Commissioned by

HIGH LEVEL PANEL for
A SUSTAINABLE
OCEAN ECONOMY

EXECUTIVE SUMMARY

# Ocean Solutions That Benefit People, Nature and the Economy


LEAD AUTHORS
Martin R. Stuchtey, Adrien Vincent, Andreas Merkl, Maximilian Bucher

CONTRIBUTING AUTHORS
Peter M. Haugan, Jane Lubchenco, Mari Elka Pangestu



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# About This Summary

This report lays out the contours of a new relationship between the ocean and humanity. Building on the latest scientific research, analyses and debates from around the world, the report showcases a balanced model for ocean management that simultaneously achieves effective ocean protection, sustainable production and equitable prosperity.

This work has been commissioned as an input to the High Level Panel for a Sustainable Ocean Economy (Ocean Panel), a unique initiative by 14 world leaders who are working with government, business, financial institutions, the science community and civil society to catalyse and scale bold, pragmatic solutions across policy, governance, technology and finance to ultimately develop an action agenda for transitioning to a sustainable ocean economy. The Ocean Panel comprises members from Australia, Canada, Chile, Fiji, Ghana, Indonesia, Jamaica, Japan, Kenya, Mexico, Namibia, Norway, Palau and Portugal and is supported by the UN Secretary-General's Special Envoy for the Ocean. The Ocean Panel is supported by an Expert Group and Advisory Network. The Secretariat, based at World Resources Institute, assists with analytical work, communications and stakeholder engagement. Ultimately, this report is an independent input to the Ocean Panel process and does not necessarily represent the thinking of the Ocean Panel.

# About the Authors


## Lead Authors

**Martin R. Stuchtey** is a Partner at SYSTEMIQ. His email address is martin.stuchtey@systemiq.earth.

**Adrien Vincent** is the Ocean Lead at SYSTEMIQ.

**Andreas Merkl** is a Partner at CEA Consulting.

**Maximilian Bucher** is an Associate at SYSTEMIQ.

## Contributing Authors

**Peter M. Haugan** is Programme Director at the Institute of Marine Research, Norway; Professor at the Geophysical Institute, University of Bergen, Norway; and Co-chair of the Ocean Panel Expert Group.

**Jane Lubchenco** is Distinguished University Professor at Oregon State University and Co-chair of the Ocean Panel Expert Group.

**Mari Elka Pangestu** is the World Bank Managing Director of Development Policy and Partnerships and Co-chair of the Ocean Panel Expert Group.


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# Foreword

As heads of government from ocean states, we know the ocean and its value.

Even so, the ocean keeps providing us with new insights.

From this report we learn that the ocean is even more important than we thought: for human and planetary health, for climate and food security, for local jobs and the global economy.

We learn that ocean health is more at risk than we thought, because different pressures add up and contribute to rapid and unpredictable changes in ocean ecosystems.

But importantly, we also learn that the ocean holds many of the urgent solutions humanity and the planet need. More fish and seafood production can provide abundant climate-friendly proteins for a growing population. Offshore clean energy can power the world many times over. Mangroves and seaweed can provide food, fuel and fibre while mitigating climate change and boosting biodiversity. Genetic resources in the ocean can advance health and fight disease.

Here's the lesson:

We *can* and we *must* produce more from the ocean, and we have to do it in ways that mitigate climate change, preserve biodiversity, regenerate ocean health and leave no one behind. We can produce more, by protecting more. The report gives us confidence in that possibility. But the report also teaches us how we have to rethink ocean policy and management altogether.

We must approach ocean management in an integrated manner in order to achieve the vision of protection, production and prosperity. We need a comprehensive approach to sustainably manage 100 percent of the ocean.

This report – building on a wide range of "Blue Papers" and "Special Reports" – is the responsibility of experts invited to inform the deliberations of the Ocean Panel. We wish to thank the global group of more than 250 experts for providing this impressive volume of knowledge.

As co-chairs of the Ocean Panel, we have brought 14 presidents and prime ministers together committed to sustainable ocean management and transformational policies that meet the test the report puts forward: protecting, producing and prospering from the ocean.

Jointly, the Ocean Panel countries are embarking on this ambitious journey, with 2030 and the accomplishment of the UN Sustainable Development Goals as our horizon. We invite more leaders and people to join.

**Erna Solberg**

*Prime Minister of Norway*

**Tommy Remengesau, Jr.**

*President of Palau*

## The New Ocean Narrative

Billions of people have personal connections to the ocean. For many people living in coastal communities, the ocean is not only a source of food and livelihoods, it is an intrinsic part of their culture and heritage. For the millions of people who earn their living from the ocean, it is a source of income and a way of life[1]. For the 40 percent of the world's population that live within 150 kilometres of the coast and the hundreds of millions of others who visit it, the ocean is central to their lives. The ocean plays an essential and usually unrecognised role in the daily lives of all of the planet's inhabitants. Indeed, breathing itself would be impossible without the ocean, which produces half of the earth's oxygen[2].

The ocean is also an enormous economic asset. Around 90 percent of the world's goods are traded across the ocean[3]. Hundreds of millions of people work in fishing and mariculture, shipping and ports, tourism, offshore energy, pharmaceuticals and cosmetics—all of which rely on ocean resources[4]. By some estimates, the ocean economy directly contributes more than $1.5 trillion a year to the global economy[5].

Putting a resource this critical at risk is reckless. But the world has not handled the ocean with care. Poor management has damaged many of the ocean's assets and reduced the ocean's natural ability to restore itself. Ocean health is on a downward spiral, preventing humanity from reaping the riches a healthy ocean could produce and jeopardising the future. The ocean is becoming warmer, more acidic, stormier, higher, more oxygen-depleted, less predictable and less resilient—and neither the problems it is facing nor the wealth it yields are distributed equitably.

Climate change is disproportionately affecting vulnerable and marginalised people, many of whom depend on the ocean for nutrition, identity and income. As they battle a warming ocean and rising sea level, they increasingly face depleted and shifting fish stocks without the ability to change gear or travel further to fish or seek other sources of livelihood.

For years, the overarching view was that the ocean is so vast that it is simply too big to fail. The folly of this approach is now evident. The new dominant narrative is that the problems are so complex that the ocean is simply too big to fix. This view is also incorrect. The ocean's problems are real, but action is already taking place to solve them.

A new way of thinking has immense potential to open the door to a sustainable ocean economy. This approach abandons the false choice between economic development and environmental protection. In contrast to a 'conservation

philosophy' of minimising destruction or an 'extractive approach' of maximising the resources that can be extracted from the ocean, the new approach seeks to achieve the integration of the 'three Ps' of effective protection, sustainable production and equitable prosperity. This approach does not mean just leaving the ocean alone; it means proactively managing human activities to use the ocean wisely rather than using it up, in order to help build a much richer future in which people have more wealth and better health, nature thrives and resources are distributed more equitably.

Realising the new vision requires an integrated, rather than a sectoral, approach that is based on five building blocks:

- Using data to drive decision-making
- Engaging in goal-oriented ocean planning
- De-risking finance and using innovation to mobilise investment
- Stopping land-based pollution
- Changing ocean accounting so that it reflects the true value of the ocean

Putting these building blocks in place would enable change across the entire ocean economy, not just in specific sectors or locations. Over time, sustainable ocean management could help the ocean produce as much as 6 times more food and generate 40 times more renewable energy than it currently does[6], contribute one-fifth of the reductions in greenhouse gas emissions needed to keep the world within the 1.5°C temperature rise limit set by the Paris Agreement goals by 2050[7], help lift millions of people out of poverty, improve equity and gender balance, increase economic and environmental resilience, build the industries of the future and provide low-carbon fuel and feed for activities on land.

Investments in a sustainable ocean economy are not just good for the ocean. They represent an excellent business proposition. Investing $2.8 trillion today in just four ocean-based solutions—offshore wind production, sustainable ocean-based food production, decarbonisation of international shipping, and conservation and restoration of mangroves—would yield a net benefit of $15.5 trillion by 2050, a benefit-cost ratio of more than 5:1[8].

