national accounting as a means of measuring the long-term sustainability of policy choices and understanding the return on investment in a sustainable ocean economy, both for current and future generations.<sup>27</sup> It recognizes the need to change ocean accounting so that it reflects the true value of the ocean as one of five building blocks of a new ocean narrative.<sup>28</sup> Such information will be essential to making the business case for investment on ocean science and in a sustainable ocean economy. The importance of the role that ocean accounting can play in providing governments with the information and tools needed to guide development of sustainable ocean economies and promote marine sectors is recognized in the Decade Outcomes, which describe a productive ocean supporting a sustainable ocean economy in 2030. Sub-objective 3.7 of the Ocean

Decade Action Framework makes reference to the need to expand and enhance tools, applications and services – such as ocean accounting – that integrate and facilitate the use of data, information and knowledge on ocean-related natural capital, including the social, cultural, environmental and economic characteristics of the ocean. The Ocean Panel commissioned research notes that data and knowledge generated through the Ocean Decade can be managed and shared to inform ocean accounting. The Ocean Decade can advance ocean accounting by considering it as a key vehicle to generate socio-economic knowledge and highlight values in the ocean to shape the development of the sustainable ocean economy. The Ocean Decade can assist in filling critical data gaps needed to develop ocean accounts, and in linking actors across the science-policy interface in their creation and use.

Figure 5 illustrates the key issues identified in the analysis, in terms of the objectives of the Ocean Decade.

27 Fenichel, E. P., Milligan, B. and Porras, I. 2020. *National Accounting for the Ocean and Ocean Economy*. Washington, DC, World Resources Institute. Available online at: <https://oceanpanel.org/sites/default/files/2020-07/National%20Accounting%20for%20the%20Ocean%20and%20Ocean%20Economy%20Full%20Paper%20Final.pdf>

28 Stuchtey, M. et al. 2020. See note 10.



# 4

## Proposals for action



The analysis in the previous sections reveals a strong potential to use **the combined power and visibility of the Ocean Decade and the Ocean Panel to accelerate the generation and use of ocean science for effective protection, sustainable production and equitable prosperity at all scales**. This potential could be realised through close and concerted efforts between the respective networks of the **Ocean Decade** - including its governance and coordination structures as well as its partners and stakeholders, and the **Ocean Panel** - including the Ocean Panel's existing members, other governments joining the Ocean Panel's commitments, partners, stakeholders, influential individuals and Action Coalitions. Together the networks of stakeholders and partners of the Ocean Decade and Ocean Panel could join forces to highlight and strengthen the coordinating role of the Ocean Decade as a framework for the co-design and co-delivery of relevant ocean knowledge to contribute to a sustainable ocean economy. IOC in its role as coordinating agency of the Ocean Decade has developed the following recommendations to contribute to the realization of this potential:

Ocean

1. **Generate the needed ocean knowledge to underpin short-term and long-term development of a sustainable ocean economy.**

- a. **Identify and meet the most urgent ocean knowledge needs to respond to the COVID-19 pandemic.** Establish a process to identify priority needs for knowledge generation and a robust enabling environment to contribute to the deployment of short- to medium-term stimulus actions for post-COVID 19 recovery. Develop targeted messaging and rapidly mobilize resources to support fulfilment of these needs, and use these resources to co-develop and launch tailored Call for Decade Actions for actors to submit initiatives to respond to the identified priorities.
- b. **Catalyse action and mobilize resources to generate and use priority ocean knowledge to underpin a sustainable ocean economy.** Establish a process to build on the analyses presented in this report and summarized in Figures 4 and 5, in order to identify priority needs for knowledge generation and a robust enabling environment to meet the sustainable ocean economy ambition. This process would introduce priority considerations of the Ocean Panel into future Calls for Decade Actions, the co-design and implementation of Decade Actions and into associated resource mobilisation efforts.
- c. **Use the Ocean Decade to develop an international research agenda for deep-sea mining.** Collaborate with the International Seabed Authority to establish a working group comprising knowledge generators and users,

to develop an international research agenda to better understand the impacts, required mitigation measures and alternatives to deep-sea mining. Use the resulting agenda to develop tailored Calls for Decade Actions and mobilize resources to support coordinated responses.

