



The Ocean Framework

An Investor guide to navigating ocean risks and opportunities

First Sentier MUFG
Sustainable Investment Institute

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The First Sentier MUFG Sustainable Investment Institute (the Institute) provides research on topics that can advance sustainable investing. As investors, both First Sentier Group and MUFG recognise our collective responsibility to society and that investment decisions should be made with consideration to our communities both now and in the future.

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About Chronos Sustainability



This report was produced by Chronos Sustainability Ltd for the First Sentier Investors MUFG Sustainable Investment Institute. Chronos Sustainability was established in 2017 with the objective of delivering transformative, systemic change in the social and environmental performance of key industry sectors through expert analysis of complex systems and effective multi-stakeholder partnerships. Chronos works extensively with non-profits, corporates, global investors and global investor networks to build their understanding of the investment implications of sustainability related issues, developing tools and strategies to enable them to build sustainability into their investment research and engagement. For more information visit www.chronossustainability.com.

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Executive Summary

What is the ocean and why does it matter?

The world has one ocean. It plays a central role in climate regulation by absorbing 90% of excess heat and 30% of atmospheric carbon emissions. Over 80% of the world's biodiversity is found in the ocean; in habitats and ecosystems that sequester carbon, provide food security, serve as nursery grounds for commercially important fish species and protect coastlines from destructive storm energy. Billions of people's livelihoods depend on the ocean in key sectors that include fisheries, tourism and marine transportation which moves 90% of global trade across the world.

The economy depends on a healthy ocean

The global economy and virtually all economic sectors are either directly or indirectly dependent on the ecosystem services derived from the ocean. Yet, despite its economic importance, the impact of declining ocean health continues to be overlooked or downplayed in risk models and investment strategies. This report explains why investors need to pay much more attention to the ocean and to ocean-related risks, impacts and dependencies in their investment research and decision-making. It describes the key features of major ocean-dependent sectors (maritime transportation, marine and coastal tourism, fisheries, aquaculture, ports, sub-marine telecommunications, offshore renewables, blue biotechnology and marine pharmaceuticals) and discusses the impacts and dependencies these sectors have on the ocean, and the scale and significance of the associated risks and opportunities.

Why Should Investors be concerned?

Companies across these sectors depend on stable fish stocks, functional coastal habitats, predictable weather systems and the carbon sequestration that the ocean provides. At the same time, industrial and destructive fishing, dredging, carbon emissions, habitat conversion and marine pollution degrade those very systems. Today, these drivers of ocean degradation coupled with the negative effects of climate change are impacting the functioning of oceanic systems and disrupting the natural equilibrium between the ocean, land and atmosphere.

For companies operating in or near the ocean (and for investors in these companies), this continued degradation presents significant risks to business-as-usual as the resources that they depend on become scarce or threatened.

Understanding exposure

To continue benefitting from the ecosystem services and economic potential of the ocean, investors need to systematically assess and evaluate their exposure to ocean-related risks and opportunities and, where identified, understand how companies are responding to mitigate and manage these risks.

The Ocean Framework has been developed as a high-level, sector-agnostic decision-making framework to support investors through this process.

The Ocean Framework equips investors with comprehensive guidance, tools, and resources to:

1. Identify, assess, and manage ocean-related risks and opportunities across portfolios;
2. Systematically prioritise sectors, companies, and issues most impacted by or dependent on ocean ecosystems; and
3. Pinpoint high-risk geographies, evaluate company responses to ocean sustainability issues, and access key data and assessment tools.

The Ocean Framework is complemented by **Engagement Guidance** that supports investors wanting to engage with priority companies to further understand how identified risks and opportunities are being managed. The Guidance provides general (sector agnostic) questions as well as tailored questions and insights for three high-impact sectors: Fisheries, Aquaculture and Maritime transportation (which includes shipping and cruise tourism).

Backing a sustainable blue economy

Achieving global climate and biodiversity targets and the Sustainable Development Goals by 2030 is not possible if ocean sustainability remains overlooked in corporate strategies and investment decision-making.

Inaction presents the biggest risk of all to the future health of the ocean.

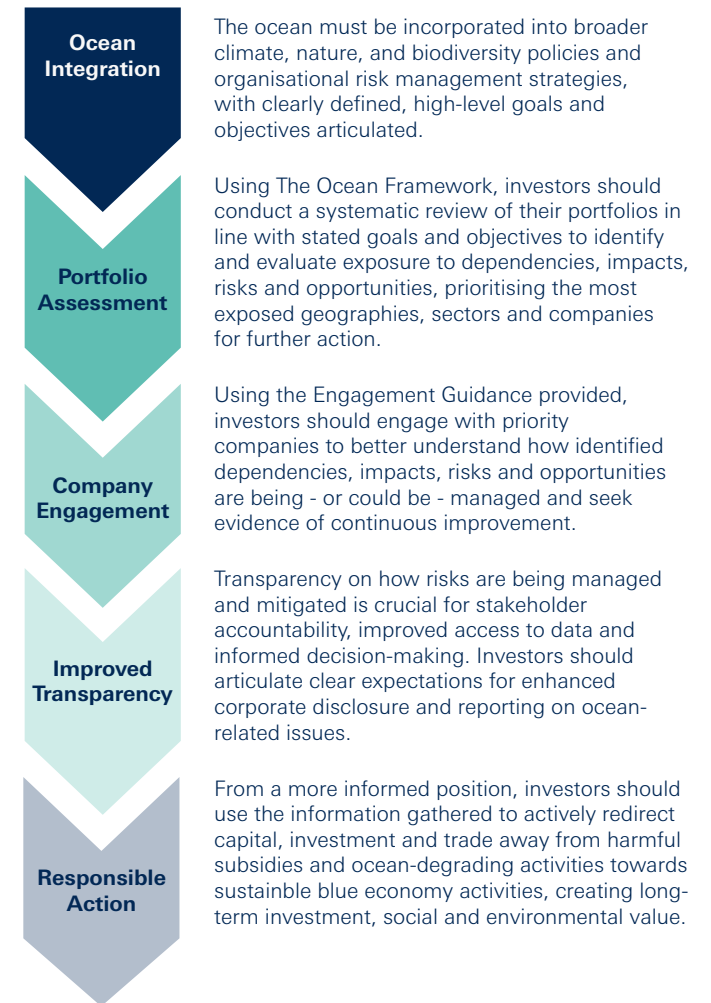
Improving ocean literacy – a deeper understanding of the inherent value of the ocean and the potential that a sustainable blue economy has for future generations and financial returns – is an important first step towards redirecting capital away from unsustainable practices in the traditional blue economy and aligning investments with sustainable economic activities. But it cannot be the only step.

A deeper understanding of the scale of ocean sustainability issues – and future implications for both society and the natural environment and long-term economic growth – should drive companies and their investors to prioritise activities that:

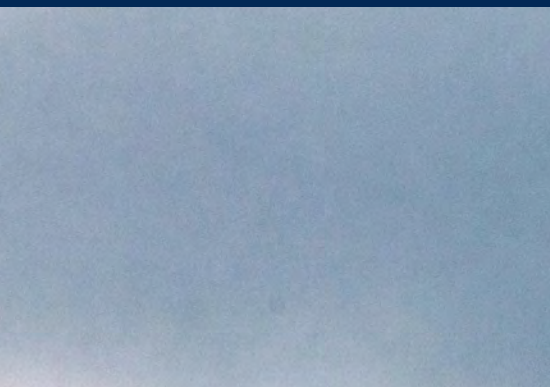
1. **Preserve ocean ecosystem integrity** by respecting conservation objectives and engaging with all stakeholders, including governments, coastal communities and Indigenous Peoples, and public and private institutions;
2. **Adopt a precautionary approach** to maximise social and economic benefits, such as food security, equity, and poverty eradication for present and future generations;
3. Ensure **economic activities restore and increase resilience** of oceanic ecosystems and conserve biodiversity to support sustained productivity;

4. **Operate within safe planetary boundaries** to mitigate the impacts of climate change, reduce pollution, and prevent biodiversity loss.

Investors and finance professionals can help drive the transition to – and realise the full potential of – a sustainable blue economy in 5 clear steps:

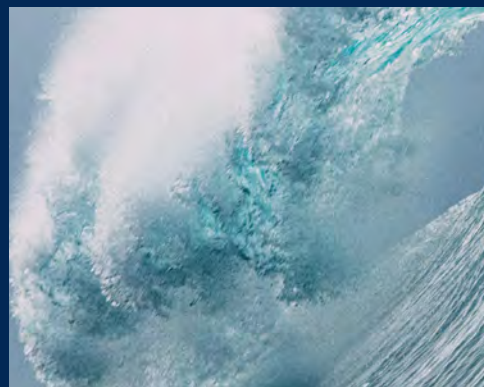


At a glance: This report is structured in four parts:



Part 1

Diving into the Seascape explains the inherent value of the ocean in terms of biodiversity, climate regulation, food supply and economic activity. Breaking down the science, the importance of the ocean-climate nexus is explained and draws into focus the five drivers of ocean degradation that threaten to destabilise vital ocean systems.



Part 2

Why ocean sustainability is relevant to investors highlights why degrading ocean health and the unsustainable use of ocean resources presents systemic economic risks. Focusing on key sectors, this section explores the impacts, dependencies, risks and opportunities that investors could be exposed to, across asset classes and investment portfolios before laying out investor recommendations that support the transition to a sustainable blue economy.



Part 3

The Ocean Framework is a practical and accessible decision-making framework for investors wanting to identify, assess and manage ocean-related risks and dependencies across sectors and investment portfolios.



Part 4

Engagement Guidance to support investors with sector-agnostic and sector-specific (Fisheries, Aquaculture and Maritime Transportation) engagement with companies, offering a set of initial and follow up questions to put to companies to find out how they are identifying, assessing and managing to ocean-related risks and opportunities.

Contents

Executive Summary	3	Part 3: The Ocean Framework	46	Glossary	72
Part 1: Diving into the seascape	7	3.1 Description of the process	47	Key Terms	73
1.1 Introduction	7	3.2 Assessing exposure to ocean-related risks and opportunities	50	Appendices	75
1.2 What is the ocean and why does it matter?	8	Part 4: Engagement Guidance	60	References	89
1.3 The ocean's role in climate regulation	9	4.1 Investor case for engagement	60		
1.4 Declining planetary health includes declining ocean health	10	4.2 Purpose of the Engagement Guidance	60		
1.5 The five drivers of ocean degradation explained	11	4.3 Scope of the Guidance	61		
1.6 Policy responses to global ocean challenges	16	4.4 How to use the guide	61		
Part 2: Why ocean sustainability is relevant to investors	18	4.5 Sector-agnostic engagement questions	62		
2.1 Integrating ocean action into climate and nature commitments	18	4.6 Sector-specific engagement questions	66		
2.2 The Blue Economy	19				
2.3 What could a sustainable blue economy look like?	20				
2.4 Scaling blue finance	24				
2.5 Oceanic ecosystem services	27				
2.6 Understanding exposure to ocean risks and opportunities	31				
2.7 Investor recommendations	43				

Part 1: Diving into the seascape



1.1 Introduction

The ocean is an undervalued global asset. It generates over half of the oxygen in the earth's atmosphere¹, regulates the global climate, underpins annual economic activity valued at \$3–6 trillion² and provides food security and livelihoods for billions of people around the globe. Indigenous peoples, coastal communities and seafarers are custodians of our ocean. Their intergenerational knowledge and deep-rooted cultural ties with the marine environment hold the key to understanding and resolving many of today's ecological and social challenges^{3,4}.

A healthy and functioning ocean, and sustainable use of it, is essential for life on earth. Yet despite its importance, the impact of declining ocean health has historically been overlooked in risk models and investment strategies. Consequently, the ocean remains treated as an inexhaustible resource when in reality it is a rapidly depreciating natural asset.

For investors, this presents both risk and opportunity. Ocean degradation – driven by the effects of climate change, over-exploitation, nature and biodiversity loss

and pollution – translates into supply chain disruptions, stranded assets and heightened regulatory and reputational risk. Yet conversely, emerging solutions such as sustainable and regenerative fisheries and aquaculture, expansions in offshore renewables and nature-based solutions to climate change and coastal resilience - represent one of the fastest-growing frontiers of the global economy.

The health of the ocean is not just an environmental issue: it is a financial one. Currently treated as an externality, the future resilience of the ocean requires sustainable decision-making and targeted action in order to support long-term value creation.

This report: a) explores how and why the ocean provides the ecosystem services that it does; b) introduces key and emerging global ocean governance and blue economy frameworks; c) highlights the

investment risks associated with ocean degradation, and d) demonstrates how these could translate into material sustainability challenges for sectors and companies that depend on the ocean and the investors that are exposed to these risks. This includes a focus on the economic activities associated with key, ocean-dependent sectors, and a review of dependencies, impacts, risks and opportunities in the context of a pressing need to protect and restore the health of our ocean. The report consolidates and maps existing ocean-related frameworks and standards and introduces The Ocean Framework, a high-level decision-making framework to support investors looking to understand their risk of portfolio exposure to ocean-harming activities.

1.2 What is the ocean and why does it matter?

The ocean is the world's largest, single ecosystem, covering 71% of the Earth's surface and containing 97% of the planet's water^a. Having evolved over billions of years, today's ocean is a complex system of interconnected and inter-dependent biological, chemical and physical processes that operate in concert with the land and the atmosphere.

There is one ocean and its waters flow between five different ocean basins (see Figure 1). The tides and currents are driven by the earth's rotation and the effects of wind and weather patterns over the surface of the water. This helps mix the layers of the ocean from the surface to the deep, moving cold, dense and nutrient-rich waters from the poles to the warmer, nutrient-poor surface waters in equatorial zones. This distribution of heat and nutrients is what sustains marine life.

Over 80% of the world's biodiversity resides in the ocean in different ecosystems and habitats. Nearly 1,300 new marine species are recorded each year⁵ and experts estimate that the ocean is home to over 2 million different species – half of which are likely to reside in the deep sea⁶.

From the surface to the deep, ocean systems are what provide the essential ecosystem services that today's economy and the global population depend on (see [Section 2.4](#) for detailed discussion).

While most economic activities are concentrated in shallow, more accessible surface waters, most of the ocean is classified as the deep sea – which starts at the point at which sunlight no longer penetrates the waters (at ca. 200m) and extends to almost 11,000m in the Mariana trench – the world's deepest ocean trench (see Figure 2).

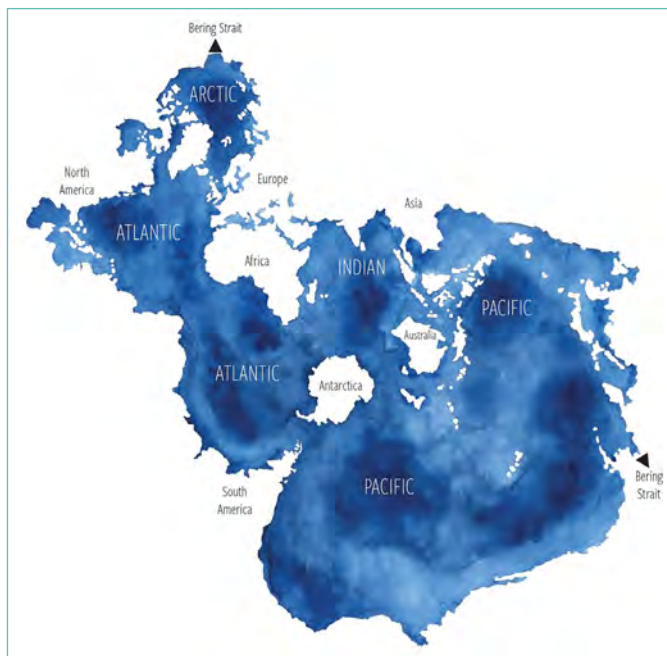


Figure 1: The Spilhaus Projection, originally published in the 1940s, illustrates how all of the world's seas and waters circulate through our one ocean. Image Source: [Natalie Renier, Woods Hole Oceanographic Institution.](#)

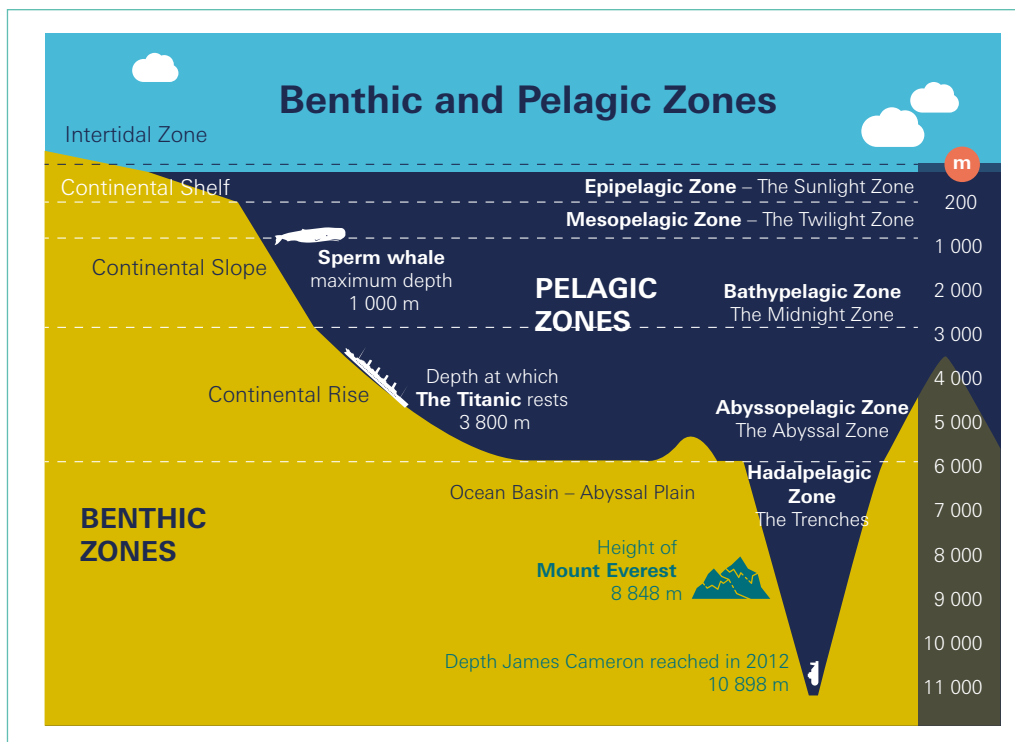


Figure 2: Areas of each ocean basin are categorised by depth. Each zone includes a wide range of habitats, ecosystems and features that are shaped by ocean chemistry and the physical dynamics. Image Source: [Let's talk Science.](#)

a. Including water frozen in the cryosphere.

1.3 The ocean's role in climate regulation

Often described as the planet's lungs, the ocean plays a central role in climate regulation. Since the early 1900s, the ocean has absorbed up to 30% of the carbon emitted by human activities (primarily, the burning of fossil and non-renewable fuels)⁷ and over 90% of excess planetary heat associated with planetary warming gases. These climate regulating services have kept global surface temperatures over 35°C cooler than they would otherwise be⁸ - creating a natural buffer to the effects of global warming.

Understanding the Ocean-Climate nexus

Biological, chemical and physical processes in the ocean drive a constant exchange of heat, oxygen and carbon dioxide between the air (atmosphere) and the water column which helps regulate the climate and sustains life on earth as we know it. This is known as the Ocean-Climate nexus and is largely influenced by atmospheric carbon and planetary temperatures.

The ocean carbon cycle

Photosynthesising marine life such as plankton, seagrass, kelp and mangroves draw down vast quantities of carbon dioxide from the atmosphere (the biological carbon pump). Marine mammals play an important role in this cycle. Great whales (baleen and sperm whales), for instance, feed on marine algae and act as carbon⁹ sinks, storing up to 33 tons of carbon over their lifetime. When whales they die, their bodies sink to the deep ocean layers, and the carbon contained is sequestered for millennia sea¹⁰ (the physical carbon pump).



In addition to active drawdown during photosynthesis, atmospheric carbon dioxide dissolves in ocean waters (particularly in the colder polar regions)¹¹. Dissolved carbon dioxide in the water forms carbonic acid – a phenomenon known as ocean acidification. Since the onset of industrialisation, the ocean's capacity to absorb anthropogenic carbon dioxide has kept pace with rising emissions however, this capacity is finite. Since the 1900s, the ocean has become 40% more acidic¹², changing ocean chemistry and reducing overall capacity to absorb carbon dioxide from the atmosphere (see [Section 1.5 Drivers of Ocean Degradation](#)).

This creates a negative feedback loop because acidic water absorbs less carbon, meaning that the effectiveness of the ocean to continue acting as a carbon sink is reduced as atmospheric carbon dioxide and global temperatures rise.

The ocean heat pump

Water is a known insulator, and the ocean is no exception. The blue realm has absorbed up to 90% of the excess heat associated with planetary-warming gases (principally, methane and carbon dioxide), slowly increasing in temperature over time. The motion of the ocean – currents, tides and vertical mixing – distributes

this heat around the planet, creating habitable ecosystems and circulating nutrients that in turn sustain biodiversity. The temperature of surface waters has a significant role in the water cycle and therefore, global weather patterns and events. Under stable conditions, the transfer of heat and moisture helps sustain freshwater supplies on land while mitigating the frequency and severity of adverse weather events (e.g. storms and cyclones).

The excess heat energy absorbed by the ocean has increased global water temperatures at all ocean depths¹³, with the highest rate of change recorded in the last 30 years¹⁴. When seawater heats up, several things happen: warmer waters expand, causing sea level to rise. Less of the sun's energy is absorbed by warm water, which contributes to the melting of sea ice (further increasing sea levels) and affects the density of seawater. In turn, this prevents vertical mixing in the water column (known as stratification), slows the distribution of heat throughout the water column and the reduces the amount of carbon sequestered in the deep sea. Stratified water affects global current systems which in turn affects global weather patterns, resulting in more frequent and extreme weather events.

Hotter waters hold less oxygen (and release carbon dioxide), increasing physiological stress on marine biodiversity which rely on oxygen to breathe. This, coupled with changes in nutrient distribution (because of increased stratification), affects the distribution of photosynthesising plankton (and commercially important fish stocks) and further reduces the drawdown of carbon from the atmosphere. In extreme circumstances, ocean dead zones can form that no longer sustain life.

The interplay between the carbon and heat pumps and the negative feedback loops described here are eroding the earth's natural buffer against the effects of climate change and amplifying the rate of global warming. For this reason, the significance of the Ocean-Climate nexus is becoming increasingly evident in efforts to address both climate change and biodiversity loss.

1.4 Declining planetary health includes declining ocean health

The ocean’s ability to consistently provide ecosystem services is compromised, as tipping points are being approached or exceeded. The rate of change in the use, exploitation and degradation of the ocean is outstripping the planet’s ability to adapt – as conveyed by the Stockholm Resilience Centre’s research on Planetary Boundaries (See Figure 3). Evidence shows that as of 2025, seven of the nine planetary boundaries have now been crossed. The Living Planet Index (LPI) measures trends in the size of wildlife populations over time to indicate overall health of ecosystems and how resilient they are against disturbances. The most recent assessment shows that the Ocean LPI has declined by 56% between 1970 and 2010¹⁵.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) states that there are five direct drivers of biodiversity loss and ecosystem degradation. In the marine environment, these manifest as over-exploitation (over-harvesting of living and non-living resources), land/sea use change (habitat loss or degradation), climate change and extensive pollution (from nutrients, chemicals, and plastics). Ineffective governance of the global ocean compounds these effects (see Appendix 1).

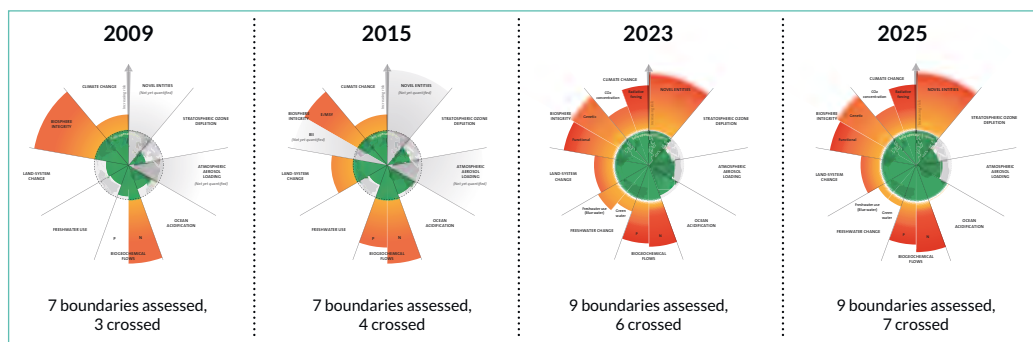
Marine biodiversity is adversely impacted by ocean changes through: a) habitats being lost; b) changes in species distribution and community compositions; and c) altered interactions between species, cumulatively driving down the health and resilience of the ocean. This gives rise to an increasing risk of the introduction (and survival) of Alien Invasive Species (AIS) which in turn, further downgrades the resilience of ocean ecosystems, severely impacts human health and well-being¹⁶ and threatens the goods and services that ocean-dependent sectors are reliant upon.

Coastal communities, islanders from small island developing states (SIDs) and Indigenous Peoples and Rights Holders in developing economies are amongst those most adversely affected by declining ocean health yet have contributed least to its decline. Tuvalu in the South Pacific is anticipated to be the first country that will be entirely lost as a result of climate change¹⁷. Over the next 30 years, it is anticipated that half of

the remaining land area of Tuvalu (just 26 km²) will be underwater, threatening access to drinking water, food security and energy supplies. By 2100, 95% of the land will be gone.

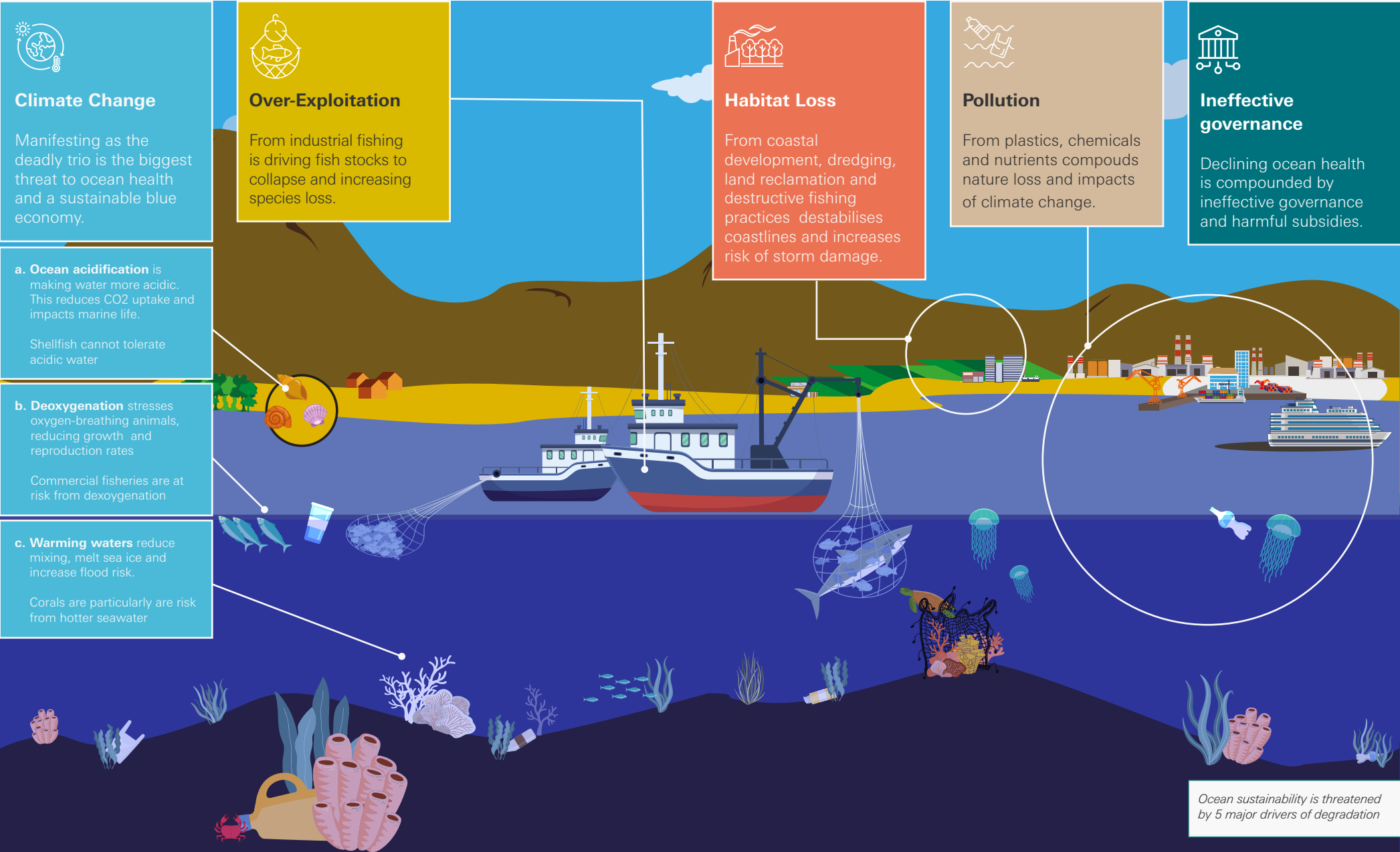
Globally, the costs associated with annual flood damage and storm surges already amount to billions of dollars each year¹⁸. Looking ahead, it is anticipated that the frequency of extreme weather events like Hurricane Melissa^b will increase in line with climate change and the continued degradation of the ocean environment. Based on current trajectories of both population growth and sea-level rise, over 800 million people will be at risk of coastal flooding by 2050 – affecting 570 low-lying coastal cities¹⁹ largely in low- and middle-income countries (LMICs)²⁰.

Figure 3: In 2025, the threshold at which the effects of Ocean Acidification can be managed is breached, with potentially long-term implications for fish species diversity, coastal ecosystems and marine tourism. Image source: Stockholm Resilience Centre



b. At the time of writing, Hurricane Melissa, a Category 5 hurricane that made landfall on the Caribbean Islands of Jamaica and Haiti in November 2025, claimed the lives of 75 people and caused economic damages equivalent to at least 32% of 2024 GDP

1.5 The five drivers of ocean degradation explained



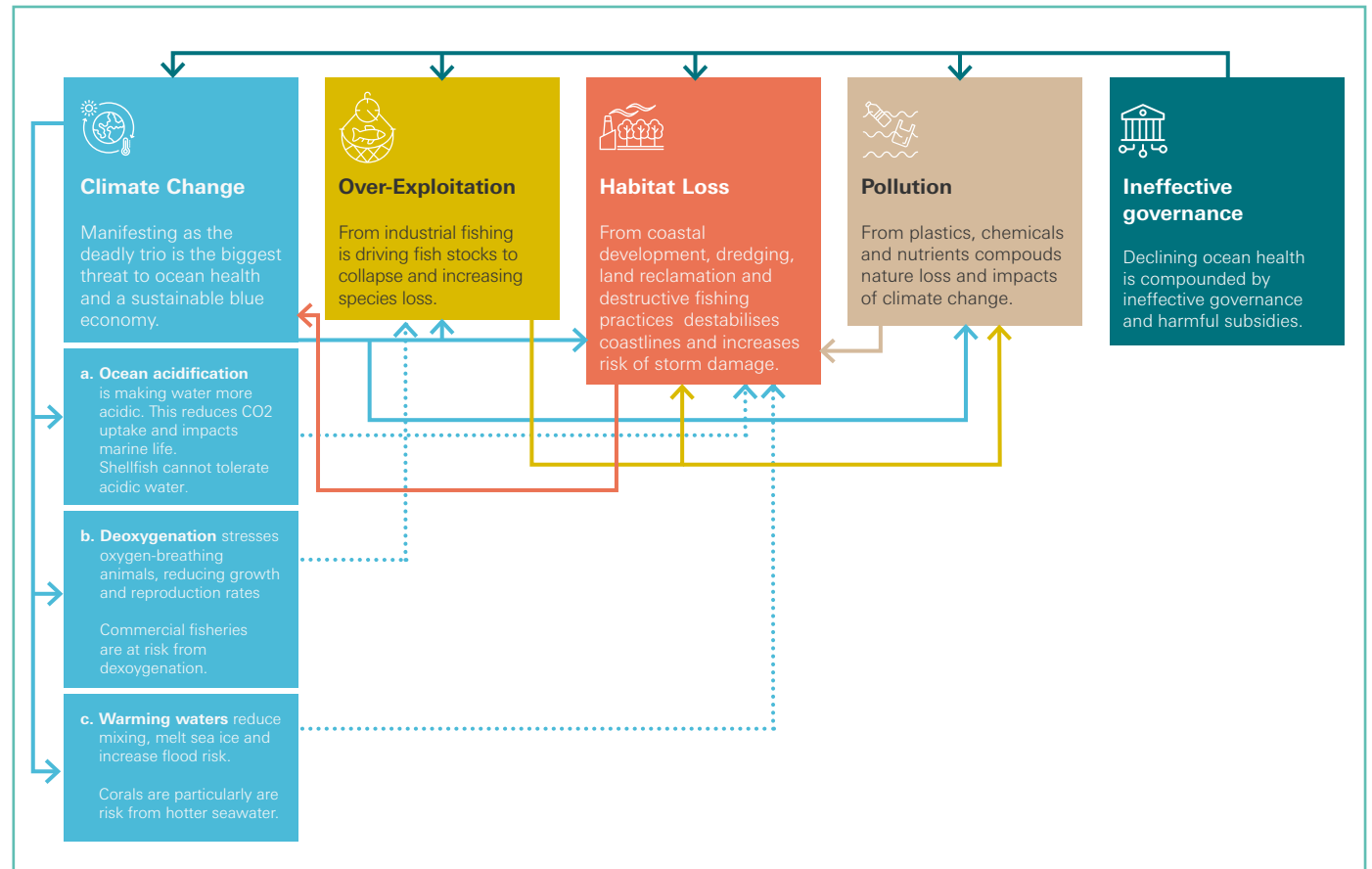
Driver 1: Climate change

Climate change is one of the most significant drivers of ocean degradation and manifests in the ocean in three ways which are known as the deadly trio:

- **Ocean Warming:** 2024 was the hottest year on record, and the first to breach the atmospheric 1.5°C^c threshold relative to pre-industrial temperatures²¹. This was reflected in the ocean where above average surface temperatures were recorded in almost all ocean basins.
- **Deoxygenation:** Oxygen levels have been steadily declining in the ocean since the 1950s, with a predicted drop of 3-5% by 2100. This puts oxygen-breathing marine life under increasing stress (respiratory and metabolic), reducing growth rates and reproductive success. Warmer waters reduce mixing between layers of the ocean meaning less oxygen reaches the deep sea which could hold long term implications for ocean health.
- **Ocean Acidification:** All ocean basins and seas have become more acidic over the last 40 years²² as more atmospheric carbon dioxide is absorbed by seawater. This is causing irreversible damage to calcium carbonate-secreting organisms²³ like hard corals (e.g. tropical & deep-sea cold-water corals), shellfish (e.g. oysters & mussels) and plankton (phytoplankton and zooplankton) which form the base of the food chain and provide vital functions in the ocean.