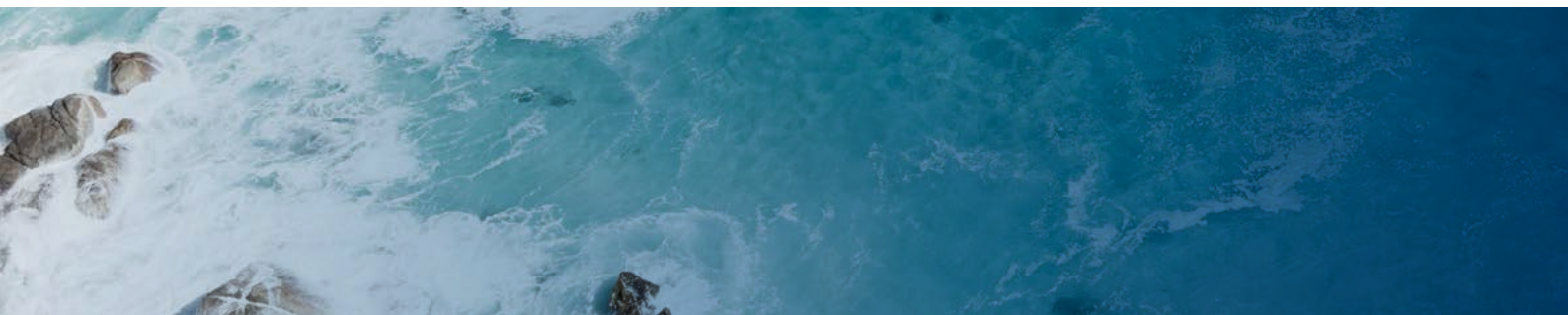
The ocean is so vast, and its role in the global economy and the lives of the world's people so fundamental, that it can be difficult to know where to start in creating a sustainable ocean economy. Fortunately, pragmatic solutions are already being implemented, albeit not at the scale needed. These efforts could jump-start progress on a much larger scale, putting the world on a trajectory that would vastly

increase prosperity in the coming decade and the longer term. These approaches embrace a philosophy in which stakeholders—including direct users of the ocean (fishers, shippers, energy producers and beach lovers, among others) as well as policymakers, governments, businesses and others—accept the new paradigm and work together to achieve the same goal of a healthy, productive ocean.

Some of the most promising efforts include empowering communities and modifying incentives to align economic and conservation outcomes. In the Philippines, for example, a network has been created that grants fishing communities clear, exclusive rights to fish in certain areas. In communities that organised to manage 'their' fishing areas and protected zones, boats and fishers are registered, the catch is recorded, regulations are respected and fishers participate in management. By embracing sustainability, participating communities increased their food and financial security and gained access to new markets and sources of capital—improving their own well-being while protecting the ocean. Complementary global trends are also emerging. Open data networks are making it easier to track and detect illegal fishing vessels. Governments are starting to tackle plastic pollution, and financiers are starting to recognise the value of investing in the ocean.

Practical solutions that can be implemented at a modest scale as well as high-level actions could create a sustainable ocean economy, underpinned by the three Ps of effective protection, sustainable production and equitable prosperity. Implementing them requires political will at all levels, including the very top.

The ocean is not too big to fail, and it is not too big to fix. But it is too big to ignore. The more we learn about the ocean, the more we see that it is central to improving the health, wealth and well-being of people. It holds the answers to the most pressing challenges facing humanity, including climate change and food security. It is time to shift away from thinking of the ocean as a victim toward seeing it as an essential part of the solution to global challenges. New partnerships need to be forged that will take action now to achieve a sustainable ocean and a sustainable future. The choice is not between ocean protection and production. Together they can help build a healthy and prosperous future.



## The Health, Wealth and Well-Being of the World and Its People Depend on the Ocean

Maintaining a healthy ocean is vital to improving global health and increasing global prosperity for everyone; expanding opportunities for all people, including women and marginalised groups; and making the world a better place to live for all, even people living far from the ocean. A sustainable ocean economy is obviously important for the traditional ocean sectors, such as fisheries and shipping. But its value goes well beyond the lives of people whose income comes directly from the sea. Because of the interconnectedness of the global economy, what happens in the ocean affects not only fishers in Fiji but also farmers in Zimbabwe, whose imported tools may have travelled to Africa in a container ship and whose air quality and climate are affected by what happens in the ocean.

The ocean provides a wide variety of vital benefits, many of which are often overlooked:

- **It helps make the planet liveable and is critical to managing the effects of climate change.** The ocean produces half of the planet's oxygen, absorbs 93 percent of the world's anthropogenic heat and moderates the earth's temperature by reducing the heat differential between the poles and the Equator[9]. Without the ocean's regulation of the earth's climate, much more carbon dioxide would be trapped in the atmosphere, exacerbating global climate change[10].
- **The global economy and the livelihoods of hundreds of millions of people depend on the ocean.** The modern global economy could not exist without the ocean. Around 90 percent of all internationally traded goods travel by ship[11]. The ocean economy directly contributes an estimated $1.5 trillion to the global economy[12]. The ocean food sector alone provides up to 237 million jobs, including in fishing, mariculture and processing[13]. Millions of people also work in other ocean sectors, including shipping, ports, energy and tourism—and many more are indirectly connected to the ocean economy.
- **The ocean provides billions of people with nutritious food, with a much smaller environmental footprint than land-based food production.** More than 3 billion people rely on food from the sea as a source of protein and key nutrients, including omega-3 fatty acids and iodine[14].
- **Coastal habitats, such as mangroves, provide protection for hundreds of millions of people, nurture biodiversity, detoxify pollutants flowing off the land, and provide nursery areas for fisheries, increasing the supply of food and providing livelihoods.** They are also a source of revenue. Coral reefs alone contribute $11.5 billion a year to global tourism, benefitting more than 100 countries and providing food and livelihoods to local people[15].
- **The ocean provides a sense of wonder, solace and connection to the natural world and is deeply woven into the cultural and spiritual lives of billions of coastal dwellers**. It also gives pleasure to the hundreds of millions of people a year who visit it[16].
- **The ocean may store unknown treasures**. In addition to its known benefits, it may be the home of undiscovered resources—including medical ones—and new knowledge.

## Its Potential Is Enormous, but the Ocean Is in Trouble

Human stressors affect virtually the entire ocean, making it more difficult for the ocean to sustain human life on earth. Climate change, overfishing, habitat destruction, biodiversity loss, excessive nutrient loads, pollution and other problems are damaging the ocean's health.

- **Climate change and greenhouse gas emissions are having multiple effects on the ocean**. The ocean is becoming warmer and more acidic, putting pressure on plants and animals from the base of the ocean food web to the top. Ocean warming affects circulation, stratification, oxygen content and sea level. By 2100, as many as 630 million people could be at risk of coastal flooding caused by climate change[17]. Sea level rise also affects agriculture, by submerging land, salinising soil and groundwater, and eroding coasts. It will also erode and submerge tourism infrastructure and beaches. In the Caribbean, for example, sea level rise of 1 metre is projected to endanger up to 60 percent of resorts, damage or cause the loss of 21 airports and severely flood 35 ports[18]. Rebuilding the region's resorts alone is projected to cost the Caribbean $10–$23 billion in 2050[19].
- **Habitats are being destroyed, biodiversity is declining and the distribution of species is changing—all of which reduce the benefits that ocean ecosystems provide**. Coastal habitats are disappearing at an alarming rate. Global mangrove cover declined by 25–35 percent between 1980 and 2000, largely as a result of land development and conversion to unsustainable mariculture ponds and rice paddies[20]. The loss of coastal habitats and coral reefs is eroding natural coastal protection, exposing 100–300 million people living within coastal 100-year flood zones to increased risk of floods and hurricanes[21]. Coral reefs—virtually all of which will be lost at 2°C warming—are declining rapidly as a result of compounding pressures from rising ocean temperatures, overfishing and nutrient pollution[22]. The biodiversity of the open ocean declined by up to 50 percent over the past 50 years[23], and the relative abundance of different species has shifted in favour of species that are more tolerant of low-oxygen conditions, such as microbes, jellyfish and some squid[24].
- **Plastic, other land-based pollutants and discharge from ships contaminate the ocean**. Because of the common belief that 'the solution to pollution is dilution', the ocean has long been used as a repository for sewage, nutrient run-offs, heavy metals, nuclear waste, persistent toxicants, pharmaceuticals, personal care products and other noxious items. More than 80 percent of all marine pollution originates on land[25]. Millions of metric tons of plastic are dumped into the ocean every year, entangling, sickening and contaminating at least 700 species of marine life[26]. Untreated ballast water from ships is discharged into foreign ports, creating one of the principal vectors of potentially invasive alien species[27].
- **Overfishing is depleting fish stocks and harming wildlife**. The 'tragedy of the ocean commons' open access that characterises fishing in many parts of the ocean means that too many boats pursue too few fish, at the expense of overall system health and productivity. Exacerbated by subsidies that increase the capacity of the fishing fleet and by illegal, unreported and unregulated (IUU) fishing, fishing has

become the number one driver of extinction risk for marine vertebrates (excluding birds)[28]. If overfishing continues, annual yield is projected to fall by over 16 percent by 2050, threatening global food security[29].

