

BUSINESS FOR OCEAN SUSTAINABILITY

THIRD EDITION — CAPTURING THE BLUE OPPORTUNITY

SDA Bocconi
SCHOOL OF MANAGEMENT
SUSTAINABILITY LAB

McKinsey
& Company

 CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

Business for Ocean Sustainability

Business for Ocean Sustainability is a multi-year research project developed by One Ocean Foundation (OOF) in collaboration with SDA Bocconi School of Management Sustainability Lab, McKinsey & Company and the CSIC (Consejo Superior de Investigaciones Científicas).

This third edition of Business for Ocean Sustainability, presents a never-before-seen picture of the relationship between business and ocean sustainability. While reaffirming the central role of businesses in maintaining a healthy ocean, the report focuses on companies' attention towards marine and coastal ecosystems, both in terms of awareness of their pressures and the actions undertaken to address them. Furthermore, going beyond a mere risk mitigation perspective, it shows how companies can create value by addressing ocean-related challenges through investments in nature-based and technology-driven innovative solutions for the protection and restoration of the ocean. This report is the continuation of a journey initiated in 2019 with the publication of the first edition of our research, Business for Ocean Sustainability - Focus on the Mediterranean Sea, and continued in 2021, with a second report entitled Business for Ocean Sustainability - Focus on the Fashion Industry, which delved deep into the sector, highlighting good practices throughout the entire value chain. In that same year, Business for Ocean Sustainability - A Global Perspective - Second Edition was published, deepening our analysis and presenting the Ocean Disclosure Initiative (ODI) for the first time, the first comprehensive ocean sustainability disclosure framework, the development and progress of which are presented in this third edition of the report. One Ocean Foundation plans to continue its commitment as a pioneer and a leader in researching the relationship between business and ocean sustainability in the coming years. Its goal is to provide innovative solutions for companies and policymakers in this field.



In collaboration with:



Find out more at www.1ocean.org

Table of contents

Foreword	03
Executive summary	07
Objectives of the report and methodology	10
Chapter 1 — Blue Natural Capital and the value at stake	14
Chapter 2 — Unlocking awareness to enable ocean sustainability	24
Chapter 3 — From awareness to activation: the proactive approach of the fundamental players in the world economy	31
Chapter 4 — From risk mitigation to business opportunity	44
Chapter 5 — Ocean Disclosure Initiative: a tool to foster awareness and responses from the business community	57
Project team	67
Glossary	68
Annex I — Description of the sample and analyses	73
Annex II — Methodology: Natural Language Processing and Generative AI approaches	78
Annex III — Science based analysis of pressures on Good Environmental Status (GES) descriptors	81
Annex IV — Activation analysis – Deep dive by sector	84
About the One Ocean Foundation	91
Our Governance	92

Foreword

By **Carlos M. Duarte**

Distinguished Professor of Marine Science

King Abdullah University of Science and Technology

Business for Ocean Sustainability – Third Edition puts forward the concept of Blue Natural Capital as the guiding principle underpinning a nature-positive Ocean Economy.

The ocean has currently been depleted of half of its Blue Natural Capital, rebuilding marine life represents a huge challenge, but also a sound business opportunity, as it will create wealth while addressing some of the global challenges that hinder present and future human well-being. Rebuilding Blue Natural Capital contributes to mitigating climate change, through the capacity of coastal ecosystems to sequester carbon and their role in defending the shoreline from storms and rising sea levels. It also contributes, critically, to increasing biodiversity, which in turn supports many other functions, such as food provision, alleviating the growing food crises that impact the most vulnerable societies, and sanitation, as healthy marine ecosystems are conducive to reduced enteric and diarrheic diseases, a major source of infant mortality in the developing world.

After a historic tour de force over the past six months, the nations under the UN have formulated ambitious goals for our ocean, including stopping biodiversity losses, protecting 30% of ocean areas and restoring 30% of degraded habitats by 2030, along with the ongoing development of a legally binding mechanism to stop plastic litter from entering the ocean.

The costs of achieving this? Huge, likely in the order of 10 trillion euros. However, the opportunity cost of not doing so is far greater, as generations of humans will be condemned to living on a planet depauperated of Blue Natural Capital, and also because investments in rebuilding marine life will return an estimated 10 euros for each euro invested. It is not just a question of a business case but a responsibility, not towards ourselves or the ocean, but our children and grandchildren.

But who is to pay for this? Certainly not governments, which struggle to provide citizens with the quality of education, health and safety, and support they demand. The task must fall to the private sector, where I sense an unprecedented willingness to contribute, as it is already contributing to carbon neutrality goals. However, we lack mechanisms for the private sector to engage, so a novel architecture for a system that promotes investments in Blue Natural Capital needs to be created. This requires the development of universal, objective metrics to quantify Blue Natural Capital, valuation systems to assign its value, and normative and governance frameworks to operate a market of the services flowing from Blue Natural Capital that reinvests a share of the revenues in growing the asset.

This requires massive leadership from the private sector, through a collaborative effort that will establish the ocean as “terra omnis” (everyone’s land) following nearly two millennia of our ocean being “terra nullius” (nobody’s land).

Foreword

By **Ralph Chami**

Co-Founder

Blue Green Future & Rebalance Earth

Visiting Professor Williams College

A round of applause must go to One Ocean Foundation for laying out a path in which the ocean economy and ocean ecology can both grow sustainably. This third edition of *Business for Ocean Sustainability* brings to the forefront the role of Blue Natural Capital as a new asset class, and a new source of wealth for countries. Society can now benefit from this new asset by protecting and restoring it. This heralds a new economy and a new mindset for humanity, where we all become stewards of a thriving ocean; a stark contrast to the current paradigm where the ocean and the life within it are only viewed through an extractive lens.

This new source of wealth, which is generated from Blue Natural Capital, brings many more benefits to countries that protect and restore their coastal and ocean ecosystems. It helps to diversify the economy, providing a hedge against the vagaries of trade, unforeseen pandemics, or against the consequences from fluctuations of the international business cycle. Indigenous people and local communities can now benefit from the new source of income and employment, while retaining ownership of the blue assets and maintaining their homesteads. Enhancing the resilience of nature stabilizes people on their land.

Nature-based solutions and blue carbon markets change the growth agenda from one that is solely focused on growth at all costs to one that integrates ocean health and sustainability. A country's balance sheet can now include Blue Natural Capital, a living nature, a living ocean.

The services of this new Natural Capital will help raise the net worth of countries endowed with these assets, providing struggling ocean states with much needed fiscal space. Valuing the services of a living nature – coastal flora and marine fauna – is key to unleashing this new source of perpetual wealth.

The market for Blue Natural Capital will also change conservation from being a cost proposition to one which generates revenue. As such, owners of Blue Natural Capital will now strive to protect the new valuable asset. Valuing Blue Natural Capital helps make visible the benefits we derive from a healthy ocean and from retaining abundant life within it, which have for too long been invisible to humans. In particular, a living ocean as a new asset class becomes relevant to the private sector, which can now recalibrate its extractive business model to one which also benefits from restoring the ocean's systems back to health.

The report also highlights an important message about the need to ensure equity towards the living ocean. Valuing the ecosystem services of a living and thriving ocean creates an incentive compatibility between humanity and ocean life. By viewing the ocean as a living system that endows financial and environmental benefits to humanity, we now have every incentive to protect and restore the ocean and all life in it. This is a win for the ocean, a win for the environment, and a win for humanity. Bravo to One Ocean Foundation!

Executive Summary

The 2023 edition of the multi-year project “Business for Ocean Sustainability” advances the One Ocean Foundation’s goal of building knowledge on the relationship between business and the ocean.

The current study introduces three new elements. Firstly, it sheds light on the concept of Blue Natural Capital, highlighting its importance as the guiding principle underpinning a nature-positive economy. Secondly, it takes a pragmatic perspective on how the business community can intervene to alleviate the pressures it exerts on the ocean, with a forward-looking approach. Lastly, it utilizes an innovative methodology combining two AI-driven approaches: Natural Language Processing (NLP) and Generative AI (GenAI) to analyze an extensive dataset of annual and sustainability reports of about 2,500 companies, representing more than 70% of the world’s market capitalization.

Preserving the ocean is paramount, as it provides vital resources and ecosystem services that enable many activities that are essential to human well-being. Over 40% of the global population relies on the biodiversity and services provided by marine and coastal ecosystems, which contribute to economic and social development. Annual revenues generated from ocean economy sectors are estimated at \$5.2 trillion, while the ocean’s total asset value is estimated at \$24 trillion. Protecting and restoring Blue Natural Capital is crucial to securing benefits for current and future generations, leading to sustainable and resilient development.

Despite its relevance, in recent decades the degradation of marine and coastal ecosystems has accelerated rapidly. This has led to a dire need for substantial changes and responses, both from the private and public sectors, to mitigate the pressures on the ocean and restore the marine environment. After two decades of deliberations and ten years of negotiations, a significant milestone was achieved in March 2023 when UN member states agreed on a treaty to protect the ocean and restore marine nature.

The High Seas Treaty will be instrumental in achieving the global goal of protecting 30% of the ocean which was adopted as part of the Kunming-Montreal Global Biodiversity Framework (GBF) during the UN biodiversity conference in December 2022 (COP15). Collaboration among governments, stakeholders, and local communities is essential for its successful implementation.

Companies are responsible for exerting direct and indirect pressures on Blue Natural Capital and therefore developing awareness of these pressures is crucial to advancing ocean sustainability. According to our findings, 52% of companies are aware of the potential pressures of their industries on the ocean, showing an upward trend with respect to 2019. As a result, several companies have started taking actions to mitigate their pressures. However, when examining the average activation score by company, a metric measuring the number of activities with a beneficial effect on the ocean implemented by companies, this remains relatively low at 20%, with considerable heterogeneity across sectors.

Numerous companies have started implementing measures that indirectly benefit the ocean through innovations in products, processes, and supply chains. Only a few have started taking measures directly aimed at ocean conservation and sustainability, such as the implementation of structured governance, policies, impact assessment, partnerships or investment in technological innovations for ocean conservation. However, the more companies' maturity towards ocean-conservation increases, the more they appear to concretize their efforts in direct actions targeting the protection of marine ecosystems.

Among the companies directly addressing ocean-related topics, 50% approach them from a risk mitigation perspective, 35% both as risk mitigation and as an opportunity, and only 15% are focused on business opportunities.

The results show that companies are starting to recognize the potential of embracing "blue" as an opportunity. In particular, the more companies' maturity increases, the more the organizations address ocean-related topics not only in terms of risk mitigation but also as an opportunity. These companies are beginning to acknowledge the fact that the blue economy¹ can facilitate value creation through sustainable practices that benefit both businesses and the environment.

Recognition of this fact is pivotal, as it has the potential to truly change the path forward. We firmly believe in change driven by an alignment of intents among all actors involved, which requires concerted action by policymakers, businesses, finance, consumers and other stakeholders.

One Ocean Foundation has invested heavily in launching this virtuous circle with the introduction of the Ocean Disclosure Initiative (ODI), the first comprehensive ocean sustainability disclosure framework. ODI addresses the gap in today's ocean sustainability and ESG frameworks and standards landscape, and functions as a reliable standard of measurement for pressures exerted on the ocean, while creating awareness, enabling transparency and disclosure, and fostering strategic response and action.

1. The concept of Blue Economy (UNCSD 2012) was designed to initiate a transformative process that would allow traditional marine activities ("Ocean-Based Economy") to be carried out in the future without compromising the proper functioning of the ocean and its provision of ecosystem goods and services, while at the same time promoting equity and social welfare. In this paper we distinguish the traditional Ocean-Based Economy from the "Blue Economy".

Objectives of the report and methodology

Objectives

This third edition of the report *Business for Ocean Sustainability* stands out for its innovative contributions across multiple areas:

- First, it focuses on a sustainability topic that is often overlooked but holds tremendous importance for the environment: ocean sustainability. The report aims to highlight the critical role the ocean plays in sustaining the planet and addressing pressing global challenges, particularly in the context of climate change. Its health and preservation are directly linked to the well-being of ecosystems, biodiversity, and the livelihoods of countless communities worldwide. By shedding light on this crucial theme, the report underlines the urgency and necessity of prioritizing ocean sustainability efforts.
- Additionally, it seeks to examine the efforts undertaken by businesses to tackle the various challenges related to ocean sustainability. This is accomplished by evaluating the level of awareness among companies regarding their pressures on marine and coastal ecosystems and investigating their involvement in activities aimed at mitigating them. The report concentrates on the proactive efforts of companies, who bear primary responsibility for pressures on the ocean, to reshape their actions. By emphasizing the responsibility of organizations, it recognizes their potential to drive positive change and make a significant difference in addressing sustainability challenges.

- The report utilizes a large dataset of about 2,500 companies that account for over 70% of the world GDP. To analyze this data, the research has incorporated cutting-edge techniques that harness the power of Natural Language Processing (NLP) and Generative Artificial Intelligence (GenAI) methodologies. These innovative approaches enable the analysis to delve deeper into the complexities of the subject.
- Finally, the report aims to present the advancements made in the development of the Ocean Disclosure Initiative (ODI), a science-based framework designed to enhance awareness among organizations about the effects of business activities on marine and coastal ecosystems. The ODI gathers data to facilitate the evaluation and disclosure of key performance indicators pertaining to the ocean. Ultimately, the project aims to create a disclosure tool that can assist companies in their sustainability journey and provide stakeholders with additional insights to assess the ocean-related sustainability practices and associated risks of businesses.

Methodology

The report leverages a comprehensive and multifaceted approach to analyze the sustainability practices of companies across different sectors, and to provide a nuanced and comprehensive analysis across multiple dimensions.

In order to identify the most significant direct and indirect pressures exerted by business activities, both ocean and non-ocean related, this report builds on existing institutional frameworks and scientific knowledge.

The ocean pressures have been analyzed based on the 3 Ocean Domains that gather together the 11 Good Environmental Status (GES) descriptors defined by the EU Marine Strategy Framework Directive. The evaluation of the direct and indirect pressures was assessed through a thorough scientific review. A panel of 56 natural and social scientists with different backgrounds (e.g. marine and socio-ecology, zoology, environmental sciences, marine biology) from leading research institutes and universities across Europe, North and South America and Australia was involved (see Annex III).

Two different AI-driven approaches (Natural Language Processing and Generative AI) were utilized for a comprehensive and detailed analysis of the companies' efforts towards ocean sustainability. The analysis was conducted on a sample of approximately 2,500 public sustainability reports from the world's largest corporations by market capitalization, from different industrial sectors and geographical regions (see Annex I).

The NLP and Generative AI approaches are complementary and can be used together to extract and generate information from text. The former allows the extraction of relevant features from text, such as words, phrases, or syntactic structures. The latter has the ability to understand and contextualize the information (see Annex II).



Chapter 1 — Blue Natural Capital and its value at stake

Protecting the ocean is imperative: challenged by anthropogenic pressures, the ocean plays a crucial role in maintaining the stability of Earth systems and providing essential services and resources for our survival and well-being

Our lives depend on the ocean, and the interactions with its ecosystem are vital for our survival and well-being, ensuring the supply of essential resources and providing fundamental services that further support socio-ecological systems². Intricate connections exist between the ocean, climate and life, in fact the ocean is part of a continuous cycle of exchange of heat, moisture and carbon with the atmosphere. Thanks to its buffering capacity, it absorbs CO₂ from the atmosphere and around 90% of the atmospheric heat, further regulating the temperature and the climate in general³.

Over 40% of the world's population⁴ depends on the biodiversity and services offered by marine and coastal ecosystems. The ocean supports unique habitats, and the ecosystem services it provides include provisioning ones (e.g. food and fresh water supply, renewable energy) regulation/supporting ones (e.g. habitat, gene pool protection, climate regulation) and cultural ones (e.g. health and well-being, cultural value, spiritual, recreational), making a major contribution to the world's economic and social development.

Nevertheless, human activities have had a detrimental impact on the ocean and its ecosystems causing ocean warming and acidification, depletion of fish stocks due to unsustainable fishing practices,

2. Shukla, P.R., et al (2019) 'Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems' [online]. IPCC. Available at: <https://www.ipcc.ch/site/assets/uploads/2019/11/SRCLL-Full-Report-Compiled-191128.pdf> (Accessed: 15 May 2023)

3. NOAA. (2020) Ocean Acidification [online] Available at: <https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification> (Accessed: 15 May 2023)

4. One Ocean Foundation, et al (2020) 'Business for Ocean Sustainability - A Global Perspective - Second Edition [online]. Available at: <https://www.1ocean.org/> (Accessed: 15 May 2023)

seawater contamination and eutrophication, among other negative consequences.