While some variation in these markers (temperature, oxygen levels and acidity) is natural, and has occurred over geological time, the rate at which today's changes are occurring is faster than previously recorded in science. Coupled with the wider drivers of degradation (remembering that the ocean is a system of systems and no change occurs in isolation) the effects of climate change are amplified further.

c. Global mean surface temperatures – calculated using data on air temperature over land mass plus sea surface temperatures - were 1.55 ± 0.13 °C relative to the 1850-1900 average.



The five drivers of ocean degradation are all interconnected, and compounded by ineffective ocean governance. This is accelerating the overall rate of ocean degradation

The Great Barrier Reef in hot waters

The Great Barrier reef is the world's largest reef system, home to over 400 types of coral, 1,500 fish species and 4,000 molluscs and is a designated UNESCO World Heritage site.

Corals (which are an animal) extract bicarbonate from seawater to create hard skeletons in which the colourful coral polyps live. Over millennia, corals have evolved to exist in a symbiotic (co-dependent) relationship with plankton (microscopic plants). The plankton, which live inside corals, provide the animals with a source of food and are what gives corals their wonderful colours. If water temperatures are too high, stressed corals expel the symbiotic plankton (and their source of food) effectively leading to starvation of coral polyps. This phenomenon – known as coral bleaching (because without the plankton, coral polyps lie dormant and only the hard white skeletons are visible) – increases coral susceptibility to disease, and the negative impacts of pollution, and can lead to mass die-off of coral reefs.

The Great Barrier Reef (GBR) has experienced 6 significant coral bleaching events since 2016 – two of which have spanned multiple years. The 2024-2025 event (itself part of a fourth, global bleaching event), attributed to increased sea temperatures, resulted in over 50% of the bleached coral dying; just 16% of coral species showed sign of recovery (Byrne et al., 2025)

Healthy coral reefs – and the ecosystem they are part of – provide vital goods and services (e.g. food, nursery grounds, coastal protection and carbon sequestration) and generate billions of dollars in tourism revenue each year. Increased frequency – and severity – of mass bleaching events and the loss of ecosystem services from coral reefs reinforces the need for nations to meet ambitious climate targets.

Amid concerns over Australia's progress on climate change, poor water quality, deforestation and unsustainable fisheries (the main threats affecting the GBR), UNESCO has ordered a State of Conservation report to be prepared by Australia in 2026. At the time of publication, the outcome is still pending but insufficient evidence of protective measures addressing the key threats may lead to the GBR being listed on the World Heritage in Danger list in 2026.



Driver 2: Over-exploitation

Industrial fishing and the over-exploitation of fish stocks is widely cited as the leading driver of marine biodiversity loss, with 38% of today's fish stocks overfished and a further 50% fully exploited²⁴. This means that the fish cannot reproduce and recover fast enough to sustain populations or population growth. Several factors drive this:

- A growing global population and consumer demand for fish protein²⁵;
- An expansion in the overall number of vessels fishing for longer (larger boats spending more days at sea) and further from the shore (fishing internationally and on the high seas)^d;
- Industrial techniques such as trawling, long-lining, gill-netting and the use of drifting Fish Aggregating Devices (dFADs)²⁶;
- Poor fisheries management and governance, including lack of enforcement or protection;
- Harmful government subsidies and unsustainable catch quotas that perversely result in over 40% bycatch being thrown back to sea because they are non-target species.
- Illegal, unregulated and unreported (IUU) fishing (like dynamite or cyanide fishing) and destructive practices such as bottom trawling which destroy habitats, release sequestered carbon and undermine food security, adding further strain to fish stocks ([see Part 2](#) for details).

Driver 3: Habitat loss

Marine habitats are particularly sensitive to the effects of pollution and disturbances in the water column that increase sedimentation (e.g. dredging of shipping channels). Where habitats are lost or degraded, the resilience of the wider seascape is reduced and natural protections against climate change (in the form of carbon storage), coastal erosion, storm surges and flooding are lost. Habitat loss is driven by economic activities such as coastal development (e.g. land reclamation); aquaculture (e.g. shrimp farming); logging and land clearance (e.g. mangrove deforestation for timber and fuel).

Driver 4: Marine pollution

Pollution – from all sources including plastics, chemicals and nutrients – compounds and accentuates drivers of nature and biodiversity loss in the ocean (see Figure 4). This is often a result of fragmented governance of natural resources and siloed policy agendas that focus on short-term benefits and financial returns and do not take into account broader, non-market value of nature's contributions and services²⁷.

Unsustainable plastic production rates topped 460 million tonnes in 2019 and created over 350 million tonnes of plastic waste²⁸ that same year. It is estimated that so-called 'mis-managed' plastic waste accumulates in the ocean to the tune of 11 million tonnes per year and is set to triple by 2040²⁹, driving ecosystem degradation and biodiversity loss and compounding the effects of climate change. Plastic and microplastic^e pollution cause physical harm and can be fatal to marine life when ingested³⁰. Recent studies also demonstrate that animals ingesting plastics are exposed to and impacted by the chemicals present in plastic^f (used during manufacturing) and by the chemicals that accumulate on the surface of plastic material in the marine environment³¹.

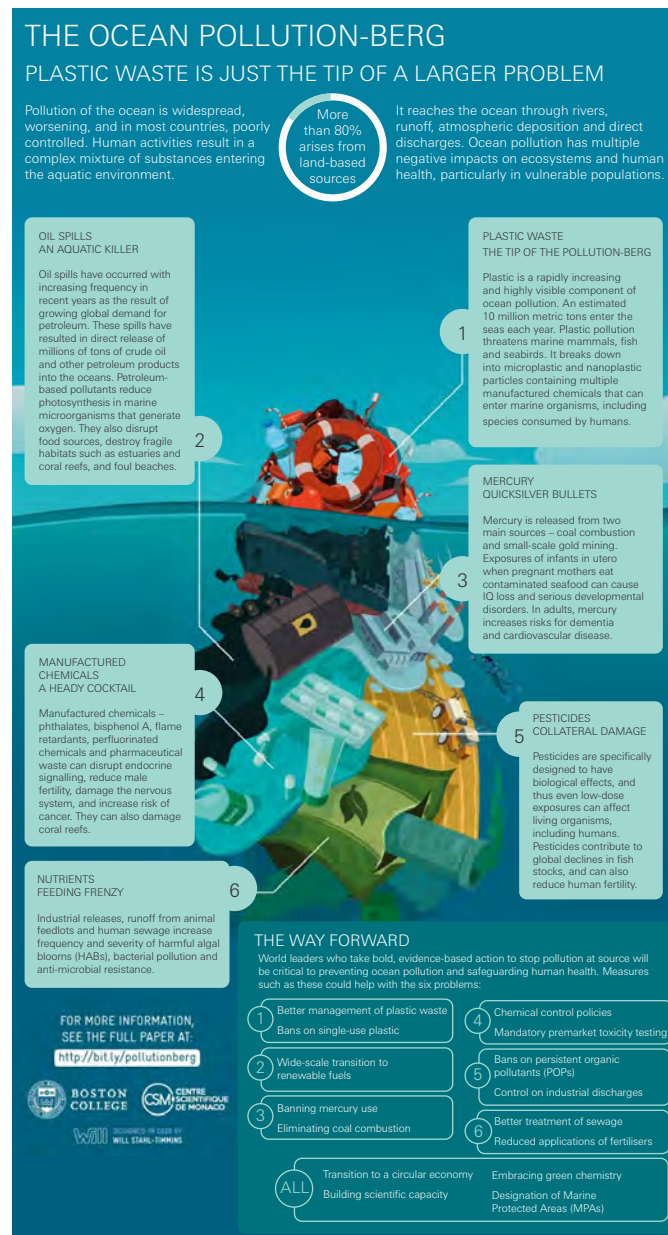


Figure 4: Plastics, chemicals and nutrients are polluting the ocean. Over 80% of pollution originates from terrestrial activities with severe impacts on marine biodiversity, food security and ocean resilience. Image Source: Will Stahl-Timmins, Boston College & Centre Scientifique de Monaco

Driver 5: Ineffective governance

Ocean governance is a complicated landscape of global, regional and national policies, frameworks, targets and commitments (see Appendix 2). As a result, regulatory gaps coupled with weak monitoring and enforcement creates opportunity for damaging and destructive economic activities that are often also associated with widespread, criminal human rights and labour abuses that exploit seafarers. Ocean goods (and services) have long been regarded as common goods³² but declining health and collapsing fish stocks called this approach in to question. The equitable sharing of goods and benefits derived from the sea and the sustainable use and protection of the marine environment are foundational principles of good governance³³.

Marine protected areas (MPAs) are regarded as a highly effective area-based management tool that can restore and maintain healthy areas of the ocean – and sustain the ecosystem services that they provide – when fully implemented. Today, just 3.1% of the global ocean is fully or highly protected³⁴ which means no or limited extractive activities are allowed. Fisheries subsidies – used to supplement fuel costs, vessel costs, fleet size etc – have, until recently, facilitated the over-exploitation, habitat loss, and pollution of the ocean. In 2021, fisheries subsidies amounted to USD 50 billion, roughly 25% of total catch value³⁵.

The figure on the next page provides real world examples for each of the drivers of ocean degradation.

d. This is despite a downward trend in the size of the global fishing fleet relative to 2015

e. Microplastics are pieces of plastic measuring less than 5mm in diameter. They can enter the ocean as microplastics (direct sources) or can form from the breakdown of larger pieces of plastic pollution once in the ocean (indirect sources).

f. Over 16,000 chemicals are known to be used in plastic manufacturing, more than a quarter of which are considered to be chemicals of concern due to their persistence, bioaccumulative, mobile and/or toxic properties.



Climate Change

Manifests in the ocean in the form of **increased temperature**, **deoxygenation** and **ocean acidification**. These changes in the ocean lead to **stratification** (reduced mixing) which directly affects ocean circulation and in turn, weather patterns, increasing both frequency and intensity of storms.

Hurricane Beryl, a Category 4 hurricane that made landfall on the Caribbean Islands of St. Vincent and the Grenadines in 2024 cost an estimated USD 230.6 million in total damages (22% of the islands' GDP) with an estimated total replacement value of all assets nearing USD 6 billion. The Caribbean Catastrophe Risk Insurance Facility (CCRIF) confirmed that parametric insurance payouts in the wake of the storm were the highest made to date – amounting to USD 45.8 million to cover damage on St Vincent and the Grenadines.



Over-Exploitation

Today, 65% of global fish stocks are exploited to maximum capacity and 35% are **overfished**. Industrial scale fishing, long-distance and deep-water fishing are driving over-exploitation. **Destructive fishing techniques** such as bottom trawling releases as much carbon annually as the whole of the aviation industry. Volumes of farmed fish from aquaculture are growing to meet consumer demand and to address some of the sustainability issues with wild-capture fisheries. However, many farmed fish (such as salmon) are **fed with wild-caught species**, undermining some of these sustainability goals.

The Newfoundland cod fishery collapsed in 1992 due to decades of overfishing, poor management, and government subsidies supporting an unsustainable industry. The Canadian government's moratorium on northern cod fishing led to the loss of a \$2 billion industry and 40,000 jobs overnight, devastating coastal communities. The Cod stocks failed to fully recover, permanently altering the regional economy and way of life.



Habitat Loss

Socio-economic factors, **pollution** and the **effects of climate change** are responsible for extensive habitat loss across the ocean. Today, just 15% of coastlines remain in their natural state.

Global mangrove forest cover has halved over the past 50 years, driven by resource extraction (timber, for building and fuel) and land-use change for farming of shrimp, rice and palm. Rapid rate of clearance and loss of ecosystem services (provisioning, regulating and cultural) resulted in increased regulation in the form of protected area status and conservation and restoration targets. Today, 40% of mangroves are formally protected.



Pollution

Oceanic pollution predominantly manifests in the form of **chemicals**, **nutrients** and **plastic pollution**, caused directly by ocean-based economic activities (e.g. shipping, fishing, mining) and indirectly by terrestrial sources of pollution (e.g. from wastewater treatment, farming, illegal dumping). Globally, over 700 marine species have been impacted by plastic pollution alone through ingestion, entanglement and habitat degradation.

WWF reported that plastic pollution in the Mediterranean Sea costs fishers EUR 138 million per year as a result of vehicle damage, opportunity cost of lost- fishing effort and clogged and damaged nets. A separate study in the Salish Sea estimates 4.5% of the value of Dungeness Crab harvest (ca USD 745,000 in 2011) is lost annually as a result of ghost fishing (where animals are trapped and perish in ALDFGs).



Ineffective governance

Marine governance is a complex mixture of global, regional and national policies, frameworks and agreements that are often **poorly implemented and enforced**. Gaps in coverage, and legal loopholes, **amplify the effects of wider drivers of degradation** and enable destructive and illegal economic activities to be carried out.

The UK has committed to protect 30% of its national waters through a network of Marine Protected Areas (MPAs). Today, 40% of England's waters are designated but in the latest official assessment, only 10% of these had monitoring in place to assess effectiveness, and only 3% of these sites had high confidence levels in the assessments. Destructive fishing practices such as bottom trawling is permitted in the remaining 90% of the network. This severely impacts the seafloor causing widespread habitat and species loss and undermines the ability of the MPA to protect and restore biodiversity.

Table 1: Real world impacts for each of the drivers of ocean degradation.

1.6 Policy responses to global ocean challenges

Governing the ocean is not a simple task and involves a complex web of over 600 national, regional and international policies, frameworks, agreements and targets³⁶. The UN Convention on the Law of the Sea (UNCLOS), adopted in 1982, is considered the overarching constitution of the sea under which several different key pieces of legislation have emerged that either directly or indirectly relate to the ocean (see Appendix 2). For the purposes of regulation, the ocean is divided into four key zones: territorial seas, exclusive economic zones, continental shelf and the high seas (see Appendix 3 for an overview).

Over the past 20 years, there have been a number of high-profile policy developments that strive for improved integration of ocean sustainability issues – outside of the UNCLOS family (see Appendix 4 for a timeline).

The 2015 Paris Agreement explicitly referenced the importance of preserving the integrity of ocean ecosystems as part of the broader climate agenda which has since translated to concrete measures across global, regional and national policy frameworks. Also in 2015, the United Nations (UN) initiated a call to action by 2030, through its 17 interconnected Sustainable Development Goals (SDGs) that address critical challenges facing the natural environment – including the ocean. SDG 14: Life Below Water introduces 10 different targets with a collective goal of ensuring ocean resources are used responsibly, to benefit society and prevent further degradation of the environment (see Figure 5).

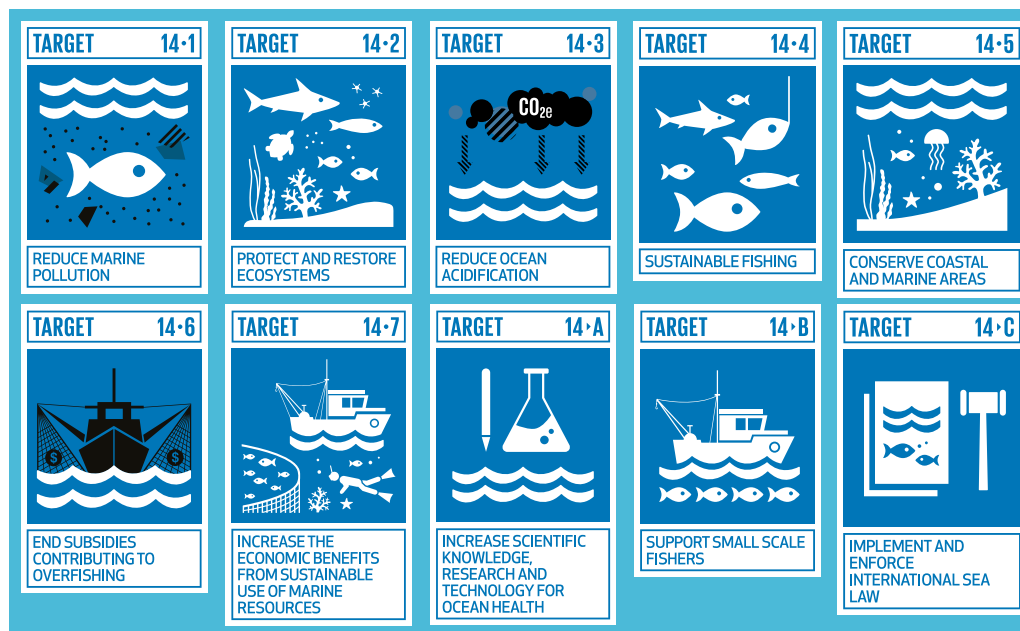


Figure 5: SDG 14: Life below water introduced 10 marine-focused targets for 2030, many of which have since been reinforced by the legally binding strategic targets of the Kunming-Montreal Global Biodiversity Framework. Image source: Chronos Sustainability Ltd. Icons sourced from *The Global Goals*.

The Global Biodiversity Framework

In 2022, at the 15th Conference of the Parties to the Convention on Biological Diversity (CBD), nations adopted the Kunming-Montreal Global Biodiversity Framework (GBF) to implement the aims of the CBD – effectively creating a roadmap for biodiversity conservation and sustainable use of marine and coastal ecosystems. Legally binding, this framework introduces targets and goals to reverse biodiversity loss by 2030 which countries are committed to delivering through National Biodiversity Strategies and Action Plans (NBSAPs). Several of the GBF targets are of direct relevance to the ocean (see Appendix 5 for details)³⁷ but most significantly, the Framework calls for the protection of 30% of the ocean by 2030 (the 30x30 target).

Following the adoption of the GBF, the world has achieved two major milestones for the protection of the ocean that – when implemented – will advance efforts to meet key targets included in the GBF and SDG14.

World Trade Organization Fisheries Subsidies Agreement

In September 2025, the World Trade Organization (WTO) Agreement on Fisheries Subsidies entered into force following its adoption in June 2022. This agreement, centred on prohibiting harmful fisheries subsidies that lead to the over-exploitation of fish stocks, is the first WTO agreement that focuses on the environment³⁸. It is widely anticipated to contribute to the restoration of overfished stocks in the ocean, with a further benefit of protecting the livelihoods of fishers around the world.

High Seas Treaty

Also in September 2025, the Race to Ratification³⁹ of the long-awaited High Seas Treaty (or BBNJ Agreement⁹) ended, and the Treaty entered into force in January 2026. Over 40% of the ocean is formally classed as high seas – areas beyond the outer limits of national boundaries (jurisdictions) that until now, were still treated as a common good (see [Appendix 3](#)). The Agreement, adopted by the United Nations, aims to “conserve and sustainably use marine biological diversity of areas beyond national jurisdiction”⁴⁰ by addressing four key issues:

- Marine genetic resources, including the fair and equitable sharing of benefits;
- Designation and implementation of marine protected areas and other area-based management tools;
- Environmental impact assessments for all economic activities; and
- Capacity-building and the transfer of marine technology, particularly from global north countries to global south countries.

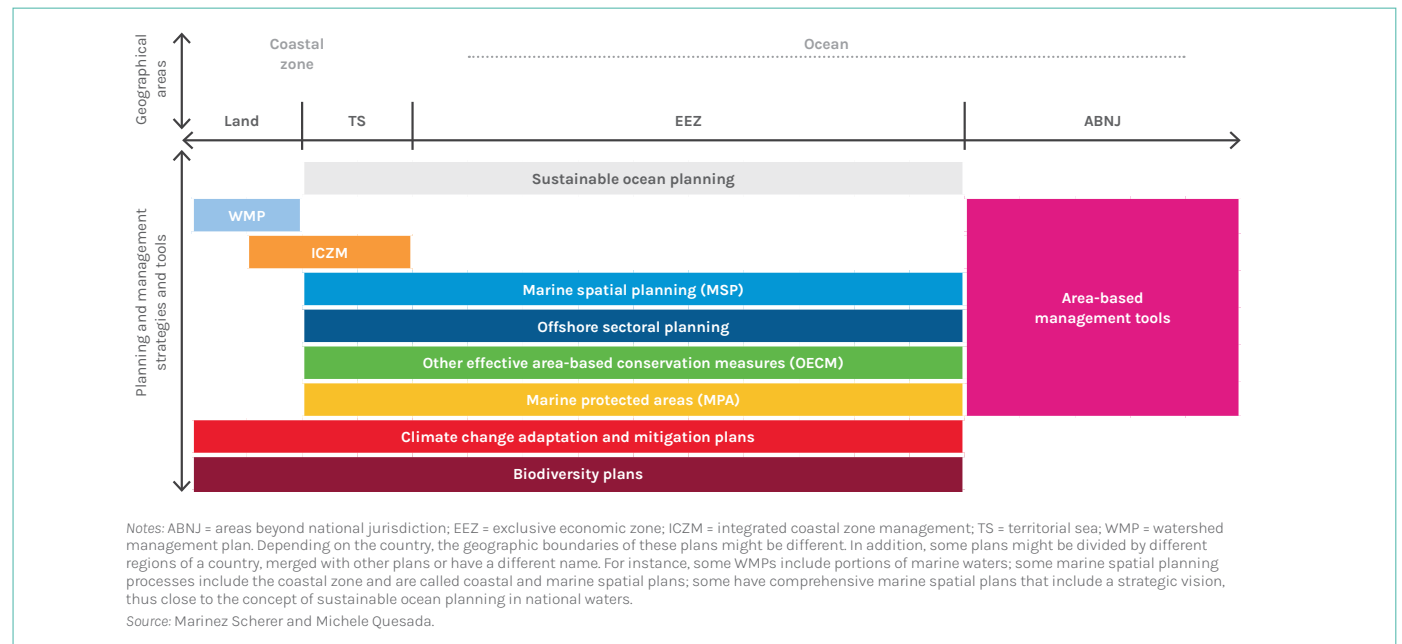
To support its full and timely implementation by all parties, Article 52 of the BBNJ Agreement introduces the financial mechanisms that will provide “adequate, accessible, new and additional and predictable financial sources”⁴¹. The article outlines three distinct mechanisms which will: provide vital support to developing countries to access and participate fully in the meetings of the Parties; generate funds for the conservation of biologically significant areas of the ocean that fall outside of national jurisdiction; and create new sources of finance to support sustainable use of ocean resources. The latter – namely, the BBNJ Special Fund – will receive funds from public and private sources and from the monetary benefits derived

from marine genetic resources. It is anticipated that this fund will create novel opportunities for blended finance solutions to ocean conservation challenges and support the sustainable growth of the blue economy⁴² (see [Section 2.4](#)).

The adoption of the BBNJ agreement coupled with the WTO agreement to end to harmful subsidies was a landmark moment for ocean sustainability: dwindling fish stocks are widely predicted to show signs of recovery; limitations on damaging and destructive activities will improve ecosystem health and sharing of benefits and resources will drive sustainable economic growth⁴³. Crucially, international cooperation over the management of the high seas will significantly increase the chances of achieving 30x30.

The UN Decade of Ocean Science for Sustainable Development (2021–2030) has, amongst other things, focused on the need to mobilise public and private investment towards ocean sustainability in response to these wide-ranging targets and commitments. Governments around the world are advancing blue economy strategies, coastal protection programs, and marine conservation initiatives through Sustainable Ocean Plans (SOPs), signalling a systemic shift toward integrating ocean health within climate action and a growing field of investment opportunity in ocean restoration and climate-focused solutions—from carbon sequestration and coastal infrastructure to sustainable fisheries and renewable marine energy⁴⁴ (see [Figure 6](#)).

Figure 6: Sustainable Ocean Plans include 9 key attributes to ensure that they are created as strategic, holistic, knowledge-based and participatory frameworks, customisable to unique national circumstances. This figure highlights how SOPs incorporate different marine management strategies to ensure cross-sectoral integration. Image Source: [High level panel for a sustainable ocean economy Handbook on Sustainable Ocean Plans - A Practitioners Guide](#)



g. Officially, the BBNJ Agreement is called the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable use of Marine Biological Diversity of Areas beyond National Jurisdiction.

Part 2: Why ocean sustainability is relevant to investors



2.1 Integrating ocean action into climate and nature commitments

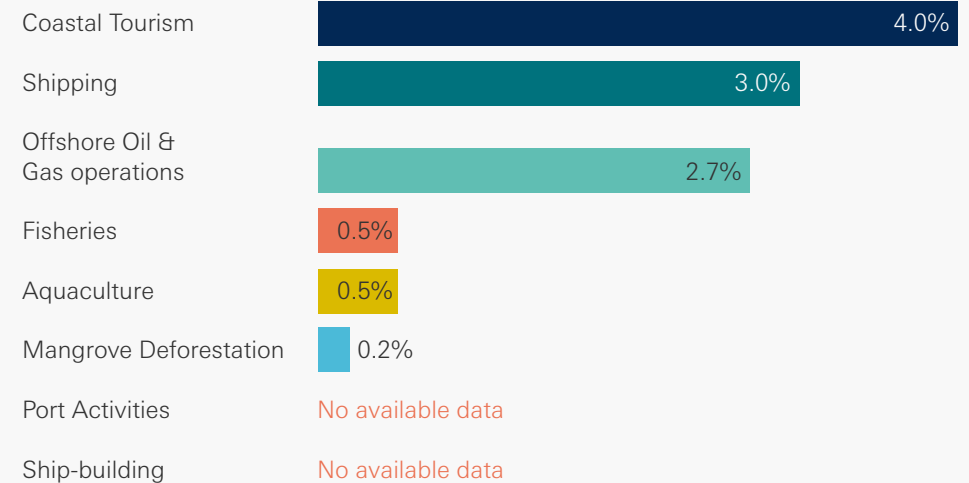
Natural capital offered by the marine ecosystem is amongst the most heavily exploited resources in the world⁴⁵. Nearly all sectors depend on and benefit from the goods and services provided by a healthy ocean either directly (where activities take place in or near the ocean) or indirectly via upstream or downstream value chain stakeholders (e.g. seafood retailers; offshore wind turbine manufacturers).

Historically, industrial activities have been primarily extractive in nature and have not considered or remedied the impacts that their activities have on the ocean. Principle amongst these impacts, are the greenhouse gas emissions associated with ocean-based activities which make up at least 11% of total global emissions that are driving anthropogenic climate change (see Figure 7). Climate change manifests in the ocean in the form of warming temperatures, falling

Figure 7: UNCTAD estimates that the ocean (blue) economy emits at least 11% of total global CO₂ emissions annually, based on available data. Image Source: UNCTAD 2025.

Ocean economy emits at least 11% of global CO₂ emissions. Key data gaps remain.

Percentage of global greenhouse gas emissions by ocean economy sector:



Source: UNCTAD (2025) calculations based on UNCTAD (2024), High Level Panel for a Sustainable Ocean Economy (2022), FAO (2021), Donato et al. (2011), MacLeod et al. (2020), IEA (2024), Statista (2024)

Note: All are latest estimates available.

oxygen levels, rising sea levels and increasingly acidic waters – each of which has severe and long-lasting detrimental effects on ocean health and threatens to destabilise the foundation of the future economy (see [Part 1](#)).

The significance of ocean health to sustainable future economies and the critical role that healthy marine ecosystems play in both climate change mitigation and preventing and reversing biodiversity loss is increasingly recognised by companies, financial institutions and governments.

The results of an online survey led by Chronos Sustainability in preparation for this report indicated that systemic and financially material risks, in the form of biodiversity and nature loss and climate regulation and resilience are amongst the key drivers for investors wanting to engage with ocean sustainability issues. Many investors are still at different stages in this process – with some reporting that they are still gathering information on key issues with others already offering ocean-related investment products and actively incorporating ocean considerations into climate and nature policies. When asked about topics and themes of most interest to investors, the survey showed that priorities varied with sector, but resource extraction (e.g. over-fishing, mining), pollution (e.g. plastics, chemical) and resilience & adaptation (including nature-based solutions to e.g. climate change) were commonly cited (see [Appendix 7](#)).

Ocean-based mitigation

Ocean-based mitigation measures focus on reducing sources and drivers of ocean degradation to prevent further impacts on nature and biodiversity. The mitigation hierarchy is a widely adopted environmental management strategy employed to halt and reverse nature and biodiversity loss. In strict order of priority, the mitigation hierarchy requires stakeholders to first avoid further harm through planned or ongoing activities, before minimising impacts, restoring damage and, as a last resort, offsetting any remaining impacts.

The High-Level Panel for a Sustainable Ocean Economy commissioned research in 2023 which highlighted that investment and implementation of available ocean-based climate solutions could reduce the global carbon emissions gap by 35% by 2050 (on a 1.5oC pathway) whilst also improving climate resilience, conserving marine biodiversity and supporting equitable and sustainable development⁴⁶.

Highly effective, actionable mitigation measures which include nature-based solutions and the roll-out of new and innovative technologies include (see [Section 2.4](#) for more details):

- **Blue carbon restoration** primarily in the form of protecting and restoring highly productive ecosystems like seagrasses, saltmarshes and mangroves helps to reduce carbon levels and stabilise coastal sediments. These ecosystems and associated food-webs capture and store carbon four times faster than terrestrial forests⁴⁷.
- **Marine protected areas (MPAs)** and other effective area-based management tools are shown to improve biodiversity and ecosystem health⁴⁸, with spillover effects in neighbouring areas⁴⁹.

- **Decarbonisation of marine transportation (including cruise tourism)** by transitioning to zero-emission fuel sources and ship technologies along green shipping corridors⁵⁰ could reduce ~3% of global greenhouse gas emissions if implemented fully by 2050⁵¹.
- **Offshore renewable energy** is poised to outgrow offshore oil and gas in the coming years⁵² and includes wind power and energy derived from waves and currents. Wind power alone has potential to meet a third of global energy needs⁵³.

Ocean Adaptation

Ocean adaptation strategies, conversely, focus on adjusting human and natural systems to manage any unavoidable impacts of climate change. Nature-based solutions have a role to play in both mitigation and adaptation strategies. For example, **restoring coastal habitats and ecosystems** like mangroves and seagrass deliver significant benefits in terms of carbon sequestration but also offer a dual benefit of stabilising coastlines and coastal sediments, helping to counter the effects of sea-level rise, protecting coral reefs from sedimentation and absorbing destructive storm energy to create a natural buffer for coastal communities – particularly in low-lying areas. **Early warning systems**, another adaptation measure, alert communities to the advancement of extreme weather events and have been shown to reduce damage by up to 30% when activated as little as 24 hours in advance⁵⁴. As a result, the World Meteorological Organization is charged with ensuring all global citizens are protected by early warning systems by 2030⁵⁵.

A review of updated Nationally Determined Contributions (NDCs) submitted for the 2025 Global Stocktake of progress towards the Paris Agreement revealed growing recognition of the role of the ocean in climate mitigation, adaptation and resilience. At the time of writing, 61 of the 66 2025 NDC submissions from coastal and island nations included at least one ocean-based climate action⁵⁶ but commitments to ocean-based climate mitigation are still lagging (see Figure 8).

In 2025, 90 signatories representing over EUR 600 billion in turnover issued a Business Call to Action ahead of the third United Nations Ocean Conference (UNOC3), calling for accelerated action towards an ‘ecological transition and sustainable blue economy’⁵⁷. Building on this momentum, the Ocean Investment Protocol⁵⁸ - was launched by the United Nations Global Compact in partnership with UNEP FI at UNOC3 to provide financial institutions, (re)insurers, ocean industries, governments and development finance institutions with a framework that helps unlock and scale private capital needed to support the growth of the sustainable blue economy, in line with the SDGs.

In order to move forward, businesses and investors highlight an overlapping set of needs that include:

- **Improved understanding** of ocean-related issues, through internal capacity building, tools and knowledge-exchange;
- Better **measurement, assessment and disclosure** of ocean-related impacts and dependencies across the value chain, and improved access to this data (see Data: [A drop in the Ocean](#));
- **Active integration** of ocean considerations into climate, nature and social impact roadmaps and strategies;
- Development and implementation of **globally recognised ocean standards** for sustainable investments and/or operations; and
- An enabling environment in the form of **effective ocean governance** to guide commercial and investment activities.

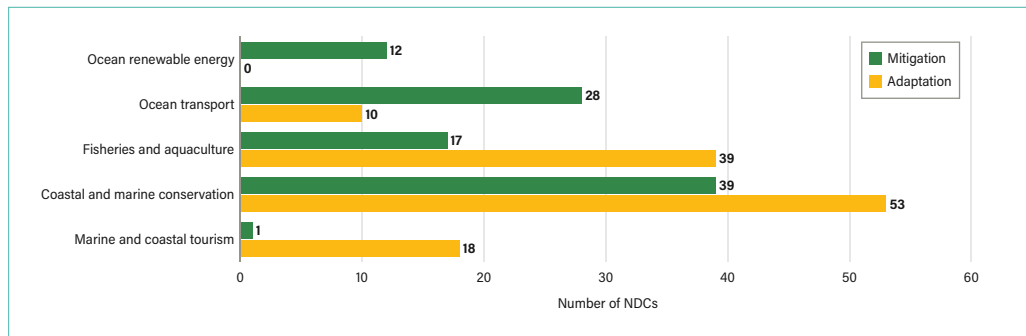


Figure 8: Updated 2025 coastal and island nationally determined contributions with ocean-based actions.
Image Source: WRI, Nov. 2025.



2.2 The Blue Economy

The blue (or ocean) economy – defined as ‘the sum of the economic activities of ocean-based industries, and the assets, goods and services of marine ecosystems’⁵⁹ – has shown significant growth over the past 30 years and contributes an estimated 3.5% to the global economy^{60,61}. The Ocean 100 – a group of 100 multinational corporations across eight ocean sectors (See Figure 9) – account for 60% of total revenues derived from the blue economy (approximately USD 1.1 trillion in total in 2018)⁶². Within each sector, the ten largest companies generate an estimated 45% of the total revenues in that sector⁶³. Today, nine of the top ten companies by revenue are oil and gas companies with a combined revenue of USD 830 billion dollars. Looking ahead, it is anticipated that the composition of dominant sectors in the blue economy will change in line with global energy transition pathways, with gross value add from offshore oil and gas predicted to decline by 2050⁶⁴ and marine renewables expected to increase⁶⁵. Marine and coastal tourism- including cruise tourism, is expected to remain a dominant growth area⁶⁶.

In 2020, the blue economy was conservatively valued at USD 2.6 trillion. If the ocean were a country, the OECD states that it’s economy would be ranked as 5th largest in the world.