A single stressor, such as overfishing or pollution, can do considerable damage. Worse still, individual stressors locally compound one another, with enormous consequences for ecosystems. Without action, these problems could cost the global economy more than $400 billion a year by 2050. By 2100, the annual cost could reach $2 trillion[30].

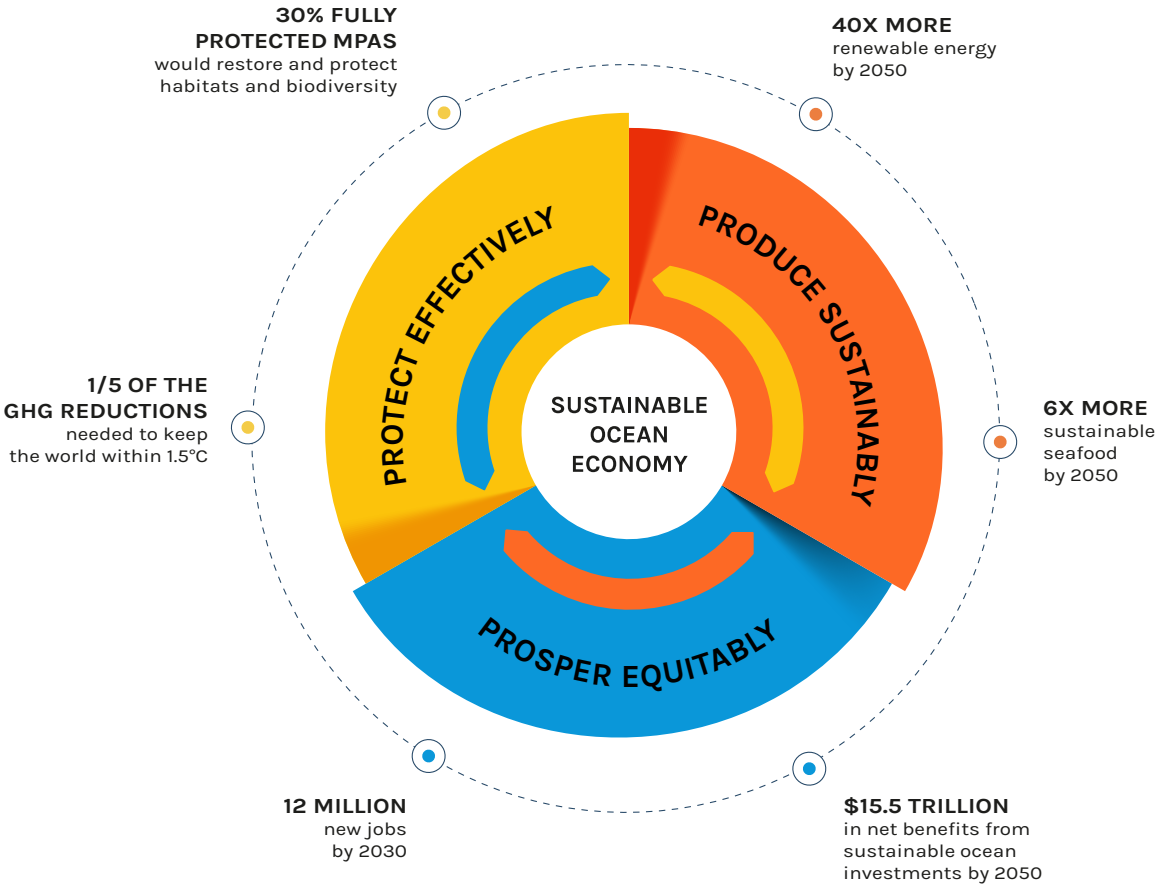
Neglect and abuse of the ocean and the effects of global climate change will make life worse for everyone. But historically underrepresented and underserved communities—including women—will bear a disproportionately large share of the burden. These groups are most vulnerable to food insecurity, loss of livelihoods and sea level rise. They are also the most likely to suffer from the many crimes and human rights violations that take place on the ocean, including human trafficking and smuggling, slave labour and peonage (debt slavery) systems.

## A New Relationship with the Ocean Is Needed—One That Creates a Healthy Ocean and a Sustainable Ocean Economy

In contrast to a conservation philosophy of minimising destruction and an extractive approach that focuses on exploiting the ocean to create wealth, a sustainable ocean economy brings diverse stakeholders together to achieve common goals—the three Ps of effective protection, sustainable production and equitable prosperity. In this new paradigm, groups work together by adopting integrated and balanced management of the ocean

in which each of the three Ps contributes to the others. Sustainable production based on regenerative practices (such as climate-ready, ecosystem-based fisheries management or seaweed farming) along with fully protected areas, for example, can help restore ocean health. The result is a triple win for nature, people and the economy and a world where prosperity is greater and more equitably distributed than it is today (Figure ES.1).

**Figure ES.1. A Sustainable Ocean Economy Can Create a Triple Win for People, Nature and the Economy**




*Note: MPAs: Marine protected areas. GHG: Greenhouse gas emissions.*

*Source: Authors, drawing on the following sources: OECD. 2016. The Ocean Economy in 2030. Directorate for Science, Technology and Innovation Policy Note, April. https://www.oecd.org/futures/Policy-Note-Ocean-Economy.pdf; Konar, M., and H. Ding. 2020. "A Sustainable Ocean Economy for 2050: Approximating Its Benefits and Costs." Washington, DC: World Resources Institute. https://www.oceanpanel.org/Economicanalysis; Costello, C., L. Cao, S. Gelcich et al. 2019. "The Future of Food from the Sea." Washington, DC: World Resources Institute. https://www.oceanpanel.org/blue-papers/future-food-sea; Hoegh-Guldberg, O., et al. 2019. "The Ocean as a Solution to Climate Change: Five Opportunities for Action." Washington, DC: World Resources Institute. https://oceanpanel.org/sites/default/files/2019-10/HLP_Report_Ocean_Solution_Climate_Change_final.pdf.*

## Protect effectively

Protecting the ocean doesn't mean just leaving it alone—it means managing human activity wisely in order to preserve biodiversity and critical habitats, allow the ocean to sustainably yield greater benefits and preserve the ocean's cultural and spiritual value. In some areas, significantly scaling back or prohibiting human activities will be necessary to allow ecosystems to recover and regenerate. In most areas, sustainable practices will be needed that both allow the ocean to produce and maintain ocean health.

Far from holding back production, restoring and maintaining the ocean's health represents the best way to generate ocean-based wealth and make the most of the ocean's unique resources. This new way of thinking is also marked by a shift from incremental improvement to ecosystem-based integrated management and from a narrow focus on gross domestic product (GDP) alone to one that takes account of both the monetary and nonmonetary benefits and assets of the ocean.

### A sustainable ocean economy would help protect the ocean by reducing the carbon dioxide emissions that are threatening it.

Ocean-based activities could provide one-fifth of the carbon mitigation needed to meet the Paris Agreement goals by 2050, reducing global greenhouse gas emissions by up to 4 billion tonnes of carbon dioxide equivalent in 2030 and up to 11 billion tonnes in 2050, according to research commissioned by the Ocean Panel[31]. Emission reductions of this magnitude are equivalent to the annual emissions from 2.5 billion cars or all of the world's coal-fired power plants.

### Protecting coastal habitats and the ocean's biodiversity would help the ocean continue to provide the ecosystem services humanity depends on.