2. **Support sustainable ocean planning.** Establish and sustain strong cooperation in the design and implementation of ocean planning based on relevant science. This could include identifying scientific needs for ocean planning, including relevant science/policy interfaces, for the countries represented on the Ocean Panel and developing Decade programmes to fulfil these needs. Maintain strong engagement of the Ocean Decade – via the IOC-UNESCO and other partners – in the Action Coalition for sustainable ocean planning. Support the Action Coalition to develop tailored Calls for Decade Actions to support the development of sustainable ocean plans. Ensure that knowledge or capacity development needs of users are fed into relevant Ocean Decade Action development processes.
3. **Reinforce collaboration on ocean data and knowledge management.** Create links and dialogue between the Ocean Decade Data Coordination Platform and the Ocean Data Action Coalition, with the aim of developing a roadmap for collaboration and joint initiatives for ocean data and knowledge management. This collaboration will have the ultimate aim of contributing to the achievement of Ocean Decade Challenge 8 related to the creation of a digital representation of the ocean, and to underpin achievement of the other Ocean Decade Challenges through the generation, management and use of ocean data and related capacity development efforts.
4. **Enhance engagement of key stakeholder groups in dialogue on a sustainable ocean economy.**
  - a. **Promote the engagement of technology and innovation stakeholders.** Create links between the Ocean Decade Technology and Innovation Working Group and the Innovation Action Coalition, with the aim of developing a roadmap for collaboration and joint initiatives.
  - b. **Increase the integration of indigenous and local knowledge in the development of a sustainable ocean economy.** Develop a working group to identify priority research and action needs for indigenous and local knowledge. The role of the group will include the identification of tools, guidance and capacity development needed to ensure that indigenous and local knowledge systems are embraced as a core element of sustainable ocean economy. Use the outcomes of the working group to mobilize resources and develop tailored Calls for Decade Actions

to elicit initiatives at the national, regional and global level.

c. **Engage Early Career Ocean Professionals (ECOPs) in a sustainable ocean economy.**

Reinforce links between Ocean Panel stakeholders and the Ocean Decade ECOP Informal Working Group, including joint actions to mobilize support for implementation of the ECOP Ocean Decade Programme.

5. **Invest in ocean knowledge as a central pillar of a sustainable ocean economy.**

a. **Analyse and communicate the benefits of investing in ocean science.**

Develop and implement initiatives to develop tools, including ocean accounting, to measure the benefits of investment in ocean science that will contribute to the development of the new ocean agenda for a sustainable ocean economy. Engage structured discussions, communications and messaging with governments, funders and resource providers – including industry and private sector – about the benefits of investing in ocean knowledge generation.

b. **Develop tools to monitor the contribution of the Ocean Decade to a sustainable ocean economy.**

Building on the initial mapping presented in Figures 4 and 5, and as part of the development of the monitoring and evaluation framework for the Ocean Decade, develop indicators (and associated methods) to track the contribution

of the Ocean Decade to a sustainable ocean economy.

6. **Educate and raise awareness of the role of ocean knowledge in a sustainable ocean economy.**

a. **Develop ocean literacy tools to contribute to a sustainable ocean economy.**

Develop and implement initiatives within the context of the Ocean Decade Ocean Literacy Strategy that aim to humanize the sustainable ocean economy narrative and provide actors with the skills and knowledge needed to contribute to achieving the ocean we want. Mobilize resources and develop tailored Calls for Decade Actions to elicit initiatives at the national, regional and global level.

b. **Develop joint messaging and targeted communications**

on the role that ocean knowledge can play in integrated ocean planning and management, regulatory and policy reform, and technology and innovation underpinning a sustainable ocean economy. This could include publications which present tangible results and achievements from collaborative actions leading to the use of ocean knowledge to achieve the vision of a sustainable ocean economy. Use the global character of the Ocean Decade to propagate and promote achievements of the Ocean Panel beyond the 14 countries participating in the Ocean Panel as best practice to be followed by other countries, primarily IOC Member States and UN Member States.

**For further information**

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