Recognizing the urgent need to reverse the course of natural degradation, the 15th Conference of Parties to the UN Convention on Biological Diversity held in December 2022 adopted the Kunming-Montreal Global Biodiversity Framework (GBF). This framework represents a historic deal to protect nature and includes 4 goals and 23 targets for achievement by 2030, with the objective of protecting and restoring nature for current and future generations, ensuring its sustainable use as well as fostering investments for a green global economy. With regard to ocean health, the most prominent targets concern the 30x30 commitment, striving to designate 30% of land and sea as protected, the objective of minimizing the impact of ocean acidification issues, and increasing the resilience of the marine ecosystem through mitigation, adaptation, and disaster risk reduction actions. In a further advancement, in March 2023, after more than a decade of talks and negotiations, UN Member States agreed on the text of the High Seas Treaty⁵ which, for the first time in history, sets out rules for the conservation and sustainable use of marine biological diversity beyond national jurisdiction. By providing the tools to establish and manage large-scale marine protected areas, the new treaty represents a substantial contribution to implementing the Kunming-Montreal Global Biodiversity Framework and its 30x30 pledge.

The value of Blue Natural Capital and the importance of its protection and restoration

Natural Capital consists of a stock of natural resources, both biotic, such as animals and plants, and abiotic. Some of these are renewable, such as food and water, while others are not, such as fuels and minerals. Societies rely on these resources and their functional processes for their well-being and prosperity. **Blue Natural Capital** corresponds to ocean-based natural resources that can be found in both coastal and marine ecosystems, such as marine animals and plants, seagrass

BLUE NATURAL CAPITAL
CORRESPONDS TO
OCEAN-BASED NATURAL
RESOURCES THAT CAN
BE FOUND IN BOTH
COASTAL AND MARINE
ECOSYSTEMS

5. United Nations General Assembly. (2023) 'Draft 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' [online] Available at: https://www.un.org/bbnj/sites/www.un.org/bbnj/files/draft_agreement_advanced_unedited_for_posting_v1.pdf (Accessed: 24 May 2023)

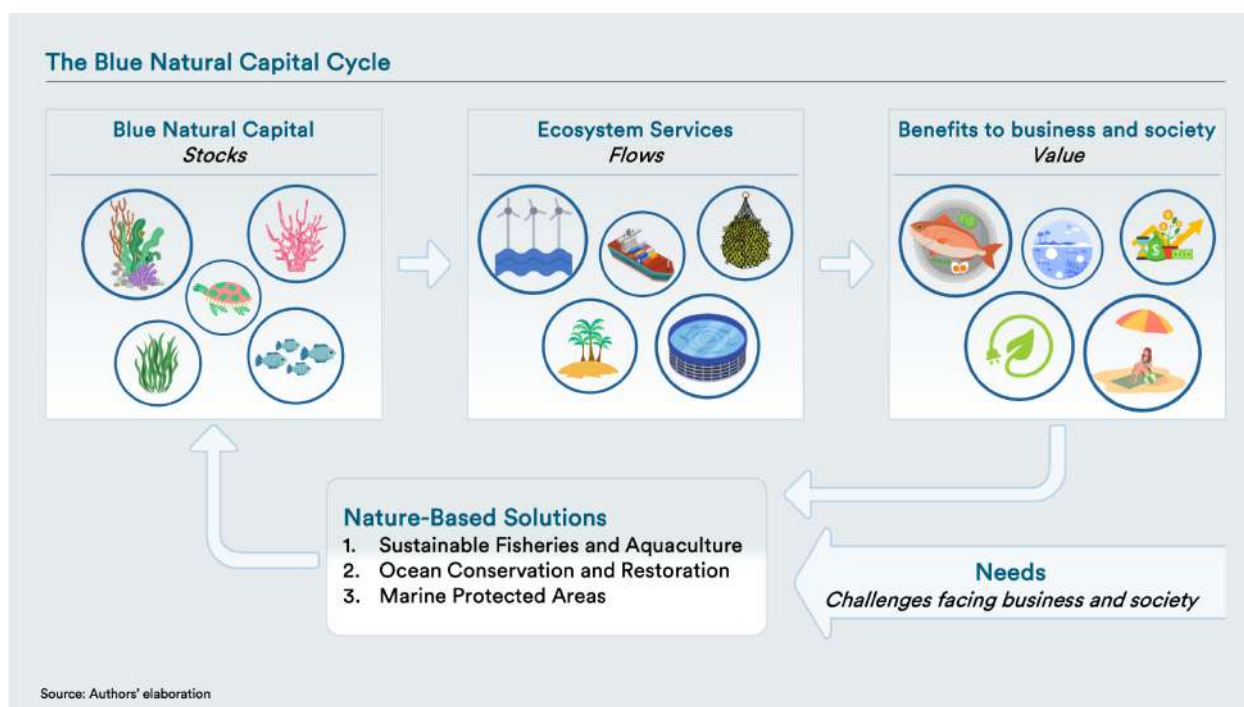
beds, mangrove forests, salt marshes, and coral reefs.

Annual revenues generated from ocean economy sectors are estimated at \$5.2 trillion⁶, while the ocean's total asset value is estimated at \$24 trillion⁷. Nevertheless, the value of Blue Natural Capital as an asset is much more complex to assess than some of the economic benefits it generates.

Stocks of natural resources and ecosystem services cannot easily be captured and measured due to their dynamic nature and nonlinear interactions, such as the value of ocean streams and tides, the role of the ocean as a carbon sink, the economic importance of sand production, and even the importance of the sea from a cultural perspective for diverse societies.

The Blue Natural Capital cycle (Figure 1) illustrates the interrelation between Blue Natural Capital, ecosystem services and solutions to meet needs and build resilience.

FIGURE 1: The Blue Natural Capital cycle



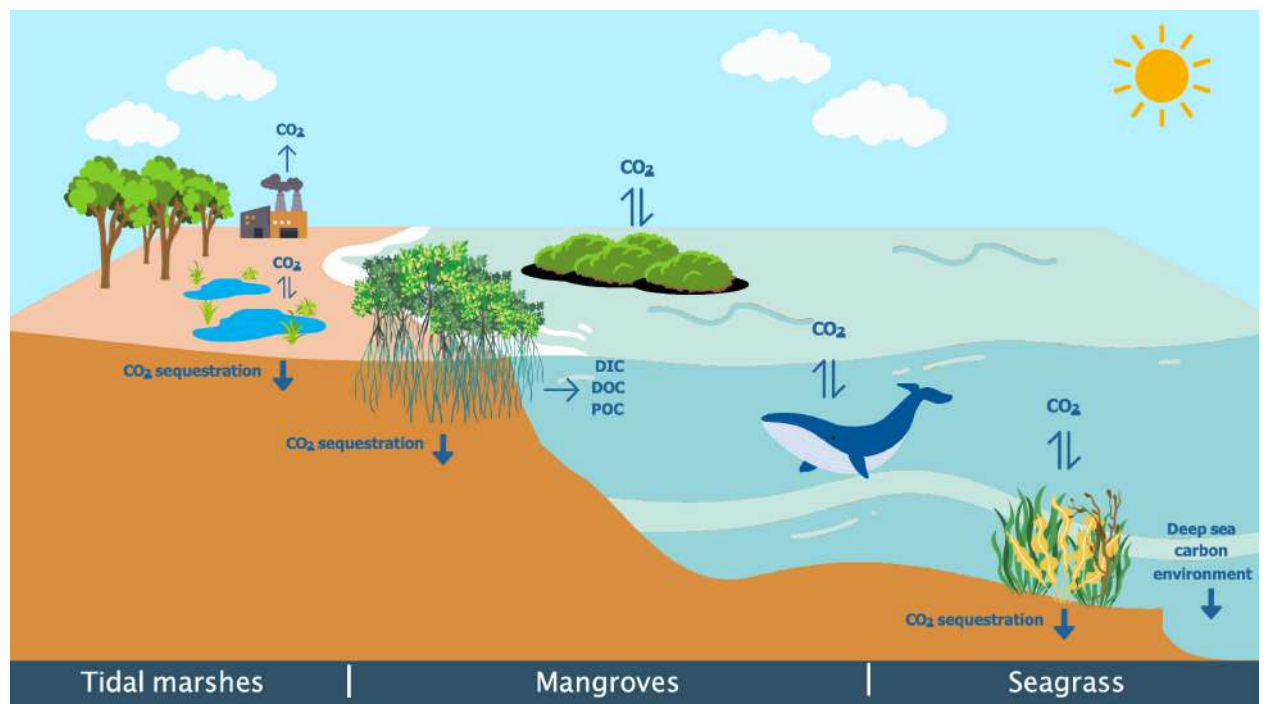
6. One Ocean Foundation, et al. (2020) 'Business for Ocean Sustainability - A Global Perspective - Second Edition. One Ocean Foundation' [online]. Available at: <https://oceandisclosureinitiative.org/> (Accessed: 15 May 2023)

7. Hoegh-Guldberg, O., et al. (2015) 'Reviving the Ocean Economy: the case for action' [online]. WWF International. Available at: <https://www.worldwildlife.org/publications/reviving-the-oceans-economy-the-case-for-action-2015> (Accessed: 15 May 2023)

Stocks of Blue Natural Capital ensure the availability of ecosystem services. Blue Natural Capital generates numerous resources and supports livelihoods through provisioning services, including tradable products and food. It also serves as valuable economic assets for businesses, such as fisheries and aquaculture farms for example. In addition, it provides cultural services associated with marine and coastal ecosystems that are paramount for tourism and recreational activities. Finally, it provides regulating and supporting services, such as air and water purification, climate regulation, erosion control and nutrient cycling. For example, mangrove forests, while securing habitat and food for marine species, provide water filtration and protection to human communities and infrastructures against natural disasters, such as storms, erosion and floods.

Marine and coastal ecosystems (Figure 2), represent important natural carbon sinks with the capacity to store large amounts of carbon over long periods of time, thus having significant potential for climate change mitigation. Blue carbon ecosystems in coastal areas have the potential to capture CO₂ and store it in their roots, stems and sediments, preventing emissions from being released for long periods of time. Finally, marine mammals, such as whales, play a pivotal role in the fight against climate change, facilitating both direct and indirect carbon sequestration.

FIGURE 2: Storage and exchange of carbon with marine and coastal ecosystems



Source: Author's elaboration

* DIC: Dissolved Inorganic Carbon, DOC: Dissolved Organic Carbon, POC: Particulate Organic Carbon

Protecting the whales: harnessing nature's climate change solution

Whales are pivotal in the fight against climate change⁸, as they are able to capture large amounts of CO₂, therefore constituting an important resource for the protection and conservation of Natural Capital. Whales, in fact, store carbon in their bodies during their lifetime; once dead, their carcasses sink to the bottom of the ocean, carrying all the carbon absorbed during their life, which is then stored in marine sediments.

Great whales can accumulate up to 33 tons of CO₂⁹, removing carbon from the atmosphere for centuries. Thanks to a phenomenon called whale pump, their interaction with phytoplankton contributes to the movement of the carbon to deeper layers of the ocean. Moreover, whales have a “multiplier effect” on phytoplankton populations: whales dive underwater to feed, but return to the surface to breathe or release fecal plumes which, being full of nutrients, are essential for the growth of phytoplankton, which in turn play a fundamental role in turning CO₂ into oxygen through photosynthesis. Researchers have reported that phytoplankton captures about 40% of the CO₂ produced every year, which is equivalent to the amount captured by 1.70 trillion trees and four Amazon forests¹⁰.

Anthropogenic threats, such as fishing activities (hunting and “ghost nets”), plastic pollution and noise pollution, still endanger whale populations. Scientific data shows that we have lost about 90% of the stock of large whales. Protection of whale populations is crucial for maintaining the health of marine and coastal ecosystems and constitutes a solution that vividly demonstrates the potential of natural resources.

8. Roman J., et al (2014) 'Whales as marine ecosystem engineers' [online]. *Frontiers in Ecology and the Environment*. Available at: <https://doi.org/10.1890/130220> (Accessed: 23 May 2023)

9. Chami, R., et al (2019) 'Nature's Solution to Climate Change: A strategy to protect whales can limit greenhouse gases and global warming. Finance and Development' [online]. International Monetary Fund. Available at: <https://www.imf.org/en/Publications/fandd/issues/2019/12/natures-solution-to-climate-change-chami> (Accessed: 23 May 2023)

10. Chami, R., et al (2019) 'Nature's Solution to Climate Change: A strategy to protect whales can limit greenhouse gases and global warming. Finance and Development' [online]. International Monetary Fund. Available at: <https://www.imf.org/en/Publications/fandd/issues/2019/12/natures-solution-to-climate-change-chami> (Accessed: 23 May 2023)

Ocean conservation and restoration call for the adoption of nature-based solutions

The existence of a strong interdependence between flourishing communities, thriving industrial sectors, and the preservation of Blue Natural Capital assets is paramount. Failing to acknowledge or mishandle this interdependence can result in the overexploitation of natural assets, which can lead to their permanent depletion and to the consequent decline of related economic activities.

Protecting and enhancing Blue Natural Capital is, therefore, fundamental to securing the benefits produced for current and future generations, leading to a more sustainable and resilient development at a local, regional, and global level.

Nature-based solutions (NbS), including both land-based and marine interventions, are emerging as a primary approach to reconstructing the function of Natural Capital by protecting and enhancing its functionality¹¹. These are actions involving the use of natural ecosystems while addressing climate and societal challenges¹². Nature-based solutions regard the restoration and conservation of natural habitats, but also include further innovations to mitigate climate change while preserving and restoring Natural Capital, thus enhancing human well-being. The coexistence of land-based and marine solutions has interrelated effects¹³, enhancing climate resilience, contributing to biodiversity conservation, and generating socio-economic benefits.

NATURE-BASED SOLUTIONS INCLUDE TECHNOLOGIES AND INNOVATIONS DESIGNED TO MITIGATE CLIMATE CHANGE, WHILE AT THE SAME TIME PRESERVE AND REPLENISH NATURAL RESOURCES

11. The Nature Conservancy. (n.d) 'What are nature-based solutions? - The Nature Conservancy [online] Available at: <https://www.natureprotects.org/posts/what-are-nature-based-solutions>

12. IUCN (2016) 'International Union for Conservation of Nature – Annual Report 2016' [online]. Available at: <https://portals.iucn.org/library/node/46619> (Accessed: 15 May 2023)

13. Shukla, P.R., et al (2019) 'Climate Change and Land: an IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems' [online]. IPCC. Available at: <https://www.ipcc.ch/site/assets/uploads/2019/11/SRCLL-Full-Report-Compiled-191128.pdf> (Accessed: 15 May 2023)

The UN Intergovernmental Panel on Climate Change (IPCC) has identified three types of marine nature-based solutions¹⁴:

- **Sustainable fisheries management.** Specific measures, such as fixing quotas within sustainable limits, increasing the mesh size of nets, and raising minimum catch sizes, but also developing more sustainable fishing techniques, support the protection of species from the consequences of fishing and climate change and safeguard the livelihoods of communities that depend on them.
- **Ocean ecosystem conservation and restoration.** These solutions, which include the restoration of mangroves, salt marshes, seagrass meadows and seaweed forests, can support biodiversity and protect communities from flooding and erosion, as well as providing effective ways to remove carbon dioxide from the atmosphere. Coral restoration is also an important solution to combat biodiversity loss due to climate change.
- **Marine Protected Areas (MPAs).** Well-identified, designed and managed MPAs, especially when they exclude fishing, can increase resilience to climate change and contribute to the protection, preservation and restoration of marine biodiversity and ecosystems by removing additional stressors on the environment. Currently, MPAs cover less than 8% of the ocean, while less than 3% of them are under high or full protection¹⁵. The scientific community has therefore been calling for more ambitious targets including the protection of at least 30% of land, coastal areas, the ocean and inland waters by 2030¹⁶.

14. IPCC (2022) 'Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change' [online]. Available at: <https://www.ipcc.ch/report/ar6/wg2/> (Accessed: 22 May 2023)

15. United Nations. (2022) 'The Sustainable Development Goals Report 2022' [online]. Available at: <https://unstats.un.org/sdgs/report/2022/> (Accessed: 15 May 2023)

16. Ensuring that by 2030 at least 30% of terrestrial, inland water, and coastal and marine areas are effectively conserved and managed is one of the targets of the "Kunming-Montreal Global Biodiversity Framework", adopted in Montreal by the 15th United Nations Convention on Biological Diversity (CBD).