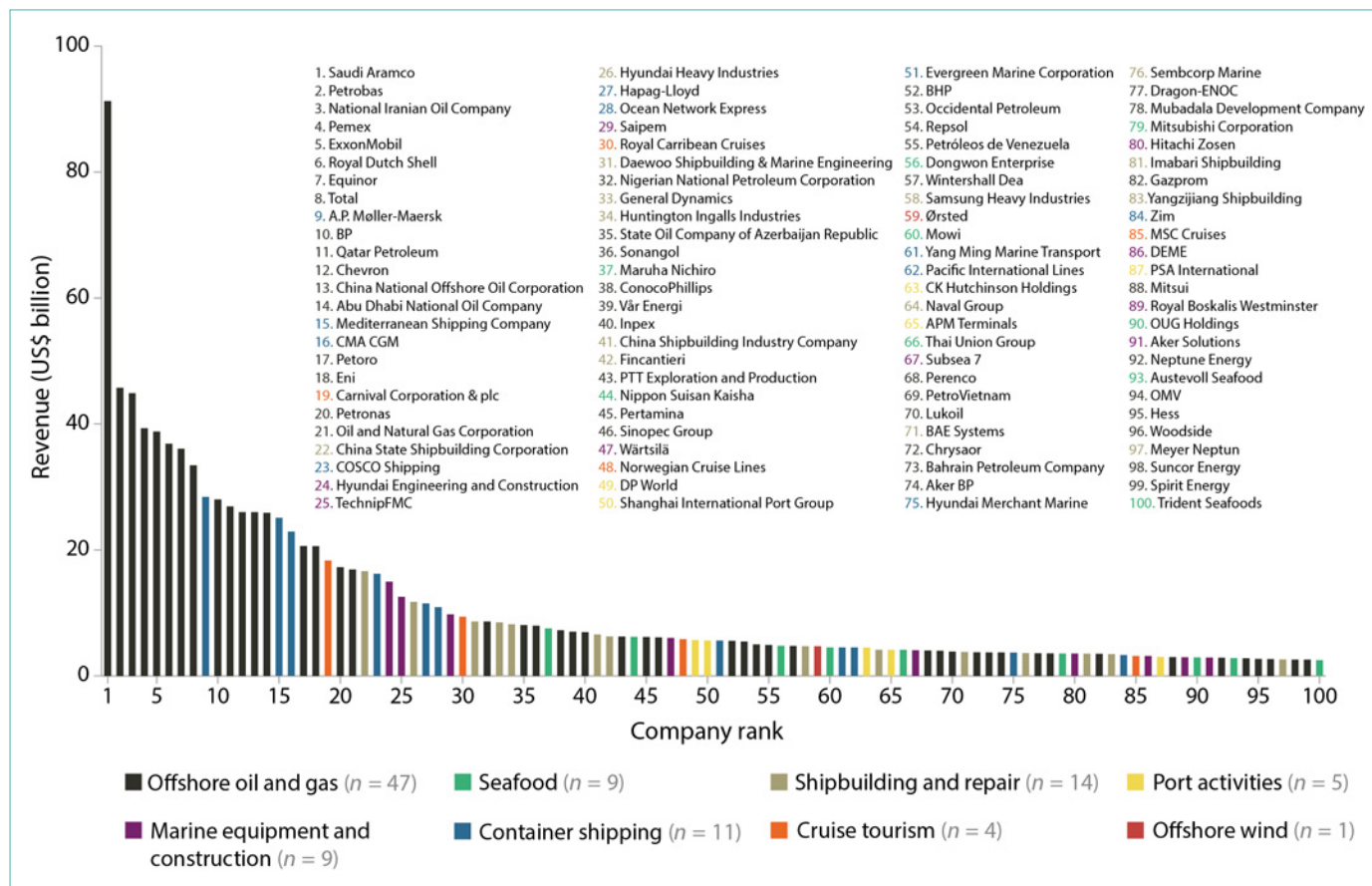


Figure 9: The Ocean 100 – a group of major multinational companies that dominate the blue economy. Image Source: Viridin et al., 2021 <https://doi.org/10.1126/sciadv.abc8041>

The OECD estimates that the blue economy has potential to quadruple by 2050, relative to 1995, but will require a systemic change in way that the ocean is used and governed⁶⁷. In the absence of stringent policy measures, risk management and more sustainable practices, the OECD predicts that continued economic growth will falter and ocean-sectors will face major future disruptions as a result of:

1. Population growth, trade & globalisation, climate change and environmental pressures that will continue to **impact ocean health**;
2. Limited investment in **productivity** (e.g. digitalisation and automation) in ocean-related industries; and
3. A **stalled global energy transition** pathway away from oil and gas.

In economic terms, WWF estimates that a business-as-usual future leaves USD 8.4 trillion in assets and revenues at risk^h by 2035 as a result of the unsustainable use of ocean resources and the effects of climate change. However, where impacts are reduced and operations align more closely with sustainability goals (e.g. SDG14), companies that operate in or on the ocean – such as those that make up the Ocean 100 (60% of which are listed companies) – are well-placed to drive a transition to a more sustainable blue economy.

2.3 What could a Sustainable Blue Economy look like?

A transition to a sustainable blue (or ocean) economy (which is defined as the sustainable use of ocean resources for economic growth, improved livelihoods and jobs and ocean ecosystem healthⁱ) could reduce the estimated value at risk under a business-as-usual scenario by more than USD 5 trillion according to WWF. Achieving a sustainable blue economy requires ecosystem integrity to be preserved and the ocean to be managed in a precautionary way, designing economic activities that operate within planetary boundaries and optimise social and economic benefits⁶⁸. Looking ahead, achieving a sustainable blue economy⁶⁹ will require:

- Significant **strengthening and implementation of ocean policies** such as the WTO subsidies agreement and the BBNJ agreement ([See Part 1](#)) **and application of integrated ocean management techniques**;
- **Investment in technology and digitalisation** of established and emerging ocean industries to increase productivity and reduce environmental impacts;
- **Enhanced collection and access to ocean data** to support science, conservation and informed decision-making; and
- **Improved inclusion and equity** for developing nations to ensure two-way capacity-building, financial support and technology transfers that protect and restore ocean health.

To align ocean-dependent sectors and drive the sustainable use of oceanic goods and services, a collaborative initiative led by WWF, the European Commission, World Resources Institute and the European Investment bank developed a set of high-level Principles for a Sustainable Blue Economy in 2018. Now hosted by UNEP Finance Initiative (UNEP FI), the 14 inter-connected Principles provide a framework for banks, insurers and investors to align ocean-linked investments with SDG14 (Life below water) and move away from activities that cause biodiversity loss, pollution and contribute to climate change, thus financing a transition to a more sustainable blue economy⁷⁰. Together, the Principles:

- Focus efforts on **inclusive and ethical multi-stakeholder projects** that deliver socio-environmental and economic benefits;
- **Prioritise biodiversity** preservation, ecosystem health and improved resilience;
- Align with international **transparency and compliance standards** and reporting requirements;
- Encourage **the precautionary management of risks**, especially where data is poor.

In practice, the Principles provide financial institutions with actionable guidance to apply the Principles through enhanced screening criteria that exclude harmful activities, such as destructive fishing methods, unverified aquaculture expansion, or marine habitat conversion, and require robust impact assessments before financing.

h. Value at Risk (VaR) is defined as a measure of financial risk that quantifies the maximum amount of loss a portfolio can sustain over time, within certain confidence intervals. It is used to estimate the size of potential loss over an entire portfolio's value.

i. The World Bank considers a sustainable blue economy as one encompassing marine renewable energy, fisheries & aquaculture, maritime transport, tourism, climate adaptation and waste management. Source: World Bank

Closing the finance gap

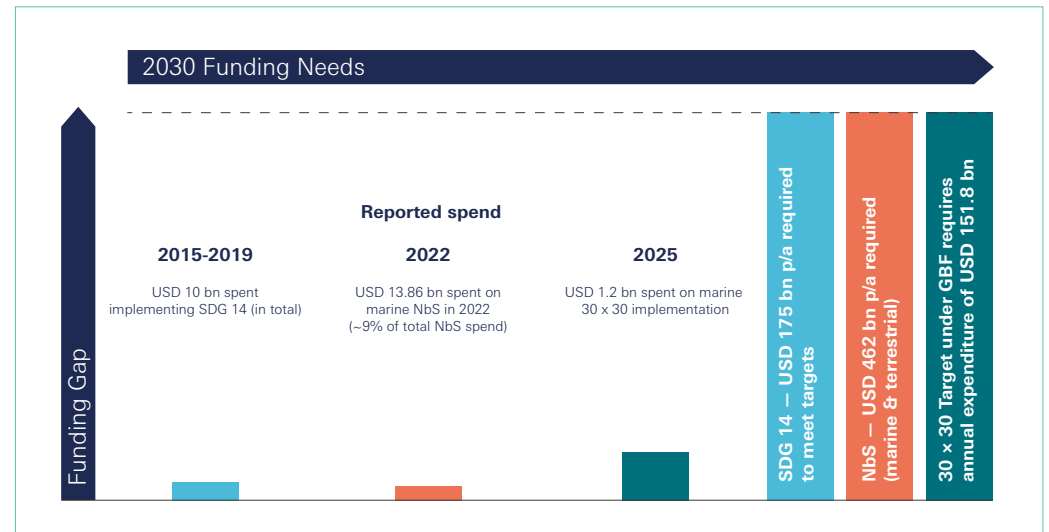
Despite the importance and growth of the blue economy, sustainable use of ocean resources and economic activities have failed to reach the level needed to meet key ocean targets resulting in a clear finance gap. SDG14 Life below water is widely reported as the most underfunded of all SDGs⁷¹, requiring an additional USD 174 billion per year to 2030 if stakeholders are to meet its targets (see Figure 10). A recent estimate by the Blue Bond Accelerator suggests funding in the range of USD 383 -717 billion per year (with a midpoint of USD 550 billion) is needed to support the transition to a sustainable blue economy⁷².

According to UNEP's 2022 State of Finance for nature report⁷³, finance flowing to marine Nature Based Solutions such as protected areas, mangrove and seagrass restoration projects amounted to just 9% of the total USD 154 billion invested in nature-based solutions in 2022 which is in itself, approximately one third of the total investment needed by 2030. Achieving the Global Biodiversity Framework (GBF) 30x30 target for the ocean – one of several ocean-related targets referring to the effective protection of 30% of the ocean by 2030 – is anticipated to require an estimated USD 15.8 billion annually by 2030⁷⁴ and could unlock USD 85 billion per year by 2050⁷⁵ in the form of restored coastal defences, reducing damage to coastal properties; avoided costs of carbon emissions from seagrass loss; and reducing lost profit from unsustainable fishing practices. To date, only USD 1.2 billion has been invested in 30x30 implementation.

Closing the gaps in the finance needed to deliver the sustainable ocean targets by transitioning to a more sustainable blue economy is fundamental to restoring the health of the ocean, driving future resilience and productivity and achieving global climate goals.



Figure 10: Published literature has estimated required funding needed to fully implement SDG 14, Nature Based Solutions (NbS) and the 30x30 GBF target by 2030. Recent reviews of spend against each of these targets shows a significant funding gap. Image source: Chronos Sustainability.



2.4 Scaling blue finance

Blue finance – a component of the wider blue economy and a distinct subcategory of green and sustainable finance⁷⁶ – refers to finance directed towards economic activities that focus on long-term sustainability, environmental conservation, restoration and improved resilience of the ocean, taking into account the well-being of communities living closest to the ocean⁷⁷. Seen as a way of unlocking the capital needed to scale investments into ocean recovery (when complemented by government action and community-level buy-in, see Figure 11, the term ‘blue finance’ is used to encompass the many different types of financial instruments, including blue bonds, debt-for-nature swaps, parametric insurance and impact investing⁷⁸ to accelerate and capitalise on emerging opportunities across sectors of the blue economy⁷⁹ (see Appendix 6).

Financial inputs are just one of the factors that determine the rate at which the blue economy will transition to a sustainable blue economy. The High Level Panel for a Sustainable Ocean Economy identifies 5 limiting factors that have slowed the transition to a sustainable blue economy:

- A **lack of universal framework** for sustainable ocean economic activities that investors can use to guide investments.
- **Low ocean literacy** amongst investors and finance professionals on the ocean’s economic, social and environmental value, as well as its transboundary nature.
- **Harmful subsidies** that continue to flow towards unsustainable practices distort market dynamics and don’t account for negative externalities.
- A **weak project pipeline** is regularly cited as an actual or perceived barrier to investors, referring to limited numbers of high-quality, investable projects that have the appropriate risk-return ratio or deal size, as well as a lack of precedent transactions.
- **Higher risks** due to the ocean’s physical conditions, increasing marine hazards (associated with climate change and ocean degradation) and issues of property rights and enforcement mean that ocean investments come with specific risks.

Several interventions have been identified to overcome these barriers and challenges, including the creation of a strong enabling environment in the form of effective public policy; integrating ocean finance into new and existing finance commitments; robust legal systems (to protect commercial activities and de-risk investments) and improved financial literacy, innovation and business-planning capacity⁸⁰ (see Figure 12).



Figure 11: Blue finance instruments can support ocean-based adaptation and mitigation measures in response to key threats facing the ocean. Scalability and impact requires government action and regulatory frameworks that align public policy with capital flows. Image source: *World Bank Accelerating Blue Finance*

Milestone policy developments in recent years – including the Global Biodiversity Framework, the High Seas Treaty and the World Trade Organization agreement to end harmful fisheries subsidies – will help to create the enabling environment and financial incentives needed to redirect capital from harmful or destructive economic activities in the ocean (e.g. non-selective industrial fishing, bottom-trawling, coastal development and carbon-intensive shipping) towards more regenerative and restorative practices (see Section 2.6 - a Sea of Opportunities).

In addition to policymakers creating an enabling environment, banks, insurers, investors and official government agencies all have a role to play in helping scale blue finance and a growing body of guidance to financial institutions exists to catalyse these investments¹. Innovation across ocean-dependent sectors, particularly emerging sectors like marine pharmaceuticals, blue biotechnology and offshore marine renewables, is paving the way for new and innovative finance models (see Appendix 6 for examples).

Successfully scaling blue finance requires an equivalent scaling in investable opportunities that overcome the actual or perceived risks discussed above, and meet investors' expectations in terms of scale, liquidity and risk-return profiles. For example, smaller-scale projects tend to have high transaction costs, low return profiles over longer timeframes, and suffer from capacity constraints (particularly in terms of business planning). These features tend to limit their attractiveness to institutional investors. It is, therefore, important that project developers carefully target those investors or sources of finance who are most likely to be interested in and appropriate to their projects. It is equally important that those involved in developing financial instruments ensure that these instruments are tailored and appropriate to the size and maturity of projects seeking funds (see Figure 12).

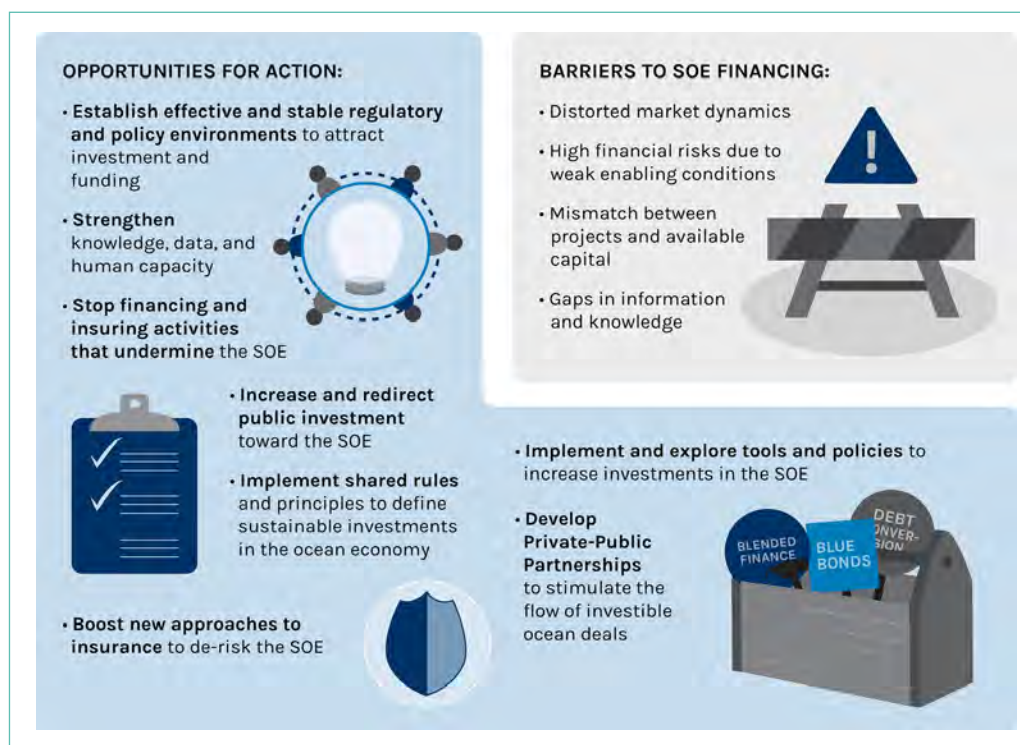


Figure 12: Successful transition away from degrading ocean activities towards a sustainable blue economy relies on establishing a supportive enabling environment; reallocation of capital away from destructive practices; improved pipelines of investable and scalable projects that align with sustainable blue economy principles and de-risking of ocean investments through blended finance and insurance to attract additional and scale investments. Image Source: Sumaila et al, 2021, *Financing a sustainable ocean economy*.

The features of the financial institutions providing capital are also important, and different types of financial institution may be relevant at different points of the project life cycle (see Figure 13). For example, philanthropic and public finance (e.g. conservation trust funds that support nature-based solutions⁸¹) can provide more risk-tolerant funds over longer timeframes to community-led initiatives that focus on restoring and increasing the resilience of ocean ecosystems and are often important in supporting project development ahead of more commercial providers getting involved.

j. For example: The High Level Panel for a Sustainable Ocean Economy has issued a working paper on Ocean Finance for the Sustainable Ocean Economy; the International Finance Corporation has issued updated Guidelines for Blue Finance; UNEP FI has issued several resources including Turning the Tide, Diving Deep and the Ocean Investment Protocol to support a transition to a sustainable blue economy; and UN Global Compact has issued practical guidance on how to issue a Blue Bond and building a global consensus on what constitutes 'Blue'.

Other forms of support – for example, knowledge-sharing, capacity-building, risk management and seed financing – are also often important at these early stages of scaling up and generating pipelines of bankable projects.

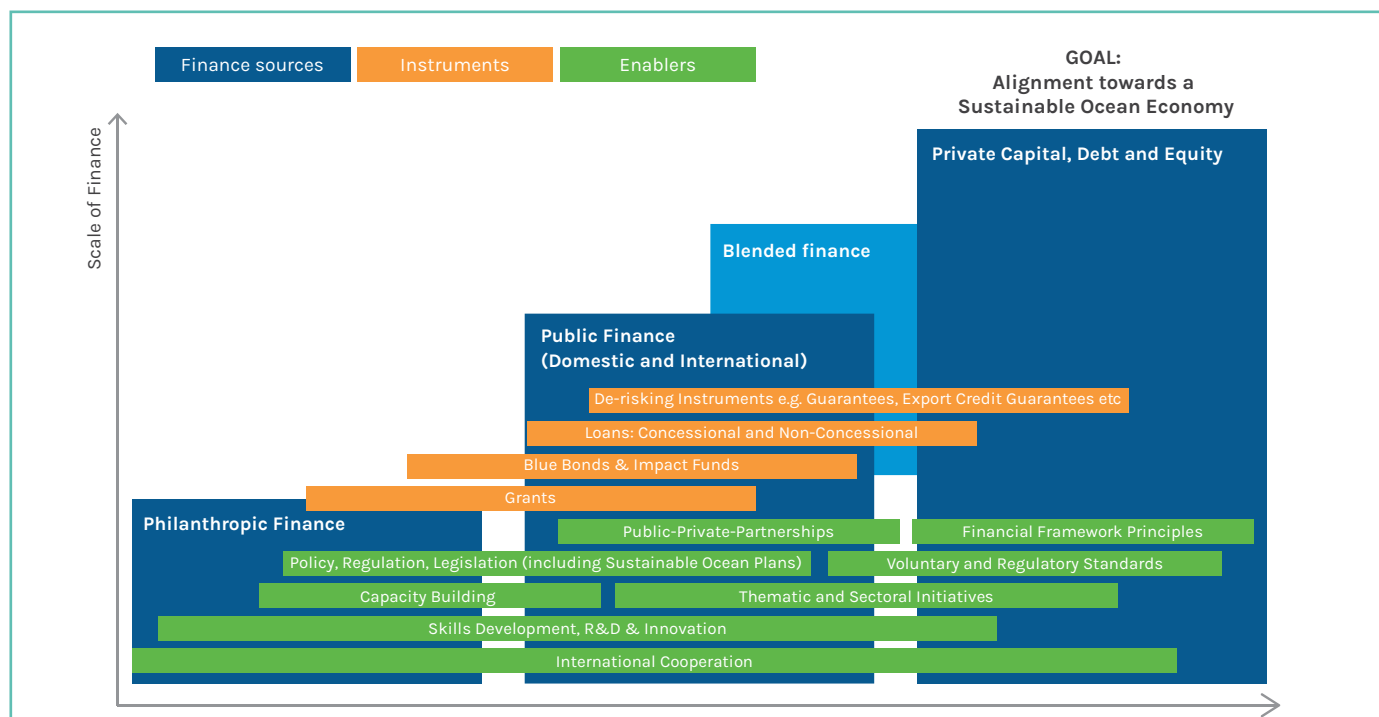
Early-stage innovation financing such as venture capital and impact investing is best suited to entrepreneurs developing innovative (often, pilot) solutions to ocean sustainability challenges. Impact investing is seen as an attractive way to generate positive, measurable environmental and social impacts, alongside financial returns. Examples have included investments focused on transitioning to more sustainable seafood (wild-capture fisheries and aquaculture), plastic pollution reduction, marine renewables and coastal infrastructure projects^{82, 83, 84}.

Risk-sharing finance structures such as traditional blended finance structures – which have relied on a combination of concessional development finance and philanthropic capital – have not met the scale needed for sustainable blue finance with just USD 13 billion reportedly invested into ocean sustainability between 2010-2020⁸⁵. Therefore, there is growing interest in exploring how to evolve and scale blended finance models to mobilise significant additional funds towards SDG14 goals.

Emerging blended finance models for ocean initiatives are combining catalytic public and philanthropic capital with investment capital in a risk-sharing model seen to increase risk protection and improve return on investments⁸⁶, in turn helping to mobilise additional funds towards SDG14 goals. Blended finance utilising public insurance (in the form of both guarantees and parametric insurance) is increasingly highlighted as a key factor in de-risking ocean investments to accelerate the growth of the blue economy^{87,88}. There are a growing number of examples of blended finance funds and vehicles being established including:

- The Althelia Sustainable Ocean Fund⁸⁹ (a USD 132 million fund focused on sustainable seafood, circular economy and marine conservation) which is supported by a principle protection guarantee facility from the USAID Development Credit Authority (DCA) with support from institutional investors (private finance) and the European Defence Fund and Ocean Conservancy (technical and philanthropic support)⁹⁰.
- The Circulate Capital Ocean Fund⁹¹ (a USD 106 million, focused on plastic waste management and recycling in Asia) which is supported by the USAID Development Credit Authority (DCA) (public support), in partnership with Closed Loop Partners and Ocean Conservancy (technical and philanthropic support) and private capital investment (e.g. from PepsiCo, Proctor & Gamble, Dow)⁹².

Figure 13: A broad range of blue finance sources, instruments and enablers exist for different stages of the investment cycle to catalyse the transition to a sustainable blue economy. Image Source: High Level Panel for a Sustainable Ocean Economy.



Case Study

The Ocean Risk and Resilience Action Alliance

The Ocean Risk and Resilience Action Alliance (ORRAA) has set itself a mission to “activate USD 500million of investment [by 2030] through finance and insurance products to build the resilience of 250 million climate vulnerable coastal people in the Global South”. To date, ORRAA has successfully activated USD 125.5 million of investments, including USD 71.5 million for product innovation and USD 41.5million for the Sea Changers Impact Financing Facility, helping to protect over 600,000Ha of coastal ecosystems.



2.5 Oceanic ecosystem services

Ecosystem services derived from the ocean are the goods and services that benefit society and the economy⁹³. These services are provided when the ocean’s biological, chemical and physical processes operate in equilibrium and maintain healthy stocks of natural capital (living and non-living resources found in nature) (see Figure 14 & Table 1 for examples).

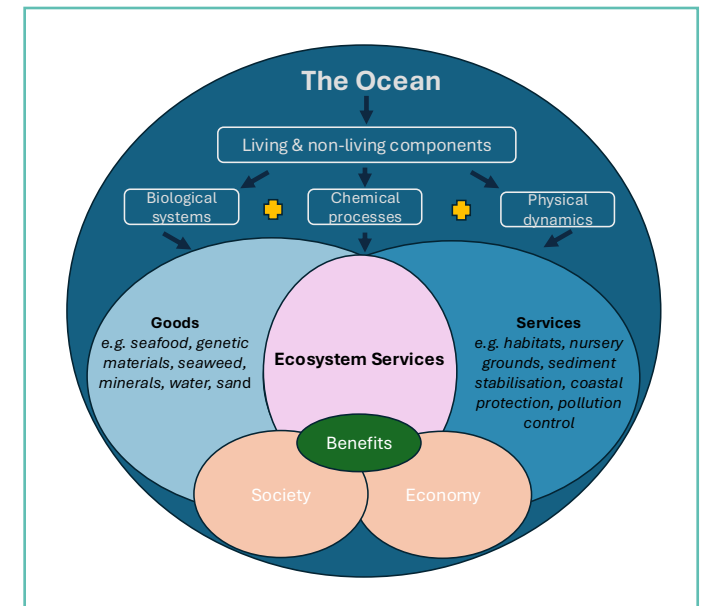


Figure 14: Ocean-related goods and services underpin the economic success of all ocean-dependent industries. Understanding impacts and dependencies on these ecosystem services is vital to support the transition to a sustainable future blue economy. Image source: Chronos Sustainability Ltd.

Marine Ecosystem:	Key environmental features & ecosystem services:
Coral Reefs	<ul style="list-style-type: none"> • Cover less than 0.1% of the ocean but support more than a quarter of marine biodiversity⁹⁴. • Nursery grounds, habitats and feeding zones for commercially important fish, shellfish, invertebrates and marine mammals. • Natural breakwaters, protect coastlines from storms and wave energy.
Mangrove forests	<ul style="list-style-type: none"> • Stabilise coastal sediments, protecting the coastline from destructive wave energy; • Highly productive carbon store • Naturally filter and purify waters to remove pollutants • Important nursery grounds for reef fish
Salt marshes, lagoons & the inter-tidal zone	<ul style="list-style-type: none"> • Supports seagrass meadows which provide food security, improve water quality and store carbon⁹⁵. • Seagrass mats cover less than 0.2% of the seafloor but sequester 10-18% of the annual carbon budget⁹⁶. • Stabilise sediments providing natural defence against coastal erosion and flooding.
Kelp forests	<ul style="list-style-type: none"> • Second most biodiverse oceanic ecosystem providing food sources, vertical habitats and foraging grounds for seabirds and marine mammals⁹⁷. • Thrive in nutrient rich waters, and reduce water turbulence thus important nursery grounds for commercially important fish species • Highly productive and fast-growing plants with high potential for effective carbon capture and sequestration⁹⁸.
Hydrothermal vents	<ul style="list-style-type: none"> • Deep-sea 'hot springs' form the basis of productive, chemosynthetic^k ecosystems⁹⁹. • Geographically isolated habitats that support high numbers of globally rare, highly adapted species. • High genetic diversity of vent organisms of importance for bioprospecting¹⁰⁰. • Important part of the oceanic biological pump¹⁰¹.

Table 1: Key features of a selection of ocean ecosystems that provide a broad range of natural goods and services which underpin the blue economy.

k. Chemosynthesis is the production of food using energy from chemical compounds as opposed to energy from light (in the case of photosynthesis).

Economic activities depend directly on ocean ecosystem services and benefit from them. Indirect dependencies manifest through company subsidiaries and through their value chains¹.

Table 2 introduces nine major ocean-dependent sectors, ranked by estimated economic value. Historically, ocean-based activity has been concentrated in well-established industries such as shipping, seafood (fisheries & aquaculture) and port infrastructure. Emerging growth sectors include sub-marine telecommunications, blue biotechnology (including marine pharmaceuticals) and marine renewables, which is expanding beyond wind to include solar, tidal and wave energy¹⁰².

These services include¹⁰³:

- **Provisioning services:** e.g. food, energy, raw materials & minerals which sectors such as fisheries & aquaculture, offshore renewable energy, and marine biotechnology depend on;
- **Regulating services:** where ecosystems such as mangroves, seagrass mats and saltmarshes act as powerful carbon sinks and natural sediment stabilisers for flood defence, underpinning emerging markets in blue carbon credits, coastal protection infrastructure, and climate adaptation solutions.
- **Cultural and recreational services:** intrinsically linked with maritime heritage, religions and spiritual values underpin tourism, real estate development and wellness sectors; and
- **Supporting services:** where biological, chemical and physicals ocean systems interact to regulate climate and support healthy ecosystem function and ensures the long-term viability of ocean-dependent sectors.



I. This report focuses on industries directly dependent on the ocean, but many more sectors are indirectly dependent on – and benefit from – the ocean and can also have negative impacts generating risks for investors (e.g. the use of pesticides on agricultural land that contaminates river water or water treatment companies discharging pollution to the coastal zone). The risks and opportunities associated with offshore oil & gas is not a focus of this report, in-line with global commitments to move towards a low carbon future.

Sector & Description	Indicative size of Industry by estimated value
<p>Maritime transport (shipping) connects global value chains, carrying raw materials and semi-processed goods to production hubs and delivering finished products to consumers. There are 50,000 registered merchant ships across 150 nations and the sector employs 1 million seafarers and transports 11 billion tonnes of goods (90% of global total) around the world each year.</p>	<p>USD 14 trillion (in 2019)¹⁰⁴</p>
<p>Coastal tourism refers to beach-based tourism and recreation activities taking place along the coastline. Maritime tourism refers to predominantly water-based activities, such as sailing, yachting and cruising, and other nautical sports, often carried out in coastal waters. Both coastal and maritime tourism are considered among the oldest and largest segments of the tourism industry, directly creating 52 million jobs, and supporting a further 100 million roles across the value chain. Tourist spending in coastal destinations amounted to 50% of total global spend in 2023 (USD 3 trillion).</p>	<p>USD 4.8 trillion contribution to global GDP, 2023¹⁰⁵ USD 1.5 trillion (direct) USD 3.3 trillion (indirect, through value chains)</p>
<p>Aquaculture covers the farming of both animals (including crustaceans, finfish and molluscs) and plants (including seaweeds and freshwater macrophytes) in both inland (freshwater) and coastal areas. Production of seafood from aquaculture reached 130.9 million tonnes in 2022, surpassing wild caught fisheries for the first time. Approximately 22 million people are employed in the sector, which has grown by 6.6% since 2020. Aquaculture operations often rely on wild capture fisheries to supply wild seed and feed for carnivorous species.</p>	<p>USD 312.8 billion in 2022¹⁰⁶</p>
<p>Fisheries (including commercial, industrial, inland, small-scale, recreational and customary fisheries) refer to the capture or harvest of fish, invertebrates or plants from natural or modified ecosystems in ocean, coastal and freshwater habitats. It is notable as the only business sector that depends on the industrial-scale capture of wildlife. Total catch exceeds 92 million tonnes (2023), constituting 9% of global agricultural trade (2022). The sector employs over 600 million people, 40% of whom operate in small-scale or subsistence fisheries.</p>	<p>USD 195 billion in 2023¹⁰⁷</p>
<p>Port infrastructure refers to the physical facilities and structures essential for the operation and management of maritime transportation. This includes docks, berths, terminals, warehouses, and cargo-handling equipment that support the loading and unloading of ships.</p>	<p>USD 163.4 billion (in 2024)¹⁰⁸</p>
<p>Sub-marine telecommunication infrastructure supports transmission of 99% of the world's data through a global network of 450 sub-sea cable systems.</p>	<p>Asset value estimated at USD 29.94 billion (2024)¹⁰⁹; USD 10 trillion p/day in daily transactions across finance sector</p>
<p>Blue biotechnology is the application of science and technology to living aquatic organisms for the production of knowledge, goods and services. Aquatic biomass is turned into commercial goods such as food, feed, nutraceuticals, pharmaceuticals, cosmetics, energy, packaging, clothes. The emerging blue bioeconomy and biotechnology sectors employ ca. 40,000 people and looks at groups of marine organisms that until now often have been ignored for commercial exploitation.</p>	<p>USD 6.4 billion in 2025 (projected, includes pharmaceuticals)¹¹⁰</p>
<p>Marine offshore renewable energy refers to all sources of renewable energy that can be extracted from the ocean, including wind, wave and tidal energy. Offshore wind energy is currently the only commercially deployed marine renewable energy with wide-scale adoption and global ocean energy capacity reached 527 megawatts in 2023 with rapid growth in offshore wind capacity noted in Europe, China, and the U.S.</p>	<p>USD 4.6 billion in 2020¹¹¹</p>
<p>Marine pharmaceuticals refer to drugs and therapeutic compounds derived from marine organisms such as algae, sponges, molluscs, and bacteria. 15–20 marine-derived compounds with unique chemical structures and biological activities have been approved for clinical use and treatment for a wide range of diseases including: cancer, pain, viral infection and heart disease.</p>	<p>EUR 400 million turnover in 2020 (EU only)¹¹²</p>

Table 2: Descriptions and indicative global value of the key ocean- dependent sectors, in order of estimated value.

2.6 Understanding exposure to ocean risks and opportunities

To assess exposure to ocean-related risks and opportunities, investors need to understand how companies in their portfolios both depend on and impact ocean ecosystem services. The Task Force on Nature Related Financial Disclosures (TNFD) provides a structured approach to identifying and evaluating dependencies, impacts, risks and opportunities which are defined as:

- **Dependencies** – of the organisation on the ocean;
- **Impacts** – on the ocean, caused or contributed to by the organisation;
- **Risks** – to the organisation, stemming from dependencies and impacts; and
- **Opportunities** – for the organisation to benefit through positive impact or mitigation of negative impacts on the ocean.

Data: A drop in the ocean

The ocean is a three-dimensional, fluid environment that is influenced by – and in turn influences – atmospheric conditions and land-sea interactions. Access to high-quality, decision-useful ocean data has reportedly been challenging for many stakeholders. Furthermore, understanding the footprint of some industries is complicated by their movement across ocean basins (e.g. shipping, cruise tourism, seafood companies).

Target 15 of the Kunming-Montreal Global Biodiversity Framework requires all large and transnational companies and financial institutions to assess and disclose their dependencies, impacts, risks and

opportunities on nature, through their operations, supply and value chains, and portfolios. Recognising that the ocean is the world's largest ecosystem, and that large institutional investors are likely to have high ocean-related exposure, a group of asset managers made a public call for 'credible' ocean data that aligns with international standards to be incorporated into mainstream ESG databases^m. Specifically, the joint statement highlighted that investors needed to access consistent, high-quality ocean-related data to inform decisions over differing timescales. To do this, data providers need to ensure data: a) coverage is applicable to all companies in the main market indices (across value chains); b) is simplified, flexible, transparent; and c) is compatible with existing public taxonomies, guidance and internal environmental assessments¹¹³. This would allow investors to:

- Embed ocean-related data into internal frameworks and assessments;
- Spotlight exposure to ocean-related risks and opportunities within portfolios and improve decision making;
- Engage on ocean-related topics with our investees;
- Identify and allocate capital for ocean-related opportunities; and
- Improve ocean-related literacy within workforces.