A restored and protected ocean would help mitigate the impact of storm and sea level rise, saving lives and livelihoods, and would reduce economic costs of damage and recovery. Healthy coral reefs, for example, reduce wave energy by up to 97 percent, potentially protecting up to 100 million coastal inhabitants from storm risks[32]. By reducing wave heights, mangroves reduce flooding of coastal areas and contribute to biodiversity. Marine protected areas (MPAs) that are fully protected from extractive and destructive activities can rebuild and safeguard biodiversity, mitigate climate change (by preventing emissions from the disturbance of sediment carbon by bottom trawling) and boost the productivity of fisheries in areas surrounding MPAs through the spillover of fish[33].

### Protecting the ocean from pollution could catalyse deeper reform of contaminating, wasteful material management practices on land.

The problem of ocean pollution starts on land. Plastic—along with numerous other pollutants, including pharmaceuticals and excess nutrients—enters the ocean because systems for their proper disposal on land are inadequate. The most effective way of stopping pollutants from entering the ocean is to tackle the root causes of pollution on land. Shifting to a 'circular economy'—a system in which resources are designed to be used continually and at their highest possible value added and recovered or regenerated as efficiently as possible at the end of their service—would yield enormous benefits for the ocean economy. Agricultural regulations aimed at reducing ocean dead zones could result in farmers adopting precision agriculture practices to reduce runoff, which would also improve the health of the soil and the quality of water in rivers and streams.

## Produce sustainably

When the ocean is managed effectively, it can produce more and its production can be more sustainable. A shift to a sustainable ocean economy would increase food and energy production, improve the quality of jobs in the ocean sector and benefit billions of people, without putting extra pressure on marine ecosystems.

### The volume of food production from the ocean could soar, helping increase food security for almost 10 billion people in 2050.

The ocean's ability to sustainably produce food is vastly under-realised. Managed better and sustainably, the ocean could produce up to six times more food than it does today—and it could do so with a low environmental footprint[34].

Most fishing today is not economically or ecologically optimised. Too many boats pursue too few fish in ways that are short-sighted and destructive. Too much seafood value is lost to poor handling. Too many non-target species are accidentally caught. If this approach continues, the yield in 2050 is expected to be around 16 percent lower than it is today[35]. In contrast, if all stocks currently exploited were fished at the maximum sustainable economic yield, production could increase by 20 percent over current production levels and by 40 percent over the catch forecast under a business-as-usual scenario[36].

The mariculture story is even more promising. The potential to expand finfish mariculture is significant if farms avoid adversely affecting surrounding ecosystems and use fish feed that is not made from wild caught fish. Unfed mariculture also holds great promise. Bivalves (such as oysters and mussels) and seaweed can substantially increase the production of nutritious food and feed, with little negative impact on the marine environment. In some cases, this kind of mariculture could actually enhance wild fisheries by creating artificial habitats and nursery grounds for fish.

About 35 percent of fish and seafood is currently wasted in the value chain. Reducing this wastage could boost consumption without increasing production[37].

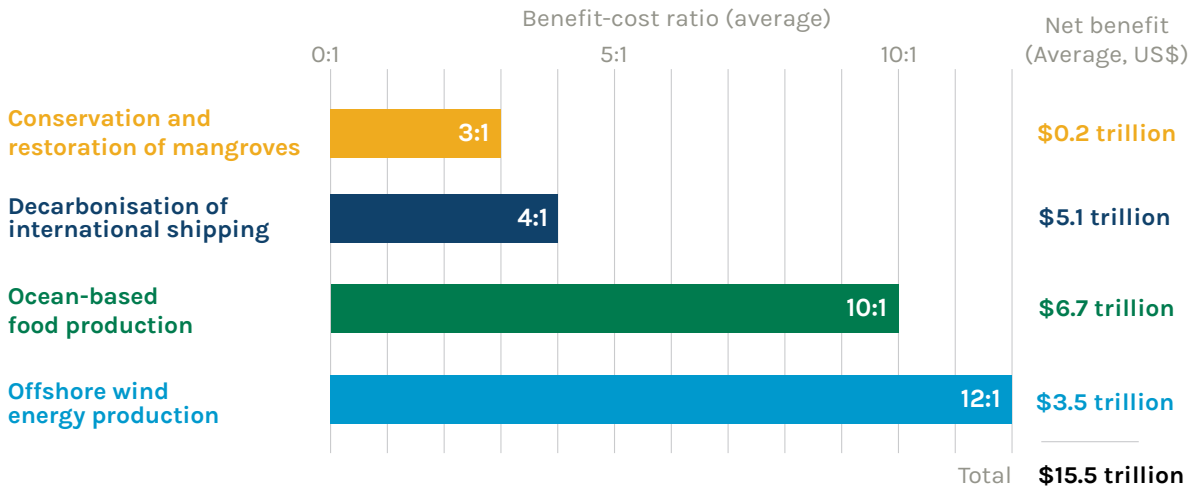
### The ocean can provide a virtually limitless supply of clean, renewable energy.

Offshore wind turbines could generate 23 times more power than the present total global electricity consumption[38]. Other potential sources of ocean-based renewable energy—producing energy from waves and tides, salinity and temperature gradients, and floating solar photovoltaic panels, for example—are still in their infancy but hold promise.

### Investments in the ocean are highly cost-effective.

Investment of $2.8 trillion today in four sustainable ocean-based solutions—conservation and restoration of mangroves, decarbonisation of international shipping, sustainable ocean-based food production and offshore wind production—would yield net benefits of $15.5 trillion by 2050[39]. All four interventions have high benefit-cost ratios (Figure ES.2).

**Figure ES.2. Sustainable Ocean–Based Interventions Have Very High Benefit–Cost Ratios and Could Yield Trillions of Dollars of Benefits**




*Note: Average benefit-cost (B-C) ratios have been rounded to the nearest integer and the net benefits value to the first decimal place. The B-C ratio for mangroves is the combined ratio for both conservation- and restoration-based interventions. The average net benefits represent the average net present value for investments and are calculated over a 30-year horizon (2020–50).*

*Source: Konar, M., and H. Ding. 2020. "A Sustainable Ocean Economy for 2050: Approximating Its Benefits and Costs." Washington, DC: World Resources Institute. https://www.oceanpanel.org/Economicanalysis.*

## Prosper equitably

Left unmanaged, a growing ocean economy could exacerbate economic inequality, as strong, elite incumbents capture the benefits of the ocean while vulnerable and marginalised groups become increasingly exposed to economic, social and cultural impacts, including displacement.

Inequality is a structural feature of the current ocean economy. Women, for example, represent just 2 percent of the world's formal maritime workers[40]. Poor, vulnerable and marginal communities are bearing—and will continue to bear—the worst effects of global climate change. A sustainable ocean economy would not only create greater wealth, it would also create a world in which resources are distributed more evenly and where all ocean users have an opportunity to have a voice in critical decisions.

### A sustainable ocean economy would create new and better jobs.

By some estimates, it could create 12 million net jobs[41]. Some sectors, particularly fisheries, will need to shed jobs. Support schemes will be needed to manage the transition to lower capacity and more sustainable management of fish stocks.

Other sectors will grow significantly. Thousands of new jobs will be created in engineering, information technology, applied science and related areas. The number of jobs in mariculture and offshore wind is projected to soar, and the increase in seaborne cargo volume and the expansion of ports are expected to create millions of jobs. Decarbonising shipping will be critical to ensure that this expansion does not come at the cost of the ocean's health.

### The new agenda would empower local fishers.

The yields of millions of artisanal fishers are far lower than they used to be, partly because of the open-access model of much of the ocean, which has resulted in overfishing. A better-managed approach would benefit many of them.

Empowering fishers by granting them access rights in exchange for sustainably managing their resource is one of the levers of the sustainable ocean economy. Doing so has already proved effective. In the territorial use rights fisheries (TURFs) that Chile created, for example, catches by artisanal fisheries have surpassed industrial catches, and the biomass and size of the target species has risen[42]. Similar approaches have met with great success in many fisheries, recovering depleted fisheries and enabling them to thrive[43].