Overall, preserving and reconstructing the ocean's Natural Capital through nature-based solutions is instrumental for human well-being and the global economy. These solutions support the protection and restoration of the marine environment, ensuring the provision of ecosystem services, addressing human needs and enhancing resilience against climate change impacts.

Collaboration between governments, stakeholders and local communities is fundamental for the successful implementation of nature-based solutions. They set the stage for cooperation opportunities between science, business and finance, enabling a multi-stakeholder approach to ocean conservation and restoration¹⁷. Chapter 4 delves into innovative nature-based solutions for protecting and restoring ocean ecosystems. Along with highlighting the benefits for the environment, they also represent a great opportunity for blue business creation, rewarding entrepreneurs and companies with a competitive edge.

17. United Nations (2017) Human Development Report 2016 [online]. Available at: <https://hdr.undp.org/content/human-development-report-2016> (Accessed: 15 May 2023)

Threats to marine ecosystems: urgent actions for ocean conservation

Human activities exert pressures on the ocean and, in recent decades, have quickly accelerated the degradation of marine and coastal ecosystems:

- **Ocean warming.** According to the IPCC, the temperature of the ocean surface increased, on average, by 0.88°C between 1850–1900 and 2011–2020, with 0.60°C of this warming having occurred only since 1980¹⁸. Ocean warming represents the main driver for both sea-level rise and oxygen depletion, which can have severe consequences on marine ecosystems, including loss of habitat and death of marine species.

- **Ocean acidification.** Since the Industrial Revolution, the acidity of the ocean surface has increased by about 30%, and it is projected to increase by another 100-150% by the end of the 21st century¹⁹. As the acidity of the ocean increases, its ability to absorb CO₂ from the atmosphere decreases, and so does its capacity to regulate climate change. In addition, ocean acidification can have harmful consequences on marine ecosystems.

- **Unsustainable fishing practices,** including overfishing, contribute to the depletion of fish stocks, altering the abundance of marine species populations and food webs. According to the FAO, the proportion of fishery stocks sitting within biologically sustainable levels fell to 64.6% in 2019, a staggering 25.4% lower than the 90% reported in 1974. The use of certain fishing gears, mainly demersal trawlers and dredgers, disturbs seafloor integrity and the associated habitats, with further consequences on the carbon stored within the sediments.

- **Contamination from oil spills,** chemical substances, and pollution from the introduction of marine litter – including “ghost nets” – have severe consequences on both water quality and marine biodiversity. Estimates show that more than 17 million tons of plastic ended up in the ocean in 2021, and this number is projected to double or triple by 2024. Plastic is currently the most abundant type of litter in the ocean, making up 80% of all marine debris found, from surface waters to deep-sea sediments.

- **Eutrophication,** which occurs when excessive amounts of nutrients enter the aquatic environment, usually in correspondence to estuaries and coastal waters, causing the overgrowth of algae (algal bloom) with detrimental effects on the marine ecosystem, including oxygen depletion and creation of dead zones.

18. IPCC (2022) 'Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change' [online]. Available at: <https://www.ipcc.ch/report/ar6/wg2/> (Accessed: 22 May 2023)

19. IGBP, et al (2013). 'Ocean Acidification Summary for Policymakers – Third Symposium on the Ocean in a High-CO₂ World.' International Geosphere-Biosphere Programme [online]. Available at: <https://unesdoc.unesco.org/ark:/48223/pf0000224724> (Accessed: 15 May 2023)



Chapter 2 — Unlocking awareness to enable ocean sustainability

The preservation and enhancement of Blue Natural Capital is fundamental for our planet. Companies are the primary actors responsible for exerting direct and indirect pressures on Blue Natural Capital. At the same time, they are the key players who can change its course.

Our findings show that despite the level of awareness of the negative pressures on the ocean having marginally increased, there deeper acknowledgement is still lacking. The recognition process is consolidating, but it is still progressing at a slow rate when compared to the growing threats to marine ecosystems and their alarming state. Achieving awareness is the starting point in championing ocean sustainability.

The level of companies' awareness of ocean-related issues has been measured both on the current state of adoption of Sustainable Development Goal 14 (SDG14) "Life Below Water" and on the acknowledgment of the negative pressures exerted on the ocean (measured on Good Environmental Status descriptors²⁰).

20. The Good Environmental Status (GES) descriptors are a set of criteria used to assess and monitor the ecological status of marine environments. For more information, refer to Annex III. All industries, whether interacting directly or indirectly with the ocean, have the potential to exert pressures on the 11 Good Environmental Status (GES) descriptors, which the European Commission identified in the Marine Strategy Framework Directive to describe "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive". The 11 GES have been categorized into the following three domains: Marine biological integrity and diversity: GES 1 Biodiversity, GES 2 Non-indigenous species, GES 3 Commercial fish and shellfish, GES 4 Food webs; Marine water contamination and chemical conditions integrity: GES 5 Eutrophication, GES 8 Contaminants, GES 9 Contaminants in seafood, GES 10 Marine litter; Seawater and/or seabed physical conditions integrity: GES 6 Sea-floor integrity, GES 7: Hydrographical conditions, GES 11: Introduction of energy including underwater noise.

SDG 14 “Life Below Water” remains one of the least prioritized SDGs by companies, but business attention has increased over the past 4 years

The United Nations 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals constitute a cornerstone in the collective efforts to tackle the most pressing global challenges. In particular, the SDG 14 “Life Below Water” sets specific targets for the conservation and sustainable use of the ocean, seas, and marine resources for sustainable development, and in fact can be considered as an indicator of the level of attention that companies devote to ocean-related issues.

For the analysis of companies mentioning SDG 14, our research project includes sustainability or annual reports (2021) from about 2,500 individual companies (see Annex I for detailed information).

Our findings suggest that 76% of the analyzed companies have committed to at least one SDG, compared to the 60% recorded in 2019²¹, with substantial growth across almost all of the 17 dimensions. This trend indicates that the adoption of Sustainable Development Goals has gained significant recognition within the business community.

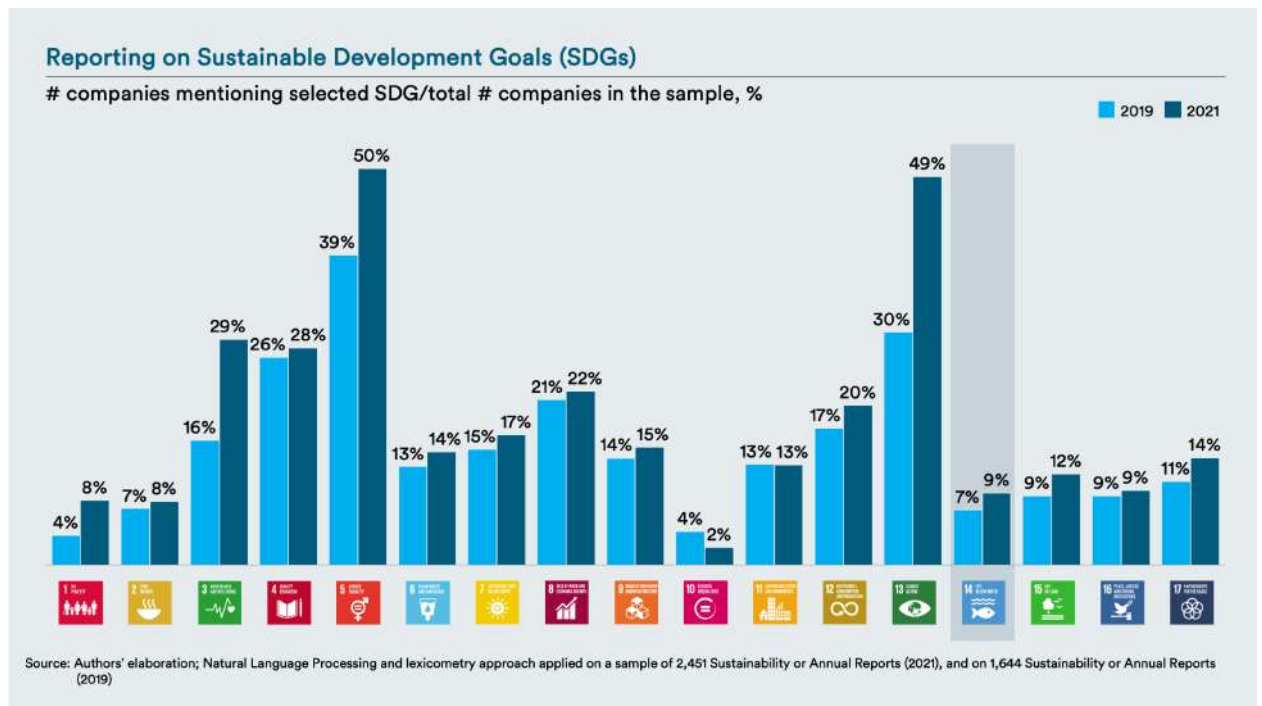
Figure 3 shows that of the 17 Goals, SDG 14 is included by just 9% of the companies assessed, making it one of the least prioritized among the environmental SDGs²². Companies mainly focus on SDG 5 “Gender Equality” and SDG 13 “Climate Action”. This comes as no surprise, since climate change and gender equality have been at the forefront of the “E” and “S” issues the business community has been trying to respond to in the last several years.

The attention to these issues has been facilitated by the standardization of reporting frameworks and supportive legislative measures, which have encouraged disclosure initiatives and further progress in addressing these pressing challenges.

21. One Ocean Foundation, et al (2020) ‘Business for Ocean Sustainability - A Global Perspective - Second Edition [online]. Available at: <https://oceandisclosureinitiative.org/> (Accessed: 15 May 2023)

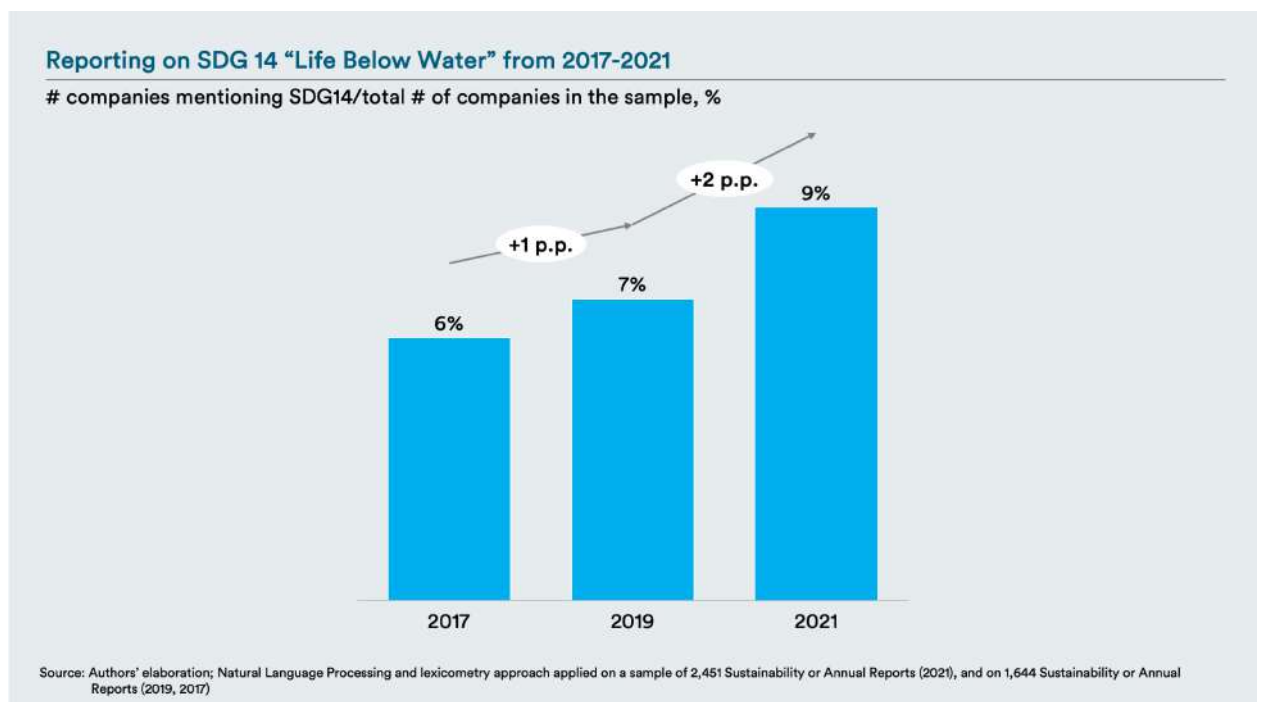
22. Environmental SDGs include: SDG 6 Clean water and sanitation, SDG13 Climate action, SDG 14 “Life Below Water”, SDG 15 Life on land.

FIGURE 3: Reporting on Sustainable Development Goals (SDGs)



However, despite being one of the least frequently mentioned, the **attention given to SDG 14 has followed an upward trajectory over the past 4 years**. Indeed, the number of companies referring to it has increased from **6% (2017)** to **9% (2021)** (Figure 4), bearing witness to a slight growth in awareness of ocean topics.

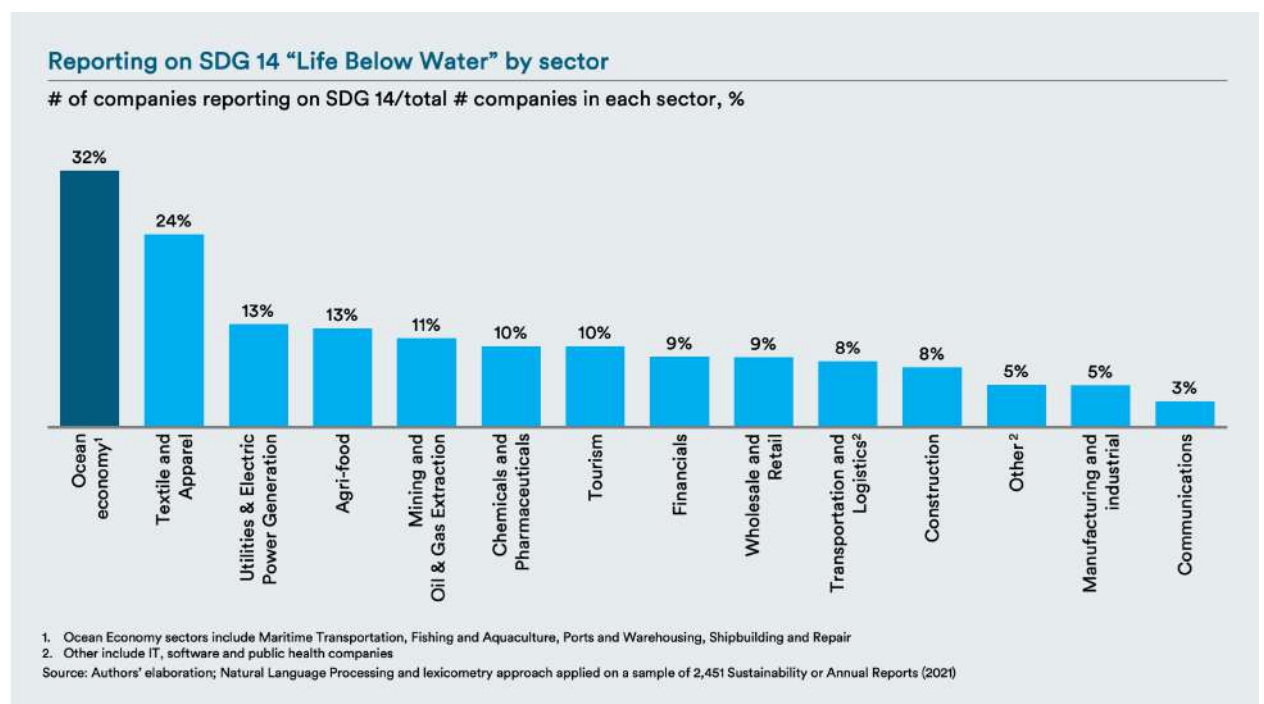
FIGURE 4: Reporting on SDG 14 “Life Below Water” from 2017-2021



Ocean economy companies lead the way in SDG 14 reporting

Attention to SDG 14 is confirmed as higher among companies operating in the ocean economy²³ due to their link with the marine environment. **32% of ocean economy companies include SDG 14 in their sustainability reports**, followed by the textile and apparel sector (24%) and the Utilities & Electric Power generation and Agri-food sectors (13%) (Figure 5). Mention of SDG 14 is relatively evenly distributed across the remaining sectors, at an average of approximately 9%.