In recent years, there has been a proliferation of tools and resources to overcome some of these challenges, enabling investors to get started with assessing exposure to ocean risks and impacts (see Figure 15 and Part 3: the Ocean Framework). Examples include:

- The **Science Based Targets Network** (SBTN) has launched three specific ocean targets for companies operating in the seafood sector, focused on over-extraction, habitat protection and reducing risks to threatened species¹¹⁴

- **TNFD** has published:
 - Sector-specific guidance for Fishing¹¹⁵ and Aquaculture¹¹⁶, Marine transportation & Cruise lines¹¹⁷; and Biotechnology & Pharmaceuticals¹¹⁸; and
 - 2025 Ocean discussion paper which compiles many of the existing resources offering ocean-related data¹¹⁹.
- The **Carbon Disclosure Project** (CDP) updated its 2026 questionnaire to better link disclosure with action. CDP helps identify both compounding and interconnected risks and opportunities. In 2026, CDP is taking initial steps toward ocean-related disclosure reflecting its ambition to promote a more holistic, comparable, and actionable environmental reporting system aligned with global standards¹²⁰.
- The **Nature Positive Initiative** (NPI), the **World Economic Forum** (WEF) and **Ocean Risk and Resilience Alliance** (ORRAA) announced a strategic partnership in 2025, to build consensus around aligned marine state of nature metrics that can be embedded into existing standards, guidance and disclosure frameworks going forward¹²¹.
- The UN-backed tool **ENCORE** (Exploring Nature Capital Opportunities, Risks and Exposure) is referenced by major reporting frameworks including TNFD, the Science Based Targets Network (SBTN) and the Global Reporting Initiative (GRI) and is a helpful starting point for companies and financial institutions to screen for risks linked to economic activities arising from both impacts and dependencies on oceanic goods and services¹²².

m. Asset managers that made [the public](#) call were: BNP Paribas AM, Robeco, Storebrand and Mirova.

Data Source	Organisation	Data Source			Scale of data			
		Ocean health	Ecosystem locations	Commercial activity and operations	Sector	Company	Country	Ecosystem
<u>Making Oceans Count Initiative</u>	HUB Ocean, Affiliated with World Economic Forum	○	○	○	○	○	○	○
<u>Ocean Health Index</u>	Conservation International	○					○	
<u>ENCORE</u>	UNEP FI, Global Canopy, NCFA	○			○			
<u>OECD Data Explorer</u>	OECD			○			○	
<u>Mapping Ocean Wealth</u>	Mapping Ocean Wealth		○	○	○		○	○
<u>UN Environment World Conservation Monitoring Centre</u>	UNEP-WCMC		○					○
<u>World Database on Protected Areas</u>	Protected Planet		○				○	○
<u>Marine Protection Atlas</u>	Marine Conservation Institute		○				○	○
<u>IUCN Red List</u>	IUCN	○						○
<u>Species Threat Abatement and Restoration Metric</u>	IUCN	○						○
<u>Vulnerable Marine Ecosystems Database</u>	FAO		○	○				○
<u>Seafood Stewardship Index</u>	World Benchmarking Alliance			○		○		
<u>Ocean Benchmark</u>	World Benchmarking Alliance			○		○		
<u>Global Fishing Watch</u>	Global Fishing Watch (Oceana, SkyTruth, Google)			○		○		
<u>FishMIP</u>	FishMIP	○					○	
<u>Ocean Disclosure Project</u>	Sustainable Fisheries Partnership			○		○		
<u>Ocean 100</u>	Duke University			○		○		

Figure 15: Examples of sources and types of ocean data available to support assessments of impacts and dependencies.
Image Source: Chronos Sustainability Ltd.

Evaluating ocean-related impacts & dependencies

Negative impacts on the ocean result in declining ocean health and the loss of goods and services that economic activities rely on (see Table 3). Ocean tipping points occur when human pressures and/or environmental conditions trigger rapid, potentially irreversible change to oceanic systems. A 2024 report warns that multiple tipping points – marine heatwaves, rapid deoxygenation, acidification, and biodiversity collapse – are accelerating faster than anticipated, with cascading consequences for global value chains¹²³. A European Union-funded study also concluded that tipping points have already been crossed in the North Sea, Baltic Sea and Arctic Ocean¹²⁴.

Tipping points are concerning because the ‘new’ state may function very differently, delivering different (or fewer) ecosystem services that society and economic activities depend on. This translates directly into financial risk and uncertainty, from supply-chain disruptions to declining asset values.

Gaps in knowledge and access to ocean data exacerbate these risks: For many, the ocean remains out of sight and out of mind, which limits understanding of potential exposure.

TNFD’s LEAP framework (Locate, Evaluate, Assess, Prepare) – allows companies to assess and report where ocean-related impacts and dependencies occur¹²⁵. Understanding the difference between impact and dependency pathways¹²⁶, and the spatial influence of assets/operations¹²⁷ and how they might impact the ocean is a crucial first step to evaluating exposure (see Figure 16).

Companies in the blue economy rely on the ocean for goods and services. When ocean health declines, these goods and services become less available, creating risks for ocean-dependent business. This is known as the **dependency pathway**. At the same time, unsustainable practices in these sectors escalate the rate at which ocean health is declining and negatively impact communities around the world. For example, destructive fishing practices can destroy habitats and deplete fish stocks, sometimes to the point of collapse. This **impact pathway** can introduce financial and operational risks to fishing companies. An **integrated impact-dependency** pathway recognises impacts and dependencies are closely connected and therefore requires a holistic assessment, often in collaboration with local stakeholders and knowledge holders.

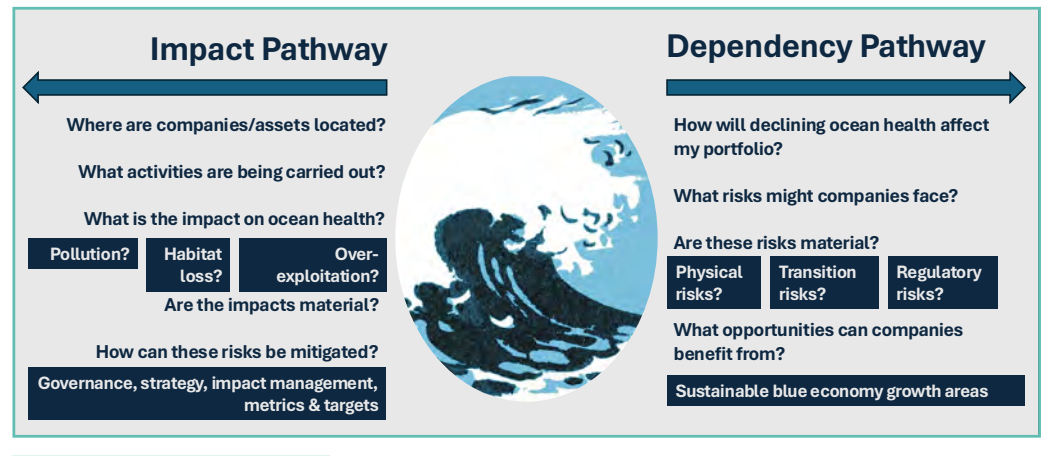


Figure 16: *Impact and dependency pathways both present risks to companies and their investors in the blue economy and require management and mitigation. Image Source: Chronos Sustainability Ltd.*



In 2025, Jouffray et al. studied the annual and sustainability reports of the top ten companies operating across 8 ocean-dependent sectors (cruise tourism, marine equipment and construction, offshore oil and gas, offshore wind, port activities, seafood, shipbuilding and repair and container shipping)¹²⁸. The study concluded:

- Less than 55% of the companies assessed reported ocean-specific impacts associated with their industry.
- A total of nine impacts are reported to varying extents across the eight sectors (see Appendix 8), with little distinction between onshore- and offshore operations and impacts. Impacts were measured against 443 indicators in total.
- The most frequently reported impacts were energy utilisation (96% of companies) and pollution (92%). Information on the type of pollution caused (i.e. chemical, plastic, noise pollution) was very limited.
- On biodiversity-related impacts: approximately 50% of the companies mentioned impacts on marine habitats, 33% included introduction of alien species and 11% reported collisions with mammals.

The report concludes that, to date, companies are taking a narrow approach to assessing and disclosing ocean-related impacts and dependencies – particularly for issues like biodiversity impacts that are not yet required by regulations. Notably, the inconsistencies identified in reporting suggest a disconnect between the scientific evidence of ocean degradation and the way in which companies evaluate financial materiality.

Case Study

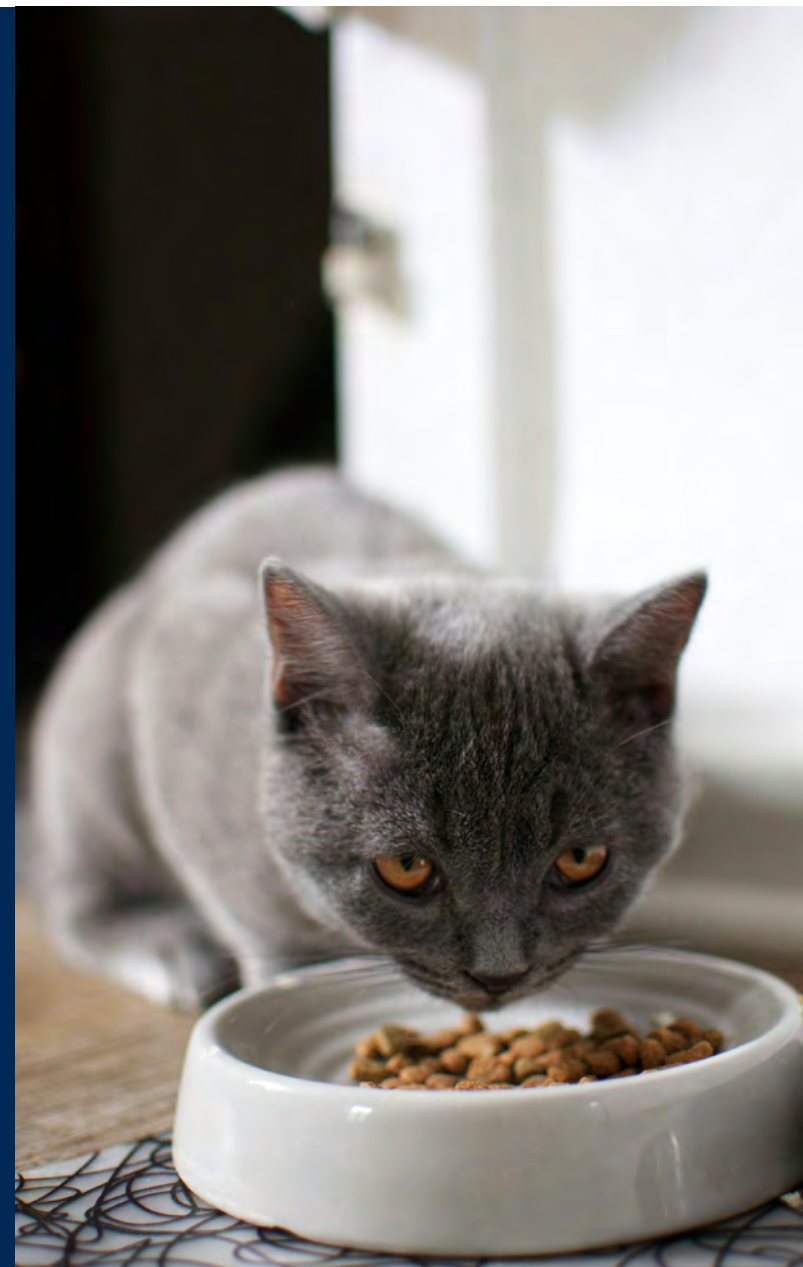
Mars Petcare integrated impact-dependency pathway

The global pet food market is worth USD 130 billion, growing annually at a rate of 5.5%. Mars reportedly earns USD 20 billion from its 50 pet care brands which includes Sheba, a premium cat food which is directly dependent on coral reefs. Coral reefs provide habitat, food sources and nursery grounds for a high number of commercially important fish species, including the species harvested for pet food. Coral reefs are under immense pressure from the impacts of climate change (e.g. heat stress, ocean acidification), pollution (e.g. plastics) and damaging fishing practices (e.g. dynamite fishing). Unsustainable exploitation of reef fish in line with growing demand for pet food reduces fish populations to an unsustainable level meaning that stocks cannot reproduce successfully or adapt to the impacts of climate change.

Mars reported that without healthy reef sustaining fish populations, Sheba falters.

Recognising the interlinkages between impact and dependency pathways, and the physical, transitional and regulatory risks to its supply chain, Mars partnered with reef restoration experts to launch its Hope Grows programme in Sulawesi, Indonesia and in Hawaii, USA to protect and restore the health of corals and to improve future resilience of the reefs. In Indonesia, Mars reports that coral growth has increased from 2% to 70% and that both the number of reef fish species and the size of fish populations have increased by 64% and 260% respectively since work began in 2019, increasing future resilience to climate-driven impacts.

<https://www.mars.com>



Ocean-sectors	Dependencies	Environmental Impacts
Maritime Transport	<ul style="list-style-type: none"> • Currents & tides • Global climate regulation • Flood mitigation • Water purification 	<ul style="list-style-type: none"> • GHG emissions • Sedimentation (associated with dredging/access maintenance) • Pollution (noise, light, air, solid waste, plastic) • Bio-fouling • Introduction of Alien Invasive Species (AIS) • Species collisions • Seabed disturbances
Ports	<ul style="list-style-type: none"> • Stable sea levels • Storm protection • Low sedimentation (access and flood prevention) 	<ul style="list-style-type: none"> • Pollution (e.g. light, noise, chemical, plastic) • GHG Emissions • Dredging (for access) impacts on seabed & water column • Access restrictions (e.g. conflict with inshore fishers)
Fishing	<ul style="list-style-type: none"> • Fish stocks and genetic materials • Global climate regulation • Resilient habitats (nursery grounds) • Flood mitigation • Water supply • Water purification • Low sedimentation 	<ul style="list-style-type: none"> • Stock depletion & collapse • Bycatch (removal of non-target species) • Plastic pollution (e.g. nets, fish aggregating devices) • Noise & light pollution • Damage to seabed and marine ecosystems (e.g. destructive fishing practices) • Introduction of AIS • GHG emissions • Illegal, Unregulated and Unreported activities (IUU)
Aquaculture	<ul style="list-style-type: none"> • Fish stocks (feed and genetic materials) • Soy (feed) • Chemicals (lice/infection prevention) • Water supply • Global climate regulation • Water purification • Low sedimentation 	<ul style="list-style-type: none"> • Land use change (mangrove removal) • Habitat degradation & seabed disturbances • Resource extraction (feed) • Chemical & nutrient pollution (e.g. antibiotic use) • Generation and release of solid waste • Introduction of AIS
Coastal & Marine tourism	<ul style="list-style-type: none"> • Inshore environment • Port/marina access • Reef systems • Recreation and visual amenity services • Flood prevention • Global climate regulation 	<ul style="list-style-type: none"> • Habitat loss & degradation • Land/ocean use change • Pollution (light, noise, chemical, plastic)
Offshore Renewables	<ul style="list-style-type: none"> • Wind • Tides (water supply) • Solar • Surface temperature • Water • Storm protection • Global climate regulation • Flood mitigation • Low sedimentation 	<ul style="list-style-type: none"> • Migratory pathways (e.g. mammals & birds) • Noise & light pollution • Chemical pollution (e.g. nuclear waste) • Access restriction (e.g. fishing grounds, tourism) • Seabed disturbances
Blue biotechnology	<ul style="list-style-type: none"> • Biodiversity 	<ul style="list-style-type: none"> • Resource extraction • Habitat damage • Cultural impacts
Pharmaceuticals & genetic provisioning	<ul style="list-style-type: none"> • Biodiversity (genetic materials) • Water supply • Water purification • Low sedimentation • Flood prevention 	<ul style="list-style-type: none"> • Resource extraction • Seabed disturbances • Cultural impacts

Table 3: Examples of ocean-related impacts and dependencies associated with key economic sectors. Data sourced from ENCORE and supplemented with desk-based research. Note: Inter-sector impacts also exist in the marine environment as a result of concentrated economic activities in the more accessible areas of the ocean (known as marine spatial squeeze). For example, maritime transport routes can impact fishers by restricting access to fishing grounds and damage nets & pots, reducing the efficiency of fishing operations and increasing costs. Source: Chronos Sustainability Ltd.

Identifying and evaluating the size of ocean-related risks

The ocean plays an essential role in mitigating climate change and nature loss – both of which are recognised as a systemic risks to investors^{129,130}. It acts as both a key climate regulator and is home to 80% of the world’s biodiversity¹³¹ and natural resources. The unsustainable use and exploitation of ocean resources and mismanagement of ocean-based activities, together with the effects of anthropogenic climate change and pollution present material risks for ocean-dependent sectors, according to a report issued by the ratings agency Moody’s¹³².

Investors can screen and evaluate portfolios to understand the extent to which they are exposed to ocean-related risks, which cut across sectors and include:

- **Physical risks**, such as the loss or damage to assets over the short term (acute risks) resulting from natural events like storms or flooding or longer-term risks (chronic risks) associated with climate change impacts (e.g. sea-level rise, warming sea temperatures);
- **Operational risks** where supply chains are disrupted or experience resource shortages;
- **Transition risks**, in the form of new or tightening regulations that can result in stranded assets; and
- **Reputational risks** as a result of increased scrutiny and consumer market shifts towards improved sourcing and sustainability practices.

Underestimating or failure to fully account for these risks across diversified portfolios that include companies operating in ocean-dependent sectors can have significant financial implications for investors. If the blue economy follows a business-as-usual scenario, it is estimated that companies operating in coastal real estate and infrastructure face the highest financial impacts in terms of value at risk, followed by seafood companies, ports and shipping companies¹³³ (see Table 4 and Table 5 for case studies).

Table 4: Overview of sector-level risks across the blue economy under a BAU scenario (2020-2035). Source: Adapted from WWF 2021 Navigating Ocean Risk

Sector	Sector-level Value at Risk (USD Billion)	Risk	Causes
Ports and shipping	874	Physical (chronic & acute)	<ul style="list-style-type: none"> • Climate impact, sea level rise; Storms
Fisheries and aquaculture	2,890 (Fisheries) 31 (Aquaculture)	Physical (chronic & acute)	<ul style="list-style-type: none"> • Fishing effort (overfishing and stock collapse) • Habitat destruction and loss (destructive fishing methods) • Pollution (nutrient, chemical, plastic)
		Reputational	<ul style="list-style-type: none"> • Unsustainable fishing practices and sourcing of feedstock
Coastal tourism	655	Physical (chronic & acute)	<ul style="list-style-type: none"> • Habitat loss and degradation (e.g. coral reefs, mangroves) • Pollution (chemical, plastic) • Storms
		Reputational	<ul style="list-style-type: none"> • Pollution (plastic)
Coastal real estate & infrastructure	3,980	Physical (chronic & acute)	<ul style="list-style-type: none"> • Climate impact (flooding, sea level rise affecting urbanised areas)
Marine renewables	8.6	Physical (chronic & acute)	<ul style="list-style-type: none"> • Climate impact (sea-level rise, storm damage, changing weather systems)

Sector	Case / Event	Estimated financial impact (USD)	Summary	TNFD-aligned Risk Category	Investor Lesson
Shipping	2023 drought (in part linked to natural El Nino event) reduced Panama Canal water levels; vessel draft restrictions and limits on overall traffic through the canal imposed ¹³⁴	Trade through the Panama canal fell by 5% in 2023 ¹³⁵ . Total economic impact is unknown but estimated impact on the USA alone was USD 1.5billion ¹³⁶	Panama Canal is a critical global trade chokepoint; low water levels reduced traffic by 30% ¹³⁷ and resulted in increases shipping costs and global supply chain disruptions ¹³⁸ .	Physical risk – acute (drought & water scarcity)	Ocean–climate variability can disrupt global trade flows and materially increase operating costs.
Ports	Hurricane Sandy (2012) flooded New York/New Jersey ports ¹³⁹	USD 2 billion in damages; 25,000 shipping containers diverted to other ports, total closure of port (lost operations) ¹⁴⁰	14 ft storm surge hit the ports of New York and New Jersey, submerging infrastructure, damaging commercial property and causing pollutants (oil, hazardous materials) to enter the water. Total economic impacts were USD 70 billion ¹⁴¹ ; USD 8 billion of this attributed to climate change-driven sea level rise ¹⁴² .	Physical risk – acute (storm surge & flooding)	Ports face concentrated physical climate risk with large balance-sheet exposure
Marine Renewables	2021 North Sea offshore wind underperformance due to low wind speeds	Ørsted reported power generation fell by 9% relative to 2020, and revenue from offshore wind decreased by DKK 1 billion relative to 2020 ¹⁴³	Revenue sensitive to wind variability; project underperformance directly impacts earnings	Physical risk – chronic (ocean–climate variability)	Ocean–climate dynamics introduce material performance and earnings risk
Fishing & Aquaculture	2016 harmful algal bloom in Chile killed 20% of salmon production ¹⁴⁴	USD 800 million losses; 40,000 tonnes of lost biomass; global price spikes (+25%)	The 2016 harmful algal bloom caused mass mortality of salmon and farmed shellfish over a 2 week period. The level of die off recorded would normally occur over two years ¹⁴⁵ .	Nature-related risk – impact & dependency (biodiversity loss, water quality)	Ocean degradation can cause sudden, systemic aquaculture losses
Coastal & Marine Tourism	Seven Mile Beach (SMB) coastal erosion, Cayman Islands (2024)	Property most at risk of coastal erosion on SMB is valued at USD 6 billion. Studies estimate that ongoing delayed action will significantly increase the cost of mitigation.	Tourism accounts for 20% of Cayman Islands GDP and tourism at SMB generates USD 1 billion p/a ¹⁴⁶ . Coastal erosion is driven largely by exposure to increased frequency and severity of storm events and wave energy ¹⁴⁷ and compounded by extensive coastal development ¹⁴⁸ . Cayman government allocated KYD 20 million for beach nourishment (sand replenishment) in the 2022/2023 budget, based on assessments at the time, and noting that replenishment would need to be an ongoing process. No funding was allocated in the 2024/2025 budget and consultations on mitigation measures – including nature based solutions – are ongoing ¹⁴⁹ .	Nature-related risk – impact & dependency (natural beach replenishment, coral sand)	Ecosystem loss erodes tourism revenues, asset values, and employment stability
Sub-Marine Telecommunications	2022 Tonga volcanic eruption severed undersea cable	Repair costs approximately USD 4.4 million to cover damage to both the domestic cable and the international cable ¹⁵⁰ .	Tonga – an archipelago nation comprised of 169 islands is served by a single international sub-sea cable. Damage to the critical infrastructure meant the island nation was without internet & communication for 38 days (the eruption also obscured satellite connectivity) ^{151,152} ; hampering wider repairs and recovery efforts from the impact of the tsunami caused by the eruption.	Physical risk – acute (geohazards)	Critical digital infrastructure is highly exposed to seafloor hazards

Table 5: Case studies from across the blue economy that highlight the financial implications of failing to reduce or mitigate ocean-related risks and impacts. Source: Compiled by Chronos Sustainability Ltd.

Risk of illegal ocean activities

Despite a growing network of international agreements and national laws, illegal ocean activity continues to thrive in regions where enforcement is weak, and governance frameworks remain fragmented or underdeveloped. These activities have far-reaching consequences for the blue economy and can elevate portfolio risk.

Illegal, Unregulated or Unreported (IUU) fishing activities are a significant threat to the sustainable management of global fisheries and are widely associated with human rights abuses and environmental impacts¹⁵³:

- **Illegal activities** are those carried out in contravention to national and/or international law. Activities are varied and include: fishing without licence; targeted capture of protected species, including shark finning; trans-shipment of supplies, catch and/or crew members at sea; ghost fishing (turning off mandatory vessel tracking systems); and illegal gear use (e.g. dynamite or cyanide).
- **Unreported** (including mis-reported) activities refers to fishing operations that fail to report required information (accurately or entirely) to relevant national or regional fisheries authorities. This includes vessel size, catch volumes, fishing effort.
- **Unregulated** fishing covers fishing in the high seas (Areas Beyond National Jurisdiction, ABNJs) where regional fisheries management organisations (RFMOs) lack authority and fishing within RFMO designations without permission (e.g. where vessels are registered to nations that are not party to RFMO in question). Unregulated fishing also refers to fishing of species where no RFMO measures apply but activities are inconsistent with sustainable resource use.

Today, one in five landed fish (20%) are estimated to originate from IUU fishing, representing financial losses of USD10-23.5billionⁿ per year¹⁵⁴ in the form of lost revenues, without taking into account social and environmental costs. IUU fishing is associated with international, organised crime¹⁵⁵, trafficking and forced labour¹⁵⁶, and occurs on both the high seas and in inland-waters (within national jurisdictions). Environmentally, IUU leads to resource depletion, biodiversity loss, habitat destruction, and pollution, undermining the health of marine ecosystems and the long-term viability of legal markets. Socially, the illegal activities jeopardise coastal livelihoods, contribute to food insecurity, particularly in the Global South, and expose workers to dangerous, exploitative conditions and human rights abuses¹⁵⁷ (see Table 6).

Together, these impacts erode the foundations of a sustainable blue economy and pose far-reaching risks across value chains for investors exposed to fishing companies or processing facilities and ocean-dependent industries' like retailers, restaurants and logistics providers.

Environmental and economic harm	Social and human rights risks
<ul style="list-style-type: none"> • Resource depletion – IUU fishing and marine species trafficking diminish fish stocks and biodiversity, undermining legal markets and food systems. • Habitat destruction – Illegal practices like blast or cyanide fishing destroy vital ecosystems such as coral reefs and seagrass beds. • Marine Pollution – Illicit discharges and poor waste management degrade water quality and ecosystem function. 	<ul style="list-style-type: none"> • Coastal livelihood loss – Small-scale fishers face reduced catches and unfair competition, exacerbating economic inequality. • Food insecurity – Declining fish populations threaten a primary protein source for millions, especially in the Global South. • Crew safety and wellbeing – Workers are exposed to violence, abuse, and unsafe conditions, often in remote jurisdictions.

Table 6: *Illegal, Unreported and Unregulated Fishing is associated with a wide range of socio-environmental impacts that undermine fisheries management and create risk for stakeholders across the value chain. Source: Chronos Sustainability Ltd.*

Companies, especially those in high-risk sectors like seafood, shipping, or logistics, may face increasing regulatory scrutiny and potential legal liabilities if compliance with fishing regulations is not strengthened. Seafood has been found to be regularly mis-labelled in restaurants and hotels across Europe (which are responsible for 30% of European seafood sales)¹⁵⁸. Seafood suppliers and retailers face significant legal, reputational, and supply-chain disruption risks from unknowingly sourcing illegally caught fish. Lack of traceability exposes brands to enforcement actions, consumer backlash, and sudden supply loss. For investors, this translates into financial risk – through disrupted supply chains, regulatory penalties, reputational damage, and degraded natural capital.

Improving fisheries transparency and traceability is crucial to tackling IUU – and to reducing the risk of exposure to illegal and unsustainably sourced seafood. Improvements in remote monitoring, access to and quality of satellite imagery, vehicle tracking systems and innovative testing using DNA are being used to combat illegal activities at sea. The IUU Fishing Risk Index¹⁵⁹ benchmarks and ranks countries on their vulnerability, prevalence and response to IUU fishing, indicating the risk of IUU fishing in and by different countries. In 2021, Vessel Viewer¹⁶⁰ was launched by Global Fishing Watch and TMT to help reduce exposure to IUU-related risks. The tool has successfully supported states and stakeholders in the implementation of effective port control measures; enhanced supply chain transparency; and increased access to data to support informed decision making by insurers, reinsurers and investors.

n. Based on data in 2009.

Illegal Tuna Fishing

In 2020, the [Environmental Justice Foundation](#) (EJF) identified a fleet of fishing vessels operating illegally in the Atlantic Ocean. The fleet exploited structural weaknesses in global fisheries governance. Highly opaque vessel ownership and registration data spread across multiple jurisdictions, including South Africa, Oman, Vanuatu, St Vincent and the Grenadines, Belize, and Tanzania. When scrutiny increased, vessels repeatedly re-registered under new flags, names, and corporate entities, to enable continued illegal operations while evading enforcement.

EJF's investigation provided verifiable evidence of illegal fishing, shark fin harvesting (including protected species such as hammerhead sharks), destructive fishing practices, and serious labour abuses, including unsafe and unsanitary living conditions and crew exploitation. Satellite data and documentation also showed evidence of illegal trans-shipment at sea – allowing catch, supplies, and crew to be exchanged without port inspections – further obscuring traceability. The scale of evidence against the fleet triggered several market-based interventions including:

- **Insurance withdrawal:** Marine insurer Hydor dropped coverage for the fleet, sharply limiting its ability to operate legally.
- **Regulatory enforcement:** The [International Commission for the Conservation of Atlantic Tunas](#) (ICCAT) blacklisted the vessels in the Atlantic in 2021 and the Indian Ocean Tuna Commission (IOTC) followed suit, blacklisting the same vessels in 2022 when fishing operations moved to the Indian Ocean thus restricting fishing access.
- **Flag-state action:** [Oman de-registered vessels](#) and withdrew fishing permits and licences.

Unlicensed and uninsured, vessels in the fleet became stranded assets, with one of the [vessels reportedly scrapped](#) in a ship-breaking yard in Pakistan.



Pursuing a sea of opportunities

The immense social, environmental and economic benefits that a healthy ocean provides presents a compelling case for supporting the transition to a more sustainable blue economy. Increasingly, investors and the companies that they invest in are exposed to a broad range of opportunities that offer operational resilience, access to new markets, transition finance, cost-of-capital benefits and growth in sustainable ocean sectors. Together, these opportunities can reduce, mitigate and manage negative impacts on the ocean, in-line with the mitigation hierarchy and address today's drivers of declining ocean health while generating a return on investments.

The World Economic Forum (WEF) states that investments into a sustainable and regenerative blue economy could return a net positive economic benefit of over USD 15 trillion (or 15% of global GDP)¹⁶¹. WEF also reports that barriers to investing in the blue economy such as immature financing solutions and lack of investable projects¹⁶² are being addressed. Research by the High Level Panel for a Sustainable Ocean Economy has demonstrated that investments in four key areas could yield benefits at least five times greater than the costs (see Table 7).

Investment in ocean conservation, restoration, and sustainable use mitigates identified risks and also creates growth opportunities in high-impact, climate-aligned sectors that support the transition to a sustainable future blue economy (See Figure 17).

Action:	Average benefit : cost ratio	Net benefit over 30 years 2020-2050 (USD trillions)
Mangrove conservation and restoration	3 : 1	0.2
Decarbonised maritime transport	4 : 1	5.1
Sustainable seafood production	10 : 1	6.7
Scaled-up marine renewables	12 : 1	3.5

Table 7: Four emerging opportunities for improved ocean sustainability and estimated benefit : cost ratios. Adapted from. *High Level Panel for a Sustainable Ocean Economy, 2020*

Case Study

Swen CP

In 2021, Swen Capital Partners co-founded 1000 Ocean Start-ups through its Blue Ocean Fund with the aim of mainstreaming investments into ocean impact innovation, particularly in the fields of tackling over-fishing, innovative solutions to marine pollution and marine climate solutions. Now hosted by the World Economic Forum, 1000 Ocean Start-ups has developed a Blue Ocean Impact Framework ([The Ocean Impact Navigator](#) which consists of 34 key performance indicators to help investors and stakeholders measure positive impacts on the ocean. The Ocean Impact Navigator has been rolled out across Europe, Asia and North America.

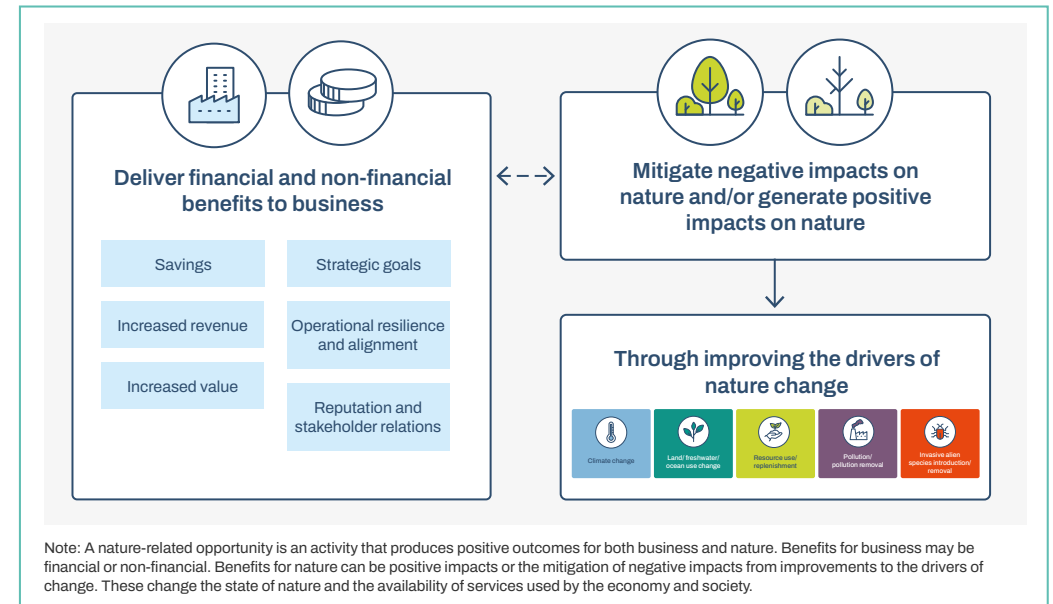


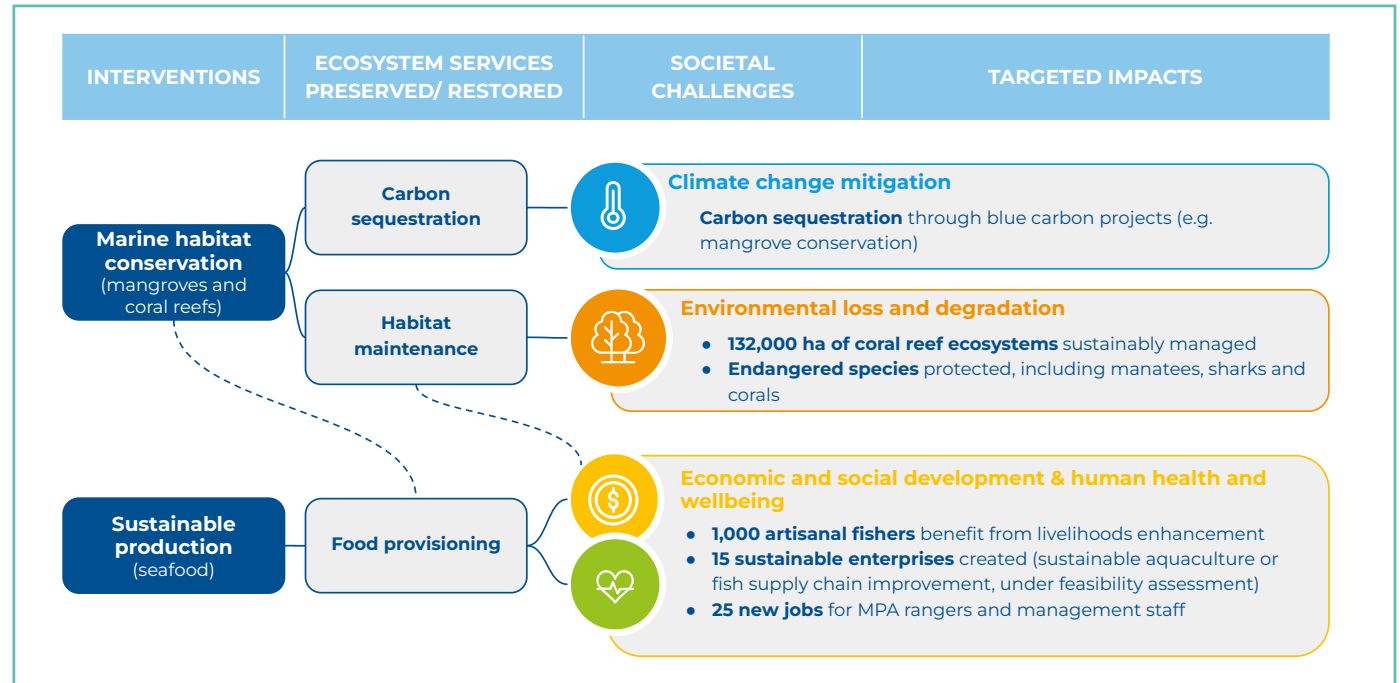
Figure 17: Nature related opportunities benefit both companies and nature. Image Source: *TNFD Discussion paper on nature-related opportunities*

Estimates suggest that every USD 1 invested in conserving marine life, generates approximately USD 10 in return when co-benefits are fully accounted for¹⁶³. For example, mangrove conservation projects that restore and replenish degraded mangrove forests help mitigate the effects of climate change by increasing potential for marine carbon sequestration. Mangrove roots filter seawater, improving water quality and act as nursery grounds for commercially important species of fish – creating safe habitat and foraging grounds. From a social perspective, mangroves stabilise the sediments on the seafloor and buffer the coastline from storm surges, thus protecting communities and commercial infrastructure from the impact of storms and wave energy. Mangrove restoration projects also create new livelihood opportunities in the form of tourism and fisheries, forging a sense of social inclusion.