### International collaboration and transparent supply chains could significantly reduce maritime crime.

IUU fishing is estimated to account for 20 percent of the world's catch (up to 50 percent in some areas)[44]. Illegal fishing is also often an indicator of other types of crime at sea, including labour and human rights violations, money laundering and tax fraud.

### Acting sustainably would help preserve the cultural importance of the ocean.

The ocean is more than just a source of economic wealth. It also has spiritual, cultural and recreational value to billions of people[45]. For many Indigenous peoples, it is a key aspect of their culture. Well-designed marine protected areas and other effective area-based conservation measures can help preserve pristine ocean areas and culturally important ocean areas (such as sacred sites, historic wrecks and sea graves).

## The ocean should be a key part of the massive global economic recovery from the COVID-19 contraction

COVID-19 has temporarily halted economic activity in the ocean economy, causing significant income and revenue losses to tourism, fisheries and mariculture, and shipping; adversely affecting the ocean's health; and exacerbating gender and income inequalities. The disruptions have led to cascading and interrelated impacts. The decline in tourism, for example, forced some communities to turn back to unsustainable fishing as a food source, putting pressure on coastal fisheries and reefs.

A key objective of the massive recovery from the COVID contraction will be to restore economic activity without simply restoring old patterns of environmental degradation, instead creating a more sustainable and more resilient future. The ocean economy can play a critical role in this process. Investment in five areas—coastal and marine ecosystem restoration and protection, sewage and waste infrastructure, sustainable unfed mariculture, zero-emission marine transport and sustainable ocean-based renewable energy—could create jobs and spur economic growth in the immediate term[46].

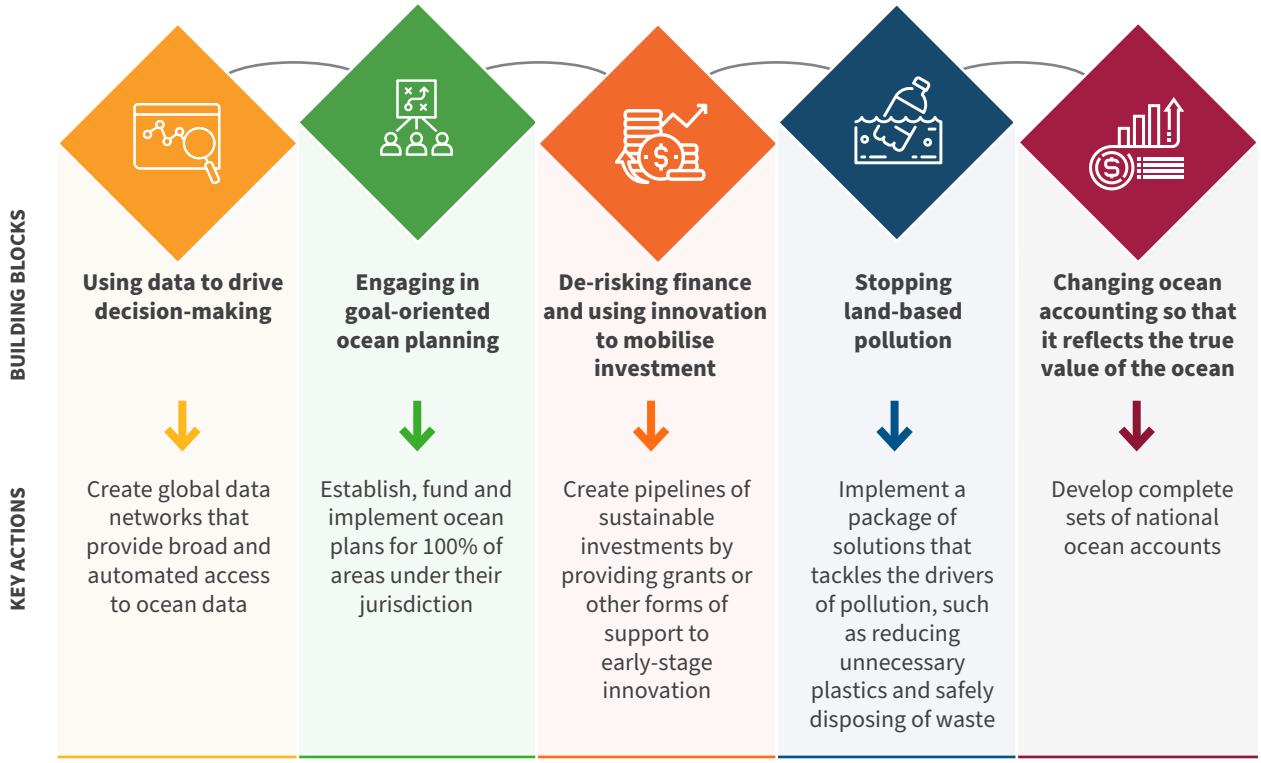
Investments made over the coming months and years will have long-term effects on the nature of the world's economies and their resilience to shocks. Efforts must be made now to avoid locking in high-emitting, high-polluting and inequitable pathways and locking out regenerative and sustainable futures. The opportunity to reset and rebuild a stronger, more equitable, more resilient and sustainable ocean economy should not be missed.

## The Challenges Are Great, but a Pragmatic Action Agenda Offers Solutions to Meet Them

A world in which effective protection, sustainable production and equitable prosperity go hand in hand is possible. But it will not happen if business as usual continues. Without action, ocean planning will continue to be largely ad hoc, fish stocks will continue to decline and land-based polluters will continue to use the ocean as a liquid dump.

Political and business decisions made now and over the next 30 years could change this trajectory. With action, more systematic, ecosystem-based, inclusive spatial planning would become the norm. Access rights for specific ocean resources would be clarified, eliminating conflicts over resources and ensuring that the wealth of the ocean is equitably distributed. Wild fish stocks would recover, and significant increases in sustainable mariculture would provide nutritious food for billions of people, ensuring food security. Polluters would be subject to legal and political actions that would limit their ability to pollute the ocean.

**Figure ES.3. Five Building Blocks Are Key to Creating a Sustainable Ocean Economy**




*Source: Authors.*

## Maintaining a healthy ocean will require action on many fronts and across multiple sectors

Delivering effective protection, sustainable production and equitable prosperity is an inspiring and feasible vision that is backed by science. The transition to a sustainable ocean economy will require a realignment of incentives, in-depth reforms of how the ocean is used and managed, and the empowerment of ocean users who are vested in enhancing ocean health.

Governments and businesses can take hundreds of sector-specific actions to improve ocean sectors, from supporting ocean-based renewable energy to create jobs in the wake of the COVID-19 contraction to supporting ecotourism and banning pollutants. These efforts are important, but without getting the fundamentals right, it will not be possible to transform the entire ocean system towards the desired sustainable model. Five building blocks can set the foundation for a sustainable ocean economy (Figure ES.3). These building blocks put the conditions in place for wider change across various ocean sectors. With these foundations in place, sector-specific reforms, innovations and research can be implemented and accelerated.

### Using data to drive decision-making.

Technologies for sensing, simulating, forecasting, tracking, managing and sharing data on open-access platforms have the potential to transform the ocean economy. New technologies can be used to register ocean-related rights and contracts, facilitating rights-based management[47]. Product tracking throughout the supply chain can help brands embrace sustainable practices and small producers connect to global supply chains. Applications can help manage fishing areas and quotas, adjust shipping traffic and avoid endangered species bycatch. In the near future, every ship's journey—and the nature of its business at sea—will be public information. Lawbreakers such as illegal fishers, polluters, smugglers and labour law violators will literally be on the public radar and subject to arrest.

Some of these technologies are already being used on a limited scale. The POSEIDON model, for example, simulates the feedback loop between fishery policies, fishing fleets and ocean ecosystems, allowing policy alternatives to be compared[48].

But barriers stand in the way of fully harnessing the power of science and data. Collecting data is very expensive, with most sensors custom-built for narrow and specific scientific missions[49]. Technological innovation in the ocean has therefore been driven largely by governments and large-scale commercial interests.

Data are fragmented into national, corporate and academic domains. Access to data is limited, and data can be difficult to use. Tools designed for marine managers, for example, are often so technical that only programmers are able to use them. Poorer countries and ocean users have little or no access to data that could help them adopt sustainable practices.