FIGURE 5: Reporting on SDG 14 “Life Below Water” by sector



23. Ocean economy sectors include fishing and aquaculture, maritime transportation, shipbuilding and repair, and ports and warehousing.

The level of awareness of the negative pressures exerted on the marine environment has risen marginally, but deeper acknowledgement is still lacking

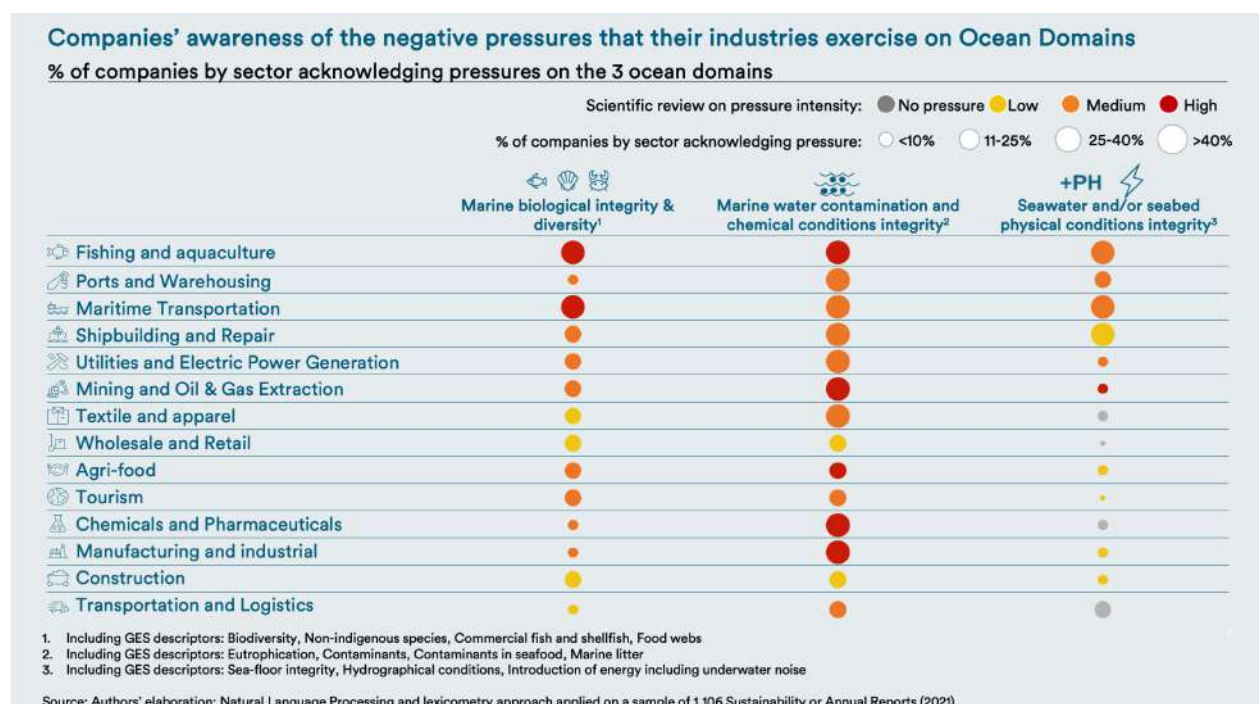
In order to measure the acknowledgment of the negative pressures exerted on the ocean based on the Good Environmental Status descriptors, we have identified a measure of “awareness”. We define companies as being “aware” of the negative pressures, considering both direct and indirect pressure, when they acknowledge at least one of the relevant pressures on selected ocean domains identified by ocean science experts (see Annex III for detailed information). The three ocean domains are derived from the GES descriptors introduced by the EU Marine Strategy Framework Directive and represent the main components of healthy marine ecosystems.

Our findings suggest that 52% of companies are aware of at least one of the pressures considered relevant by ocean experts for their sector. This marks a slight increase compared to 2019 (51%), thus showing an upward trend.

52% OF COMPANIES ARE AWARE OF AT LEAST ONE OF THE PRESSURES THEIR SECTORS EXERCISE ON THE OCEAN

When we look at awareness across sectors (Figure 6) it emerges that issues regarding marine water contamination and chemical conditions integrity are those most frequently mentioned by companies.

FIGURE 6: Companies' awareness of the negative pressures that their industries exercise on Ocean Domains



Indeed, on average, more than 40% of companies acknowledge these. According to ocean experts, most of the sectors exert high pressure precisely on this domain, and the high level of attention towards it highlights a positive trend. This level of concern can be considered as the result of growing attention from different stakeholders (e.g. media, policymakers, social movements, consumers).

Conversely, awareness of pressures on marine biological integrity and diversity and seawater and/or seabed physical conditions integrity remains limited. For example, despite the high intensity of pressures exerted by their industries, very few companies belonging to Utilities and Electric Power Generation, and Mining and Oil & Gas Extraction seem to be aware of the risks their activities generate for seawater and seabed physical conditions. Similarly, the Agri-food and Tourism sectors, despite exerting medium pressure on marine biological integrity and diversity, fail to adequately recognize this.

When taking a closer look at the ocean economy sectors, they appear to be on average more aware of the direct pressures exerted on the ocean than other sectors, specifically regarding issues under the ocean domain of seawater and/or seabed conditions integrity. In fact, at least 70% of companies in the maritime transportation sector acknowledge the pressures across all three ocean domains. The same applies to companies operating in fishing and aquaculture.

In the next chapter we investigate whether the business community has turned awareness into action, exploring the level of activation in companies with regard to ocean-related issues across different sectors.



Chapter 3 — From awareness to activation: the proactive approach of fundamental players in the world economy

As fundamental players in the world economy, organizations not only need to consider the value of the marine ecosystem and the impact that their actions have on it, they also must take a proactive approach towards protecting and safeguarding Blue Natural Capital.

The level of awareness of the pressures on the ocean and marine environment has increased slightly over the past years and some companies have started to intervene, through direct and indirect actions, to reduce their impact on the ocean environment.

Most of the companies engage in activities such as investment in product, process and supply chain innovations, which indirectly benefit the ocean. However, the most mature²⁴ organizations have started implementing actions with a direct impact on the protection of ocean and marine ecosystems.

Companies' awareness of their direct and indirect pressures on the ocean is consolidating. As a result, a number are taking action to mitigate their pressures

Our analysis, aimed at evaluating the level of activation in companies on ocean issues, has leveraged Generative AI (GenAI), an advanced Artificial Intelligence language model²⁵. GenAI has allowed us to analyze 400+ Sustainability Reports from six prioritized industrial sectors and identify the initiatives that companies are implementing to prevent/mitigate their pressures on marine and coastal ecosystems.

THE ACTIVATION SCORE MEASURES AND COMPARES THE ACTIVITIES THAT COMPANIES ARE CARRYING OUT TO BENEFIT MARINE ECOSYSTEMS

24. In this context, when mentioning “companies’ maturity” we refer to their activation score towards ocean-related actions. The higher the activation score is, the more mature the company.

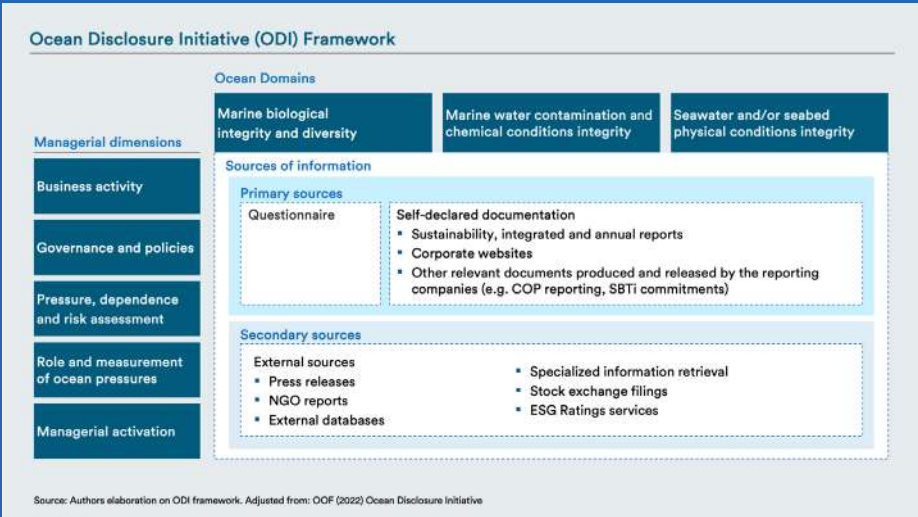
25. For any further information regarding the use of GenAI and the methodology, refer to Annex II

To measure and compare the activities that companies are carrying out and that benefit the marine ecosystems, an activation score has been developed at company level following the Framework set out by the Ocean Disclosure Initiative (ODI), with the aim of measuring the ocean sustainability practices implemented by organizations.

Ocean Disclosure Initiative overview

The Ocean Disclosure Initiative (ODI), introduced by the One Ocean Foundation in September 2021, stands out as the first ocean disclosure framework and rating methodology that provides comprehensive support in guiding businesses in assessing and disclosing the pressures exerted on marine ecosystems and taking action on ocean-related issues, promoting prevention, mitigation and remediation responses. The ODI framework considers 3 main ocean domains and 5 fundamental managerial dimensions, which are combined to create an integrated matrix that assesses each managerial dimension across all the marine environment domains (Figure 7).

Figure 7: Ocean Disclosure Initiative Framework



The three ocean domains group together the 11 Good Environmental Status (GES) descriptors identified by the EU, thus representing the main components of healthy marine ecosystems, whose preservation and good status is paramount for a fully functional ocean.






The managerial dimensions, used to analyze the levels of awareness and activation of the companies in our sample, are intended to provide companies with the opportunity to disclose their level of acknowledgement related to the direct and indirect pressures exerted on marine ecosystems, and the initiatives implemented to prevent and/or mitigate them. The ODI methodology is scientifically robust, employing a combination of primary and secondary sources of information. These sources are carefully integrated to create a comprehensive assessment, evaluation, and scoring system. Specifically, primary sources consist of a questionnaire addressed directly to firms, integrated with information gathered through the review of self-declared documentation such as sustainability reports. Secondary sources of information, meanwhile, are used to complement the information gathered directly from the company and provide insights related to actual or potential controversies involving the reporting companies.

ODI provides a shared language for companies, scientific and financial communities, and civil society to address and mitigate the significant pressures humanity places on our ocean. By integrating with existing sustainability disclosure frameworks, ODI complements global sustainability reporting standards, adding a specific dimension focused on ocean sustainability.

The activation score has been calculated considering 4 ODI Managerial Dimensions and 11 actionable initiatives (Figure 8). It ranges from 0-100% and is calculated as the ratio of the number of actionable initiatives implemented by each company over the total number of actionable initiatives²⁶.

THE ACTIVATION SCORE IS CALCULATED TAKING INTO ACCOUNT 4 ODI MANAGERIAL DIMENSIONS AND CONSIDERS THE NUMBER OF ACTIONABLE ACTIVITIES IMPLEMENTED OVER THE TOTAL NUMBER OF POSSIBLE ONES

FIGURE 8: Activation score on ODI Dimensions

Activation score on ODI Dimensions					
Managerial Dimensions	 Governance and policies	 Pressure, dependence and risk assessment	 Role and measurement of ocean pressures	Managerial activation	
				 Directly Ocean related	 Indirectly Ocean related
Actionable Initiatives	<ol style="list-style-type: none"> 1. Ocean Policy 2. Board oversight on ocean-related issues 	<ol style="list-style-type: none"> 3. Risk analysis on ocean-related issues 	<ol style="list-style-type: none"> 4. Ocean-related Targets and KPIs 	<ol style="list-style-type: none"> 5. Innovation for the oceans 6. Partnerships 7. Engagement, education & awareness initiatives 8. Ocean-related certifications 	<ol style="list-style-type: none"> 9. Product innovation 10. Process innovation 11. Supply chain innovation

Source: Authors' elaboration

The four Managerial Dimensions considered are:

1. **Governance and policies** - evaluating if and how companies integrate ocean-related issues in their **policies**, and if the **board oversees** such topics so that firms' commitment translates into formal governance structures and/or initiatives.
2. **Pressure dependence and risk assessment** - investigating whether firms carry out **systematic analysis** of the direct and indirect pressures they exert on the marine environment and of the risks to which they are exposed regarding the most significant ocean-related issues.

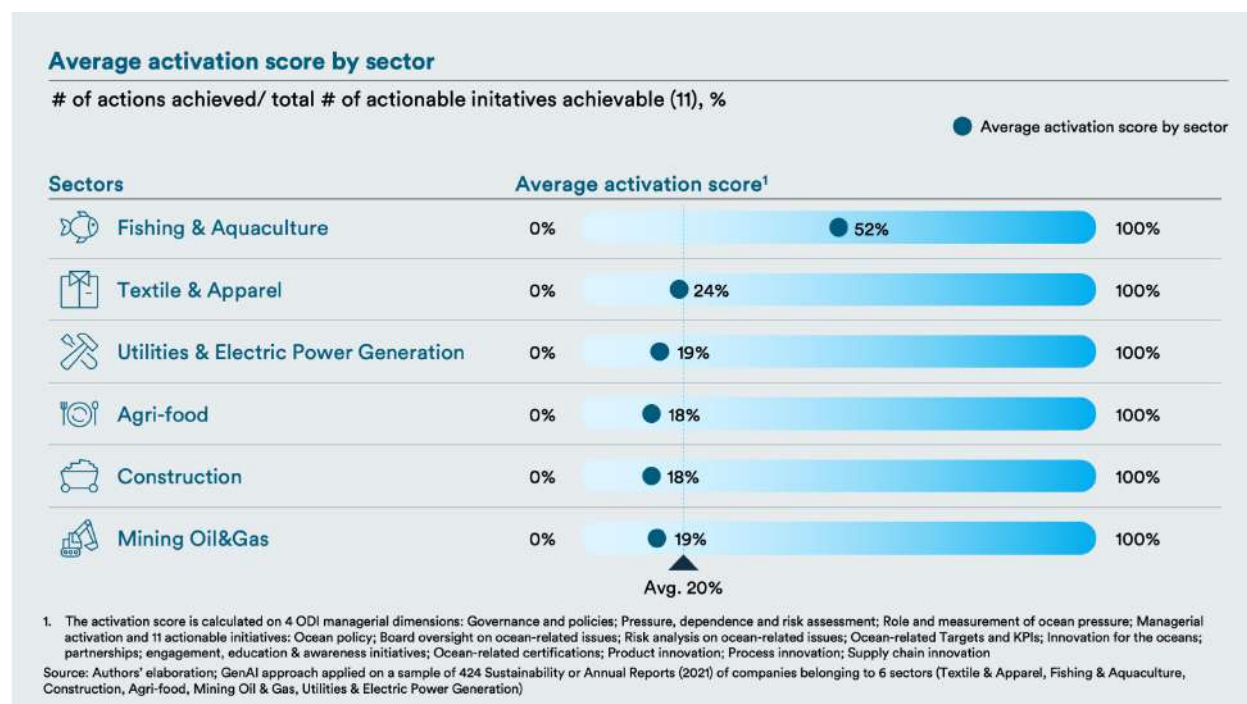
26. The total score is calculated as the average score achieved on 11 actions relative to the 4 ODI dimensions. In detail, for 8 actions, the score was either 0 or 1, for 3 actions, the score ranged between 0-1 (according to the number of sub-actions identified over total possible actions (number different for each sector)).

3. Role and measurement of ocean pressures - examining whether companies have integrated marine and coastal ecosystem preservation in their long-term strategy, setting specific **ocean-related targets or KPIs**.

4. Managerial activation - focusing on the activities put in place to address pressures on marine ecosystems. These include mitigating activities that are **directly related to ocean protection** (e.g. certifications, ocean-focused innovation, partnerships, engagement, education and awareness initiatives) and activities that are **indirectly beneficial** to them (e.g. product, process, supply chain innovation).

Our findings suggest that the activation score²⁷ of the companies in the sample is **generally low**, with an average **activation score by company of 20%** (Figure 9). This implies that, on average, each company is active on less than 2 actionable initiatives for ocean preservation, leaving much room for progress and improvement.