In Belize, the Turneffe Atoll Marine Reserve (TAMR) was first established in 2012 and is co-managed by the Turneffe Atoll Sustainability Association (TASA)¹⁶⁴. TAMR is Belize’s most important marine protected area in terms of both size (132,000 Ha) and the biodiversity and habitats it supports. In 2021, TAMR benefitted from a USD 1.2 million blended finance investment to support the development of eco-friendly tourism initiatives and strengthen the protection of its diverse coral reef ecosystems. Launched in 2021 in partnership between the Ministry of Blue Economy, Belize and TASA, catalytic grant funding, concessional loans and refundable grants were leveraged to structure the blended finance facility, that attracted private finance investments (commercial loans). As part of the commitment, TASA received support to develop sustainable, community-led, revenue-generating business models that align with conservation objectives, ensuring the long-term preservation of this vital marine ecosystem. Revenue generating projects included nature-based tourism, a blue carbon project (mangrove focus) and sustainable aquaculture¹⁶⁵ (see Figure X.1).

To monitor the success of the initiative, a KPI framework including 20 impact metrics was developed for six key criteria: ecosystem integrity; species protection; livelihood enhancement; sustainable enterprises; equity improvement; and MPA management effectiveness. Independent external partners (Verra, Gold standard) are responsible for verifying the impact metrics for nature and communities.

Figure X.1: A case study in blended finance facility structured for financing interventions in the Turneffe Atoll, Belize. Image source: *WWF*



As a result of increased actual and predicted returns on investment, opportunities in the sustainable blue economy are increasingly attracting the attention of investors, banks and insurers. These opportunities, according to the Blue Bond Accelerator programme are evolving beyond decarbonising existing oceanic sectors and are capitalising on emerging opportunities such as¹⁶⁶:

- Sustainable seafood which is predicted to grow by six times by 2050, becoming the primary source of fish protein;
- Climate resilience projects, particularly at the coast, mitigating the effects of climate change and improving the lives of billions of people;
- Marine renewable energy which is predicted to reach 40% growth by 2050; and
- Ocean-based carbon capture & storage ventures to reduce Green House Gas (GHG) emissions by 35% by 2030.

Case Study

Asset Owners engaging with Ocean Action

At the time of publication, there are few examples of how and why asset owners taking action on the ocean. Allianz’s research arm has published an overview of ocean-related issues in 2024 ([Sustainable Ocean](#)), recognising the significance of ocean conservation and describing its partnerships with organisations to protect marine wildlife from illegal and destructive fishing practices and plastic pollution, including from abandoned, lost or otherwise discarded fishing gear (ALDFGs).

NBIM, as managers of assets of the Norwegian Government Pension Fund Global, also recognise risk that ocean degradation poses to the long-term value of their portfolio and have published a clear set of Investor expectations aimed at the board member of companies that operate directly on or in the ocean (including those operating in sectors covered by this report) and those that might indirectly affect the ocean as a result of terrestrial activities (e.g. waste management, agriculture, mining companies). As articulated in the expectations, NBIM states that “companies based on, depending on or affecting the ocean should integrate ocean-related risks and opportunities into corporate strategy, risk management and reporting. Companies should act responsibly and transparently on ocean-related governance”. ([NBIM Ocean Sustainability Expectation of Companies](#)). NBIM states that the information provided by companies, in certain circumstances, is used to assess ocean-related exposure, management and performance. As long-term investors and managers of large, diversified portfolios, recognition of the risk that nature and biodiversity loss and ocean degradation poses to long-term value sends a clear signal to companies that ocean-related dependencies, risks, impacts and opportunities need to be managed going forwards.

Central banks and financial regulators are closely monitoring systemic risks from nature and biodiversity loss¹⁶⁷. At the 2025 Monaco Blue Economy and Finance Forum (BEFF), the President of the European Central Bank recognised the interdependence between ocean health, climate stability and long-term economic prosperity¹⁶⁸. The Ocean Investment Protocol, launched by UNEP FI and partners at UNOC3, guides financial institutions, insurers and reinsurers, ocean industries, governments and development finance institutions to manage risks and understand opportunities to increase energy security, food security and transport security.

In line with the Marrakesh Partnership’s Climate Action Pathway for Ocean and Coastal Zones¹⁶⁹, the Protocol identifies five key opportunities (breakthroughs) across ocean-dependent sectors, that require finance to scale and support the transition to a resilient, equitable and sustainable future blue economy (see Table 8).



Ocean Investment Protocol Breakthrough:	2030 Finance Goals:
Marine Conservation	Investments of at least \$72 billion secure the integrity of ocean ecosystems by protecting, restoring and conserving at least 30% of the ocean for the benefit of people, climate and nature.
Ocean-Based Transport	Continued decarbonisation of maritime transport so that zero emission fuels make up 5% of international shipping’s energy demand. Over 450,000 seafarers are retrained and upskilled in new low-carbon ship technologies and at least 30% of global trade moves through climate-adapting ports.
Ocean Renewable Energy	At least 380 GW of offshore wind capacity is installed, and targets and enabling measures for net-positive biodiversity outcomes are established. USD10 billion in concessional financing is mobilised to support developing economies to reach this goal.
Aquatic Foods	At least USD 4 billion per year is secured to support resilient aquatic food systems that will contribute to healthy, regenerative ecosystems and sustain low-carbon food and nutrition security for the global population.
Coastal Tourism	Annual investments of USD 30 billion per year support halving emissions of coastal tourism. Additional investments build the resilience of local communities and to recover and protect ecosystems to sustainably manage tourism in island and coastal destinations most vulnerable to climate change.

Table 8: Five key ocean-related breakthroughs (opportunities) identified in the UNEP FI Ocean Investment Protocol to reduce exposure to unsustainable ocean practices and support the transition to a stable, resilient and equitable future blue economy.

2.7 Investor recommendations

The global economy and virtually all economic sectors are either directly or indirectly dependent on the ecosystem services derived from the ocean. However, the long-term health and stability of the ocean – and, in turn, its ability to continue to deliver these ecosystem services - is jeopardised by today's unsustainable use of ocean resources

Over-exploitation and habitat loss, combined with escalating pollution and the negative effects of climate change are impacting oceanic systems and affecting the natural equilibrium between the ocean, land and atmosphere. For companies, degradation of the natural environment presents risks as resources that they depend on become scarce or threatened. For investors, this degradation creates significant investment risks. Effectively addressing these risks not only protects investment value but also creates potentially significant investment opportunities.

But transitioning to a sustainable blue economy does not come without challenges. Global ocean governance is a complex mix of international, regional, national and sub-national policies and agreements. Large and established sectors such as fishing and maritime transportation currently benefit from harmful subsidies that drive ocean-degrading activities. Lack of monitoring and access to data prevents stakeholders from assessing the full extent of ocean-related impacts and dependencies from direct operations. Assessments of indirect impacts on the ocean are extremely limited. All of these challenges mean that investors are exposed to potentially material, portfolio-wide risks.

To continue benefitting from the ecosystem services and economic potential of the ocean, investors need to systematically assess and evaluate their exposure to ocean-related risks and opportunities and, where identified, understand how companies are responding to mitigate and manage these risks.

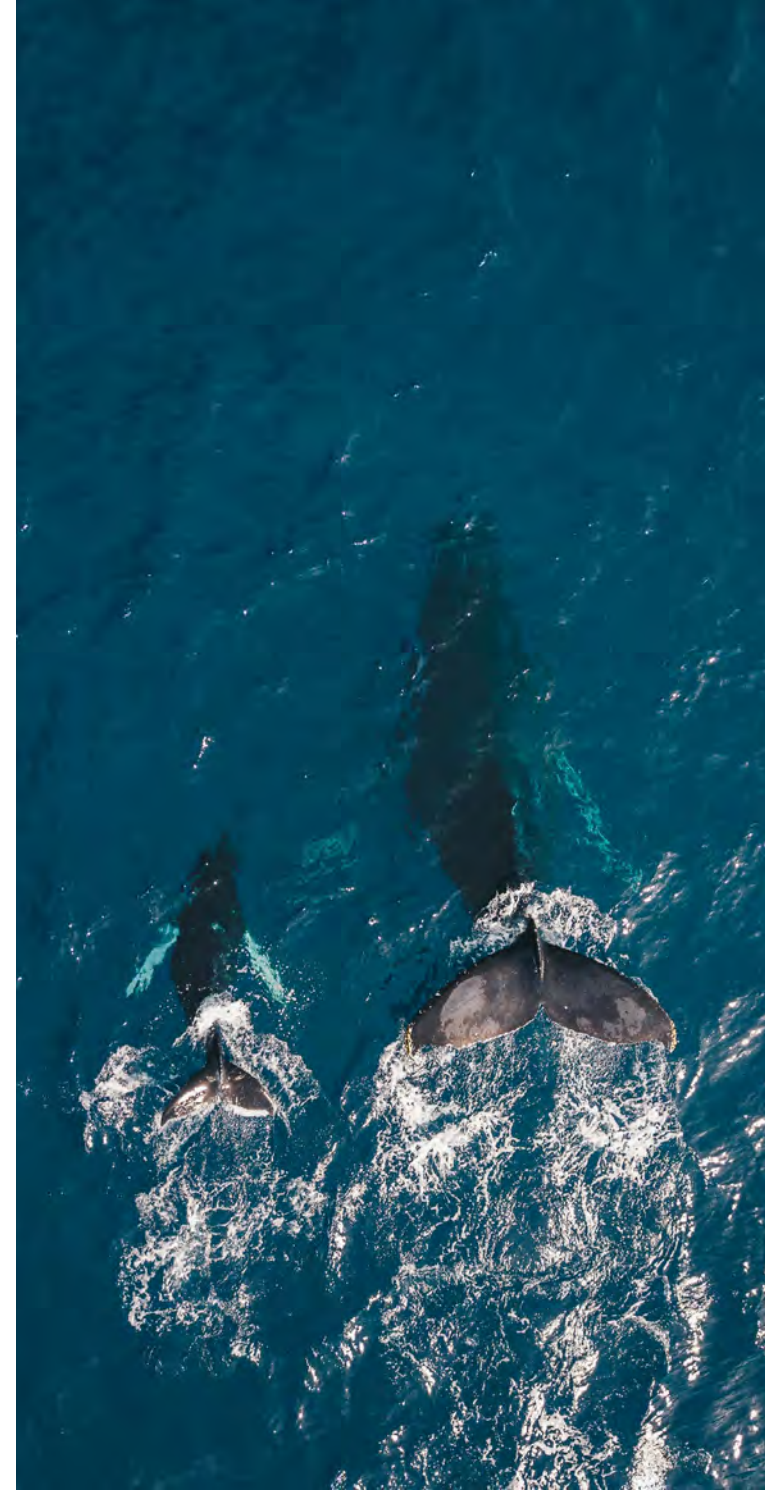
The Ocean Framework has been developed as a high-level, sector-agnostic decision-making framework to support investors through this process (See Part 3).

The Ocean Framework equips investors with comprehensive guidance, tools, and resources to:

1. Identify, assess, and manage **ocean-related risks and opportunities** across portfolios;
2. Systematically **prioritise sectors, companies, and issues** most impacted by or dependent on ocean ecosystems; and
3. **Pinpoint high-risk geographies**, evaluate company responses to ocean sustainability, and access key data and assessment tools.

The Ocean Framework is complemented by **Engagement Guidance** that supports investors wanting to engage with priority companies to further understand how identified risks and opportunities are being managed ([see Part 4](#)). The Guidance provides general (sector agnostic) questions as well as tailored questions and insights for three high-impact sectors: Fisheries, Aquaculture and Maritime transportation (which includes shipping and cruise tourism).

Improving ocean literacy¹⁷⁰ – a deeper understanding of the inherent value of the ocean and the potential that a sustainable blue economy has for future generations and financial returns – is an important first step towards redirecting capital away from unsustainable practices in the traditional blue economy and aligning investments with sustainable economic activities.



A deeper understanding of the scale of ocean sustainability issues – and future implications for both society and the natural environment and long-term economic growth – should drive companies and their investors to prioritise activities that:

- 1. Preserve ocean ecosystem integrity** by respecting conservation objectives and engaging with all stakeholders, including governments, coastal communities and Indigenous Peoples, and public and private institutions;
- 2. Adopt a precautionary approach** to maximise social and economic benefits, such as food security, equity, and poverty eradication for present and future generations;
- 3. Ensure economic activities restore and increase resilience** of oceanic ecosystems and conserve biodiversity to support sustained productivity;
- 4. Operate within safe planetary boundaries** to mitigate the impacts of climate change, reduce pollution, and prevent biodiversity loss.

Investors and finance professionals can help drive the transition to – and realise the full potential of – a sustainable blue economy in 5 clear steps:



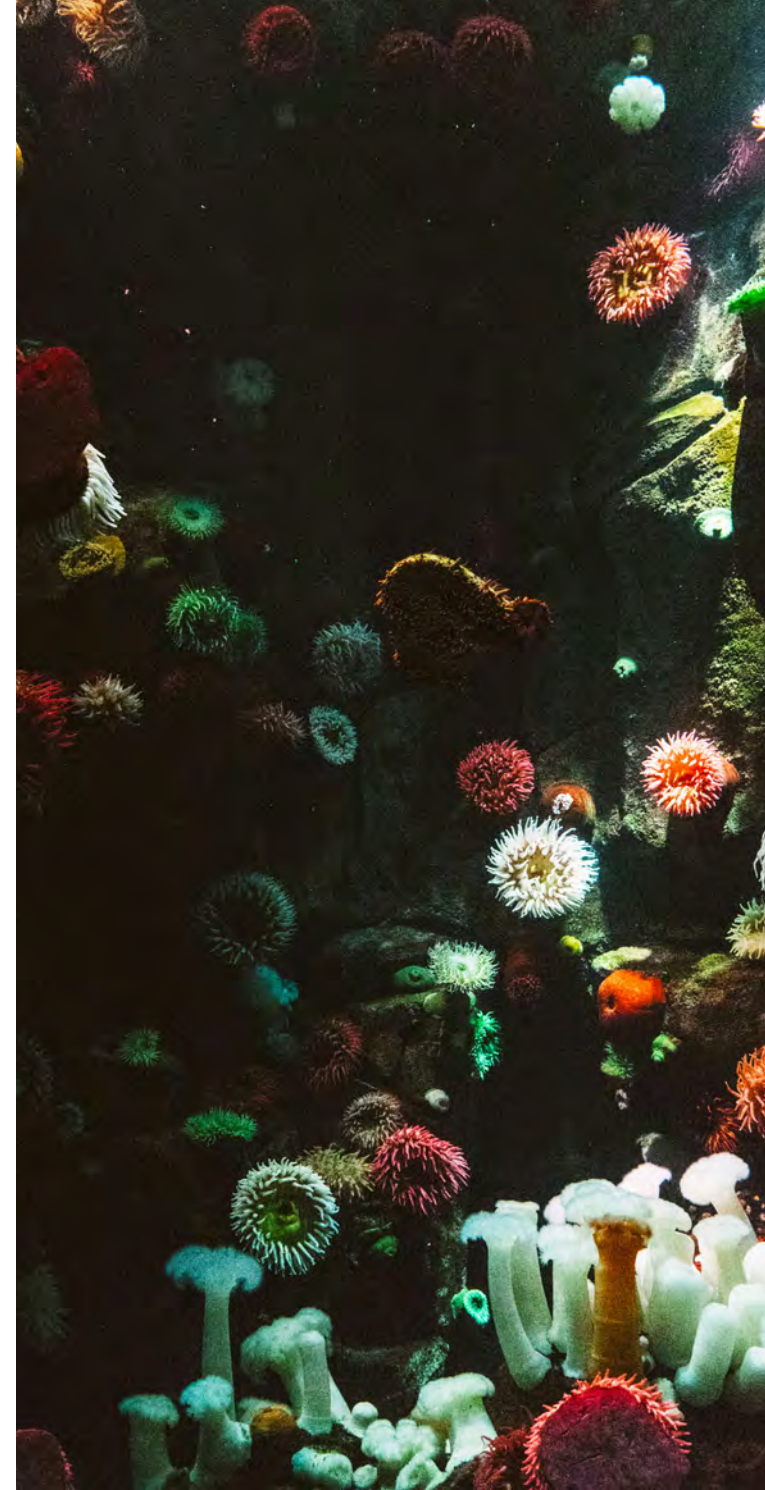
The ocean must be incorporated into broader climate, nature, and biodiversity policies and organisational risk management strategies, with clearly defined, high-level goals and objectives articulated

Using The Ocean Framework, investors should conduct a systematic review of their portfolios in line with stated goals and objectives to identify and evaluate exposure to dependencies, impacts, risks and opportunities, prioritising the most exposed geographies, sectors and companies for further action.

Using the Engagement Guidance provided, investors should engage with priority companies to better understand how identified dependencies, impacts, risks and opportunities are being - or could be - managed and seek evidence of continuous improvement.

Transparency on how risks are being managed and mitigated is crucial for stakeholder accountability, improved access to data and informed decision-making. Investors should articulate clear expectations for enhanced corporate disclosure and reporting on ocean-related issues.

From a more informed position, investors should use the information gathered to actively redirect capital, investment and trade away from harmful subsidies and ocean-degrading activities towards sustainable blue economy activities, creating long-term investment, social and environmental value.



Investor levers to support the transition to a sustainable blue economy

1. Ocean integration in policies & strategies

2. Portfolio Assessment

3. Innovative finance tools

4. Capital Allocation

5. Active ownership

6. Better data & transparency

7. Responsible Action

8. Policy advocacy

Drivers of degradation

Transition Opportunities

Examples

Goal



Climate Change

Blue Carbon initiatives

Mangrove & Seagrass restoration

Marine renewables

Offshore wind expansion



Over-Exploitation

Sustainable seafood

Certified sustainable aquaculture



Habitat Loss

Habitat restoration

Reef restoration

Designation of protected areas

Marine spatial planning



Pollution

Sustainable shipping

Decarbonising shipping

Regenerative agriculture

Integrated Pest Management

Plastic Circularity

Reuse systems at scale

Chemical safety

PFAS elimination



Ineffective governance

Implementation of BBNJ

Designation of large scale MPAs

Elimination of harmful subsidies

Implementation of WTO Agreement

Adoption of GPT

High ambition GPT covering life cycle

Implementation of GFC

Safer Chemicals Management

A sustainable blue economy that supports ocean restoration, builds resilience, reduces risks to communities and ocean-dependent economic activities and protects and increases long-term value.

Nature benefits

- Nature & Biodiversity restoration & resilience
- Climate regulation
- Coastal protection
- Reduced pollution
- Water purification

Societal benefits

- Livelihood protection & enhancement
- Food security
- Clean energy
- Flood risk reduction
- Reduced conflict

Economic benefits

- Operational resilience
- Access to new markets
- Cost-of-Capital benefits
- Growth in Sustainable sectors
- Transition finance

Part 3: The Ocean Framework

Recognising the increasing importance of ocean health and sustainability to long-term financial performance, Part 3 of this report introduces The Ocean Framework – a high-level, sector-agnostic framework for analysing the broad spectrum of ocean-related themes within their investment portfolios.

The framework, which includes detailed user guidance and highlights available tools and resources, is designed to support investors wanting to understand and manage relevant ocean sustainability issues (and potential risks) within their portfolios. The Ocean Framework have been intentionally drafted to align with existing investor frameworks and tools, particularly TNFD, Science Based Targets Network (SBTN), Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE), and Nature Action 100 (NA100) and guides the user through a series of seven steps to systematically identify, assess and prioritise key sectors, companies and issues that are most exposed to ocean-related risks and opportunities.

Using the guidance provided, investors will be able to screen for exposure to ocean-linked sectors and companies, pinpoint geographies most at risk, and prioritise companies exhibiting significant impacts and dependencies on ocean ecosystems. The framework also supports the evaluation of how companies are managing ocean-related risks, and highlights the essential data, indicators and tools required to carry out robust assessments.

By following this process, investors can better understand their portfolios' relationship with the ocean, enabling more informed decisions to drive positive change and mitigate risks in a rapidly evolving environmental landscape.



3.1 Description of the process

This framework sets out a process for investors to identify key ocean-related risks and opportunities in their portfolio, enabling them to prioritise particular sectors and/or companies.

Identifying risks and opportunities is an iterative process and will require returning to some steps to build and scale the assessment or to introduce new data as it becomes available.

The framework includes 7 steps, which entail an increasingly granular assessment of ocean-related risks and opportunities within portfolios (see Figure X.1). Each step in the process guides investors to answer the following questions:

Step 1: Objective setting

To begin, investors need to determine the core objectives of the assessment which may range from gaining a high-level understanding of portfolio-level ocean risks and opportunities to selecting target companies for in-depth engagement. The objective then determines the scope of the assessment.

Step 2: Assessing ocean exposure

Investors can then examine their direct and indirect exposure to ocean sectors and commodities, starting with a focus on sectors that have a physical presence on the ocean and/or involve high risk material commodities.

Step 3: Identifying sector-level impacts and dependencies

Once key sectors have been identified, investors can create a heatmap of the important impacts and dependencies across these sectors in order to identify the sectors with the greatest exposure to ocean-related impacts and dependencies.

Step 4: Screening and company-level prioritisation

Once the sector scope has been narrowed, investors can then identify the key companies in their holdings that are in each priority sector. This could be decided through size of holding as well as companies with the greatest potential exposure to ocean impacts and dependencies.

Step 5: Determining interface with sensitive locations

If location-specific data are available, investors can map the intersections between companies' operating locations (e.g. shipping routes, fishing ground, etc.) and areas of high biodiversity or sensitive locations.



Step 6: Assessing company impacts and dependencies

Based on this mapping and an assessment of the company's management of ocean risks, investors can identify the key impacts and dependencies that are relevant to a company's operations. Investors can also assess the extent to which companies have governance, risk assessment and management systems in place to address these potential risks.

Step 7: Understanding risks and opportunities

Finally, based on an understanding of sector, company and location-level impacts and dependencies, investors can determine the material ocean-related risks and opportunities which they may be exposed to (e.g. policy, reputational and physical risks).

It is important to note that this framework is intentionally designed for use by a broad range of investors, including investors with large, diversified portfolios with multiple asset classes and extending to those with smaller portfolios and assets limited to specific asset classes. Therefore, for certain investors some steps may be more relevant than others depending on the capacity for assessment, availability of data and the size of portfolio. Investors' ability to assess and act on ocean-related risks and opportunities will also depend on practical issues such as the availability of data/information, the investors' objectives and timeframes and the relationship (the form of investment, the scale of the investment, the access to the company) between the investor and the company.

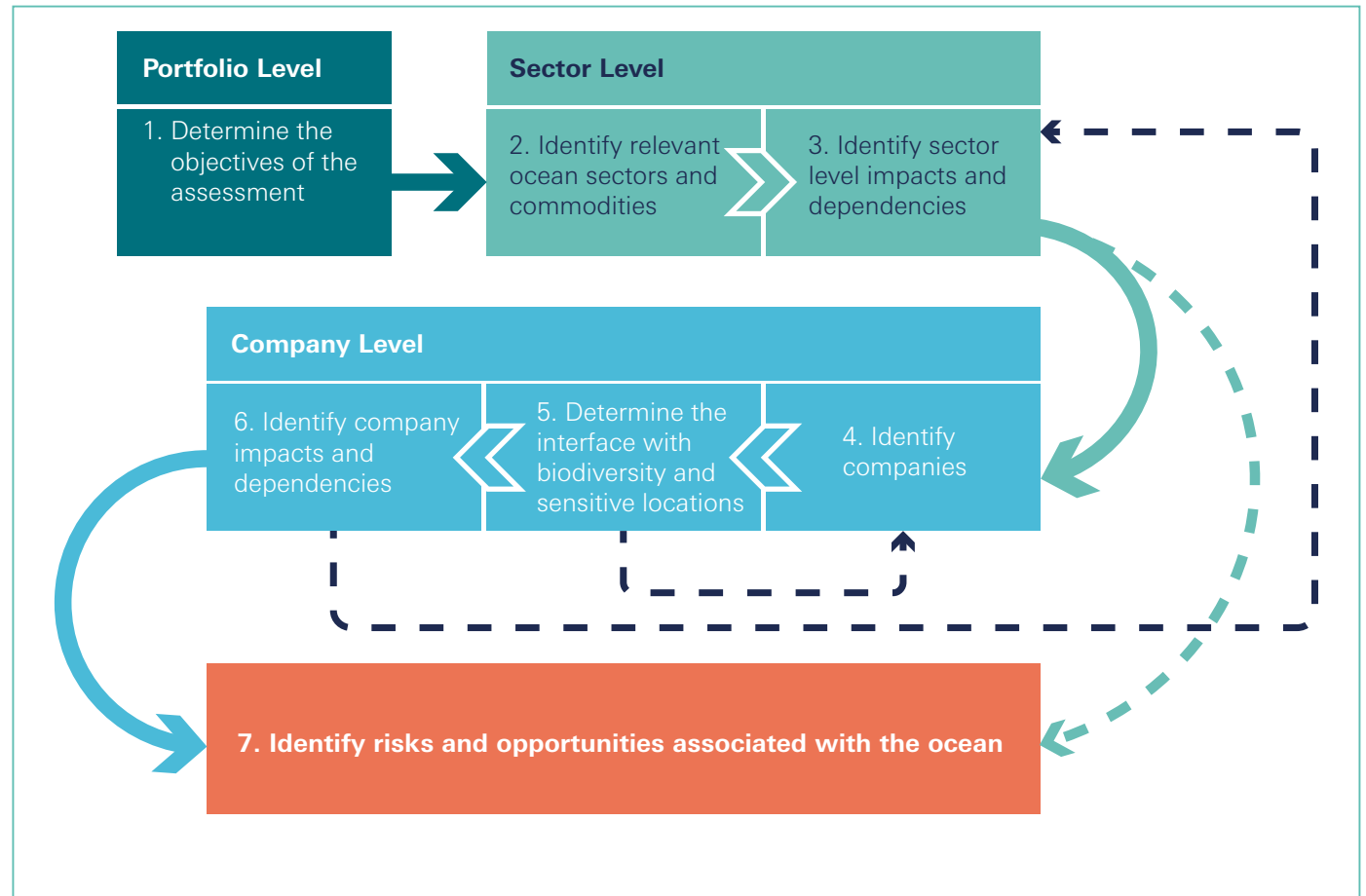


Figure X.1: High-level framework for assessing ocean-related risks and opportunities. Note: Dotted arrows reflect the iterative nature of the assessment process, indicating areas when investors may need to revisit earlier stages of the process and evolve their approach as data availability improves. Image Source: Chronos Sustainability Ltd

Steps may need to be repeated, but not in all instances

Applying the Ocean Framework to Support Positive Outcomes for Ocean Health

While this framework is primarily designed to support the assessment of financially material ocean-related risks and opportunities, it can also be used by investors who also wish to achieve positive outcomes for ocean health, alongside financial returns.

These investors should first define the ocean outcomes they want to contribute to, their objectives and capacities, and then use Steps 1-7 of the Ocean Framework to identify the sectors, geographies, companies and assets where capital allocation, stewardship or engagement could most effectively support those outcomes.

In line with the [Five Dimensions of Impact](#), these investors might use the following questions to help shape their assessment priorities:

- What specific ocean outcomes are we seeking to achieve (e.g. recovery of fish stocks, reduction in marine pollution, protection or restoration of marine habitats)?
- Where are the most credible leverage points for change across value chains, sectors or regions (e.g. capital provision, governance reform, technology deployment, market access)?
- Who or what will benefit from the outcome (e.g. threatened species, coastal communities, threatened habitats)?
- What is the scale of impact intended to be secured (e.g. measurable threat reduction, increase in population numbers, area of restored habitat)?

- How can investment, engagement or policy support contribute to these outcomes in a way that is additional, intentional and measurable and avoids unintentional consequences or negative trade-offs?
- What are the key drivers and structural barriers currently preventing these outcomes (e.g. what are the risks that impact is not achieved)?

Once these questions are clarified, these investors can proceed through the existing seven steps of the Ocean Framework to:

- identify priority sectors and companies (Steps 2–4),
- assess alignment with sensitive ecosystems and locations (Step 5),
- evaluate company-level impacts, dependencies and management responses (Step 6), and
- assess how investment activity may contribute positively to both social and environmental impact outcomes and long-term value creation (Step 7).

To support impact measurement processes, investors may also draw on established impact measurement resources such as [GIIN's IRIS+ Catalog of Metrics](#), which provides standardised metrics relevant to ocean-related themes including sustainable fisheries, pollution reduction, ecosystem protection and livelihoods. These indicators can be used alongside the data sources referenced in this framework to define targets, track outcomes and communicate impact performance.



3.2 Assessing exposure to ocean-related risks and opportunities

Step 1: Determine the objectives of the risk assessment

To begin their assessment of ocean-related risks and opportunities, investors should first decide on the key objectives of the assessment. This can help to determine the level of detail and granularity that investors should apply to the assessment. For instance, investors with significant holdings in ocean-related sectors may choose to undertake targeted engagement with key companies which would involve undertaking steps 1 to 7. Meanwhile, investors with large, diversified portfolios may opt to only do a sector level assessment (i.e. skipping from step 3 to step 7) to understand their sector-level risks and opportunities.

Core Question: What is the core objective of the risk assessment?

Guidance questions:

1. What is the purpose of conducting this assessment (e.g. understanding investment risk, client communication)?
2. Is this a pilot assessment or a comprehensive assessment?
3. Which asset classes do I want to focus on?
4. What internal capacities and resources do I have to conduct this risk assessment? How much time do I have?
5. What pre-existing knowledge and expertise do I have on ocean-related issues?
6. What data do I have or can I access?

Step 2: Identify relevant ocean sectors and commodities

Once the core objectives of the assessment have been determined, investors can identify which sectors are likely to have significant ocean-related impacts and dependencies and are relevant to the objectives set. This may depend on:

1. **Direct exposure:** these are sectors that with have a physical presence in the ocean.
2. **Indirect exposure:** those in the upstream or downstream supply chain that rely on ocean-related products or services (e.g. food retailers selling seafood, consumer goods companies using shipping services).

As a starting point, investors are likely to prioritise industries with direct exposure to the ocean (as seen in Table X.1). As their approach develops and data becomes more readily available, investors may choose to extend the assessment to sectors with indirect exposure.

Once relevant sectors and commodities have been identified, investors can determine their holdings across each of these sectors by identifying companies that solely operate in this sector as well as ones where key business lines are in one or more of these sectors. This allows investors to identify which sectors they have the greatest exposure to and set priorities for Step 3.

Industry	Description
Transport (shipping)	Global movement of goods and people via commercial maritime vessels (e.g. container shipping, bulk cargo transport).
Fisheries	Harvesting wild marine species for food, trade, and livelihoods worldwide.
Aquaculture	Farming aquatic organisms using controlled marine cultivation systems.
Marine & Coastal Tourism	Recreation and travel activities centred on oceans, coasts, and beaches (e.g. cruise tourism, coastal hotels).
Marine renewables	Ocean-based energy from waves, tides, offshore wind, and thermal gradients (e.g. offshore wind farms, wave energy projects).
Port infrastructure	Facilities enabling vessel berthing, cargo handling, logistics, and maritime trade.
Telecommunications	Subsea cable network transmitting global digital data and communications across ocean basins.
Blue biotechnology	Ocean organisms leveraged to develop industrial, environmental, biochemical products.
Marine pharmaceuticals	Discovery of ocean-derived compounds for developing medical treatments.

Table X.1: Industries with direct exposures to the ocean

Note: An alternative approach to identifying the scope for the assessment is to focus on specific high-risk commodities. SBTN^o identifies eight commodities that have a potential high impact on either marine pollution or marine ecosystem use (Table X.2). Investors may choose to (See Part 2) use this list as a basis for selecting relevant industries by selecting sectors that have a high exposure to these commodities (either in their direct operations or in their value chain). Assessing this requires consistent turnover data from relevant sectors or companies and is therefore likely to be harder to assess.

Commodity	Relevant Material Pressures
Oil (crude)/petroleum	Marine ecosystem change; marine pollution
Platinum	Marine pollution
Sand (construction-grade)	Marine ecosystem use change
Wild capture seafood (freshwater)	Marine pollution
Wild capture seafood (saltwater)	Marine ecosystem change; marine pollution
Nitrogen fertilizer	Marine pollution
Gasoline	Marine pollution
Farmed seafood/aquaculture	Marine ecosystem conversion; marine pollution

Table X.2: SBTN high-risk commodity list

Core Question: Which sectors or commodities have the most significant exposure to ocean activities?

Guidance questions:

1. Which sectors in your portfolio have a direct exposure to the ocean (i.e. are included in the list in Table X.1? What % of my portfolio is in these sectors?
2. Are there any companies or sectors in your portfolio that have a high exposure to high-risk material commodities (see Table X.2)?

Step 3: Develop sector level heatmap of impacts and dependencies

Once relevant sectors have been identified, investors can begin to use Table X.3 below to determine the key ocean-related impacts and Table X.4 to assess relevant sectoral dependencies (see Part 2 for a detailed overview of ocean-related impacts and dependencies). Determining impacts and dependencies will involve examining the key ocean ecosystem services that the sector depends on (e.g. climate regulation, coastal protection, food provision) as well as the impacts the sector may have on the ocean (e.g. marine ecosystem use, marine pollution, etc.).

Based on these factors, investors can develop a heatmap which categorises sectors into 'low', 'medium' or 'high' impact which can then be overlaid with the information about the portfolio's exposure to key sectors gathered in step 2.

The heatmap in Table X.3 and X.4 is based on ENCORE materiality ratings. While ENCORE provides a good starting point for sector analysis, data categories are generally not granular enough to determine ocean-related sectors, impacts and dependencies specifically. For example, "Wired telecommunications" includes both land-based and ocean-based telecommunications. Therefore, investors should consider supplementing these ratings with other, ocean-specific datasets, particularly for sectors which they are highly exposed to. ENCORE also provides [more information on the methodology used to determine materiality ratings](#). ENCORE materiality ratings are also likely to evolve as new datasets emerge.