**KEY ACTIONS:** Overcoming these and other barriers requires the creation of global data networks that provide broad and automated access to ocean data. Governments can lead the way by mandating these standards and helping create data networks that aggregate decentralised data into a common, searchable database. They can require that data sharing be a non-negotiable condition of access to public resources—whether the resources are fish stocks and mineral deposits or funds for coastal management or for research. To achieve or improve accountability, governments can prioritise technology-forcing regulations governing the real-time monitoring of fishing, seafood imports, shipping emissions, mining, coastal development and pollution.

### Engaging in goal-oriented ocean planning.

The sector-by-sector assortment of regulations for some ocean activities, coupled with an open-access model for others has contributed significantly to today's decline in ocean health and cannot continue. The shortcomings of the system are evident. Open-access fisheries almost always fail[50]. Uncoordinated ocean development creates operational inefficiencies, conflicts over use and environmental degradation that undermines future productivity. Unrestricted industrial, nutrient and carbon-related pollution is changing the ocean's chemistry and affecting its biology and economic potential.

Given the interconnectedness of the ocean's sectors, it does not make sense to manage them separately. Ecosystem-based management, science-based marine spatial planning and integrated ocean management are tools that can be used to facilitate more systematic and equitable management of the ocean's resources and services. Some locales are already using ecosystem-based management tools that are science-based and grounded in broad

stakeholder engagement and focus on achieving a healthy and resilient ocean ecosystem—with excellent results. Xiamen, China, for example, has seen a 40 percent improvement in socioeconomic benefits from its marine sectors since it adopted integrated ocean management in 1994[51].

A variety of barriers has held back the widespread uptake of goal-oriented planning. Standards and practices for planning, accountability, transparency and legal rights or protections in the ocean remain a century or more behind their land-based equivalents—partly because businesses fear that integrated planning is a way for conservationists to pursue an antibusiness agenda. Top-down planning processes have failed to engage all users, resulting in inefficient processes and a lack of buy-in and implementation.

To be successful, ocean plans must find a balance between the requirements of different ocean users, between the needs of the ocean and the needs of the coast and its people. Growing evidence from countries in which integrated ocean planning has been used shows how the agendas of ecosystem health, food and energy security, local prosperity and coastal protection can reinforce one another. Scientific and local knowledge are key to understanding co-benefits and navigating the trade-offs.

Ocean planning needs to provide inclusive, equitable access by and recognition of local communities. Local fishers must have access to traditional fishing grounds, cultural sites must be protected and viewsheds must be preserved. Representatives of all types of ocean users must be involved in planning. Resource owners, lessees and access holders must be given secure titling and reliable and effective legal recourse against polluters, trespassers and other violators.

**KEY ACTIONS:** To ensure that goal-orientated planning becomes a reality, countries should establish, fund and implement ocean plans for 100 percent of the areas under their jurisdiction, using a process that is science-based, inclusive, participatory and adapted to the local context. Doing so is crucial to balancing protection and production and ensuring equitable access and rights for local users.

### De-risking finance and using innovation to mobilise investment.

Current investment in sustainable ocean industries, biodiversity and conservation is grossly inadequate. It needs to quadruple to restore and sustainably maintain ocean health[52].

Investment is limited for a variety of reasons. The fact that externalities such as the effects of ocean sector activities on global climate change, pollution and human rights are not reflected in the prices producers receive means that ecologically unsustainable businesses can thrive. Harmful subsidies—typically supporting the expansion of large-scale industrial fishing fleets and fossil-fuel extraction —distort the ocean economy.

In some cases, investing in sustainability is a long-term proposition. Rebuilding fish stocks and fishing sustainably can make business sense in the long run, for example, but can be costly in the short to medium run. As a result, opportunities are missed. Governments could help solve the problem by providing resources to mitigate transition challenges—by, for example, repurposing subsidies and implementing fishery reforms that prevent overfishing and help ensure a strong return on investment.

**KEY ACTIONS:** Countries that establish sustainable ocean development as a national priority can hope to attract investment from sovereign wealth funds and development finance institutions. Through their own and other public or philanthropic funding sources, private investment capital can be de-risked, catalysing private investment in novel industries and business models like sustainable fisheries (reforms), or MPAs financed by tourism fees. This bending of public and private capital can be especially catalytic in increasing investments in developing nations. Governments can also help stimulate the pipeline of sustainable ventures and projects by providing grants or other forms of support to early-stage innovation, as Norway has done to support next-generation offshore aquaculture and the European Union has done to support offshore wind generation. In the offshore energy sector, governments could support renewable energy by providing low-cost infrastructure, setting feed-in tariffs and providing subsidies for sustainable activities. They could also reduce risk—by ensuring regulatory certainty, providing insurance and providing offtake/demand guarantees, particularly for capital-intensive offshore investments such as wind energy and large-scale mariculture.

### Stopping land-based pollution

Virtually every pollutant present on land is also present in the ocean, with compounding and significant deleterious impacts on ecosystem health. Plastics, nutrients (primarily nitrogen and phosphorus), pesticides and parasiticides, antibiotics and other pharmaceuticals, industrial chemicals, oil and gas, heavy metals, toxins, medical waste, e-waste and other types of debris are diverted to the ocean with very few financial consequences for the polluter.

These materials end up in the ocean because waste management and sewerage infrastructure in many countries, especially Asia and Africa, are inadequate. Waste collection is largely unprofitable because few consumer products are recyclable.

Addressing the ocean pollution challenge has been complicated by the difficulties of attribution (many pollutants come from more than one source) and the overwhelming asymmetry of the situation: When heavily protected land-based private interests clash with the interest of a weakly defended common pool resource like the ocean, the ocean loses.

A growing number of governments and industries are taking action. Measures such as banning plastic bags are welcome, but their effect will be insufficient. Current commitments on plastics, for example, are likely to reduce annual plastic leakage into the ocean by only 7 percent by 2040[53].

**KEY ACTIONS:** To stop the leakage of plastics into the ocean, a diverse and more ambitious set of solutions is needed that includes reducing unnecessary plastics, recycling materials and safely disposing of waste. Recycled materials must become cheaper than virgin plastic. Companies must be held accountable for how much plastic they use and whether they use recycled content, recyclable product designs and plastic substitutes. Massive investment must be made in waste collection and recycling technology and infrastructure, particularly in developing countries, where such infrastructure is weak. Tackling the underlying cause could also help reduce other pollutants. Adopting precision agriculture on land could help reduce nutrient runoff into the ocean, for example.

### Changing ocean accounting so that it reflects the true value of the ocean

Traditional measures of the economy, such as GDP, ignore externalities, such as the effect of production on pollution or global climate change. They also fail to place a value on natural resources and ignore the way benefits are distributed.

Measuring only the GDP generated by ocean-based sectors does not capture the true value of the ocean—and can reward unsustainable practices. The ocean's broader value must be fully accounted for and used in decision-making, based on a holistic set of metrics that includes measurements of infrastructure assets, such as ports; natural assets, such as fish populations and coral reefs; and indicators of benefits to people, such as measures of income and well-being.

**KEY ACTIONS:** To measure the value of the ocean more accurately, national statistical offices, in partnership with other agencies, need to develop complete sets of national ocean accounts. Interactive dashboards should be created to allow users to explore the data by aggregating and disaggregating sectors and groups of people.

Having these five building blocks in place will enable change in key ocean economy sectors such as sustainable food from the ocean, renewable energy from the ocean and sustainable tourism. These sectors will also need targeted and sector-specific actions in terms of policies, technology and finance innovation, and scientific research, but having these building blocks in place will set governments and other stakeholders on the right path and lay the groundwork for the achievement of a prosperous and sustainable ocean economy.

## This new way of thinking about and managing the ocean is gaining traction

The ocean is moving up the policy agenda. Coastal countries, especially small island states, are advocating for socially equitable and environmentally sustainable growth. Civil society is increasingly recognising the decline in the ocean and favouring government action to protect the ocean.