FIGURE 9: Average activation score by sector

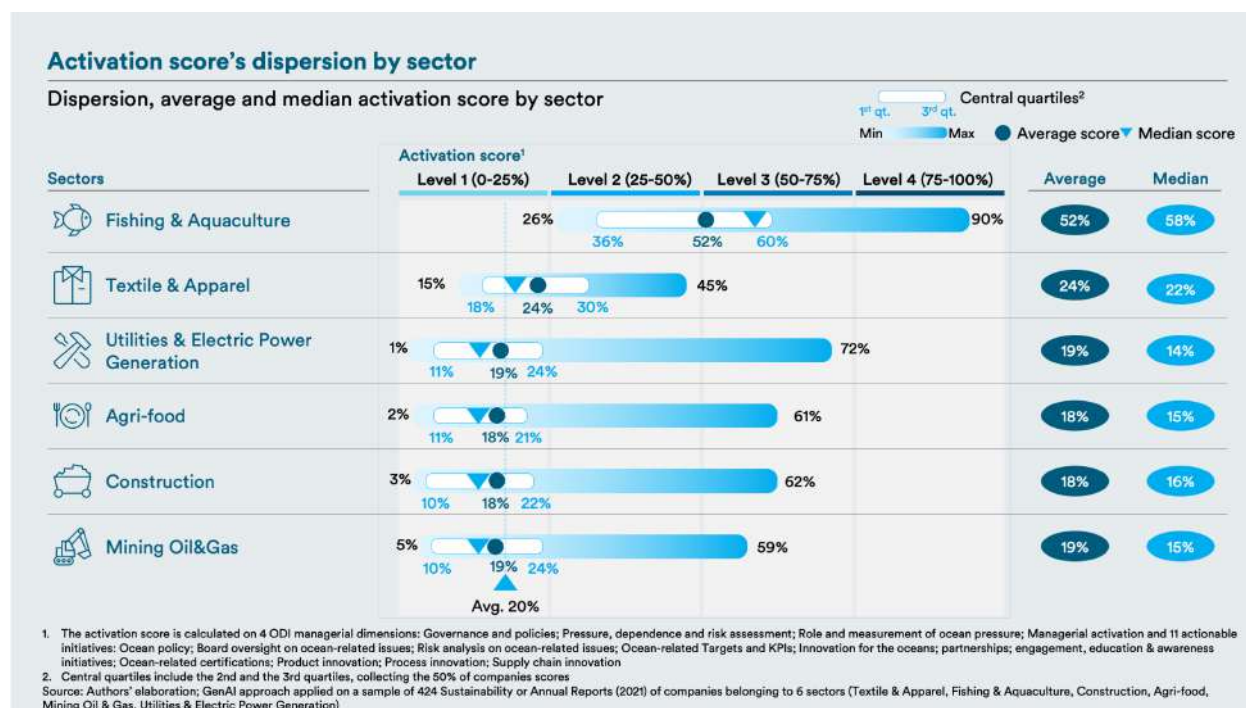


27. The level of activation of a company is calculated as the ratio of the number of activities carried out by a company compared to the total number of actions on which it is evaluated

The Fishing & Aquaculture sector stands out as the most active one with an average activation score²⁸ of 52%. This could be attributed to several factors, such as the sector's nature and its dependence on natural resources, and the need to comply with marine-related regulations. The other sectors show similar behavior, with average results very close to or below the total average (20%), with the exception of Textile & Apparel, scoring 24%.

In order to understand how company behavior differs within the same industry, we looked at the dispersion of the activation scores. The significant dispersions of companies' activation across sectors (Figure 10) denotes a certain heterogeneity among the companies. Fishing & Aquaculture is the sector with the highest dispersion, highlighting the co-existence of both top performers (i.e. companies active in all or almost all of the actionable initiatives to prevent/mitigate the pressures exerted on the ocean) and laggards. The Textile & Apparel sector, on the other hand, has the lowest dispersion range, indicating a more homogeneous pattern.

FIGURE 10: Activation score's dispersion by sector



28. The sector activation level is calculated as the average score of the companies belonging to the sector

Furthermore, the analysis suggests that in almost all sectors, there are only a few best performers, indicating that some companies are leading the way in adopting sustainable practices, while the rest have an activation score very close to or below 20%. The median level of activation in the different sectors is in fact often below average. The Fishing & Aquaculture sector stands out as an exception, with the median above the average. This suggests that most companies in the sector are performing well, with a high level of commitment to ocean-related sustainability practices.

Finally, by splitting the companies into 4 levels of activation (Figure 11) it emerges that the vast majority (75%) have an activation score below 25%, therefore corresponding to Level 1 and only <1% have an activation score higher than 75% (Level 4).

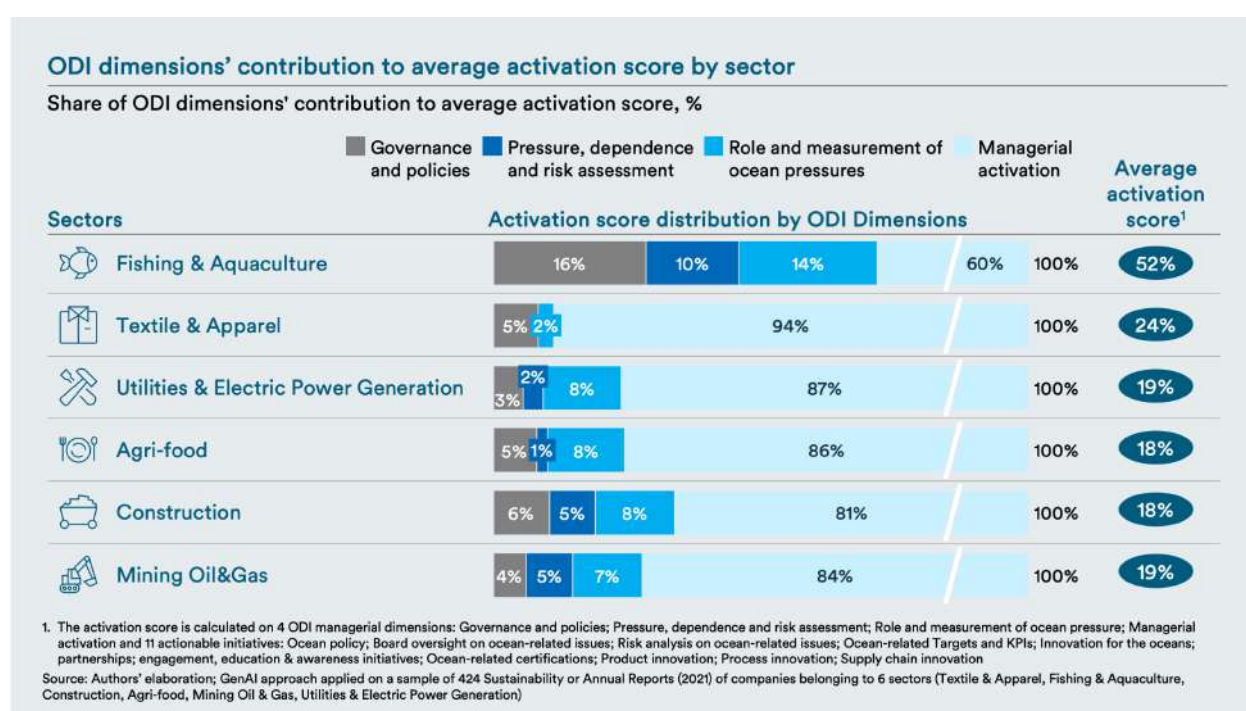
FIGURE 11: Companies' distribution by level of activation



While many companies are adopting measures that indirectly benefit the ocean, only a limited number have implemented structured governance, policies or processes to measure their impacts on the ocean

The activation score is mainly driven by the managerial activation dimension, which contributes to 60-90% of the activation score across sectors (Figure 12). Only a few companies have already implemented **structured governance** and **specific policies** for the ocean, as well as **assessment and risk analysis procedures**, or processes aimed at the **measurement of ocean impacts**.

FIGURE 12: ODI dimensions' contribution to average activation score by sector



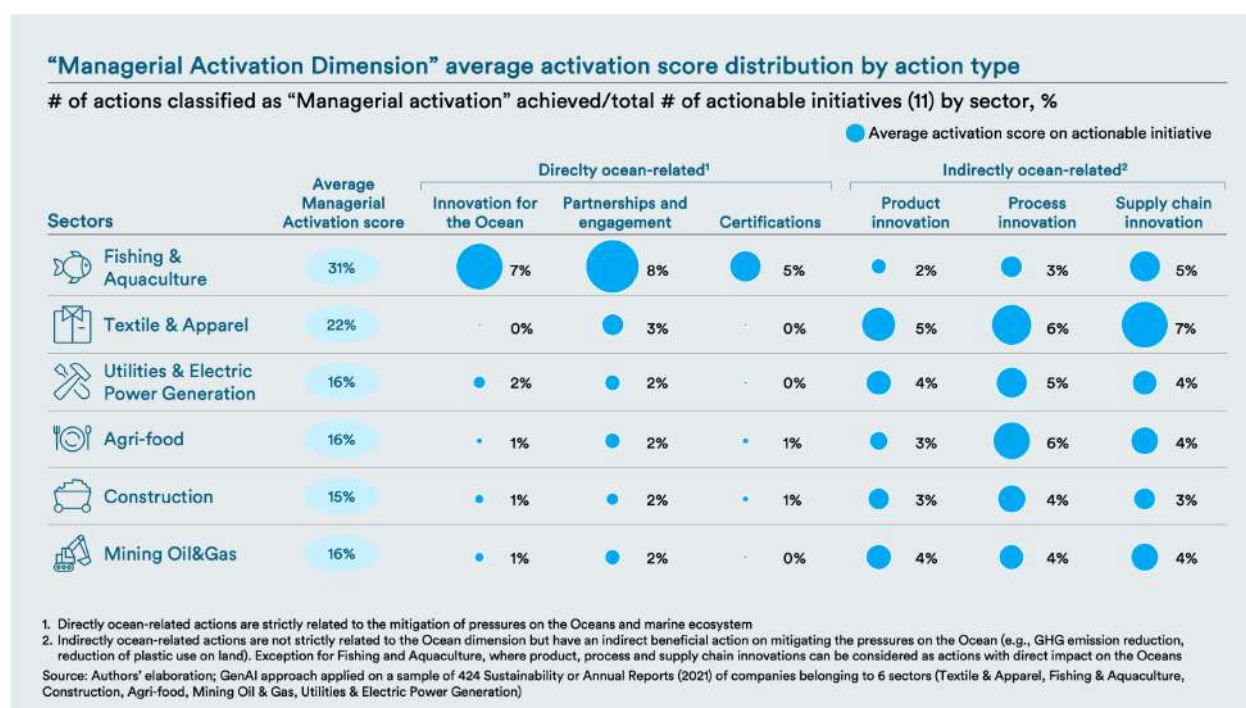
Companies in the Fishing & Aquaculture sector, due to their nature and characteristics, seem ahead of the others, having structured more thorough **ocean-related governance**, such as allocating responsibilities at the board level, introducing ocean-related policies, or dedicating sections of their environmental policy to the protection of ocean and marine ecosystems.

The number of companies conducting **pressure, dependence and risk assessment** on ocean-related topics is slightly higher in those sectors with a higher probability of operating in direct contact with the marine environment, such as Fishing & Aquaculture, Mining Oil & Gas and Utilities & Electric Power. However, the number of companies that formalize such risk assessment remains low.

The measurement of companies' pressures on the ocean, with the introduction of KPIs and/or targets is relatively widespread, with examples of companies monitoring the release of polluting substances that might affect marine biodiversity and habitats, while others are engaged in conducting regular inspections of the maritime areas they operate on.

The managerial activation dimension has been evaluated in two sub-dimensions: directly and indirectly ocean-related (Figure 13). The first includes actionable initiatives that are undertaken by companies to address ocean sustainability, while the second includes initiatives not explicitly designed to address ocean sustainability, but which nevertheless have a positive impact on it. Our analysis shows that whereas all sectors **perform indirectly ocean-related actions** to mitigate their pressures on the environment and marine ecosystems, only the **Fishing & Aquaculture sector** extensively performs **directly ocean-related actions**.

FIGURE 13: “Managerial Activation Dimension” average activation score distribution by action type



With regard to directly-ocean related managerial actions, while the sectors' general level of activation remains low, several companies are building **partnerships** to directly prevent or mitigate their pressures on marine ecosystems. For example, various organizations in the fashion world have signed up to the Fashion Pact, a global coalition committed, among several streams of initiatives, to protecting the ocean, while other companies partner with NGOs and establish, or participate in, sector-specific coalitions to finance projects aimed at protecting or restoring marine biodiversity and habitats, such as projects aimed at restoring mangroves forests, coral reefs or planting *Posidonia oceanica*.

Educational programs on ocean-related issues or cooperation with scientific research centers to promote education and knowledge also exist. The Fishing & Aquaculture sector, with over 80% of companies involved in ocean-related partnerships, is particularly focused on building collaborations aimed at promoting innovations and new technologies, such as monitoring instruments aimed at fostering ocean conservation.

Only a few companies, apart from those belonging to the Fishing & Aquaculture sector, hold **ocean-related certifications** or invest in **ocean-related innovation**. Some of the most interesting innovations include the launch of new product lines incorporating new materials sourced from ocean-plastic, the development of innovative technological systems to minimize noise generation in the seabed, or the development of coastal restoration projects that simultaneously restore oyster reefs.

Our analysis, with the aid of Generative AI, has carefully evaluated customized actions for each sector under the three **indirectly ocean-related managerial actions**. Among the most common activities identified and evaluated as “**Product innovation**” are the use of recycled or recyclable materials, implementation of Life Cycle Assessment strategies and eco-design choices. The Textile & Apparel sector, given its nature, emerges as being the most focused on reducing its environmental impact through product innovation. Indeed, most of the companies analyzed in the Textile & Apparel sector include recycled/recyclable and sustainable materials in their products and are committed to reducing the use of plastics in their products²⁹.

29. For deep dive analysis, please refer to Annex III

Under the sub-dimension of “**Process innovation**”, circular economy practices are becoming more relevant, especially for the Textile & Apparel and the Agri-food sectors, as are waste reduction measures and energy efficiency. Almost all the companies across every sector monitor GHG emissions, whose reduction is fundamental for mitigating the anthropogenic pressures on the ocean.

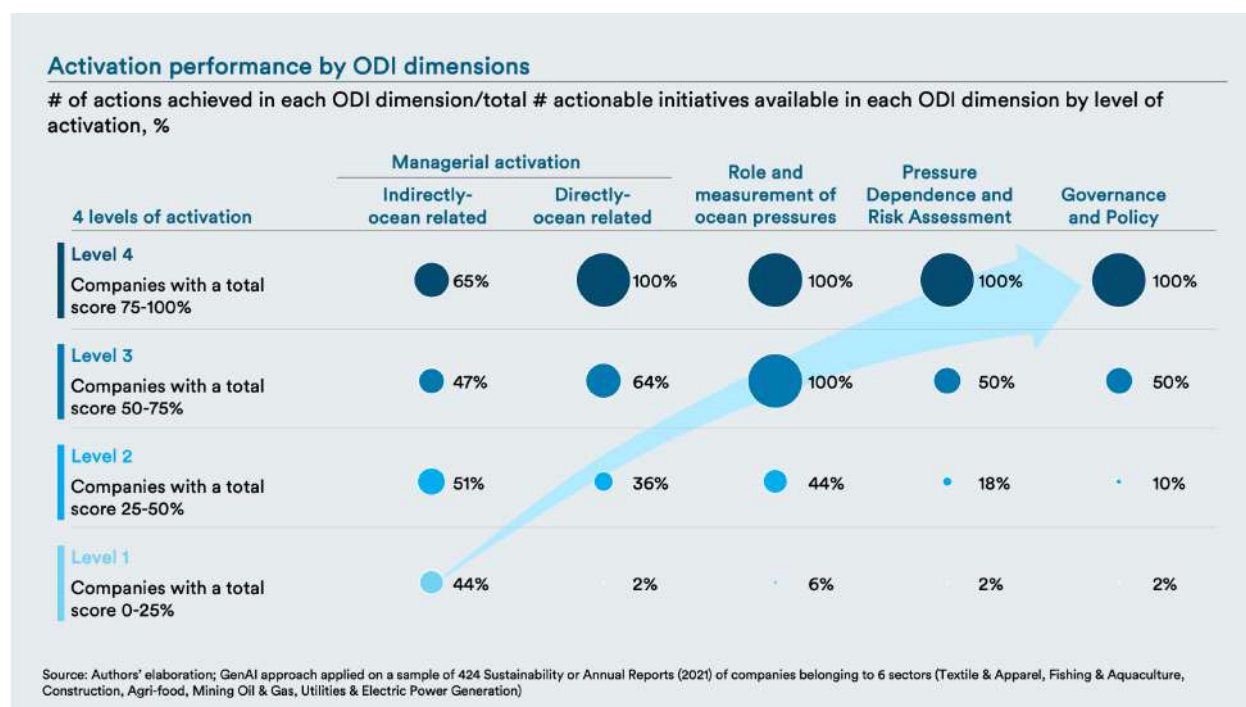
Companies are also carrying out a range of actions within “**Supply chain innovation**” to foster more sustainable behaviors. Traceability is among the main concerns for the Textile & Apparel and the Agri-food industries, while all sectors are incorporating ESG criteria into the supplier selection process, with a particular focus for companies belonging to the Textile & Apparel, Construction, Fishing & Aquaculture and Agri-food sectors. Most of the companies in the sample track Scope 3 emissions and have introduced sustainable transportation choices.