Additionally, it is important to note that ENCORE uses the ISIC Group/Class level classification. Therefore, investors may wish to create a crosswalk to calibrate their sector classifications to line up with data sets and tools (e.g. NACE-GICS – ISIC). UNEP FI have published a [sector mapping tool](#) that can facilitate this process. Activity classifications will often not align perfectly to one another (e.g. marine renewables is captured by 'ocean energy production' which does not account for offshore wind).

^o. SBTN (2024). High Impact Commodity List.

Table X.3: Heatmap exercise of impacts of direct ocean sectors (based on ENCORE)

Sector	ISIC Group / Class Classification	Area of seabed use ^p	Other biotic resource extraction (e.g. fish)	Emissions of toxic pollutants to water and soil ^q	Emissions of nutrient pollutants to water and soil	Generation and release of solid waste	Disturbances (e.g. noise, light)	GHG emissions	Emissions of non-GHG air pollutants	Volume of water use ^r	Introduction of invasive species
1. Transport (shipping & cruise-liners)	Sea and coastal water transport	Medium	N/A	Low	Low	Medium	Very high	High	High	Low	Very high
2. Fisheries	Fishing	High ^s	High	Medium	N/A	High	High	Medium ^t	Medium	Medium	Medium
3. Aquaculture	Aquaculture	High	Very high	High	High	High	Medium	Medium	N/A	Medium	High
4a. Tourism (recreation)	Sports activities ^u	Low	Very low	Low	N/A	Low	Medium	Low	Very low	Low	N/A
4b. Tourism (accommodation)	Short term accommodation activities ^v	N/A	N/A	Low	Low	Medium	Low	Low	N/A	Low	Medium
5. Marine renewables	Ocean energy production ^w	Medium	N/A	Very low	N/A	Low	Medium	Very low	Very low	Very low	N/A
6. Port infrastructure	Service activities incidental to water transportation ^x	Medium	N/A	Low	Medium	Low	Very low	Medium	Low	Low	N/A ^y
7. Telecommunication	Wired telecommunications	Medium	N/A	Low	N/A	Very low	Low	Low	Very low	Very low	N/A
8. Blue biotechnology ^z	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9. Marine pharmaceuticals	Manufacture of pharmaceuticals, medicinal chemical and botanical products	N/A	N/A	Medium	Medium	Medium	Medium	Medium	Medium	Medium	N/A

p. Area of seabed use considers disturbances to hydrodynamic features and seabed habitats. Given the lack of available quantitative indicators, this impact is assessed using a qualitative methodology.
q. While ENCORE data on 'emissions of pollutants to water and soil' accounts for emissions to seawater alongside freshwater, materiality ratings for ocean-related industry tend to be low given that the most material impacts to water and soil pollution occur through land-based activities and materiality ratings are determined relative to all economic sectors.
r. ENCORE data for volume of water use mainly considers freshwater use, rather than seawater use.
s. Some fishing activities occupy or interact with the seabed (e.g. beam trawling, dredging). This can significantly damage seabed habitats and morphologies such as reef formations.
t. Emissions mainly arise from combustion engines on fishing vessels and refrigeration.
u. 'Sports activities' is a broad sector which is not limited to water-related sports and therefore may fail to capture relevant ocean-related impacts.
v. Accommodation activities encompass a broad range of tourism types beyond coastal tourism. Therefore, the impacts assessed by ENCORE extend beyond ocean-related impacts and may not fully capture ocean-related impacts. For instance, coastal accommodation can use high amounts of water and have significant noise and light pollution impacts which affect marine biodiversity.

w. Ocean energy production primarily centres of tidal and wave energy technologies and therefore does not capture impacts from ocean-based hydropower and offshore wind energy.
x. It is important to note that this ISIC classification focuses on the operation of port infrastructure rather than the construction of ports or maintenance of port access. For materiality ratings related to the construction of ports, refer to ISIC sector 'Construction of other civil engineering projects'.
y. While ports are often a key site for the introduction of alien invasive species, these impacts are captured by the 'sea and coastal water transport' sector rather than 'service activities incidental to water transportation'.
z. Note that blue biotechnology is not captured as a sector classification in the ENCORE dataset. However, there is notable overlap between blue biotechnology and marine pharmaceutical sectors so investors may opt to look to the row below as a proxy for impacts and dependencies.

Table X.4: Heatmap exercise of select^{a.1} ocean-related dependencies of direct ocean sectors (based on ENCORE)

Sector	ISIC Group Classification*	Cultural Services			Provisioning Services			Regulating and maintenance services			
		Recreation-related services	Visual amenity services	Education, scientific and research services	Water supply	Biomass provisioning	Genetic material	Global climate regulation	Flood mitigation	Water purification	Soil and sediment retention
1. Transport (shipping & cruise-liners)	Sea and coastal water transport	Very high	Very high	N/A	Low	N/A	N/A	Medium	High	Medium	Low
2. Fisheries	Fishing	N/A	N/A	Very high	High	Very high	High	Very high	Medium	Very high	Very high
3. Aquaculture	Aquaculture	N/A	N/A	N/A	High	Very high	Medium ^{a.2}	Medium	High	Very high	Very high
4a. Tourism (recreation)	Sports activities	Very high	Very high	N/A	Low	Low	N/A	Medium	Medium	Very low	Very low
4b. Tourism (accommodation)	Short term accommodation activities	Very high	Very high	Very high	Low	N/A	N/A	Very low ^{a.3}	Very low	Very high	Low
5. Marine renewables	Ocean energy production	N/A	N/A	N/A	Medium	N/A	N/A	Medium	High	N/A	Medium
6. Port infrastructure	Service activities incidental to water transportation	N/A	N/A	N/A	Low	N/A	N/A	Very low	High	N/A	Low
7. Telecommunication	Wired telecommunications	N/A	N/A	N/A	Very low	N/A	N/A	Very low	Medium	N/A	Low
8. Blue biotechnology	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9. Marine pharmaceuticals	Manufacture of pharmaceuticals, medicinal chemical and botanical products	N/A	N/A	Very high	High	N/A	High	Very low	Medium	Very high	Medium

a.1. Note that ENCORE covers a wider range of nature-related dependencies. For the purpose of this table, a set of ocean-relevant dependencies were selected across the three main dependency categories.

a.2. Aquaculture and fishing have different ratings with regard to genetic material dependencies because while fishing directly depends on the provision of (a wider variety of) genetic materials to maintain fish stocks, aquaculture depends on the effective management of (fewer) genetic resources for farmed aquatic plants and fish.

a.3. It is important to note that ENCORE considers the aggregated dependencies for the entire sector of short-term accommodation activities (i.e. hotels). Certain types of activities (e.g. coastal hotels) are likely to be more dependent on global climate regulation and flood mitigation services than the 'very low' materiality rating suggests.

To further build on this exercise, several open-access tools can support the classification of impacts and dependencies:

- ENCORE provides materiality rating for over 80 sub-sectors based on ecosystem services and pressures.
- WWF's Biodiversity Risk Filter provides a high-level mapping of the impacts and dependencies of key sectors, several of which relate directly to ocean biodiversity.

Investors should then overlay the heatmaps with their assessment of their holdings across each of the sectors. The outcome of this exercise should allow for investors to determine:

- A. The most material impacts and dependencies across their entire portfolio (i.e. by identifying common impacts and dependencies across multiple sectors); and
- B. The sectors which have the highest overall impacts and dependencies.

At this stage, investors may choose to use this heatmap as a basis for having a high-level understanding of their portfolio's exposure to sector-level risks and opportunities.

Alternatively, investors may choose to use this exercise to form the basis for further in-depth analysis and engagement in priority sectors. Depending on resources and capacity, investors may choose to start with an analysis of a limited number of sectors with the view of broadening this scope in the future. Investors can choose priority sectors based on where their largest holdings are as well as on whether these sectors have significant impacts and dependencies. Investors may also consider targeting priority sectors in particular asset classes where they may hold greater influence over the asset (as is often the case for infrastructure or private equity assets).

Core Questions: Which sectors in my portfolio have the greatest potential exposure to ocean-related impact and dependencies?

Guidance questions:

1. How material are ocean-related impacts and dependencies on the sectors in my portfolio?
2. Which sectors have the most significant impacts and dependencies? How significant are my holdings in these sectors?

Step 4: Identify priority companies

To begin further analysis within key sectors, investors should identify priority companies to assess for their ocean-related risks and opportunities. A good starting point for this is likely to be the companies where investors have the largest holdings across the key sectors identified in step 3^{a,4}. Prioritisation may also be informed by (a) some high-level measures of exposure to impacts and dependencies and (b) a high-level assessment of the quality of management. Specific indicators for company-level data on impacts and dependencies can be obtained from data service providers (see examples in Table X.5) or obtained from company disclosures and reporting. Where data is lacking, investors can choose to engage with companies to request more information and data. In relation to quality of management, the following are useful initial questions (where data is likely to be available through data providers):

- **Does the company publish a biodiversity policy / action plan?**^{a,5} A lack of a biodiversity policy or plan may indicate a lack of acknowledgement of nature-related risks as a business issue.
- **Has the company been involved in controversies or incidents related to the ocean?** Controversy screenings can provide an indication of whether a company has failed to adequately manage ocean-related risks.
- **Does the company publish ocean-specific metrics or data?** An absence of such reporting may suggest that ocean-related risks and opportunities are not on the company's agenda. If data are available – for example, “the extent of seafood sustainable certification” or “the proportion of locations covered by sustainable fisheries and aquaculture programmes”, these may provide an indication of how well ocean-related risks and opportunities are being managed.

a.4. Jouffray et al. (2025) identify the 10 largest firms across 8 key ocean sectors. Cross-checking holdings against this list of firms could provide a starting point for investors to prioritise companies.

a.5. Biodiversity policies are likely to focus on ocean-related risks and opportunities for companies which operate in key ocean sectors.

Investors who have the capacity to undertake more detailed fundamental analysis (e.g. private equity or infrastructure investors) may choose to prioritise companies based on a broader set of ocean-related indicators. Depending on the relevant companies, these may include specific location data as well as data on impact drivers, state of nature, ecosystem services and the company's response to ocean-related risks and opportunities (Table X.5). UNEP FI's Turning the Tide Guidance Annex includes indicators related to ocean sectors, setting out recommendations for investors to 'challenge' companies based on specific indicator thresholds.

To decide on which metrics would be most relevant, investors should consider the most material impacts and dependencies identified in the sector-level heatmapping exercise.

Investors are likely to source most of this data directly from company reporting, either directly or through ESG data providers. As many companies are in the early stages of reporting on ocean metrics, investors may need to engage with priority companies to improve disclosure (see Part 4 on Engagement). Additionally, some investors may choose to engage with ESG data providers to improve the availability of ocean-related metrics. For example, in 2024, a group of five asset managers issued a joint statement calling for ESG data providers to enhance their data offerings on ocean-related risks and opportunities at the project and issuer level^{a.6}.

Metrics category	Example indicators
Location prioritisation	<ul style="list-style-type: none"> • Operations inside or adjacent to protected area • Endangered species recorded near operating sites
Impact drivers	<ul style="list-style-type: none"> • Wastewater volume discharged • Containers lost at sea • Volume of wild-caught fish by species • Accidental marine mammal or bird mortality • Vessel spill incidents • Fish escape incidents • Percentage of habitat disturbed or degraded • Area converted for aquaculture • Volume and species of fish, shellfish, invertebrates and seaweed caught or harvested
State of nature	<ul style="list-style-type: none"> • Marine ecosystem extent and condition • Water quality
Ecosystem services	<ul style="list-style-type: none"> • Marine tourism value (e.g. yachting, swimming, number of people participating in ocean activities, expenditures) • Coastal protection (e.g. structure of habitats and how that interlinks with reducing wave energy and wind damage) • Volume and annual stock of carbon sequestered by marine habitats • Cultural services (e.g. research, educational values)
Response	<ul style="list-style-type: none"> • Number of biodiversity action plans • Number or percentage volume of products that are certified to leading sustainability standards

Table X.5: Examples of different indicators for measuring ocean-related issues (TNFD, 2025)

Beyond data from company reporting, investors can supplement and verify reported data using data from several sources. For example:

- [HUB Ocean](#) is an evolving database of ocean-related data which includes corporate reporting as well as country and sector-level reporting.
- [World Benchmarking Alliance plans to publish an Ocean Benchmark in 2026](#) which will examine how 125 leading companies contribute to the sustainable management of oceans and coastal ecosystems.

This initial data gathering exercise can help to inform investors on the extent to which companies are reporting on and addressing their ocean-related risks and opportunities.

Core Question: What are the priority companies in my portfolio?

Guidance questions:

1. Which companies are the largest holdings in the priority sectors of my portfolio?
2. What widely available data points are available to allow me to prioritise companies?
3. What other data sources can I use to supplement or verify the reported data?

a.6. BNP Paribas Asset Management (2024). Statement from the private financial sector to ESG data providers: The urgent need for better ocean-related data to make informed investment decisions. <https://www.bnpparibas-am.com/en/sustainable/statement-from-the-private-financial-sector-to-esg-data-providers/>

Step 5: Determine the interface with biodiversity and sensitive locations

A further step that investors can take to understanding asset-level impacts and dependencies, risks and opportunities, is to examine the interface of specific operations with locations of high biodiversity or sensitivity. This step is particularly relevant to investors who invest in a limited number of ocean-related assets or companies (i.e. infrastructure or private equity investors). Investors with larger, diversified portfolios may opt to skip this step. To conduct this exercise, investors can begin by identifying the key operating locations of priority companies. These locations will vary depending on the sector of the company. For example: Shipping and cruise line companies may publish data on their key routes or the ports out of which they operate.

- Aquaculture companies may publish precise, farm-level location data though this is often not the case. In some countries, aquaculture companies must obtain licences to operate in specific locations; this information may be made publicly accessible on regulatory websites.
- Fishing companies may publish information on their licenses to fish in certain locations. Alternatively, [Global Fishing Watch](#) tracks the locations of specific fishing vessels.

This data can be overlaid with data on sensitive locations or areas of high biodiversity (Figure). Several public data tools can be used to facilitate this exercise:

- [Ocean+ Data Viewer](#) provides a mapping of ocean ecosystems and protected areas.
- Conservation International's [Ocean Health Index](#) provides a composite indicator of ocean health across over 220 exclusive economic zones (EEZs) globally.
- [Marine Protected Atlas](#) contains a dataset of officially designated parks, reserves and other conservation areas.
- [Particularly Sensitive Sea Areas](#) is a list of designated areas chosen by the International Maritime Organisation.
- [FAO Database for Vulnerable Marine Ecosystems](#) provides a global inventory of fisheries measures adopted in areas beyond national jurisdiction to prevent adverse impacts of bottom fisheries on vulnerable marine ecosystems.

Core Question: Do companies / assets in my portfolio operate in areas of high biodiversity and/or sensitivity?

Guidance questions:

1. Where are the key operating locations of the priority companies?
2. Where are marine protected areas and other sensitive locations located?
3. Are these operating locations in (or close to) sensitive areas and/or areas of high ecosystem integrity or a decline in ecosystem integrity?

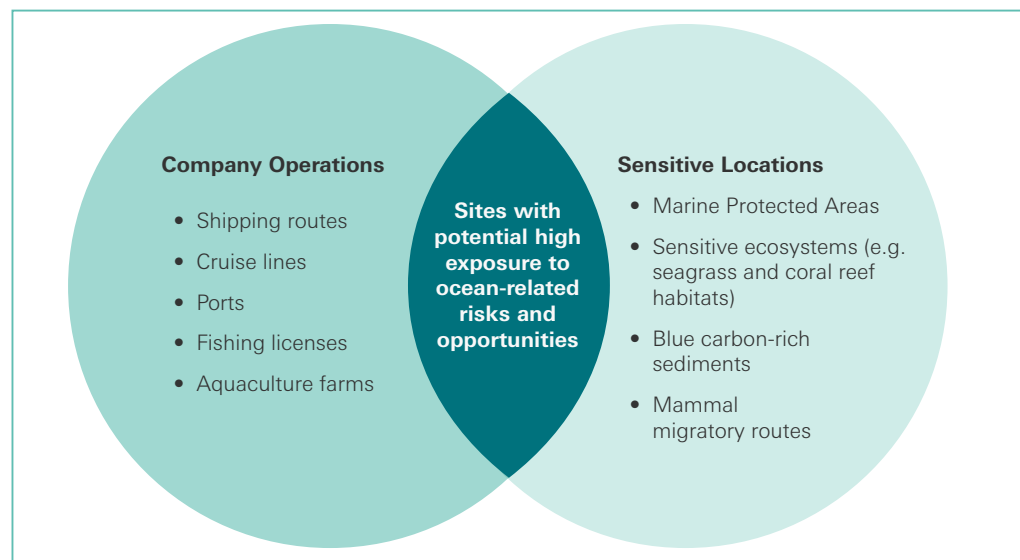


Figure X.2: Examples of the overlap between operating locations and sensitive locations.
Image Source: Chronos Sustainability.

Step 6: Individual company impacts and dependencies

Building on the sector-level heat-map exercise undertaken in Step 3, as well as the company-level analysis undertaken in Steps 4 and 5, investors can begin to identify an individual company's impacts and dependencies on the ocean.

The sector-level heatmap exercise can provide an important basis for understanding a company's direct impacts and dependencies. Ideally, investors can supplement this heatmap with information on company location (Step 5) to identify the most relevant impacts and dependencies which require further attention. Investors may then choose to supplement this with an analysis of the company's potential upstream and downstream impacts and dependencies. For example, a shipping company is likely to have indirect impacts through shipbuilding, warehousing and cargo handling activities.

Once relevant impacts and dependencies have been identified, investors can examine the extent to which the company is equipped to manage these by examining the company's governance, risk assessment, targets and implementation. Useful resources to support this exercise include:

- UNEP FI's [Turning the Tide Guidance](#) on how to avoid and mitigate environmental and social risks and impacts when allocating capital to companies in the blue economy.
- Nature Action 100 _ can provide a useful tool for investors to assess a company's management of ocean impacts and dependencies (Table X.6).

In assessing companies, investors may look for companies to conduct an impacts and dependencies assessment (Indicator 2), establish targets aligned with the SBTN Ocean targets (Indicator 3) and develop a clear ocean-related policy (Indicator 4).

Indicator	Sub-indicators
1. Ambition	1.1 The company has a commitment to avoid and reduce key drivers of nature loss and/or to restore and regenerate marine and coastal ecosystems throughout its value chain.
2. Assessment	2.1. The company publicly discloses the location of all assets and activities in its direct operations and upstream and downstream value chain that are situated in or adjacent to ecologically sensitive marine locations. 2.2. The company assesses and publicly discloses its material dependencies and impacts on the ocean within its own operations and throughout its value chain. 2.3. The company assesses and publicly discloses the risks and opportunities stemming from material dependencies and impacts on the ocean.
3. Targets	3.1. The company has comprehensive and measurable targets to avoid and reduce key drivers of nature loss and to restore and regenerate marine ecosystems. 3.2. The company's targets pertain to its material ocean-related impacts and dependencies, are validated by an impartial and independent third party, and are designed in an integrated manner that takes account of the company's climate targets. 3.3. The company publicly discloses its progress toward its targets on an annual basis.
4. Implementation	4.1. The company publicly discloses a strategy for achieving its ocean targets. 4.2. The company respects and upholds the rights of Indigenous Peoples and local communities. 4.3. The company's fiscal policies are aligned with achievement of its ocean-related targets.
5. Governance	5.1. The company board has clear oversight over its ocean-related dependencies, impacts, risks and opportunities, including implications for and engagement with Indigenous Peoples and local communities. 5.2. The board has sufficient expertise to oversee issues pertaining to ocean-related dependencies, impacts, risks, and opportunities, including how the company's actions on nature impact Indigenous Peoples and local communities.
6. Engagement	6.1. The company engages with its value chain to help achieve its ocean targets. 6.2. The company publicly discloses direct lobbying activities and any expectations for associations that it is a member of which are not aligned with The Biodiversity Plan. 6.3. The company identifies and engages with key stakeholders on ocean-related issues and incorporates the outcomes of these activities in its strategy and operations. 6.4. The company has a grievance and redress mechanism through which individuals and communities may raise complaints or concerns that they have been adversely impacted by the company's actions pertaining to the ocean.

Table X.6: Nature Action 100 Benchmark indicators adapted to ocean context.

Core Question: What are the key ocean-related impacts and dependencies of my priority companies?

Guidance questions:

1. Which sector-level impacts and dependencies are most relevant to my priority companies (based on the company's key activities and locations)?
2. How is the company managing these impacts and dependencies through its risk assessments, targets, implementation, governance and engagement processes (see examples in Table X.6)?

Step 7: Identify risks and opportunities associated with the ocean

Once impacts and dependencies have been identified, investors can determine the specific risks and opportunities which may arise from these (See Table X.7). Depending on the objectives of the assessment, investors may do this on a sector level (after Step 3), on a company level (after Step 6) or on a specific asset level (combining Steps 5 and 6).

Ocean impacts and dependencies can translate into financial risk across various channels (Figure X.3), as detailed in [Part 2](#).

To assess risks and opportunities, investors may need to conduct additional analysis, which may be done in-house or through third party providers. For example:

- Mapping relevant regulations that apply to the company’s operating geographies can enable an assessment of policy risks.
- Climate and weather modelling of flood and storm risks in particular locations can help to identify acute physical risks.
- An understanding of relevant environmental laws in a company’s operating jurisdictions can help to uncover potential liabilities and litigation risks.

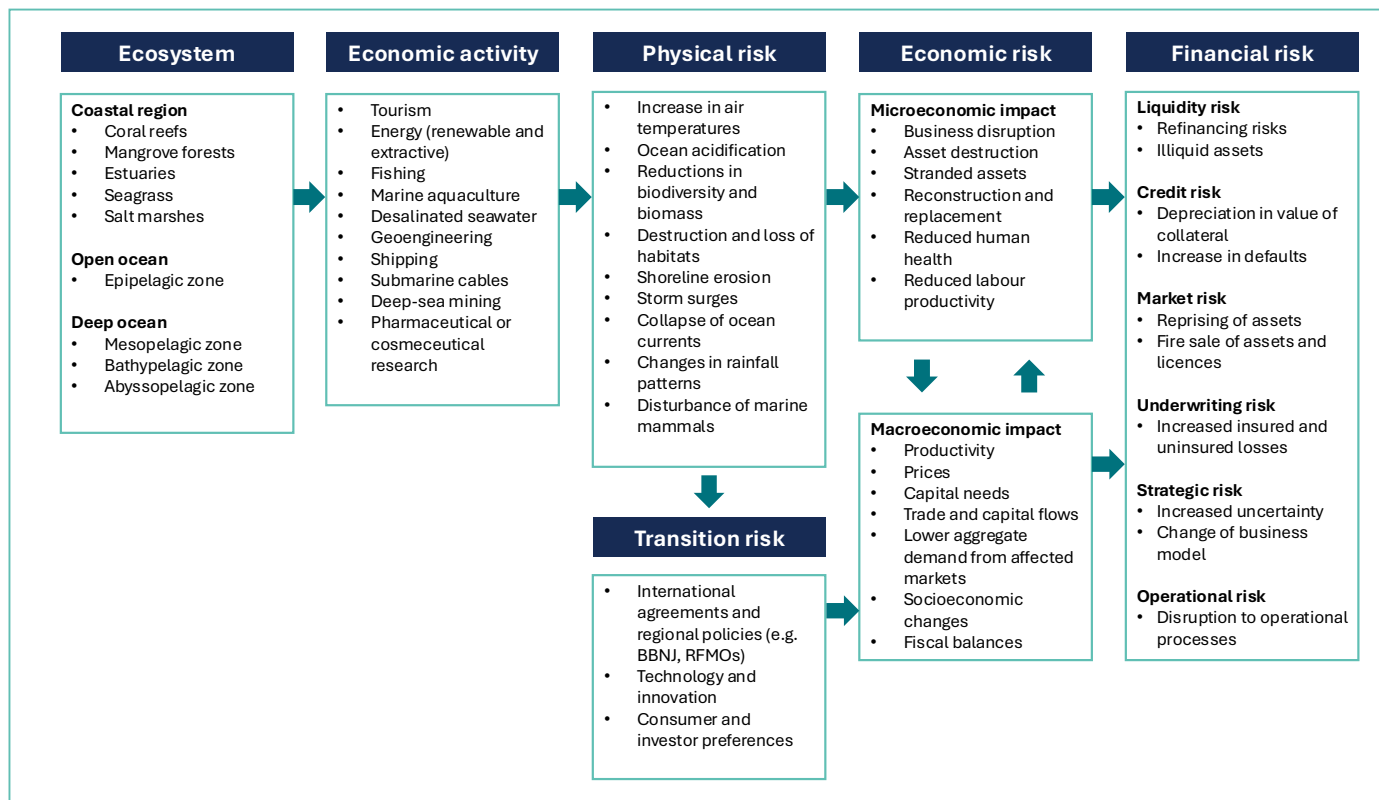


Figure X.3: Transmission channels of ocean-related risks. Image Source: Almeida and Reitmeier (2024). *The blue imperative: understanding interactions between the ocean, climate and economy*. Centre for Economic and Transition Expertise.

Type		Description	Example
Physical Risk	Acute	Sudden, severe events causing immediate disruption, such as storms or floods.	Diseases or pests lead to decline in aquaculture fish stocks.
	Chronic	Long-term, gradual environmental changes that erode conditions over time.	Degradation of marine habitats leads to loss of genetic material for marine pharmaceutical discoveries.
Transition Risk	Policy	Financial or operational impacts from new laws, regulations, or compliance requirements.	Implementation of GBF 30x30 framework leads to a rise in marine protected areas, increasing operating costs for fishing.
	Litigation	Exposure to legal action, claims, or liability arising from environmental or social harms.	A shipping company is sued for damages after an oil spill contaminates coastal ecosystems.
	Reputation	Damage to stakeholder trust due to perceived misconduct, poor performance, or inaction.	Media coverage on the bioaccumulation of chemicals in farmed fish damage brand value of aquaculture company.
Opportunities	Resource efficiency	Reducing costs and impacts through improved energy, water, or material efficiency.	Higher long-term catch yields from avoiding overfishing.
	Markets	Accessing growing markets for low-carbon, nature-positive, or resilient solutions (e.g., carbon markets, blue economy sectors).	Access to emerging eco-tourism markets from sustainable coastal tourism practices.
	Financing	Attracting investment or lowering cost of capital through sustainability performance, green financing, or transition funding.	Eligibility for preferential rates.

Table X.7: Illustrative list of ocean-related risks and opportunities

Core Question: What are the key ocean-related risks and opportunities in my portfolio?

Guidance questions:

1. How do key sector or company-level impacts and dependencies translate into potential financial risks and opportunities?
2. What additional information do I need to understand my exposure to ocean-related risks and opportunities?

Part 4: Engagement Guidance



4.1 Investor case for engagement

All ocean-dependent sectors face a common set of systemic, cross-cutting challenges that are increasingly material to long-term investment performance. Across industries, key sector-agnostic issues include accelerating marine biodiversity loss and habitat degradation; rising levels of marine pollution from plastics, chemicals, wastewater and underwater noise; and the escalating impacts of climate change on ocean temperature, acidity, and circulation ([see Part 1](#)). These pressures are often compounded by unsustainable resource use, weak or uneven governance across jurisdictions, and persistent social and labour risks linked to marine activities, particularly in complex and global supply chains. Together, these dynamics undermine ecosystem resilience and heighten operational, financial, and reputational risks for companies reliant on ocean health.

For investors, unmanaged ocean-related risks can translate into more comprehensive regulation, increased enforcement and litigation exposure, supply chain disruption, and the potential for stranded or impaired assets as business models become misaligned with ecological limits or policy direction ([see Part 2](#)). Effective engagement presents opportunities to protect and enhance long-term value by influencing corporate actions. Companies that invest in mitigation measures, strengthen adaptive capacity to climate and ecosystem change, and align strategies with the transition toward a sustainable blue economy are better positioned to manage risk and capture emerging opportunities. Frameworks such as the Sustainable Development Goals and UNEP FI's Sustainable Blue Economy Principles provide a reference point for aligning finance with environmental sustainability, social inclusion, and long-term economic resilience, reinforcing the role of investor engagement as a critical lever for improved ocean stewardship and sustainable returns.

4.2 Purpose of the Engagement Guidance

To understand and assess their level of exposure to ocean related dependencies, impacts, risks and opportunities and to improve long-term sustainability and value, investors may wish to engage with companies within their portfolios. Investors can assess and prioritise which companies to engage with using the Ocean Framework ([see Part 3](#)). This engagement guidance has been developed, to provide investors with a set of initial and follow up questions to ask companies in different sectors about how they are identifying, assessing and managing to ocean-related risks and opportunities. The questions are designed to be applicable to all asset classes although it is acknowledged that the availability of data, investor access to company management and the ability of investors to exert influence will depend on the specific company, on the form (e.g. equity, debt) and scale of the investment, and on the relationship between the investor and the company.

Recognising that investors engage with portfolio companies for a range of reasons, using different approaches and within varying contexts, the guidance sets out a series of:

- **Sector-agnostic engagement questions:** that focus on the main drivers of ocean degradation and ocean-related sustainability issues that are either directly caused by unsustainable ocean-based economic activities (e.g. overfishing, habitat destruction) or which have the potential to affect and impact ocean-based industries (e.g. climate change).
- **Sector-specific engagement questions:** tailored to more established, high-impact, sectors such as seafood, shipping and cruise tourism.

In addition to gaining insights into how companies are assessing and managing risks and opportunities where relevant, company engagement may also help to close some of the data gaps that may have been identified during the screening process (see Part 3, Step 4 discussion).

4.3 Scope of the Guidance

The engagement guidance provided includes high-level, sector-agnostic guidance that applies to all asset classes (e.g. equity, fixed income, private markets, real estate, infrastructure) and focuses on the main ocean sustainability issues that are relevant to institutional investors (see [1.1 Investor case for engagement](#)).

4.4 How to use the guide

User instructions

This guide can be used in conjunction with The Ocean Framework (see [Part 3](#)) which enables investors to screen portfolios, identify and prioritise companies to engage with and inform the key objectives of their engagement, prioritising companies and specific issues where risks and opportunities are most material.

This guide is intended to be used with companies where ocean-related issues have been identified as potentially material risks.

[Section 4.5](#) introduces a set of sector-agnostic questions relating to governance, strategy, risk and impact management, and targets and metrics, in line with TNFD reporting requirements. The guidance provides the user with a series of opening, entry-level questions to ask companies that operate in or on the ocean, followed by a series of more detailed, follow-up questions where relevant.

In addition, a series of sector-specific engagement questions are included in [Section 4.6](#) for seafood (including fisheries and aquaculture) and marine transportation (including shipping and cruise tourism) companies. Note: the sector-specific questions should be used in addition to – rather than in place of – the sector-agnostic guidance questions to gain greater clarity on how companies operating in these high impact sectors are assessing and managing their ocean-related dependencies, impacts, risks and opportunities.



While investor expectations of companies in response to these engagement questions will vary depending on a company's exposure to ocean-related risks as well as the maturity of their existing practices, several resources can be used to help investors communicate their recommendations to companies:

- UNEP FI's [Turning the Tide Guidance Annex](#) sets out key indicators and suggested actions related to seafood, ports, marine transport, marine renewable energy and coastal and marine tourism sectors.
- FAIRR's [Seafood Traceability Engagement](#) includes investor letters to seafood companies, setting out specific expectations related to ocean risks and opportunities.
- TNFD's sector-specific guidance on [aquaculture](#), [fishing](#) and [marine transportation and cruise lines](#) can be used to shape recommendations about how companies should assess and report on their ocean-related impacts and dependencies.
- SBTN's [Ocean Targets](#) methodology can be used by investors to guide seafood companies in setting actionable, time-bound targets to avoid and reduce overexploitation, protect structural habitats and reduce risks to endangered, threatened and protected species.

Practical considerations for assessing ocean-related impacts

When assessing ocean-related risks and opportunities, it is important for companies and investors to consider several challenges in collecting ocean-related data:

- **Place-based impacts in mobile and distributed activities:** Many ocean-dependent sectors, including shipping and fishing, operate across large and often transboundary marine areas. Impacts are therefore highly place-specific and can vary significantly depending on location, timing, and intensity of activity. To better understand investment risks, investors need to understand location-specific aspects by looking beyond company-wide averages and assessing whether companies identify and manage risks in ecologically sensitive areas such as marine protected areas (MPAs), particularly sensitive sea areas (PSSAs), and key migratory routes. Evidence of marine spatial planning, route optimisation, area-based restrictions, and engagement with regional management bodies can be more decision-useful than aggregate metrics alone.
- **Data paucity and uneven data quality:** Ocean-related impacts are frequently characterised by limited, fragmented, or inconsistent data, particularly in offshore, small-scale, or multi-jurisdictional contexts. Investors should recognise that data gaps are often structural rather than indicative of poor management. Engagement should therefore focus on whether companies are transparent about uncertainties, invest in monitoring and data collection, and participate in credible improvement initiatives, rather than relying solely on complete or standardised datasets.

- **Incorporating ocean impacts into climate and nature reporting:** Ocean health and ecosystem function is directly related to both climate and nature related goals ([See Part 1](#)) and investors should encourage companies to include ocean-related risks and dependencies in both climate disclosure frameworks (e.g. Taskforce on Climate-related Disclosures, TCFD) and emerging biodiversity disclosure frameworks (Taskforce on Nature-related Financial Disclosures, TNFD). This includes identifying priority ocean-related risks and dependencies, disclosing governance and management responses, and aligning targets and metrics with ecosystem-level outcomes rather than isolated operational indicators.

Figure X.4 maps a range of financing initiatives, engagement initiatives, frameworks and reporting frameworks, their intended audience and action pathways included to help Investors overcome some of these challenges. Additionally, [Part 3: The Ocean Framework](#) provides an overview of the ocean-related datasets and metrics that are available to support reporting and engagement.