The action agenda is ambitious but entirely feasible. Progress in building the foundations for change is already evident:

- The data revolution has begun. Sensors and satellites are increasingly being deployed to monitor the ocean. Data on invasive species in bilge water and nutrients in river deltas, for example, provide actionable information in near real time—the holy grail of adaptive management. Sound fishery management digital tools, including vessel tracking, fishery simulation, and registry and enforcement systems, are widely available.
- Several regions have replaced siloed management practices with more integrated marine spatial planning. For example, the Baltic Sea states have coordinated across

borders and sectors to implement a science-based planning strategy and have been rewarded with the return of predators and birds as well as restored fish stocks[54].

- Sustainable ocean investments are on the rise. In a recent survey, 72 percent of investors classified the sustainable ocean economy as investable[55]. Thousands of sustainable ocean ventures are emerging across all continents.
- Together, the United States, Europe and Asia adopted 95 policies and pieces of legislation limiting plastic packaging between 2010 and 2019.
- A growing number of countries are adopting more holistic accounting techniques. China, for example, is using gross ecosystem product (GEP) to steer its transition towards inclusive, green growth[56].

Similar trends can be observed at the ocean sector level. Backed by industry, support is growing for green shipping, the development of new technologies and practices that reduce the impact of mariculture on ecosystems, and community-led programs restoring fish stocks, to name just a few emerging changes. Inspiring success stories, such as the reform of fisheries in the United States, demonstrate that sound ocean management can simultaneously restore fish stocks and benefit fishers and coastal communities[57]. To achieve a sustainable ocean economy, change needs to happen faster and at a bigger scale than is currently happening. Actions at the local and national level can help accelerate change.

## Targeted actions can help accelerate progress

The huge scale of the challenge and the high stakes involved mean that acting quickly and effectively is crucial. Delivering immediate gains can help demonstrate the long-term benefits of pursuing a sustainable ocean economy, spurring stakeholders to take action. Creating sustainable ocean economic zones and forming national task forces are concrete actions than can move the agenda forward right away.

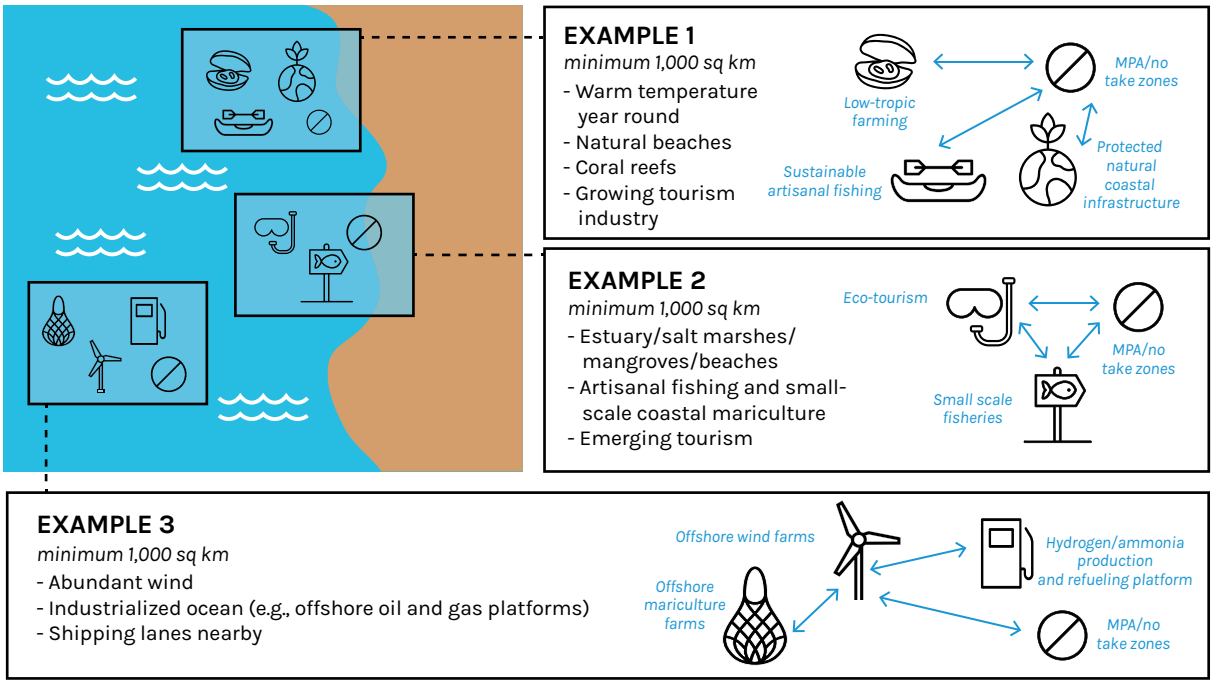
### Sustainable ocean economic zones can illustrate the benefits of a sustainable ocean economy at a small scale.

Special economic zones (SEZs) are areas within a country that the government sets aside to attract direct investment in particular economic activities. These zones typically offer low rents, taxes, utilities and infrastructure costs; relief from bureaucratic procedures; and loan guarantees to market-rate investors. They range in size from small neighbourhood zones to entire cities.

Taking inspiration from the success of the SEZ concept in a country's exclusive economic zone (the ocean zone over which a coastal state has special rights with respect to marine resources) could be a powerful catalyst for accelerating a sustainable ocean economy. Sustainable ocean economic zones (SOEZs) could provide a test bed for systemic experimentation and innovation, where incentives could be tested, results monitored and adapted to, and risks managed. In the process of designing and implementing these zones, the classic hurdles to ocean management—free access, lack of planning, conflicts over use and externalities—can be addressed in the context of real business, rather than as abstract policy.

SOEZs are a way for countries to support and evaluate the sustainable ocean economy model at a scale they are comfortable with. Biological conditions, existing industries and stakeholders, and local needs determine which activities take place in an SOEZ (Figure

**Figure ES.4. Sustainable Ocean Economic Zones Can Be Test Beds for Experimentation and Innovation**




There is no "one size fits all" model

The ocean economic activities in a given zone need to be determined locally as a function of:

- Biophysical characteristics of the area (temperature, natural assets, fish stocks, wind availability, etc.)
- Existing industries and human activities in the zone
- Willingness of local players to engage in a sustainable ocean transformation

**COMMON MANAGEMENT ELEMENTS TO ALL OF THESE OCEAN ECONOMIC ZONES**

Dense network of sensors allows scientific monitoring of the zone

Actions are undertaken in the coastal area nearby the zone to limit land-based pollution

Economic health and sustainability of the zone is controlled by a digital dashboard

100% of the zone is managed according to a plan, developed in a collaborative process with zone users

Tailor-made financing mechanisms and guarantees are provided by public sources

Scientific attention is made to ensure benefits are redistributed equitably to communities and women

*Source: Authors.*

ES.4). One locale might use an SOEZ to attract and test high-technology models combining energy generation, shipping and large-scale mariculture. Another might combine carbon-financed restoration, coastal protection, tourism and fishery enhancement.

Whatever activities take place within the zone, all SOEZs share several common elements. The entire zone is managed according to a plan, a dense networks of sensors allows scientific monitoring of the zone and efforts are made to ensure that benefits are redistributed equitably to communities and women.

### National ocean task forces can accelerate the shift towards a sustainable ocean economy.

Establishment of a sustainable ocean task force at the (ocean) ministerial or head of state level with a mandate to adapt the sustainable ocean agenda to the national context could accelerate change. Such a task force could perform several important functions:

- Conduct a comprehensive marine resource mapping of 100 percent of the country's exclusive economic zone.
- Support and facilitate an inclusive, participatory process to develop a plan that ensures a streamlined and efficient regulatory process, avoids conflicts over spatial use and protects and sustains key oceanic systems.
- Bring together relevant ministries and the head of state on the steps required to accelerate the transition towards a sustainable ocean economy, including financial guarantees and risk-reduction measures, policy and regulations, and international coordination.
- In coordination with relevant organisations, academic institutions and civil society groups, lead special initiatives, such as the design of networks of marine protected areas and SOEZs and efforts to control land-based pollutants.

National task forces can be a way to highlight the relevance of the ocean economy to national priorities like food security, international trade and tourism.