The more companies' maturity towards ocean preservation increases, the more they are active on all ODI dimensions

Our analysis (Figure 14) highlights that the more companies' maturity³⁰ increases, the more they start structuring ocean-related governance and developing risk assessment processes, focusing on a wider range of long-term strategic planning for the implementation of advanced ocean sustainability practices, complemented by the setting of ocean specific targets and KPIs. On the other hand, companies that score lower on the activation scale (level 1-2) tend to focus only on managerial actions, partially setting targets and KPIs, reacting to the various issues without a clear strategic and governance view.

COMPANIES' MATURITY REFERS TO THEIR ACTIVATION SCORE TOWARDS OCEAN-RELATED ACTIONS. THE HIGHER THE ACTIVATION SCORE IS, THE MORE MATURE THE COMPANY

FIGURE 14: Activation performance by ODI Dimensions



30. In this context, when mentioning “companies’ maturity” we refer to their activation score towards ocean-related actions. The higher the activation score is, the more mature the company.



Chapter 4 — From risk mitigation to business opportunity

The preservation of coastal and marine ecosystems poses new challenges to most companies, many of which are yet to acknowledge their direct and indirect pressures (e.g. those caused by inland activities) and are not fully aware of the risks associated with the deterioration of ocean ecosystems.

For most of the companies directly addressing ocean-related topics, the actions taken are still focused on a reactive approach, acting on risk mitigation to meet compliance and minimum requirements, with a general lag in the formalization of strategies to address ocean challenges in terms of governance and policies.

However, an increasing number of companies belonging to various industries, not limited to the ocean economy sectors, are recognizing the potential of embracing "blue" as an opportunity. In particular, the more the companies' maturity increases, the more the organizations address ocean-related topics not only in terms of risk mitigation, but also as an opportunity. These companies are beginning to acknowledge the fact that the blue economy³¹ can facilitate value generation options, both through new innovations to mitigate pressures and nature-based solutions focused on protecting ecosystem services and marine conservation.

31. The concept of Blue Economy (UNCSD 2012) was designed to initiate a transformative process that would allow traditional marine activities ("Ocean-Based Economy") to be carried out in the future without compromising the proper functioning of the oceans and their provision of ecosystem goods and services while at the same time promoting equity and social welfare. In this paper, we distinguish the traditional Ocean-Based Economy from the "Blue Economy."

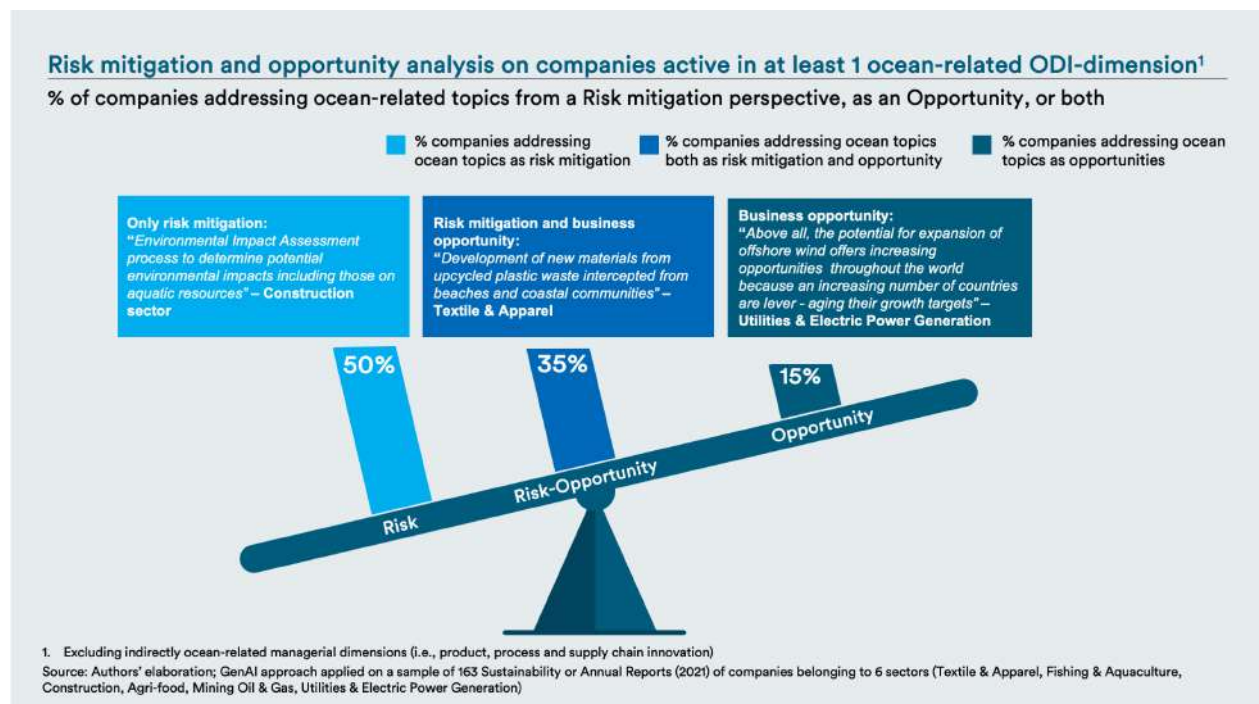
As companies mature and increase their level of activation on ocean-related topics, the more likely they are to view ocean-related issues also as opportunities rather than simply risks to be mitigated

The analysis has leveraged GenAI technology to capture the terminology companies use in their Sustainability or Annual Report when referring to ocean-related topics.

Our findings show how, focusing on a sub-sample of companies that is only active on ocean-related Managerial Dimensions (thus excluding, for the purpose of analysis, indirectly ocean related managerial activation actions), the behavior is primarily focused on risk mitigation. 50% of companies in the sample, in fact, address ocean-related topics only in terms of risk mitigation, 35% both as risk mitigation and as an opportunity, and only 15% are focused on business opportunities (Figure 15).

50% OF THE COMPANIES ANALYZED VIEW OCEAN RELATED ISSUES AS RISK MITIGATION ONLY, 35% SEE THEM AS BOTH A RISK AND OPPORTUNITY AND 15% PERCEIVE THEM AS A CHANCE FOR BUSINESS GROWTH

FIGURE 15: Risk mitigation and opportunity analysis on companies active in at least 1 ocean-related ODI-dimension



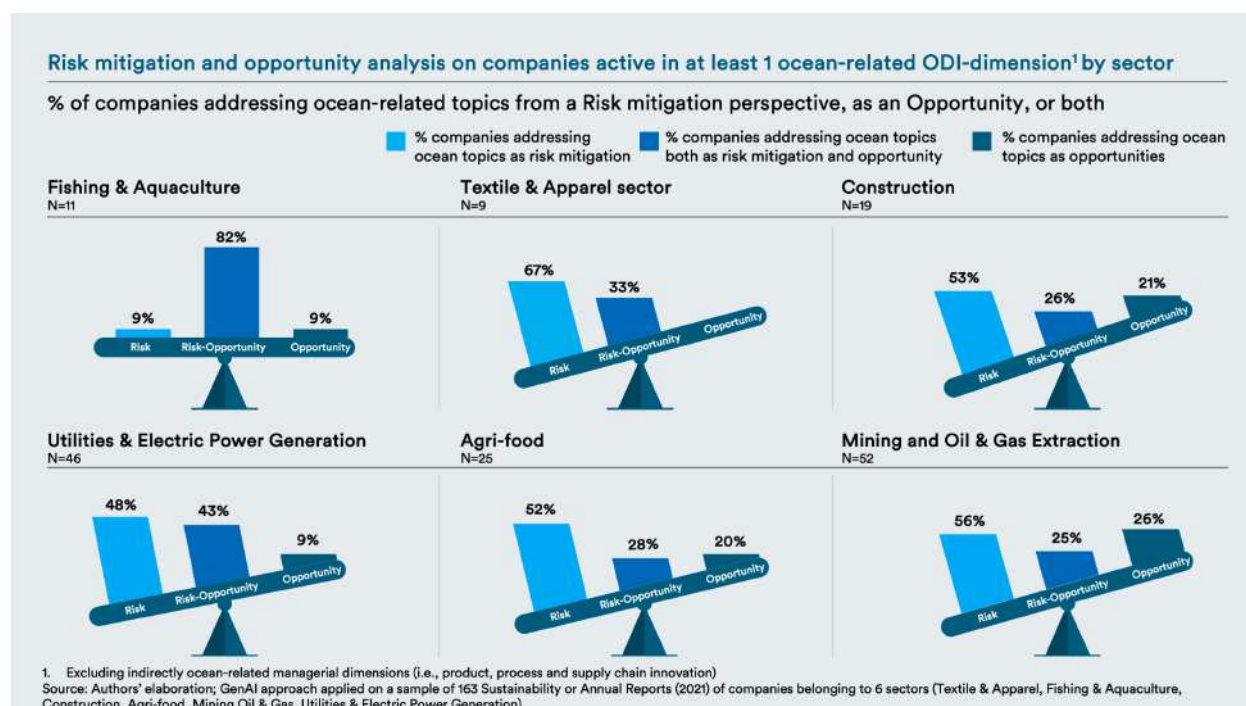
These results suggest that a vast majority of companies still address ocean-related topics from a risk mitigation perspective, for example structuring risk assessment processes to determine and mitigate pressures on aquatic resources, implementing prevention activities to avoid dangerous spills, joining or establishing partnerships, like cooperating with NGOs to support ocean protection and restoration projects.

A small portion of companies address ocean topics only as an opportunity to generate value. This is often the case of companies generating energy within the marine environment, as well as sea-farming or fishing.

Other companies simultaneously recognize the importance of risk mitigation and the opportunity of generating value by protecting the ocean. These companies invest in projects aimed at creating new products made from plastic recovered from the ocean, investing in the restoration of marine biodiversity and leveraging the potential for blue carbon sequestration, investing in ocean harvesting technologies to generate green energy and at the same time preventing potential damages to marine ecosystems.

The sector-specific behavior reflects the overall pattern, with a general predominance towards risk mitigation (Figure 16), with the exception of Fishing & Aquaculture, where 82% of companies address ocean issues both as risk mitigation and as an opportunity.

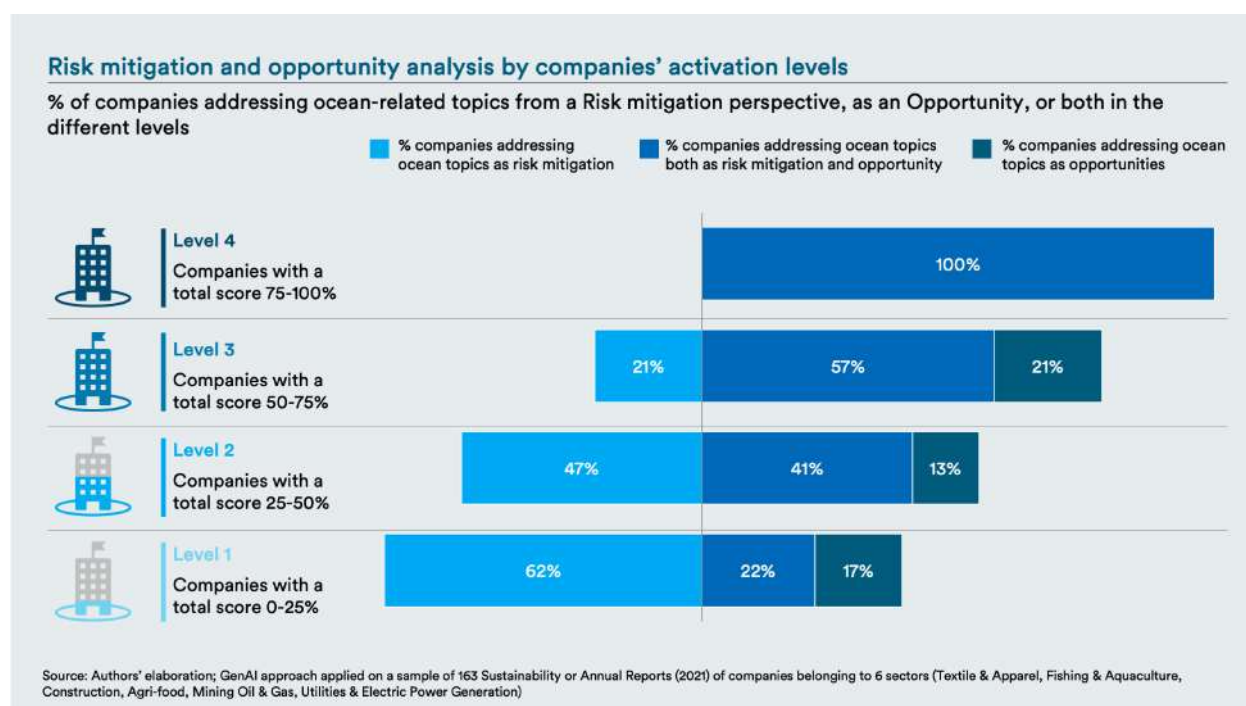
FIGURE 16: Risk mitigation and opportunity analysis on companies active in at least 1 ocean-related ODI-dimension by sector



Furthermore, our analysis highlights that, as companies mature and increase their level of activation on ocean-related topics, the more likely they are to view ocean-related issues also as opportunities rather than simply risks to be mitigated. Companies with an activation Level of 1 and 2 mainly address ocean topics in terms of risk mitigation, whereas companies with the highest levels of activation (Level 3-4), show greater focus on addressing ocean topics also as potential business opportunities. This suggests that as companies become increasingly conscious of the pressures they exert on the ocean and take steps to mitigate them, they also begin to see the potential for creating value through sustainable practices that benefit both their business and the environment itself.

In conclusion, while there is still much work to be done, the trend is moving in the right direction. As companies continue to mature in their approach towards ocean sustainability, we can expect to see a greater emphasis on creating value through sustainable practices that benefit both businesses and the environment.