Initiative	Organisation	Primary Target Audience						Action Pathway					
		Private Finance			Public finance		Policymakers	Companies	Collaboration	Capital allocation ^{a.7}	Stewardship ^{a.8}	Disclosure	Policy advocacy
		Investors	Banks	Insurers	MDBs ^{a.9}	Statutory finance							
Financing Initiatives													
Principles for Sustainable Blue Economy	UNEP FI	○	○	○						○	○		○
Ocean Risk and Resilience Action Alliance	ORRAA	○	○	○	○	○		○	○	○			
Blue Bond Accelerator	ORRAA	○	○	○	○	○	○	○	○	○			
ProBlue Initiative	World Bank				○	○	○			○			
Clean Oceans Initiative	European Bank for Investment				○					○			
Blue Natural Capital Financing Facility	International Union for Conservation of Nature (IUCN)	○	○			○		○		○			
1000 Ocean Startups	World Economic Forum	○						○		○			
Engagement Initiatives													
Nature Action 100	Ceres, IIGCC, Planet Tracker, Finance for Biodiversity Foundation	○						○	○		○		
Seafood Traceability Engagement	FAIRR	○						○	○		○		
Frameworks													
Ocean Investment Protocol	UN Global Compact, UNEP FI	○	○	○	○	○	○		○	○	○	○	○
High Level Panel for a Sustainable Ocean Economy	World Resources Institute	○		○	○	○	○	○	○	○			○
Blue Bond Guidelines	ICMA	○	○		○	○		○		○		○	
IFC Blue Finance Guidelines 2.0	International Finance Corporation	○	○		○	○		○		○		○	
Towards Shared Marine Metrics	Nature Positive Initiative	○	○	○				○				○	
Reporting Frameworks													
TNFD	TNFD	○	○	○				○				○	
SBTN Oceans Hub	SBTN	○	○					○				○	
Global Ocean Accounts Partnership	Global Ocean Accounts Partnership					○	○		○			○	
CDP	CDP	○	○	○				○				○	

Figure X.4: Examples of financing initiatives, engagement initiatives, frameworks and reporting frameworks that relate to the ocean, including the intended audience and action pathways. Compiled by Chronos Sustainability Ltd.

a.7. Capital allocation refers to initiatives which make specific recommendations on the factors to be considered in financial decision-making and/or on the decisions that should be made (e.g. not to support certain activities, to preferentially allocate capital to specific actors).

a.8. Stewardship refers to engagement with entities that are receiving financial support.

a.9. Multinational Development Banks (MDBs) are international financial institutions that provides loans, grants and technical assistance to developing countries to support economic development and social progress. In the context of ocean finance, MDBs potentially play a catalytic role by mobilising public and private capital for sustainable ocean-based activities, de-risking investments through blended finance and guarantees, and supporting policy reform and capacity-building.

4.5 Sector-agnostic engagement questions



Topic	Opening questions	Follow-up questions
Governance		
Acknowledgement	<ul style="list-style-type: none"> How do you identify ocean-related risks and opportunities in relation to your business? 	<ul style="list-style-type: none"> What ocean-related impacts and dependencies affect your business strategy?
Commitment to reducing ocean-related risks	<ul style="list-style-type: none"> Do you have a commitment to addressing identified ocean-related risks? 	<ul style="list-style-type: none"> Who is responsible for overseeing the commitment is met?
Board-level accountability and oversight	<ul style="list-style-type: none"> Does the board have oversight over ocean-related risks? 	<ul style="list-style-type: none"> How often and under what circumstances does the board discuss ocean-related risks? How is the board overseeing ocean-related risks (e.g. does the board conduct regular structured trainings, get input from independent advisors / experts)?
Strategy		
Ocean integration	<ul style="list-style-type: none"> How are ocean-related impacts and risks in your strategies approached (e.g. as part of your climate strategy or your nature and biodiversity strategy)? 	<ul style="list-style-type: none"> What is needed to integrate ocean-related issues into both climate and nature strategies? How is the ocean related risk assessment with your climate and nature risk assessments used?
Identifying marine dependencies and impacts	<ul style="list-style-type: none"> Have you identified your ocean-related impacts and dependencies, risks and opportunities? 	<ul style="list-style-type: none"> How do you evaluate the significance of the identified impacts, dependencies, risks and opportunities? Do you assess and disclose the locations of all assets and activities in your direct operations that are situated in or adjacent to ecologically sensitive locations (e.g. marine protected areas)? Do you assess and disclose the locations of all assets and activities in your supply chain that are situated in or adjacent to ecologically sensitive locations (e.g. marine protected areas)? How are material business dependencies and impacts on the ocean evaluated?
Integration into risk assessment and management	<ul style="list-style-type: none"> How do you integrate ocean-related risks in your risk management processes? Have you identified any material ocean-related impacts and dependencies in your operations and value chain? 	<ul style="list-style-type: none"> How is the materiality of any identified risks assessed (e.g. what process did you follow, what stakeholders were consulted, what data and indicators were used)? How was the significance of these issues determined? What opportunities have you identified as a result of the risk management process?
Risk and impact management		
Policy	<ul style="list-style-type: none"> Do you have a policy which addresses ocean-related issues? Are ocean-related issues incorporated into your climate and nature & biodiversity policies? 	<ul style="list-style-type: none"> How do ocean risks intersect with other issues (including nature and climate change)? Does the policy describe the company's approach to reducing its most material impacts on: <ul style="list-style-type: none"> water pollutants waste generation plastic use end-of-life management of equipment and infrastructure spills and hazardous material incidents disturbances (including noise, light, electromagnetic radiation) air pollutants greenhouse gas emissions invasive alien species management
Action plans	<ul style="list-style-type: none"> Is there an action plan for managing, minimising and/or mitigating your ocean-related impacts and dependencies? What actions are taken to reduce identified impacts on the ocean? 	<ul style="list-style-type: none"> What approach, tools and/or data are you using to assess whether the identified ocean-related risks and impacts are being managed and reduced? Are you engaging with suppliers and other stakeholders to implement your action plan? What challenges are you experiencing with integrating the action plan? Has action plan to address any material ocean-related impacts and dependencies identified in your value chain been expanded?
Incident preparedness and remediation planning	<ul style="list-style-type: none"> Do you have a strategy in place to manage and remediate potential ocean-related incidents (e.g. pollution events)? 	<ul style="list-style-type: none"> Is there a grievance and redress mechanism through which individuals and communities may raise complaints or concerns that they have been adversely impacted by your actions pertaining to the ocean?
Lobbying	<ul style="list-style-type: none"> Are you a member of a trade association which lobbies policymakers on ocean-related issues? Do you undertake direct lobbying with policymakers on ocean-related issues? 	<ul style="list-style-type: none"> What position has the trade association taken on [relevant ocean-related policy]? What is your position on [relevant ocean-related policy]?
Metrics and Targets		
Objectives and targets	<ul style="list-style-type: none"> Have you set any targets related to protecting the ocean, oceanic habitats or marine biodiversity? 	<ul style="list-style-type: none"> Are the targets time-bound and do they include the baseline value and base year from which progress is measured? Are the targets clear, quantitative and measurable? Are the targets short-term (until 2030)? Are targets validated by an independent third-party organisation (e.g. SBTN)?
Reporting & Disclosure	<ul style="list-style-type: none"> Do you report and disclose on key ocean related impacts and dependencies? 	<ul style="list-style-type: none"> Do you report on relevant ocean-related metrics, including: <ul style="list-style-type: none"> The spatial footprint (km²) of your operations, including the total disturbed area and the total rehabilitated/restored area The extent of ocean use change (km²) by type of ecosystem and type of business activity Pollutants released (tonnes) Total weight of plastics used or lost (tonnes) Non-GHG air pollutants released (tonnes) Quantity of high-risk natural commodities sourced from the ocean, including the quantity sourced under a sustainable management plan or certification programme

4.6 Sector-specific engagement questions

Companies in high-priority sectors are expected to identify, assess, manage, and disclose material ocean-related risks and impacts, and align business strategies with long-term ocean health. This guide enables investors to focus their engagement questions on the key issues that are likely to affect – or be caused by – companies operating in these ocean sectors.

Marine Transportation

Sector scope: Cargo shipping, container shipping, bulk carriers, tankers, ferries, and cruise lines.

Sector overview:

Marine transportation, including commercial shipping and cruise lines, is a cornerstone of the global economy and a critical enabler of international trade and tourism. The shipping sector comprises around 50,000 registered merchant vessels across more than 150 nations, employs approximately 1 million seafarers, and transports an estimated 11 billion tonnes of goods each year (around 90% of global trade by volume). Cruise lines operate within the wider coastal and maritime tourism economy, which is among the largest segments of the global tourism industry, directly supporting around 52 million jobs and enabling a further 100 million across the value chain. In 2023, coastal destinations accounted for roughly 50% of global tourism expenditure, equivalent to approximately USD 3 trillion.

The sector is highly dependent on healthy ocean systems for safe navigation, port operations, and sustained tourism demand, yet it also exerts significant pressures on marine environments. Key impacts include greenhouse gas and air pollutant emissions, underwater noise, physical disturbance of habitats, pollution from spills and wastewater discharge, and the spread of invasive species through ballast water and biofouling. These pressures expose companies to growing regulatory, operational and reputational risks as international standards tighten and expectations around ocean stewardship increase. For investors, engagement with marine transportation companies enables a more in-depth assessment of how ocean-related risks and dependencies are managed and whether business strategies and capital allocation are aligned with a credible transition toward lower-impact and more resilient maritime operations.



Key issues	Key Questions	Follow-up questions
Greenhouse Gas (GHG) emissions	<ul style="list-style-type: none"> • Have you set a time-bound target(s) for the reduction of GHG emissions? • Are you increasing your use of low-carbon fuels and efficiency technologies? 	<ul style="list-style-type: none"> • How do your targets align with the International Maritime Organization (IMO) decarbonisation objectives^{b.1}? • Do you have a credible transition plan explaining how targets will be met (e.g. fleet renewal, retrofits, fuel switching, operational measures)? • Do you participate in initiatives such as the Sea Cargo Charter^{b.2}? If not, why not? • How is capital expenditure and R&D aligned with decarbonisation pathways?
Air pollutants	<ul style="list-style-type: none"> • How do you monitor and reduce non-GHG air pollutants from vessels? • How have your emissions of non-GHG air pollutants changed in recent years? 	<ul style="list-style-type: none"> • What actions have you taken to address non-GHG air pollution from vessels (e.g. increased use of cleaner fuels, shore power, or exhaust abatement technologies)? • How do you manage operations in emission control areas (ECAs)? • Have you had any breaches of ECA requirements?
Water pollutants and spills	<ul style="list-style-type: none"> • Do you have pollution prevention & response policies in place? How often are they reviewed and updated? • Have you had any severe spill incidents in recent years? • How do you manage routine waste and wastewater from vessels? 	<ul style="list-style-type: none"> • What systems do you have in place to prevent, detect and respond to spills and illegal discharges? • Have you paid any fines or have you faced any sanctions for illegal discharges? • Do you undertake testing and training as part of your spill prevention and response plans? • How do you monitor compliance with MARPOL^{b.3} (i.e. onboard waste generation and port-side disposal & waste management)?
Marine disturbances	<ul style="list-style-type: none"> • How do you assess and mitigate impacts from vessel noise, routing, and speed? • Are sensitive marine areas explicitly considered in your voyage planning? 	<ul style="list-style-type: none"> • How are sensitive marine areas or marine migratory routes in your voyage planning (e.g. through route optimisation, speed management, etc.) accounted for? • Are any quieting technologies to reduce the impacts from vessel noise adopted? • How are you engaging with regulators or conservation bodies to better understand and manage your impacts on marine sensitive areas?
Invasive species	<ul style="list-style-type: none"> • Do you have effective ballast water and biofouling management policies? • How is compliance with international standards monitored across the fleet? 	<ul style="list-style-type: none"> • How do you comply with the Ballast Water Management Convention^{b.4}? Have there been any breaches of these requirements in recent years? • Have you faced any regulatory action related to invasive species introductions? • Do you measure and/or report on any invasive species risk indicators?

b.1. The IMO's 2023 greenhouse gas strategy aims to reach net-zero emissions from international shipping by or around 2050, with key checkpoints to reduce total GHG emissions by at least 20% (striving for 30%) by 2030 and at least 70% (striving for 80%) by 2040, compared to 2008 levels.

b.2. The Sea Cargo Charter provides a framework to quantitatively assess and disclose whether chartering activities are in line with internationally adopted climate goals.

b.3. The IMO International Convention for the Prevention of Pollution from Ships (MARPOL) and specifically Annex V strictly prohibits disposal of waste including plastics at sea and requires evidence of waste logs and monitoring of disposal at port reception facilities.

b.4. The Ballast Water Management Convention sets out standards to ensure that ships manage their ballast water so that aquatic organisms and pathogens are removed or rendered harmless before the ballast water is released into a new location.

Fisheries

Sector scope: Wild-capture commercial fisheries across industrial, semi-industrial, and large-scale artisanal fleets, including vertically integrated seafood companies and those sourcing from third-party fisheries.

Summary:

Fisheries encompass the commercial, industrial, inland, small-scale, recreational, and customary capture of fish, invertebrates, and aquatic plants from ocean, coastal, and freshwater ecosystems. The sector is distinct in that it is the only major industry dependent on the industrial-scale extraction of wild biological resources. Global capture fisheries production exceeds 92 million tonnes (2023) and accounts for approximately 9% of global agricultural trade (2022). Fisheries support livelihoods for more than 600 million people worldwide, with an estimated 40% engaged in small-scale or subsistence fishing, underscoring the sector's economic and social significance as well as its exposure to local ecological conditions.

The fishing industry is fundamentally dependent on healthy, productive, and resilient aquatic ecosystems, including well-managed fish stocks, intact habitats, and functioning food webs. At the same time, fishing activities can exert significant pressures on marine and freshwater environments through overfishing, illegal, unreported and unregulated (IUU) fishing, bycatch of non-target and endangered species, habitat damage from certain gear types, labour and human rights abuses, and pollution from operational discharges and lost or abandoned fishing gear. These impacts create material risks for investors, including stock depletion, regulatory intervention, supply chain disruption, reputational damage, and heightened social risk. Effective investor engagement is therefore critical to assess whether companies have robust governance, traceability, and risk management systems in place to align harvesting practices with long-term stock sustainability, ecosystem integrity, and respect for human rights (including labour rights, access rights, benefit sharing and social licence to operate), thereby supporting the resilience of the sector over time.



Key issues	Key Questions	Follow-up questions
Overfishing and stock sustainability	<ul style="list-style-type: none"> • Are your fishing activities / sourcing policies aligned with scientifically determined sustainable catch limits? • How do you assess and manage exposure to overfished or data-poor stocks? • Have you set time-bound targets to transition key fisheries toward certification or fishery improvement projects (FIPs)? 	<ul style="list-style-type: none"> • What actions are taken to manage high-risk fisheries? • What proportion of catch or sourcing is certified under Marine Stewardship Council (MSC) or other credible schemes recognised by the Global Sustainable Seafood Initiative (GSSI) Benchmark Tool? • What proportion of catch or sourcing are engaged in credible FIPs? • What proportion of catch is from stocks with up-to-date stock assessments?
Illegal, Unreported and Unregulated (IUU) fishing	<ul style="list-style-type: none"> • What systems are in place to prevent, detect, and respond to IUU fishing risks? • How is vessel activity monitored and verified across your owned and sourced fleets? 	<ul style="list-style-type: none"> • Do you have a zero-tolerance policy in place for IUU fishing? • Have there been any IUU incidents in your owned or sourced fisheries? • How are your traceability systems aligned with recognised standards such as the Global Record of Stocks and Fisheries Standard (GRSF), Global Dialogue on Seafood Traceability (GDST) standard and the Marine Stewardship Council's Chain of Custody standard? • What proportion of vessels have unique vessel identifiers (e.g. IMO numbers)? If not all, why not? • Are vessel monitoring systems (VMS), automatic identification systems (AIS), or electronic monitoring used across your entire operations? • Have there been any breaches of compliance with seafood traceability regulations (e.g. EU IUU Regulation, U.S. Seafood Import Monitoring Program)?
Bycatch	<ul style="list-style-type: none"> • How do you identify, monitor, and reduce bycatch of non-target and endangered, threatened, or protected (ETP) species? • Are bycatch risks explicitly assessed by fishery, species, and gear type? • How are bycatch incidents reported and remediated? 	<ul style="list-style-type: none"> • Do vessels use any bycatch mitigation measures (e.g. turtle excluder devices, bird scaring lines, circle hooks)? • Have you adopted any species-specific mitigation measures? • What is the weight (tonnes) or number of non-target and ETP species caught, injured, or killed? • What is the bycatch rate per unit of effort (by fishery and gear type)?
Gear impact	<ul style="list-style-type: none"> • What proportion of fishing activity relies on high-impact gear, and how are associated habitat risks managed? • Have you set time-bound targets for the phase-out of high-impact gear types? 	<ul style="list-style-type: none"> • What proportion of vessels use bottom-contact gear? • What are your plans to increase the uptake of gear modifications or alternative fishing methods (e.g. planned capital expenditure)? • What proportion of catch is taken with modified or low-impact gear? • Do you have any area-based restrictions in place (e.g. voluntarily avoiding sensitive habitats)?
Marine pollution and lost gear	<ul style="list-style-type: none"> • What proportion of gear is marked with vessel or port ID? • Do you take actions to retrieve lost gear or report lost gear to authorities? • Do you rely on the use of Fish Aggregating Devices (FADs)? • Are gear recovery and reporting systems in place? • How do you dispose of end-of-life gear? 	<ul style="list-style-type: none"> • Have you faced regulatory sanctions for marine pollution? • What actions are taken to limit pollution (including wastewater, bilge water and effluents) from your fishing operations? • How is lost or abandoned gear, including FADs managed, where relevant? • Do you actively participate in ghost gear recovery initiatives? • Have you committed to upgrading more circular, sustainable gear to minimise waste generation (e.g. planned capital expenditure)?
Social and Human rights	<ul style="list-style-type: none"> • How do you minimise impact and conflicts with coastal communities adjacent to fishing areas? • What policies and controls are in place to prevent forced labour and other human rights abuses? • How are risks managed in distant-water and high-risk fisheries? 	<ul style="list-style-type: none"> • Are coastal communities on use of local fishing grounds actively consulted? • How are the rights and access of small-scale and artisanal fishing communities to fishing grounds and resources protected? • What proportion of the fleet/suppliers are covered by labour standards aligned with International Labour Organisation (ILO) conventions? • Have you had any reported labour violations? What remediation measures were taken? • What corrective actions plans are in place to manage forced labour allegations? • Have you undertaken any independent social audits? • Are worker grievance mechanisms in place? What is the coverage of these mechanisms? • Have you collaborated with any worker organisations and NGOs?

Aquaculture

Sector scope: Marine aquaculture, including finfish, crustaceans, molluscs, and seaweed, across open-net pens, ponds, recirculating aquaculture systems (RAS).

Summary:

Aquaculture encompasses the farming of aquatic animals and plants across inland freshwater systems and coastal and marine environments. Global aquaculture production reached 130.9 million tonnes in 2022, surpassing wild-capture fisheries for the first time and marking a structural shift in global seafood supply. The sector employs approximately 22 million people worldwide and has expanded by around 6.6% since 2020, reflecting strong demand for aquatic protein and the role of aquaculture in food security. Many aquaculture operations, particularly those producing carnivorous species, remain partially dependent on wild-capture fisheries for seed and feed inputs, creating important linkages between aquaculture performance and the health of wild fish stocks.

The sector is highly dependent on access to clean water, stable ecosystems, and predictable environmental conditions, as well as on the availability of sustainable feed ingredients and healthy broodstock. At the same time, aquaculture can generate material environmental and social impacts, including habitat conversion, nutrient and chemical pollution, disease transmission to wild populations, and animal welfare concerns. Poorly managed feed sourcing can place additional pressure on wild fisheries and land-based ecosystems, while excessive use of antibiotics and pesticides presents regulatory, ecosystem, and public health risks. For investors, these impacts and dependencies translate into exposure to regulatory tightening, biosecurity events, supply chain disruption, and reputational risk. Effective engagement therefore focuses on whether companies are improving feed sustainability, reducing chemical intensity, safeguarding animal welfare, and adopting production systems and siting practices that support long-term resilience and growth.



Key issues	Key Questions	Follow-up questions
Habitat damage and siting	<ul style="list-style-type: none"> • How do you assess and avoid impacts on sensitive marine and freshwater habitats when siting farms? • Have you undertaken independent environmental impact assessments? 	<ul style="list-style-type: none"> • Are coastal communities on use of inshore areas actively consulted? • How are the rights and access of small-scale and artisanal fishing communities to fishing grounds and resources protected? • Do you have any no-net-loss or avoidance commitments for sensitive habitats? • How do you consider cumulative and ecosystem-level impacts? • What proportion of production is in certified or spatially zoned areas? Do you have any plans to expand this?
Feed sourcing	<ul style="list-style-type: none"> • Do you have a sustainable feed sourcing policy? • Have you considered the upstream impacts related to the sourcing of key feed inputs (including soy and wild-capture fisheries)? If so, what are these impacts and how are they being assessed? • How is pressure on wild stocks and land-based ecosystems managed? 	<ul style="list-style-type: none"> • What proportion of feed inputs are sourced from certified, alternative, or by-product-based feeds? • Do you have plans to scale the use of alternative or circular feed ingredients? • Have you set any time-bound targets to reduce reliance on wild-caught fishmeal and fish oil? • Have you set any time-bound targets to improve your feed conversion ratio?
Marine pollution	<ul style="list-style-type: none"> • How are nutrient releases and water quality impacts monitored and controlled? • What measures are in place to prevent marine litter and waste loss? • How do you monitor, manage and dispose of end-of-life gear, including pens? 	<ul style="list-style-type: none"> • What is the nutrient discharge intensity (i.e. nitrogen and phosphorus releases per tonne of seafood produced)? • Have any waste and litter prevention programmes been implemented? If so, what were the outcomes of these programmes? • Have you committed to transitioning to more circular gear & pen design to minimise waste (e.g. planned capital expenditure)?
Chemical use (antibiotics, pesticides, therapeutants)	<ul style="list-style-type: none"> • What actions have been taken to minimise the use of antibiotics and other chemicals? • Do you prioritise alternatives such as vaccination and improved husbandry in your operations? 	<ul style="list-style-type: none"> • How are practices aligned with the World Health Organization (WHO) and World Organisation for Animal Health (WOAH) frameworks on antimicrobial stewardship? • What proportion of operations are under “antibiotic-free” or equivalent standards? • Has there been any evidence of antimicrobial resistance associated with your operations? • How has antibiotic and pesticide intensity changed over time? • How do you minimise risk of chemical contamination in nearby waterways and water bodies?
Animal welfare, disease and parasites	<ul style="list-style-type: none"> • How do you monitor and manage disease outbreaks, and parasite loads? • Do you monitor and disclose animal welfare outcomes? 	<ul style="list-style-type: none"> • Have any animal welfare standards in your operation (e.g. related to stocking density, stunning practices, transport practices) been adopted? • Have you undertaken third-party certification for your animal welfare practices (i.e. GSSI-recognised certification schemes)? • What are the mortality rates for each species in your operations? Have these changed over time? • Have there been any severe disease outbreaks? How were these managed? Did they affect wild populations? • How do you minimise risk of disease spreading to wild stocks in neighbouring waters? • Have there been any parasite infestation incidents?

Glossary



ABNJ	Areas Beyond National Jurisdiction	IMO	International Maritime Organization	TCFD	Task Force on Climate-related Financial Disclosures
AIS	Alien Invasive Species	IOC	International Oceanographic Commission	TNFD	Task Force on Nature-related Financial Disclosures
BEFF	Blue Economy and Finance Forum	ISA	International Seabed Authority	UN	United Nations
BBNJ	Biodiversity Beyond National Jurisdiction	ITLOS	International Tribunal for the Law of the Sea	UNCLOS	United Nations Convention on the Law of the Sea
CCRIF	Caribbean Catastrophe Risk Insurance Facility	IUCN	International Union for the Conservation of Nature	UNCTAD	United Nations Conference on Trade and Development
CBD	Convention on Biological Diversity	IUU	Illegal, Unreported and Unregulated fishing	UNDP	United Nations Development Programme
CITES	Convention on the Illegal Trade of Endangered Species of Wild Fauna & Flora	LEAP	Locate, Evaluate, Assess & Prioritise	UNEP	United Nations Environment Programme
CDP	Carbon Disclosure Project	LMICs	Low and Middle Income Countries	UNEP FI	United Nations Environment Programme Finance Initiative
ENCORE	Exploring Natural Capital Opportunities, Risks and Exposure	LPI	Living Planet Index	UNEP-WCMC	United Nations Environment Programme World Conservation Monitoring Centre
ESG	Environmental, Social, Governance	MARPOL	International Convention for the Prevention of Marine Pollution from Ships	UNESCO	United Nations Educational, Scientific and Cultural Organization
EU	European Union	MPA	Marine Protected Area	UNGA	United Nations General Assembly
EUR	Euros	NbS	Nature-based Solutions	UNSG	Secretary-General of the United Nations
FAO	Food and Agricultural Organization	NDC	Nationally Determined Contributions	USD	United States Dollars
GBF	Global Biodiversity Framework	NPI	Nature Positive Initiative	WEF	World Economic Forum
GBR	Great Barrier Reef	OECD	Organisation for Economic Co-operation and Development	WHO	World Health Organization
GHG	Greenhouse Gases	ORRAA	Ocean Risk and Resilience Action Alliance	WOAH	World Organisation for Animal Health
GRI	Global Reporting Initiative	PSMA	Agreement on Port State Measures	WTO	World Trade Organization
ICCAT	International Commission for the Conservation of Atlantic Tunas	RFM	Regional Fisheries Management Organisation	WWF	World Wide Fund for Nature
IOTC	Indian Ocean Tuna Commission	SBTN	Science Based Targets Network		
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services	SDGs	Sustainable Development Goals		
ILO	International Labour Organization	SIDs	Small Island Developing states		
		SOLAS	International Convention for the Safety of Life at Sea		

Key Terms

“Anthropogenic” refers to any environmental change, process, substance, or effect that is caused, influenced, or produced by human activities, either directly or indirectly. Source: USGS

“Aquaculture” is the growing of algae and other seaweeds; culturing or farming of aquatic organisms, such as fish, molluscs and crustaceans, in captive conditions that involve regular stocking, feeding and protecting against predators. Source: TNFD

“Biodiversity” is the variability among living organisms from all sources, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. Source: CBD

“Blue biotechnology” is the application of science and technology to living aquatic organisms for the production of knowledge, goods and services. Aquatic biomass is turned into commercial goods such as food, feed, nutraceuticals, pharmaceuticals, cosmetics, energy, packaging, clothes. Source: OECD

“Blue (or ocean) economy” is defined as the sum of the economic activities of ocean-based industries, and the assets, goods and services of marine ecosystems. Source: OECD (See definition for sustainable blue economy below). Source: LSE

“Blue finance” is a component of the wider blue economy and refers to finance directed towards economic activities that focus on long-term sustainability, environmental conservation, restoration and improved resilience of the ocean, taking into account the well-being of communities living closest to the ocean.

“Coastal tourism” refers to beach-based tourism and recreation activities taking place along the coastline. “Marine tourism” refers to predominantly water-based activities, such as sailing, yachting and other nautical sports, often carried out in coastal waters. Source: OSPAR

Note: Cruise tourism is included under the umbrella SIC classification “Marine transportation” (see below).

“Drivers” (of biodiversity loss) are natural and anthropogenic factors that affect biodiversity directly. Anthropogenic direct drivers are the set of activities performed by humans that result in biodiversity loss such as over-exploitation of natural resources, habitat loss, pollution and climate change. Source: IPBES

“Sustainable blue (ocean) economy” is defined as the sustainable use of ocean resources for economic growth, improved livelihoods and jobs and ocean ecosystem health. The World Bank considers this to encompass renewable energy, fisheries & aquaculture, maritime transport, tourism, climate adaptation and waste management. Source: World Bank

“Dependencies” (on nature) are aspects of nature’s contributions to people that a person or organization relies on to function, including water flow and quality regulation; regulation of hazards like fires and floods; pollination; carbon sequestration. Source: SBTN

“Ecosystem” refers to a dynamic complex of living (biotic) elements (e.g. plant, animal, and microorganism communities) and the non-living (abiotic) environment that interact and exist as a functional unit. Source: SBTN

“Ecosystem Services” are the contributions of ecosystems to the benefits that are used in economic and other human activity. Source: TNFD

“Fisheries” is the term applied to the people involved or engaged; species or type of fish targeted; area of water; method of fishing; class of boats; purpose of the activities, or a combination of all of the above in raising or harvesting seafood. Source: NOAA

“Habitat” is the area, characterised by its abiotic and biotic properties, that is habitable by a particular species. Loss of habitat reduces the amount of space where a particular species, or group of species can survive and reproduce. Source: TNFD

“Impacts” (on nature) can be positive or negative contributions of a company or other actor toward the state of nature, including pollution of air, water, or soil; fragmentation or disruption of ecosystems and habitats for nonhuman species; and alteration of ecosystem processes.
Source: SBTN

“Impact materiality” is information on the organization’s most significant impacts on the economy, environment, and people, including impacts on their human rights.
Source: TNFD

“Marine offshore renewable energy” refers to all sources of renewable energy that can be extracted from the ocean, including wind, wave and tidal energy.
Source: EU

“Marine pharmaceuticals” refer to drugs and therapeutic compounds derived from marine organisms such as algae, sponges, molluscs, and bacteria.
Source: Lindequist

“Marine Protected Areas” “are clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”. Note: (a) “Marine and coastal protected area’ means any defined area within or adjacent to the marine environment, together with its overlying waters and associated flora, fauna and historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/ or coastal biodiversity enjoys a higher level of protection than its surroundings. (b) “Areas within the marine environment include permanent shallow marine waters; sea bays; straits; lagoons; estuaries; subtidal aquatic beds (kelp beds, seagrass beds; tropical marine meadows); coral reefs; intertidal muds; sand or salt flats and marshes; deep-water coral reefs; deep-water vents; and open ocean habitats.” The CBD recognises well-governed and effectively managed MPAs as a “proven method for safeguarding both habitats and populations of species and for delivering important ecosystem services”.
Source: CBD

“Maritime transportation” encompasses both marine transportation (SICS classification: TR-MT) and includes ocean freight shipping (but not river freight shipping) and cruise liners (SICS classification: TR-CL). Maritime transport connects global value chains, carrying raw materials and semi-processed goods to production hubs and delivering finished products to consumers.
Source: TNFD Sector Guidance

“Mitigation” means action(s) taken to reduce the extent of a negative impact on e.g. a species, habitat or ecosystem.
Source: TNFD

“Mitigation (or conservation) hierarchy” is the sequence of actions to anticipate and avoid, and where avoidance is not possible, minimise, and, when impacts occur, restore, and where significant residual impacts remain, offset for biodiversity-related risks and impacts on affected communities and the environment.
Source: TNFD

“Nature” refers to all non-human living entities and their interaction with other living or non-living physical entities and processes. This definition also recognizes that air pollution, climate regulation, and carbon are part of “nature” more broadly and therefore, nature-related action encompasses issues related to pollution and climate change as well.
Source: SBTN

“Nature-based solutions” are actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems that address societal, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits.
Source: IUCN

“Ocean” means all interconnected saline waters characterised by waves, tides and currents.
Source: TNFD

“Ocean acidification” is defined as the increasing acidity (lowered pH level) of seawater as a direct consequence of increased atmospheric carbon dioxide (CO₂). The ocean (seawater) absorbs CO₂ and chemical reactions convert this gas to an acid in the water. Ocean acidification is linked to global warming (which is also caused by increasing atmospheric CO₂ levels) but is a separate issue.
Source: WHOI

“Planetary boundaries” concept presents a set of nine planetary boundaries within which humanity can continue to develop and thrive but beyond these boundaries (tipping points) the potential for irreversible change increases.
Source: Stockholm Resilience Centre

“Port infrastructure” refers to the physical facilities and structures essential for the operation and management of maritime transportation. This includes docks, berths, terminals, warehouses, and cargo-handling equipment that support the loading and unloading of ships.
Source: EU

“Science-based targets” are specific, measurable, actionable, and time-bound objectives, based on the best available science, that allow actors to align with Earth’s limits and societal sustainability goals.
Source: TNFD

“Species” is the fundamental category for the classification and description of organisms, defined in various ways but typically on the basis of reproductive capacity; i.e. the members of a species can reproduce with each other to produce fertile offspring but cannot do so with individuals outside the species.
Source: TNFD

“Sub-marine telecommunication infrastructure” represents an integrated, critical infrastructure system carrying over 99% of international data traffic through a global network of 450 sub-sea cable systems.
Source: ITU

Appendices



Appendix 1: Major drivers of ocean degradation and impacted ocean-dependent sectors	76
Appendix 2: Global Biodiversity Framework targets of specific relevance to ocean sustainability issues	77
Appendix 3: Delineating areas of the ocean for the purposes of governance and regulation, as defined by UNCLOS	78
Appendix 4: Global Ocean Governance at the level of the UN	81
Appendix 5: A timeline of major ocean-related policy responses over the past 20 years	82
Appendix 6: Examples of existing financial instruments and mechanisms that can be applied to the sustainable blue economy	83
Appendix 7: Ocean-related themes, impacts and opportunities of interest to institutional investors, relevant to specific industries	87
Appendix 8: Main environmental impacts disclosed by ocean-based companies	88

Appendix 1: Major drivers of ocean degradation and their effects on the ocean

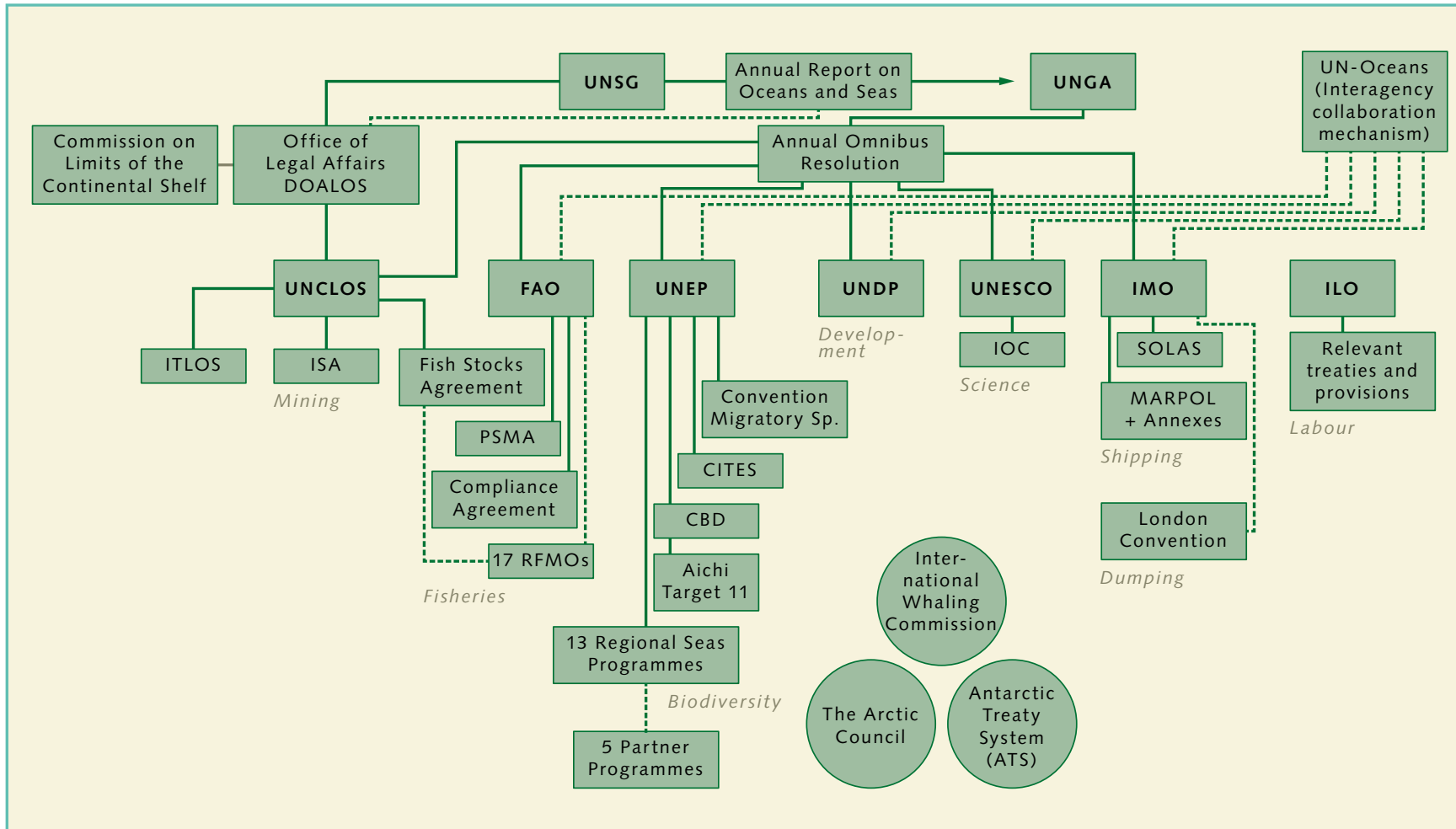
The table below highlights effects of degradation and introduces a series of real-world case studies. Ocean-dependent sectors at risk from the declining state of nature are highlighted for each driver. Source: Chronos Sustainability Ltd.