## The Ocean Is Not Too Big to Fail, and It Is Not Too Big to Fix, but It Is Too Big and Too Central to the Planet's Future to Ignore

Effective ocean protection, sustainable ocean production and equitable human prosperity are inseparable and compatible. When integrated into a sustainable ocean economy, they can change the current downward trajectory of ocean health, producing positive outcomes for people and nature. Setting the foundations within which the three Ps can be achieved and transforming key ocean sectors will not be easy, but it can be done. Doing so would vastly increase the resilience of the global economy and improve the lives of some of the world's poorest and most vulnerable people. Indeed, creating a sustainable ocean economy would help the world meet all of the Sustainable Development Goals (SDGs), not just SDG 14 (on life below water) (Figure ES.5).

Current practices, laws and cultural norms help support the open-access model that characterises much of the ocean. All of them can change. History shows that even very

**Figure ES.5. A Healthy Ocean Is Critical to Meeting the Sustainable Development Goals**


**NO POVERTY**

Sustainable ocean growth means sustained growth, which is able to lift and keep people out of poverty

**ZERO HUNGER**

Farming and fishing sustainably has the potential to produce far more protein than a 2050 population requires

**GOOD HEALTH AND WELL-BEING**

Apart from being able to provide more nutritious food, a healthy ocean is the recharging point for billions of people

**QUALITY EDUCATION**

Lifting marginalised coastal communities out of poverty increases their children's chances for a good education

**GENDER EQUALITY**

Increasing gender equality in the ocean economy would empower millions of women

**CLEAN WATER AND SANITATION**

Desalination of ocean water provides drinking water to millions of people. Additionally, improving sanitation can increase coastal water quality

**AFFORDABLE AND CLEAN ENERGY**

Expanding the ocean's almost unlimited renewable energy potential is predicted to contribute 10% of the global electricity production increase by 2050

**DECENT WORK AND ECONOMIC GROWTH**

Growing the ocean economy sustainably is projected to more than double the current ocean economy

**INDUSTRY, INNOVATION AND INFRASTRUCTURE**

Constructing low carbon ports and renewable ocean energy will stimulate innovation and create vital infrastructure

**REDUCED INEQUALITIES**

Granting well-defined ocean access rights and sustainable resource use ensures long-term prosperity of marginalised groups

**SUSTAINABLE CITIES AND COMMUNITIES**

Constructing blue-green storm protection infrastructure will make cities more sustainable

**RESPONSIBLE CONSUMPTION AND PRODUCTION**

Solving ocean plastic pollution drives us to built a more circular economy on land

**CLIMATE ACTION**

Growing ocean industries sustainably can contribute up to one-fifth of greenhouse gas savings towards achieving a 1.5°C future

**LIFE ON LAND**

Reducing ocean dead zones catalyses land-based reforms towards regenerative precision agriculture

**PEACE, JUSTICE & STRONG INSTITUTIONS**

In a sustainable ocean economy, a nation's sovereignty over its exclusive economic zone and resources is achieved

**PARTNERSHIPS FOR THE GOALS**

The ocean is a platform for collaboration and strengthens the global partnership for sustainable development

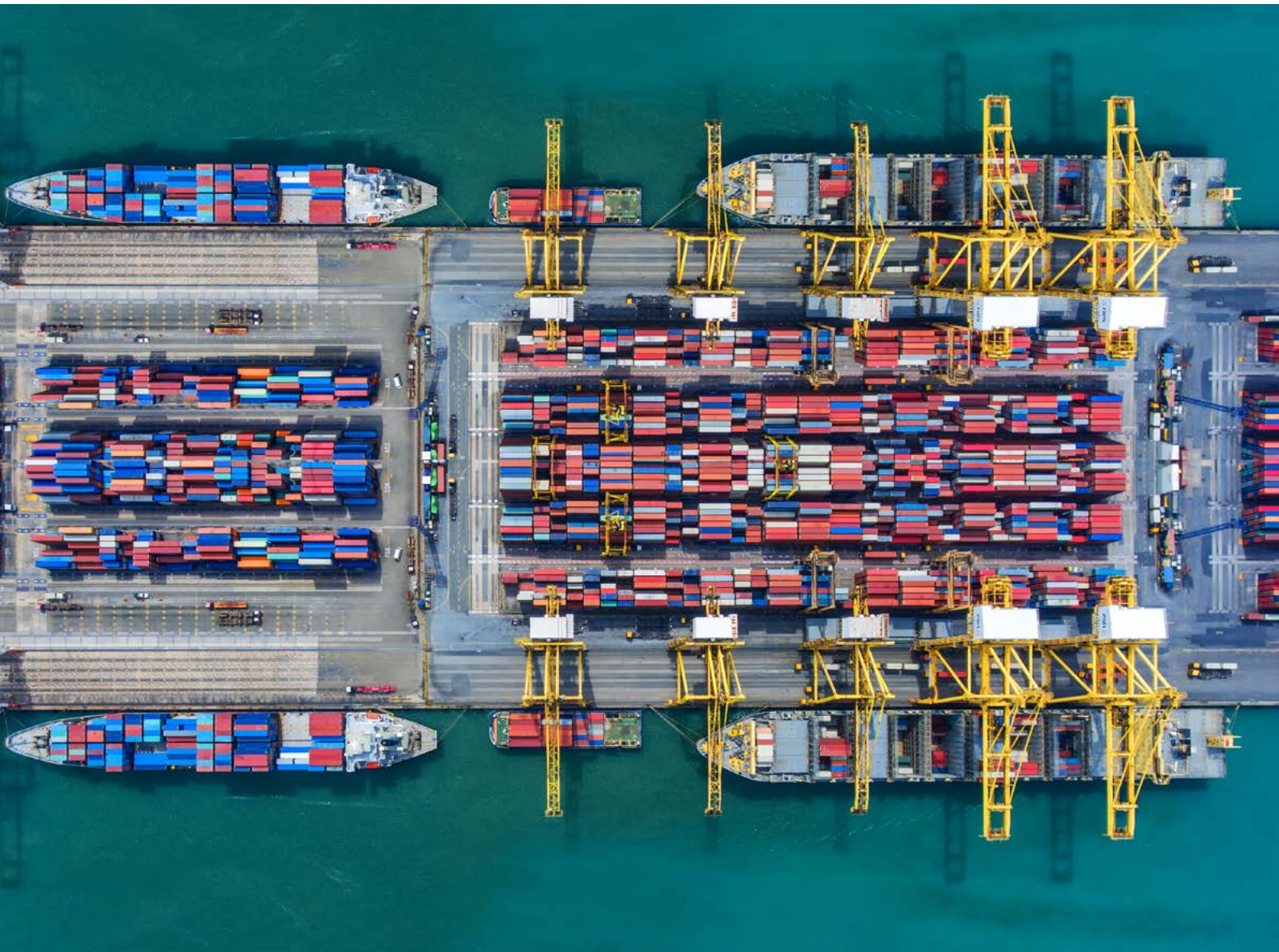
*Note: Regarding SDG 6 (clean water and sanitation), the link to the ocean can be made through desalination plants. Regarding SDG 17 (partnerships for the goals), the ocean provides excellent platforms for collaboration. Peaceful ocean science collaboration, for example, has been important for diplomatic relations (e.g., U.S.-Soviet Gulf Stream experiments in the 1960s).*

*Source: Authors.*

complex systems can shift onto new trajectories, sometimes very quickly. The energy transition in Germany, the banning of smoking in bars and restaurants in much of the world, and the adoption of the Montreal Protocol on Substances that deplete the ozone layer are all examples of changes that required major shifts in attitudes and laws that occurred within the space of a few years.

This kind of change can and must take place among stakeholders in the ocean economy. Spearheaded by a new cohort of ocean interests deeply vested in ocean health—sustainable fishers and mariculturists, coastal communities, renewable energy generators, ecotourism operators, scientists, environmentalists, social and civil society organisations—pollution and over-exploitation can be counteracted.

The journey towards a sustainable future has already begun, with pioneers leading the way. New sustainable technologies are attracting investors, and businesses and governments are waking up to the opportunities of a sustainable ocean economy in building a new future after COVID-19. They are also increasingly recognising the risks and cost of inaction. Inspiring efforts from around the world provide a glimpse of what can be achieved globally if stakeholders act now.



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HIGH LEVEL PANEL *for*
**A SUSTAINABLE OCEAN ECONOMY**

10 G Street NE
Suite 800
Washington, DC 20002, USA
+1 (202) 729-7600

**oceanpanel.org**