FIGURE 17: Risk mitigation and opportunity analysis by companies' activation levels

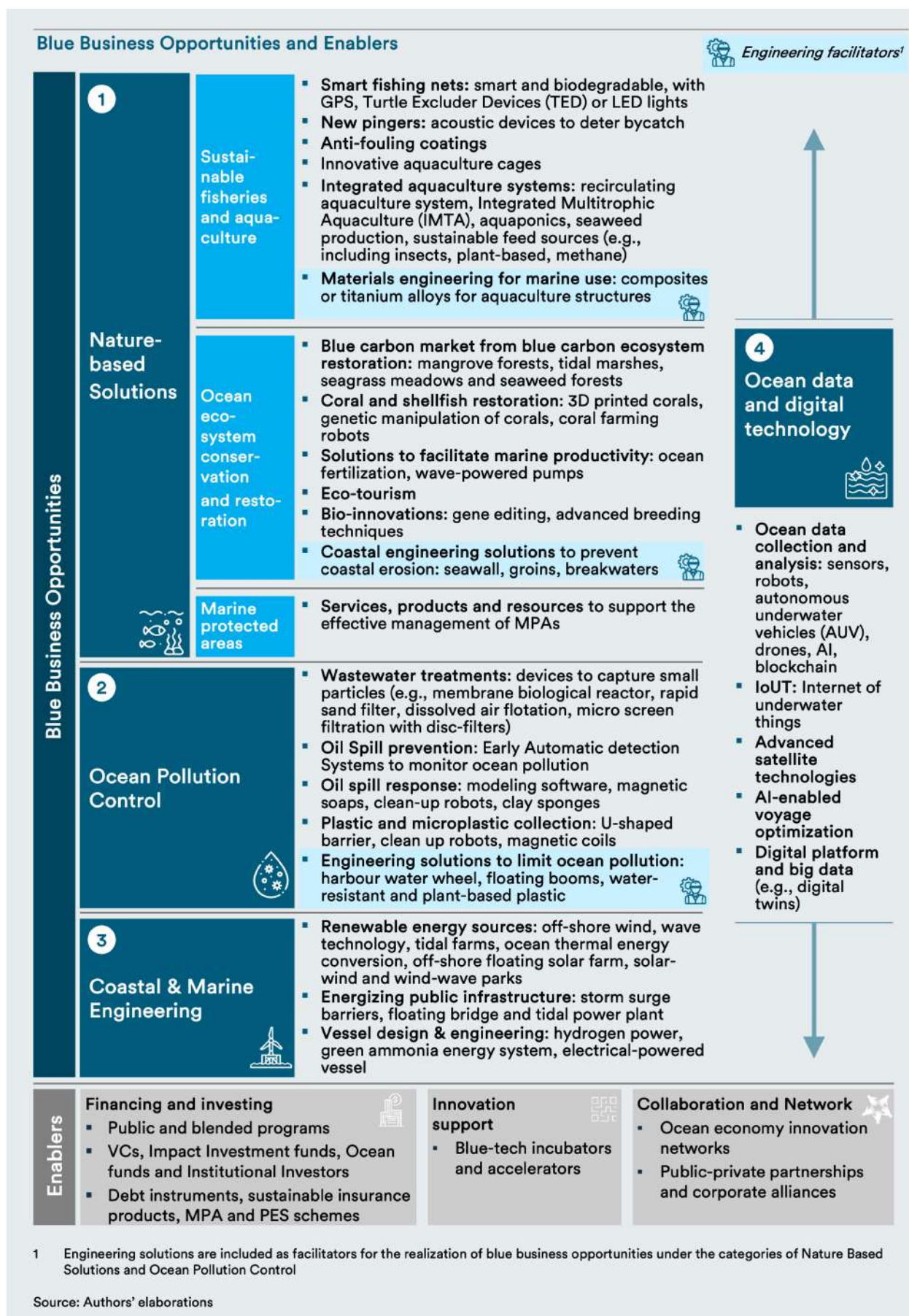


Unlocking Blue Business Opportunities

Blue business opportunities have the potential to generate value for companies by cutting costs, enhancing efficiency, creating new sources of revenue, fostering organizational resilience and improving reputation and brand image. Companies are beginning to acknowledge this potential, which, if realized, could significantly impact the trajectory of sustainable innovation and practices for marine and coastal ecosystems, providing strong incentives for their adoption.

In this report, we have identified examples of blue business opportunities and key enablers to drive the expansion of blue businesses (Figure 18). The blue business opportunities have been classified into 4 categories. The first is **Nature-based Solutions** and includes sustainable fisheries management, ocean ecosystem conservation and restoration, and Marine Protected Areas (MPAs). The second is **Ocean Pollution Control**, the third **Coastal and Marine Engineering** and the last **Ocean Data and Digital Technology**.

FIGURE 18: Blue Business Opportunities and Enablers



1. Nature-based Solutions include the following opportunities:

— **Sustainable fishing and aquaculture:** Technology-driven solutions to support the implementation of more sustainable fishing practices include the development of innovative types of **smart fishing nets** as well as acoustic devices (i.e. “pingers”) capable of repelling non-targeted species. Similarly, promising business solutions aimed at mitigating the pressures exerted by the aquaculture sector include the development of **new types of cages** to avoid the escape of farmed species, the application of **integrated aquaculture farming systems**, including the production of seaweed, and the production of feed from more sustainable sources, such as insects and plants like algae. In this regard, engineering facilitators to support the sustainability of fishing and aquaculture sectors include **advanced materials applications**, such as the utilization of composites or titanium alloys in durable aquaculture structures.

— **Ocean conservation and restoration:** Nature-based solutions that enhance the storage and protection of blue carbon can provide opportunities for companies that specialize in carbon offset and carbon credit. These companies can help businesses offset their carbon emissions by investing in **blue carbon projects that capture and store carbon**, such as the conservation and restoration of mangrove forests, wetlands, seagrass meadows and seaweed. Moreover, innovations in the field of **coral restoration**, based on both biological innovations and engineering solutions, are increasingly gaining ground and helping to restore reefs. Equally interesting are the solutions focusing on the growth of **shellfish** organisms that are natural filter feeders. **Ocean fertilization** and the installation of **wave-powered pumps** that favor the upwelling of nutrients are opportunities that can facilitate marine productivity. Designed to be harmonized with ocean protection and conservation policy and targets, **eco-tourism**, including nature-based tourism operations like the observation of marine fauna in their natural habitat, represents an emerging business opportunity for both companies and local communities that aims to protect natural resources, especially biodiversity, while creating an enjoyable experience for tourists³². Engineering facilitators include solutions for the prevention of coastal erosion such as the installation of seawalls, groins and breakwaters, often made with sustainable materials.

32. Casimiro et al (2022), ‘Ecotourism in Marine Protected Areas as a tool to valuate natural capital and enhance good marine governance: A review’ [online] Available at: <https://www.frontiersin.org/articles/10.3389/fmars.2022.1002677/full> (Accessed: 14 May 2023)

— **Marine protected areas (MPAs):** To reach the goal of enhancing the protection of coastal areas and the ocean, the creation of new MPAs is necessary. Studies indicate³³ that they represent one of the most effective ways to sustain marine biodiversity and build resilience, preserving and restoring marine habitats, and supporting economic and social prosperity. MPAs today represent an important undervalued asset, which has the potential to ensure significant financial returns in the long term³⁴. Thus far, mainly governments and the non-profit sector have led the way in funding MPAs. However, opportunities are emerging for returns-driven investments by the private sector as well, which has a stake in the collective responsibility to protect and restore the marine environment, whether directly connected to the ocean or not. These potential economic opportunities are linked to fishing, shipping and aquaculture activities³⁵ in those MPAs where these activities are permitted³⁶, but also eco-tourism development³⁷. Indeed, MPA revenues, generated through a variety of streams, whether direct, like visitor fees and payment for ecosystem services (PES) schemes, or indirect, like blue carbon credit schemes and the supply of captured and recycled CO₂ for product development, are instrumental for both MPA management and investor returns³⁸. Moreover, other sources of funding, including blended financing instruments coming from the state, private and third sector, can be utilized to respond to the need for additional resources for effective management of MPAs³⁹. Therefore, both public and private stakeholders are called to establish partnerships and provide services, products and resources to support the effective management of these essential protected zones.

33. O'Leary, B., et al (2016) 'Effective Coverage Targets for Ocean Protection' [online]. Available at: <https://doi.org/10.1111/conl.12247> (Accessed: 15 May 2023). This study includes an intensive search of peer-reviewed scientific literature and relevant review articles that design MPAs as one of the principal tools advocated to preserve and maintain biodiversity and ecosystem services and to mitigate the negative effects of anthropogenic activities.

34. Davis, K., et al (2019) 'Estimating the economic benefits and costs of highly-protected marine protected areas' [online]. Available at: <https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.2879> (Accessed: 16 May 2023)

35. Rodríguez-Rodríguez D., et al. (2015) Assessing the socioeconomic effects of multiple-use MPAs in a European setting: A national stakeholders' perspective.

36. The label "Marine Protected Areas" involves different levels of protection that might allow or exclude specific types of activities, please refer to: Al-Abdulrazzak, D., et al. (2012) 'Classifying levels of protection in Marine Protected Areas' [online] Available at: <https://doi.org/10.1016/j.marpol.2011.08.011> (Accessed: 24 May 2023)

37. Casimiro et al (2022), 'Ecotourism in Marine Protected Areas as a tool to value natural capital and enhance good marine governance: A review' [online] Available at: <https://www.frontiersin.org/articles/10.3389/fmars.2022.1002677/full> (Accessed: 14 May 2023)

38. Pascal, N., et al (2021) 'Impact investment in marine conservation' [online]. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S2212041621000061> (Accessed: 16 May 2023)

39. Friends of Ocean Action (2020) 'The Business Case for Marine Protection and Conservation.' [online] Available at: https://www3.weforum.org/docs/WEF_Business_case_for_marine_protection.pdf (Accessed: 15 May 2023)

2. Ocean pollution control

There are several opportunities to mitigate the multiple sources of pollution, notably liquid and solid waste, capable of altering the chemical and physical parameters of seawater. In terms of **wastewater management**, these include the development of innovative types of membranes that can filter and capture larger and smaller particles, as well as the installation of specific barriers and the use of clean-up robots.

In terms of chemical pollution, oil still represents the greatest danger for the ocean, hence, **oil spill prevention** through Early Detection Systems, and **response** to accidents through clean-up robots, magnetic soaps and clay sponges, are key areas of opportunity. Furthermore, engineering facilitators to limit ocean pollution may include, in terms of prevention, the development of water-resistant and biodegradable plant-based plastics as well as the installation of harbor water wheels that can collect debris and, in terms of mitigation, floating booms designed to catch floating plastic waste.

3. Coastal and marine engineering

Developing and implementing engineering solutions based on green innovation for coastal infrastructures is vital for preserving ocean health. The transition to **renewable energy sources**, such as offshore wind farms, offshore floating solar farms, wave and thermal technology, tidal farms, and multi-source offshore parks, such as wind-wave and solar-wind, currently represents a unique business opportunity. Engineering innovations also include **energizing public infrastructures** and integration of smart solutions, such as storm surge barriers, floating bridges and tidal power plants. Green solutions in the field of **maritime transportation and vessel design**, including marine (liquid) green hydrogen power and fuel-cell applications, green ammonia energy systems, and electric propulsion systems, represent interesting alternatives to traditional fuel power.

4. Ocean data and digital technology

Developing and implementing smart devices such as advanced sensors, cameras, smart buoys, specialized robots, drones, and satellite technology, has the potential to allow the collection of **higher-quality big data on the ocean**. This is essential for monitoring and predicting ocean conditions, tracking behavior of marine animals, better mapping the ocean and preventing waste pollution. Real-time data obtained through the **Internet of Underwater Things (IoUT)** application can facilitate the identification of short and long-term trends, and feed elaborated digital platforms. Finally, artificial intelligence is expected to play a key role in analyzing data, forecasting and responding to ocean challenges, as well as optimizing marine operations such as voyage routing.

The abovementioned blue business opportunities and innovations often rely on the support and involvement of various **enablers** that facilitate their financing, development, and promotion.

Financing and investment instruments or players, for example, can support blue business creation by providing the necessary resources to aspiring entrepreneurs and innovators working on ocean-related solutions. These may include debt instruments, like blue bonds and sustainability-linked loans, sustainable insurance products, public and blended financing programs, or MPA and Payment for marine Ecosystem Services (PES) financing schemes, often provided by Conservation Trust Funds (CTFs). In addition, venture capital, impact investment and dedicated ocean funds as well as institutional investors are catalysts for upscaling blue business opportunities.

In 2022, nearly 500 equity funds had an average exposure of more than 3% to SDG14 “Life Below Water” in public markets, with the exposures of more than 100 of those funds at 10% or more⁴⁰. While some of those funds are dedicated solely to water, others consider broader themes in which healthy ocean play a crucial role, such as the future of food production or the clean energy transition.

40. Morgan Stanley, [n.d.] 4 ways to invest in a Sustainable “Blue Economy” [online] Available at <https://www.morganstanley.com/ideas/blue-economy-investing-ocean-priorities> Accessed on: 22 May 2023.

Furthermore, in the latest years the attention towards the creation of blue businesses has risen thanks to instruments and players fostering sustainable innovation. For example, the EU Commission launched the 'BlueInvest' investment platform, aiming at fostering investment, innovation, and sustainable growth in the Blue Economy. As of 2022, the BlueInvest Fund had already awarded \$42.5M through grants dedicated to SMEs and start-ups, while an additional \$500M has already been mobilized for the following period. This measure falls within the overarching investments under the European Green Deal⁴¹, which formulates a roadmap for making Europe the first climate neutral continent in the world. It aims to unlock at least €1 trillion in public and private sustainable investments in the next decade, devoted amongst other things to the conservation and restoration of the ocean.

The role of innovation support players such as blue-tech incubators and accelerators is paramount for developing, commercializing, and scaling new ocean innovations. They provide a nurturing environment for entrepreneurs and innovators, offer access to specialized expertise and industry networks, provide financial support, bridge the gap between research and industry, and facilitate partnerships and market access. Their contributions are essential for driving progress in the ocean sector and addressing its challenges, making them paramount in the ocean innovation ecosystem.

In conclusion, collaboration and networks, such as public-private partnerships, corporate alliances, and ocean economy innovation networks, play a pivotal role in mobilizing relevant stakeholders to accelerate the development of ocean solutions. These collaborative initiatives bring together diverse entities, including corporates, SMEs, startups, public organizations, research centers and academia, to collectively drive progress in the ocean sector. These initiatives facilitate the pooling of resources and expertise, promote knowledge exchange, enhance market access, and foster a holistic approach to addressing complex ocean challenges. By bringing together corporates, SMEs, startups, public organizations, and academia, collaboration and networks drive progress in the ocean sector and contribute to a sustainable and thriving economy.

41. European Commission (n.d.). Delivering the European Green Deal. [online] [commission.europa.eu](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en). Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en.

A new opportunity for blue carbon ecosystem restoration: the case of blue bonds

To support investments in activities connected to the restoration of blue carbon ecosystems, blue bonds are gaining momentum. Blue bonds aim to raise funds to support projects related to the conservation and restoration of blue carbon ecosystems. The first blue bond transaction, involving over \$550 million, was issued in 2018 for the Seychelles project in collaboration with The Nature Conservancy (TNC). In addition to providing capital for restoration and conservation, blue bonds contribute to raising awareness about the importance of the ecosystems they support. Between January 2018 and December 2022, 26 blue bond transactions were issued for a value of \$5 billion and a CAGR of 92%, with 11 out of those transactions taking place in 2022.

Currently, blue bonds represent less than 0.5% of the sustainable debt market, financing investments in different areas of the sustainable blue economy. International finance institutions are the main issuers of blue bonds, but their market remains much less developed compared to the green bond one. However, blue bonds represent a key vehicle for attracting additional capital into ocean financing and investing.