Degradation driver:	Effects:	Case study example:	Sectors at risk:
Climate Change	Increasing Sea Temperatures are a result of increasing planetary temperatures. Long-term monitoring shows the ocean is getting warmer at all depths which is directly responsible for extinction and displacement of marine species.	Higher sea surface temperatures in the Gulf of Maine (>99% faster warming relative to global ocean temperatures) increased mortality of Atlantic Cod stock and a displacement to cooler waters. Fishing quotas weren't adjusted in time and stocks collapsed impacting local fishers ¹⁷¹ .	<ul style="list-style-type: none"> • Fisheries • Tourism • Pharmaceuticals • Blue biotechnology
	Sea Level Rise , driven by thermal expansion of water and melting polar ice caps. Effects are non-linear, varying with rate of carbon emissions and resultant temperature increases but range from 0.5m-1m by 2100.	<p>In the UK, the Environment Agency predicts that the UK seas could rise by 1m by 2100 as a result of climate change. Today, 2.4 million properties in the UK are at risk of flooding from rivers and the sea. When climate change is factored into the models, the number of properties at risk of annual flooding by 2069 increases by 27% to 3.1million relative to 2024 figures.</p> <p>Overall, the predicted effects of sea-level rise, more frequent storms and increased rainfall by 2050 place one in four UK homes at risk of flooding, with London cited as the most at-risk region¹⁷².</p> <p>Note: The Environment Agency assessment categorises the properties at-risk of flooding today on a scale from high risk to very low risk.15% of the total at-risk properties are considered to be at high risk of annual flooding events, 44% of these properties are at risk of flooding to depths of 30cm or higher. The environment Agency assessment highlights that there has been a significant increase in the number of high-risk properties since the previous assessment in 2023 (+87.6%) and a fall in the number of medium-risk properties (-48.2%).</p>	<ul style="list-style-type: none"> • Ports • Transport (shipping) • Tourism • Marine renewables
	Hotter waters reduce the amount of oxygen (deoxygenation) held which prevents mixing (stratification) and the distribution of nutrients. Oxygen levels have fallen by 2% since the 1950s ¹⁷³ . This has serious, long-term consequences for the deep ocean which is replenished with oxygen from surface waters over millennia. In the short term: primary production is affected; marine life experiences respiratory stress (increasing metabolic rate and compounding respiratory stress) and larger organisms (e.g. mammals, sharks) cannot reproduce or survive in anoxic conditions.	Tuna is considered one of the most economically valuable fisheries in the ocean ¹⁷⁴ - worth an estimated USD 12 billion in 2018 and it is particularly susceptible to deoxygenation due to the species' high metabolic rate. 60% of the tuna industry is controlled by the Pacific islands yet the Pacific is thought to be particularly at risk from oxygen depletion ¹⁷⁵ .	<ul style="list-style-type: none"> • Fisheries • Aquaculture • Marine pharmaceuticals • Tourism
	Stratification driven by climate change (warmer waters, deoxygenation and reduced mixing), directly affects ocean circulation and in turn, weather patterns, increasing both frequency and intensity of storms.	Hurricane Beryl, a Category 4 hurricane that made landfall on the Caribbean Islands of St. Vincent and the Grenadines in 2024 cost an estimated USD 230.6 million in total damages (22% of the islands' GDP) with an estimated total replacement value of all assets nearing USD 6 billion ¹⁷⁶ . The Caribbean Catastrophe Risk Insurance Facility (CCRIF) confirmed that parametric insurance payouts in the wake of the storm were the highest made to date – amounting to USD 45.8 million to cover damage on St Vincent and the Grenadines. Since its inception as a regional risk pool in 2007, total payments made by CCRIF are reportedly USD 360 million ¹⁷⁷ .	<ul style="list-style-type: none"> • Transport (shipping) • Port infrastructure • Telecommunications (cable damage) • Fisheries (lost & damaged assets & fishing days) • Aquaculture (lost & damaged assets, pollution) • Marine renewables (lost & damaged assets) • Tourism

	<p>Ocean Acidification is directly attributed to the rise of anthropogenic, atmospheric CO₂ which has largely been absorbed by the ocean. The ocean has absorbed excess CO₂ increasing acidity. This directly impacts crustacea & shellfish and decreases resilience to oceanic warming, leading to coral bleaching.</p>	<p>Tourism is the main economic activity on the Hawaiian island of Maui, generating USD 5 billion p/a. During the 2014/2015 bleaching event, between 40-60% of Maui's corals were affected, and reduced overall coral coverage by 15%. The estimated loss of recreation value as a result of this single bleaching event reducing ecosystem health equated to USD 26.4 million p/a¹⁷⁸.</p>	<ul style="list-style-type: none"> • Fisheries • Aquaculture • Tourism • Port infrastructure
<p>Over-exploitation</p>	<p>Today, 65% of global fish stocks are exploited to maximum capacity and 35% are overfished. Industrial scale fishing, long-distance and deep-water fishing are driving over-exploitation.</p> <p>Approximately 40% of each catch is estimated to be bycatch (non-target species) and includes vast numbers of marine mammals, turtles, corals and seabirds.</p> <p>Destructive fishing techniques such as bottom trawling releases as much carbon annually as the whole of the aviation industry.</p> <p>Volumes of farmed fish from aquaculture are growing to meet consumer demand and to address some of the sustainability issues with wild-capture fisheries. However, many farmed fish (such as salmon) are fed with wild-caught species, undermining some of these sustainability goals.</p>	<p>Once one of the world's richest fisheries, the Newfoundland cod fishery collapsed in 1992 due to decades of overfishing, poor management, and government subsidies supporting an unsustainable industry. The Canadian government's moratorium on northern cod fishing led to the loss of a \$2 billion industry and 40,000 jobs overnight, devastating coastal communities. The Cod stocks failed to fully recover, permanently altering the regional economy and way of life.</p>	<ul style="list-style-type: none"> • Fisheries • Blue biotechnology • Marine pharmaceuticals
<p>Habitat loss</p>	<p>Economic activities and the effects of climate change are both responsible for extensive habitat loss across the ocean and just 15% of coastlines remain in their natural state¹⁷⁹. Drivers of habitat loss are varied:</p> <ul style="list-style-type: none"> • Economic: coastal development, land reclamation, aquaculture; • Social: food (e.g. growing rice); fuel needs (e.g. mangrove wood) • Pollution: sewage treatment (e.g. loss of seagrass mats), nutrient run off (e.g. harmful algal blooms) • Climate-related: sea-level rise, increased turbidity and sedimentation, warming waters. 	<p>Global mangrove forest cover has halved over the past 50 years, driven by resource extraction (timber, for building and fuel) and land-use change for farming of shrimp, rice and palm¹⁸⁰. Rapid rate of clearance and loss of ecosystem services (provisioning, regulating and cultural) resulted in increased regulation in the form of protected area status and conservation and restoration targets. Today, 40% of mangroves are formally protected¹⁸¹.</p>	<ul style="list-style-type: none"> • Transport (shipping) • Port infrastructure • Fisheries • Aquaculture • Marine renewables • Tourism • Blue biotechnology
<p>Pollution</p>	<p>Pollution manifests in the form of chemicals, nutrients and plastic in the ocean.</p> <p>Chemical pollution in the ocean is caused directly by ocean-based economic activities (e.g. shipping, oil and gas platforms, mining) and indirectly by terrestrial sources of pollution (e.g. from wastewater treatment, industrial activities, illegal dumping).</p>	<p>In the 1950s, Japan experienced a public health crisis known as the Minamata Disease following the release of a type of mercury (methylmercury) from two Japanese chemical plants into Minamata Bay. Methylmercury is a highly hazardous neurotoxicant that bioaccumulates in the fish and shellfish and, when ingested, poisons humans. Children, babies in utero and the elderly were disproportionately impacted by mercury poisoning, which compromises the central nervous system. Over 10,000 people were affected by the 1960s, 10% of which died from the effects of the disease¹⁸². Full economic impacts of this pollution event were extensive due to the persistent, highly mobile and bioaccumulative effects of mercury in the environment. Conservative estimates in 1991 suggested that the combined health, environmental and fisheries impacts of the Minamata Bay pollution amounted to 12.6 billion yen per year¹⁸³. As a result of the extent and scale of impact from Mercury pollution, UNEP initiated a policy response in 1995 to address mercury and five other persistent pollutants. By 2001, the Stockholm Convention was adopted followed by the Minamata Convention in 2013¹⁸⁴.</p>	<ul style="list-style-type: none"> • Fisheries • Aquaculture • Tourism • Blue biotechnology • Marine Pharmaceuticals

	<p>Conservatively, 8-12.7million tonnes of plastic pollution enter the ocean annually, degrading habitats, entangling marine life and reducing ecosystem resilience to climate change. Globally, over 700 marine species have been impacted by plastic pollution through ingestion, entanglement and habitat degradation¹⁸⁵. Abandoned, Lost or Otherwise Discarded Fishing Gear (ALDFGs) is the largest category of plastic debris by volume that enters the ocean directly with wide-ranging environmental and socioeconomic impacts¹⁸⁶.</p>	<p>WWF reported that plastic pollution in the Mediterranean Sea costs fishers EUR 138 million per year as a result of vehicle damage, opportunity cost of lost- fishing effort and clogged and damaged nets¹⁸⁷. A separate study in the Salish Sea estimates 4.5% of the value of Dungeness Crab harvest (ca USD 745,000 in 2011) is lost annually as a result of ghost fishing (where animals are trapped and perish in ALDFGs)¹⁸⁸.</p>	<ul style="list-style-type: none"> • Fisheries • Aquaculture • Tourism • Shipping
	<p>Nutrient run off (Nitrogen and Phosphorus) primarily from industrial agriculture leads to a phenomenon called eutrophication – a rapid bloom in algal species that consume surface-level oxygen and create 'dead zones' that can no longer sustain life because the waters can become toxic (in the case of harmful algal blooms) and anoxic.</p>	<p>The Gulf of Mexico experiences persistent, annual states of hypoxia (oxygen levels are too low to support aquatic life) as a result of nutrient run-off from agricultural activity across the Mississippi and Atchafalaya River Basins (spanning 12 US States)¹⁸⁹. The Gulf of Mexico hosts half of the USA's wetland ecosystems that commercially important fisheries depend on. The socioeconomic and environmental impacts of annual hypoxia is estimated to be in the range of USD 2.4 billion annually, since 1980¹⁹⁰.</p>	<ul style="list-style-type: none"> • Fisheries • Aquaculture • Tourism
<p>Ineffective governance</p>	<p>Marine governance is a complex mixture of global, regional and national policies, frameworks and agreements that are often poorly monitored and enforced. Gaps in coverage, and legal loopholes, amplify the effects of wider drivers of degradation and enable destructive and illegal economic activities to be carried out. This is particularly true for extractive industries such as fishing: only 2.8% of global surface waters are protected from overfishing¹⁹¹ and it is estimated that 20% of all landed fish species are caught illegally today¹⁹².</p>	<p>The UK has committed to protect 30% of its national waters through a network of Marine Protected Areas (MPAs). Today, 40% of England's waters are designated but in the latest official assessment, only 10% of these had monitoring in place to assess effectiveness, and only 3% of these sites had high confidence levels in the assessments. Destructive fishing practices such as bottom trawling is permitted in the remaining 90% of the network. This severely impacts the seafloor causing widespread habitat and species loss and undermines the ability of the MPA to protect and restore biodiversity.</p>	<ul style="list-style-type: none"> • Fisheries • Aquaculture • Transport (shipping) • Ports • Tourism • Telecommunications • Marine Renewables • Marine Pharmaceuticals • Blue Biotechnology

Appendix 2: Global Ocean Governance at the level of the UN



At the UN level, global ocean governance involves many different stakeholders that are wholly or partially involved with aspects of the ocean. Solid lines = direct dependencies between body and international agreement; dashed lines = functional links. Intergovernmental organisations do not form part of the UN system and are shown separately. Source: World Ocean Review, 2015 – Sustainable Use of Our Oceans pp. 84.

Appendix 3: Delineated zones for ocean governance

The United Nations Convention on the Law of the Sea (UNCLOS) partitions the ocean into different legal zones. Within this framework, the sovereignty of a state diminishes as distance from the coast increases.

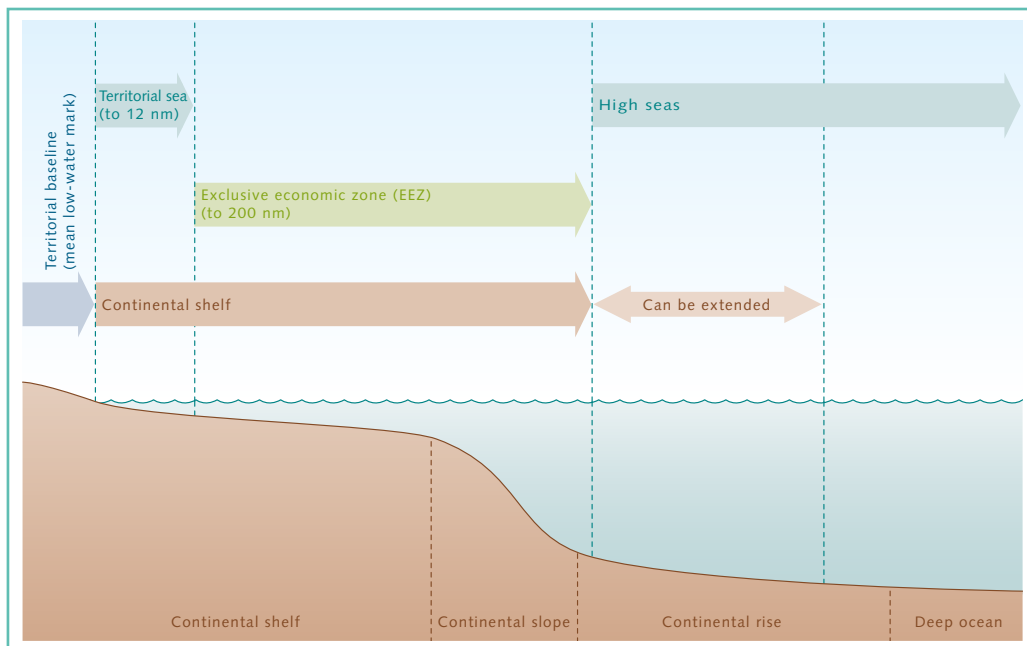


Image source:
[World Ocean Review, 2015](#)

Ocean zone:	Area covered:	Responsibilities:
Territorial Seas	Low tide mark - 12 nautical miles	<ul style="list-style-type: none"> • Sovereign territory • Primarily governed by national legislation • Right for peaceful passage for ships
Exclusive Economic Zone (EEZ)	12-200 nautical miles	<ul style="list-style-type: none"> • Includes control over water column and the seafloor • Not part of sovereign territory • Coastal states have the right to use/extract resources from their own EEZ. • Other countries must seek permissions from the coastal state to access and extract from their EEZ
Continental Shelf	12-350 nautical miles	<ul style="list-style-type: none"> • Overlaps with the EEZ • Refers explicitly to the seafloor • The continental shelf is a geological formation and extension of the mainland. • Where present, allows a country to extend its rights to exploit the seafloor and mineral resources
High Seas	>200 nautical miles	<ul style="list-style-type: none"> • Areas beyond any national jurisdiction – considered a common area • RFMOs control fisheries in this area • ISA governs access to and use of the seabed and its resources • Governance does not take into account trans-boundary issues like pollution and climate change • Weak monitoring & enforcement gives rise to illegal activities like piracy, illegal fishing in this area

Appendix 4: A timeline of major ocean-related policy responses over the past 20 years.

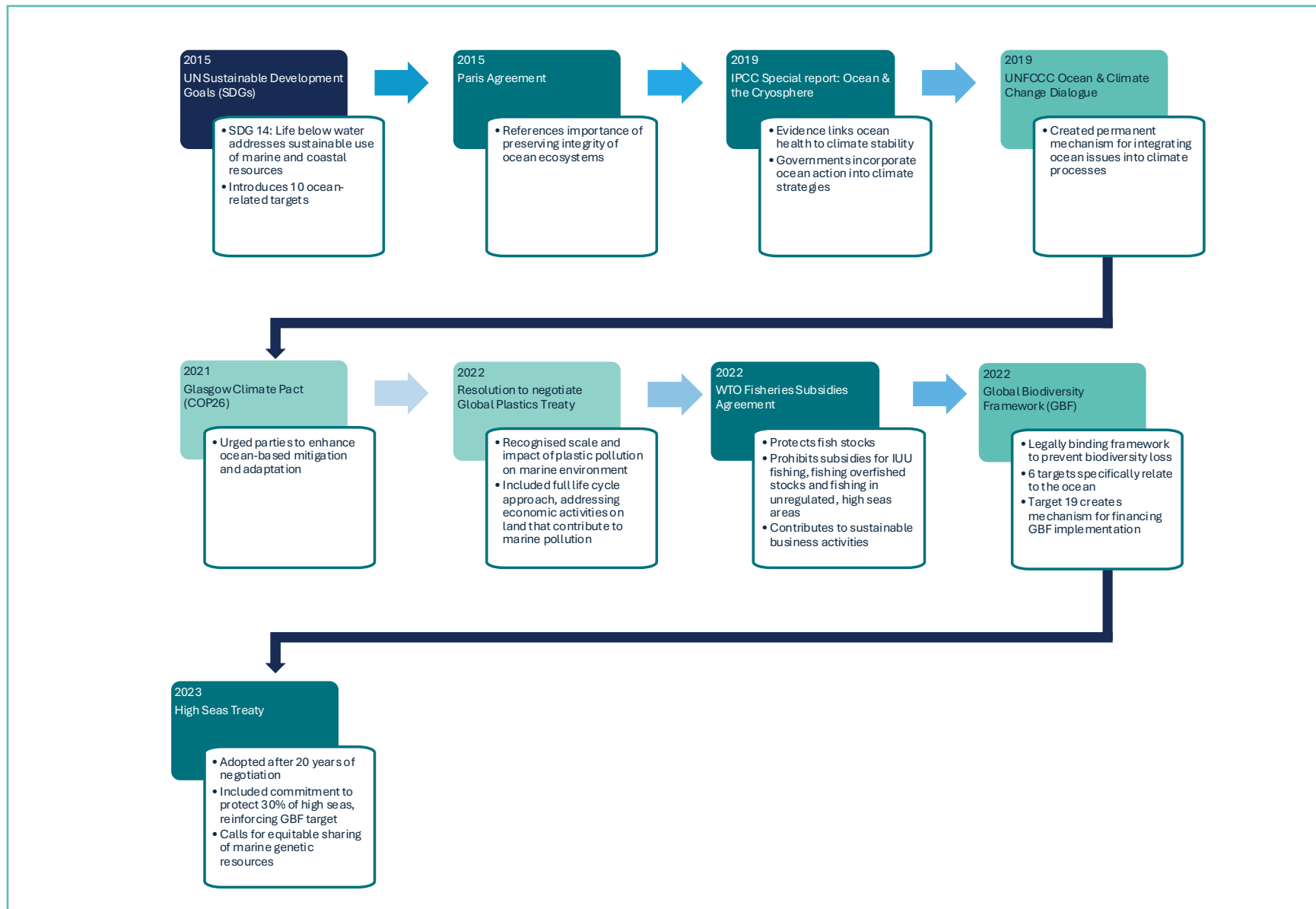


Image Source: Chronos Sustainability Ltd.

Appendix 5: Global Biodiversity Framework Targets

The following GBF targets are of specific relevance to ocean sustainability issues:

Target 2	Calls for the restoration of 30% of all degraded marine & coastal ecosystems.
Target 3	Calls for the effective conservation and management of 30% of marine and coastal waters through ecologically representative, well-connected and equitably governed systems of protected areas and/or area-based conservation measures.
Target 7	Addresses the risks of marine pollution from all sources (i.e. nutrient run off, plastics and chemical pollution).
Target 8	Focuses on the need to minimise the effects of climate change, which manifests – inter alia – as ocean acidification in the marine environment by prioritising the mitigation hierarchy nature-based solutions to repair and restore ocean resilience.
Target 10	Aims to ensure that fisheries are managed sustainably, management and use of wild species.
Target 13	Calls for effective measures to ensure the fair and equitable sharing of benefits that arise from the utilisation of genetic resources [...] and traditional knowledge.
Target 19	Speaks to the financial resources needed to implement national biodiversity strategies and action plans (NBSAPs) - establishing a 2030 target of USD 200 billion p/a from all financial sources, including international finance.

Appendix 6: Examples of financial instruments and mechanisms that can be applied to the sustainable blue economy.

While there is notable overlap with climate finance models and nature finance models due to the ocean’s role in mitigating climate and nature risk, the emerging ocean finance tools have been developed specifically to support blue finance in a dynamic and innovative way. Information compiled from [LSE](#), [High Level Panel for a Sustainable Ocean Economy](#), [Convergence Finance](#) and [OECD](#).

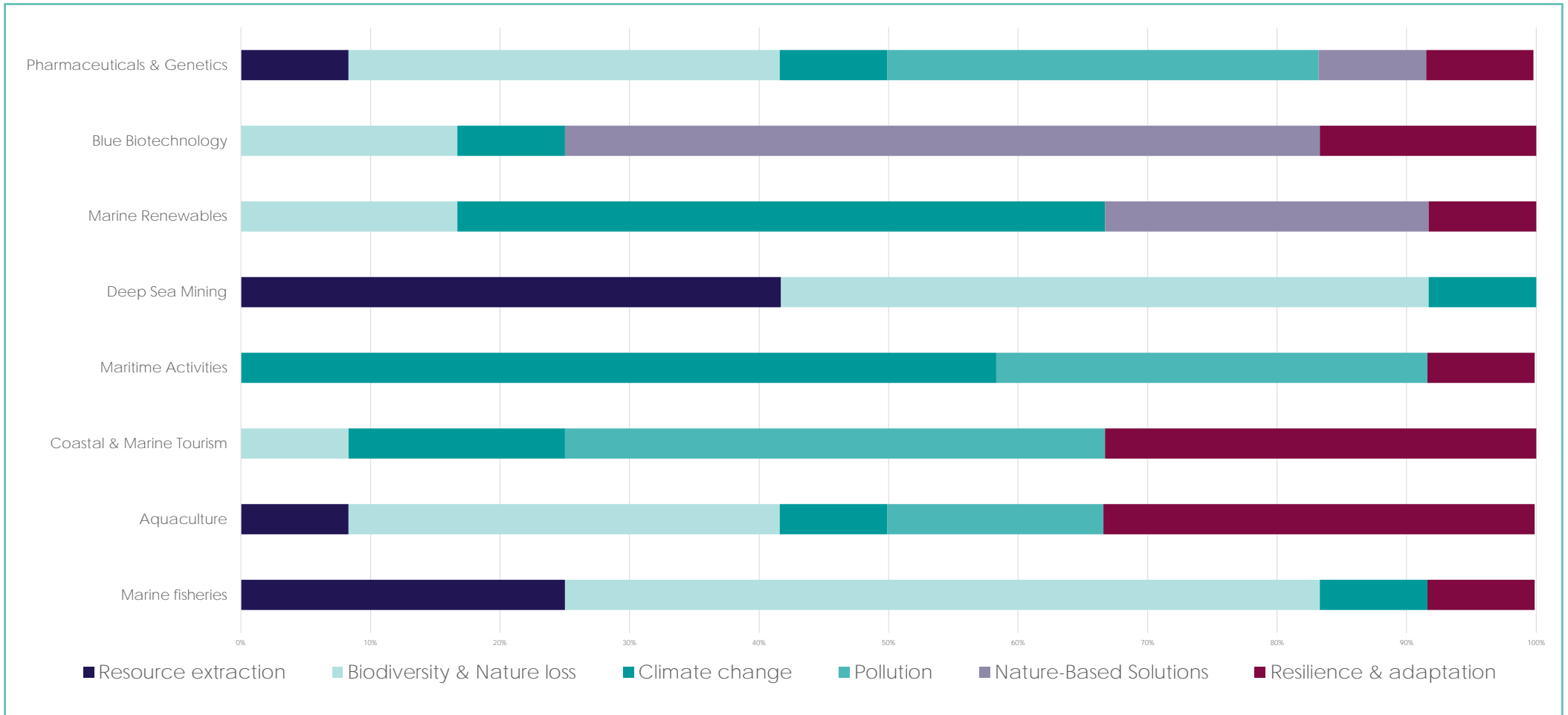
Financial mechanism	Examples of financial instruments	Description	Example
Outcome-based finance mechanism linking financial incentives to measurable environmental outcomes, aligning capital flows with verified ecological impact.	Biodiversity credits	<ul style="list-style-type: none"> Biodiversity credits are defined as “a verifiable, quantifiable and tradeable financial instrument that rewards positive nature and biodiversity outcomes (e.g. species, ecosystems and natural habitats) through the creation and sale of either land or ocean-based biodiversity units over a fixed period.”¹⁹⁹ Credits are generated by projects that have conserved or restored a designated area or species over a specific period. Credits establish a mechanism by which companies can meet biodiversity targets needs but there must be a demonstrable net-positive impact on nature and biodiversity - unlike carbon credits, biodiversity credits cannot be used to offset a company’s negative impacts. For legitimacy, biodiversity credits must be anchored around principles of high-integrity, equity and inclusion, and transparency. Credits can then provide funding towards conservation and restoration initiatives. 	Vanga Seagrass Project , Southern Kenya
	Blue carbon credits	<ul style="list-style-type: none"> Blue carbon is defined as ‘carbon stored in marine habitats that are responsive to management’²⁰⁰. Blue carbon credits tradable instruments where companies voluntarily purchase credits to offset their own greenhouse gas emissions. Carbon offsets must be generated by sequestration of carbon in marine ecosystems such as mangrove forests and seagrass mats and blue carbon initiatives must be able to demonstrate additionality to progress to verification. The funds generated from the sale of credits are in turn used to support conservation initiatives. 	Mikoko Pamoja Project , Kenya, a mangrove conservation and restoration project and world’s first blue carbon project.
	Loans (with blue components)	<ul style="list-style-type: none"> Blue loans are defined as financing instruments that are explicitly and exclusively for projects that support a sustainable blue economy²⁰¹. These generally feature performance-linked terms that incentivise environmental improvements, where the borrower is rewarded for achieving quantified predetermined sustainability performance objectives in the agreed timeframe. Some blue loans have been issued as part of government debt restructuring programmes. 	The Nature Conservancy and Government of Belize blue loan debt conversion for ocean conservation

Dedicated funds and facilities that structure long-term financing to support sustainable blue economies.	Blended finance	<ul style="list-style-type: none"> • Blended finance is defined as “the use of catalytic capital from public or philanthropic sources to increase private sector investment in sustainable development”²⁰². • This funding instrument includes the strategic combination of public or philanthropic capital with private investment to fund sustainable ocean-based projects (e.g., fisheries, coastal protection, renewable energy) • Utilises public funds to de-risk investments and attract private investors to high-potential but risky, long-term marine initiatives. • Successful examples blend funds from international donors or sources of concessional financing, with sources of local capital to ensure long-term sustainability and local stewardship. 	Global Fund for Coral Reefs operates through two primary financial instruments: the GFCR UN Fund and the private-sector-led GFCR Equity Fund.
	Impact funds	<ul style="list-style-type: none"> • A blue impact fund is defined as an investment vehicle that “creates a measurable, beneficial impact on the environment or society while earning a positive financial return”²⁰³. • Three key components distinguish impact funds from mainstream investing: <ul style="list-style-type: none"> • Intentionality to exert positive impact • Benefits must be measurable and transparent • The investment must generate a positive financial return. 	Outrigger Impact Fund (proposal stage) would provide dedicated finance to SIDS across six regenerative and sustainable ocean economy sectors through an impact-led Article 9 fund, pursuing a 100% sustainable investment approach, with dedicated impact key performance indicators.
Thematic bonds which mobilise capital through fixed-income markets.	Blue Bonds	<ul style="list-style-type: none"> • Blue bonds are defined as “a debt instrument that national governments, development banks and corporations issue to raise finance for marine and ocean-based projects that have long-term sustainability objectives and benefits”²⁰⁴. • Blue Bonds can be issued by public and private sector issuers to access opportunities in a sustainable blue economy and create avenues for larger, longer-term financing. • Typical projects supported by blue bonds include: coastal climate adaptation and resilience projects; marine conservation initiatives, sustainable marine tourism, sustainable value chains (e.g. for fish and seafood products); and marine renewables. 	Seychelles Blue Bond is the world’s first example of a successful sovereign blue bond.
	Debt-for-nature swaps	<ul style="list-style-type: none"> • Debt-for-Nature swaps are defined as loan instruments where debt is purchased (swapped) at a lower rate, in return for implementation of environmental and social commitments, over a specified (long term) timeframe²⁰⁵. • Conservation efforts are supported via a Fund that is created as part of the terms of the loan. • Completing a debt-for-nature swap Involves multiple stakeholders and sources of finance to provide capital, insurance, technical assistance (both financial and conservation) and compliance. • Government participation provides leadership and commitment to the deal. 	Government of Ecuador pursue Galápagos debt-for-nature swap in 2023.

Fiscal and economic instruments that integrate conservation financing into broader fiscal and economic measures instruments.	(Private) Equity investments	<ul style="list-style-type: none"> • (Private) Equity investments are defined as “an investment in exchange for shares (equities) in a company” that is active in the sustainable blue economy such as ocean-related businesses or initiatives that support sustainable development and ocean health²⁰⁶. • Investments are generally only repaid where the business/organisation makes a profit. • Equity investors are typically attracted to later-stage, established companies. 	UBS Rockerfeller Ocean Engagement Equity Fund identifies investable markets worth more than USD 1.1 trillion in areas including wastewater treatment, waste management and plastic recycling, and sustainable aquaculture.
	Payment for ecosystem services	<ul style="list-style-type: none"> • Payments for ecosystem services (PES) are defined as “incentive-based mechanisms for sustainable resource management”²⁰⁷. • PES are voluntary, market-based incentive schemes where beneficiaries of environmental services (e.g. clean water, carbon sequestration, biodiversity) compensate landowners for adopting practices that maintain or enhance these services. • Based on a ‘beneficiary pays’ approach where natural resource users are paid to conserve the resource in question or manage it more sustainably by those who benefit from the enhanced provision of the resource. 	Tanzania’s Marine Legacy Fund derives revenues from commercial fishing licences, marine ecotourism revenue sharing, and oil and gas taxation that is used to pay coastal communities for conservation and to finance some operational expenses
Risk management tools providing financial protection against climate-related disasters affecting coastal and marine ecosystems.		<ul style="list-style-type: none"> • Parametric (or index based) insurance is defined as “a type of insurance that covers the probability (or likelihood) of a loss-causing event happening [like a hurricane] instead of indemnifying the actual loss incurred from the event”²⁰⁸. • This insurance model uses “parametric” triggers - pre-agreed thresholds, such as specific hurricane wind speeds - that automatically release funds, bypassing lengthy damage assessment processes. • Provides predictable and timely resources for communities affected by natural disasters so that they can execute rapid response actions to repair the natural environment and resume the ecosystem services it provides to coastal communities as soon as possible. • This model is particularly valuable to small island developing states at higher risk of adverse effects of climate change. 	Oriente Salvaje Parametric Insurance in El Salvador, developed by the Save the Waves Coalition in partnership with ORRAA and Willis Towers Watson in addition to local stakeholders.

Appendix 7: Ocean-related themes, impacts and opportunities of interest to institutional investors, relevant to specific industries

Image Source:
Chronos Sustainability Ltd



Appendix 8: Ocean-related impacts disclosed by ocean-dependent companies

In a survey of annual and sustainability reports issued by the top 10 companies in major ocean-dependent industries, Jouffray et al. identify nine types of environmental impacts that are disclosed to varying extents.

Impact	Description
Energy utilization	When a firm notes how they use energy (for example, energy intensity, energy consumption, fuel consumption, type of fuel consumption, greenhouse gas emissions). This also refers to any specific efforts companies have made to mitigate the types of GHG-producing fuel they use or decarbonization measures. For example, emissions monitoring systems, reducing gas flaring, turning off engines when berthed at the port (that is cold ironing), switching to liquefied natural gas, changing to biofuels or investing in research related to hydrogen.
Oil spills and gas leaks	When a firm notes how they are causing oil and gas leaks. This can include references to preventative measures in advance of an oil spill or to mitigation interventions after an oil spill (for example, it may be coded together with other impacts if these efforts include, say, habitat restoration as a result of that company's oil spill, in which case it would be coded under 'oil spills and gas leaks' and also 'alteration of habitats').
Pollution	When a firm notes how they are causing other types of pollution in the form of waste (grey water, sludge), garbage (metal, glass and paper), hazardous substances and plastic. This also includes references to specific practices to reduce the waste discharged, such as waste recycling efforts, the installation of an improved water filtration system and reducing single-use plastics and packaging.
<u>End-of-life</u>	<u>When a firm notes how they handle the end-of-life of their assets and the associated impact on ocean sustainability (for example, active ship demolition and ship recycling programmes or standards in place).</u>
Noise	When a firm notes how they are causing or mitigating noise (for example, bubble curtains around the base of a wind farm).
<u>Alteration of habitats</u>	<u>When a firm notes how they may directly alter habitats or force species to relocate as a result of their operations. This can also refer to any specific efforts the company has made in mitigating their impact on ecosystems and reducing the number of species displaced (for example, coastal restoration linked to the damage done by port activities). It specifically includes policies to avoid marine protected areas as well as initiatives to address biodiversity.</u>
Removal of biomass	When a firm notes how they are directly removing any form of biota from the ocean (for example, through fishing, farming or dredging). This can include references to specific practices companies have to reduce the volume of biomass removed or to improve the subsequent indirect impacts of bycatch or mortality, but it does not include mentions of sourcing biomass produced from another industry (for example, cruise companies mentioning the sourcing of certified seafood to serve on board their vessels).
<u>Non-native species</u>	<u>When a firm notes how they are introducing non-native species. This can include references to ballast water treatments (for example, policy, practices and any instruments around ballast water withdrawal and discharge), sea lice in aquaculture operations and the escape of farmed fish.</u>
Collision with fauna	When a firm notes how they might collide with fauna. This includes activities associated with any vessels, including port activities, and can also refer to any specific efforts the company has made to mitigate their damage (for example, policies the company has to avoid common migratory routes).

Source:
<https://www.nature.com/articles/s41893-025-01631-8/tables/1>

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