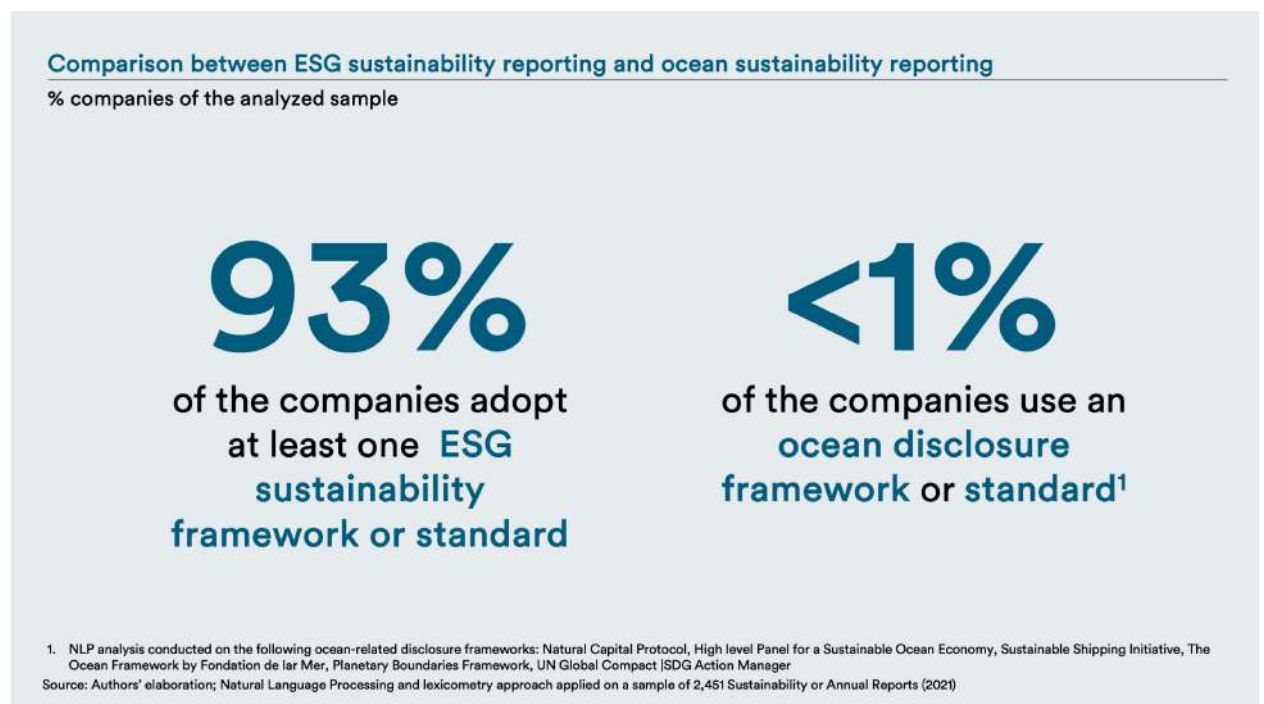


Chapter 5 — Ocean Disclosure Initiative: a tool to foster awareness and responses from the business community

At the core of the transformative process towards blue business creation is acknowledgment, which can only be achieved through understanding of the pressures of business activities on ocean and marine ecosystems. This chapter aims at gaining a better understanding of the relevance of sustainability and ocean-related issues for the business community.

Our findings highlight that sustainability reporting is widespread and, on the rise, with 93% (Figure 19) of companies incorporating at least one ESG sustainability framework or standard in their annual reporting, representing an increase of 7% compared to the data that emerged from the analysis conducted in 2019.

FIGURE 19: Comparison between ESG sustainability reporting and ocean sustainability reporting



However, confirming the results of our previous study, none of the existing sustainability frameworks or standards are designed to fully support businesses in assessing and reporting their pressures on marine ecosystems. As such, the ocean sustainability reporting landscape remains in its infancy with the lack of a tailor-made, comprehensive ocean disclosure framework becoming more apparent than ever.

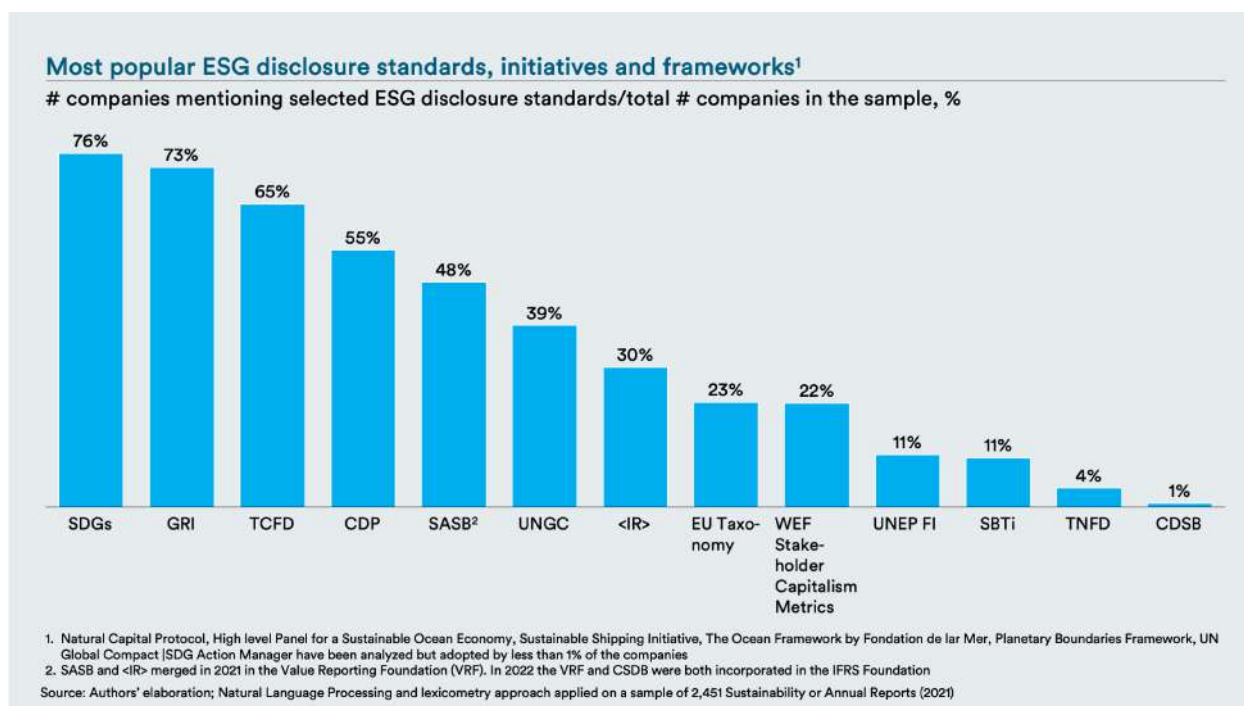
To fill this gap, the One Ocean Foundation has invested heavily in starting this virtuous circle with the introduction of the Ocean Disclosure Initiative (ODI), the first comprehensive ocean sustainability disclosure framework. The ODI addresses the gap that exists in today's ocean related sustainability and ESG frameworks and standards landscape, and functions as a reliable measurement of impact, with the aim of fostering awareness and initiating action.

Despite the abundance of sustainability and ESG frameworks, standards and initiatives, none of them adequately address the urgent need for ocean sustainability disclosure

In order to map the orientation towards general as well as more issue-specific forms of transparency and disclosure, we tested how frequently companies mentioned a broad range of standards, initiatives and frameworks.

According to our findings (Figure 20), the Global Reporting Initiative (GRI) standards are mentioned by 73% of companies, while 65% make reference to the Task Force on Climate-related Financial Disclosures (TCFD) framework, the initiative launched in 2015 by the Financial Stability Board (FSB). Building on TCFD's recommendations, in 2021 the Taskforce on Nature-related Financial Disclosures (TNFD) was created to establish a novel framework to assist organizations with the identification, assessment, management and disclosure of nature-related dependencies, impacts, risks and opportunities.

FIGURE 20: Most popular ESG disclosure standards, initiatives and frameworks



Despite the fact that the TNFD was only established in June 2021, and the TNFD framework is due to complete its recommendations (v1.0) in September 2023⁴², 4% of companies already mentioned it in their 2021 annual disclosure reports. This highlights the increasing demand for a disclosure framework that focuses on nature-related issues, including ocean-related ones.

CDP (formerly the Carbon Disclosure Project) is mentioned by 55% of the companies analyzed. This comes as no surprise, as carbon emission management and climate mitigation are disclosure areas in which CDP has been developing its leadership since 2002, and for which it is trusted by thousands of companies. These findings are aligned with the increased attention towards SDG 13 “Climate Action” (Chapter 2), as the climate crisis remains at the top of the corporate agenda. As additional guidance, CDP has added other specific reporting frameworks aimed at supporting companies in disclosure on sustainable forestry, water security management and supply chains.

42. Taskforce on Nature-related Financial Disclosure (TNFD) Dashboard. Available at: <https://framework.tnfd.global/> (Accessed: 19 May 2023)

When focusing on Europe, the inclusion of EU Taxonomy by approximately a quarter of the companies in our sample signifies the change that this legally binding classification standard has brought to the sustainability reporting scene.

Having come into effect in July 2020, the Taxonomy Regulation establishes the basis for the EU taxonomy standard by defining the necessary conditions for an economic activity to qualify as environmentally sustainable⁴³. Our findings highlight that attention to EU Taxonomy was already evident in the 2021 reporting cycle, with the climate change mitigation and adaptation objectives becoming applicable for EU Taxonomy reports as of January 2022. When it comes to the ocean, consultation on the “Environmental Delegated Act”, which underpins the development of technical criteria for the remaining environmental objectives, is currently open⁴⁴, setting out the rulebook for the economic activities that can substantially contribute, among others, to the sustainable use and protection of water and marine resources.

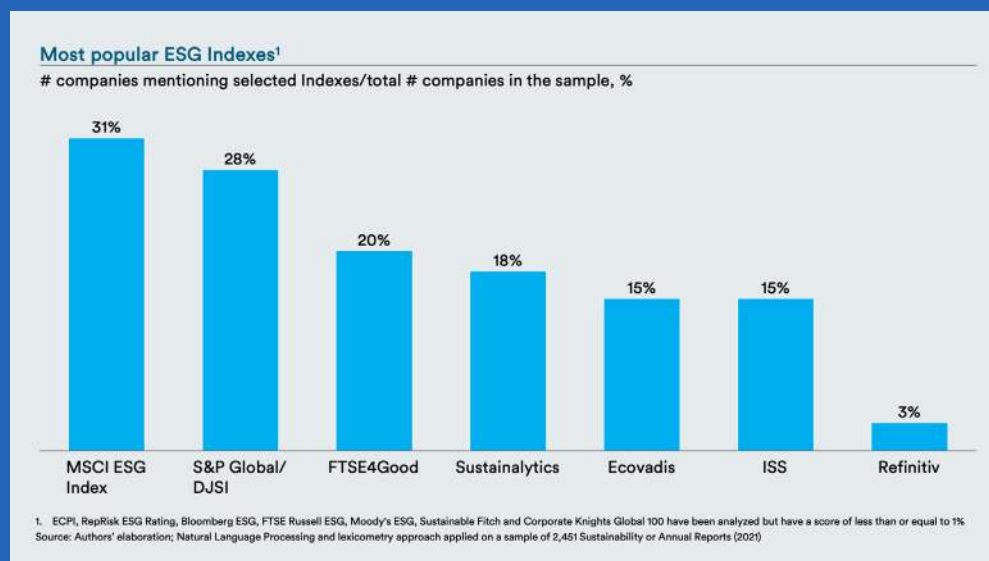
43. The EU taxonomy establishes six environmental objectives which include climate change mitigation, climate change adaptation, the sustainable use and protection of water and marine resources, the transition to a circular economy, pollution prevention and control, and the protection and restoration of biodiversity and ecosystems. European Commission (n.d). 'EU taxonomy for sustainable activities' [online]. Available at: https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en (Accessed: 19 May 2023)

44. European Commission (n.d) 'Sustainable investment – EU environmental taxonomy' [online]. Available at: (Accessed: 19 May 2023)

Additional insights on the inclusion of ESG rating and scoring indexes in corporate reporting

In line with sustainability and ESG frameworks and standards, there is growing interest in the inclusion of ESG rating and scoring indexes in the sustainability (or annual) reports of the companies analyzed. Figure 21 show that 31% of our sample declares to be included in the Morgan Stanley Capital International (MSCI) ESG index, which has achieved the highest ranking in terms of popularity. The Dow Jones Sustainability Index (DJSI), now integrated under the umbrella S&P Global ESG index, is second in terms of popularity, and FTSE4GOOD is included by a fifth of the companies analyzed. 2021 marked the entrance of Sustainalytics ESG Risk Ratings in the ESG Index landscape with 18% of companies incorporating it in their reporting. EcoVadis, the Institutional Shareholder Service (ISS) ESG Ratings & Rankings, and Refinitiv ESG Indexes complete the group with 15%, 15% and 3% respectively.

FIGURE 21: Most popular ESG Indexes



To cover every corner of the sustainability reporting arena, we must mention that there is a group of initiatives that have been developed relatively recently which explicitly mention use of marine resources as one of the impact drivers that companies should assess as they monitor their pressures and dependencies on Natural Capitals (e.g. the Natural Capital protocol). There are also others that provide guidance to self-assess the progress towards the 17 Sustainable Development Goals, including SDG 14 “Life below Water”. Examples include the SDG Action Manager launched by the UN Global Compact or the Ocean Framework by Fondation de la Mer, which is seeking broader diffusion in the market. Moreover, the TNFD framework is expected to encourage the inclusion of ocean-related topics in financial reporting when it comes into effect.

Nevertheless, none of the frameworks or standards illustrated above enables companies to assess their ocean-related pressures, both direct and indirect, nor are they suitable to provide comprehensive guidance in terms of managerial activation as a response to these pressures.

The need to establish a comprehensive disclosure and rating framework capable of supporting companies in disclosing on ocean-related pressures and taking action in the form of tailored responses for the prevention, mitigation and restoration of the negative consequences such pressures can engender, is imperative.

The Ocean Disclosure Initiative (ODI), the first comprehensive ocean sustainability disclosure framework

Our research on ocean sustainability began in 2019 and has led to the development of the **Ocean Disclosure Initiative (ODI)**, the first comprehensive ocean disclosure framework. It is an innovative tool that measures organizations’ environmental pressures on the ocean, increasing awareness, enabling disclosure, and fostering strategic responses on ocean-related issues. The ODI provides a shared language for companies, scientific and financial communities, and civil society to address and mitigate the significant pressures humanity exerts on the ocean.

It is framed around seven specific pillars:

1. **Ocean-focused**, to fill the gap in terms of availability of guidance, standardized metrics and indicators related to the disclosure of pressures on marine and coastal ecosystems, as well as on the actions to mitigate such pressures.
2. **Material**, as it is intended to focus on the most significant direct and/or indirect pressures exerted by each business, considering the specificities of each industry.
3. **Science-based**, to promote the collection and disclosure of data and information, based on the acknowledgement of the functioning of the socio-ecological system and on the availability of robust and reliable scientific evidence related to the possibility of improving the environmental status of ocean ecosystems.
4. **Comprehensive**, in the sense that it considers not only the direct pressures on marine ecosystems but also the indirect ones, most of which are land-based, while acknowledging the complexity of the ocean-based system.
5. **Consistent with a sustainability risk management approach** already embraced by leading financial institutions within the general ESG perspective, to highlight both risks and benefits related to sound ocean sustainability.
6. **Multi-stakeholder and open to the contribution of the first adopters** - i.e. the business and financial communities, academia and research, governments, NGOs, civil society, industrial and consumer associations.
7. **Aligned with existing initiatives**, with the main objective being complementarity in terms of ocean conservation with existing frameworks and standards.

The ODI questionnaire and its journey of evolution

The core part of the Ocean Disclosure Initiative is represented by a specific questionnaire. The ODI questionnaire enables companies to present a comprehensive overview of their level of ocean sustainability maturity, disclosing the activities they carry out to prevent, mitigate and/or remediate the pressures they exert on marine ecosystems as well as relative policies, strategies and targets. Therefore, the company has the opportunity to present a comprehensive overview of its level of ocean sustainability maturity, as well as the various initiatives and actions it has taken to prevent or mitigate the pressure on the ocean.

THE ODI QUESTIONNAIRE
ALLOWS COMPANIES
TO DISCLOSE THE
ACTIVITIES THEY
CARRY OUT TO PREVENT,
MITIGATE AND REMEDIATE
THE PRESSURES THEY
EXERT ON THE MARINE
ECOSYSTEMS,
THEIR GOALS AND
THEIR TARGETS

The questionnaire has been designed to generate an overall score and sub-total scores for a company's ocean sustainability practices, which can be used to create a company profile and benchmark its practices against other companies in the industry. To accurately capture the complexity of the ocean ecosystem and the various direct and indirect pressures of different industries on it, a sector-specific questionnaire with a set of core questions common to every industry combined with additional questions that address sector-specific material topics has been developed.

As of June 2023, **six industry-specific questionnaires** have been developed on the basis of **in-depth industry reviews**, which illustrate the main pressures exerted on the ocean by each sector as well as best practices to mitigate them. The sector-specific questionnaires are being tested by different types of companies, with different characteristics and activities, in order to create a representative picture of how each sector deals with different aspects of ocean sustainability.

During this process, **onboarding of the business community has been of paramount importance** in terms of development, further refinement, and enhancement of the ODI framework. Thus far, the ODI framework and draft questionnaires have been tested and reviewed by more than **25 leading companies in six different sectors**.

The onboarding process is organized in pilots following the sectors analyzed. The involvement of the companies first includes their participation in kick-off workshops, where they are introduced to the Initiative and are invited to provide a first round of feedback. During the testing phase, 1-to-1 meetings are conducted with the ODI development team. The goal is to delve deep into the different dimensions and elements of the ODI questionnaire while addressing questions and requests for clarification.

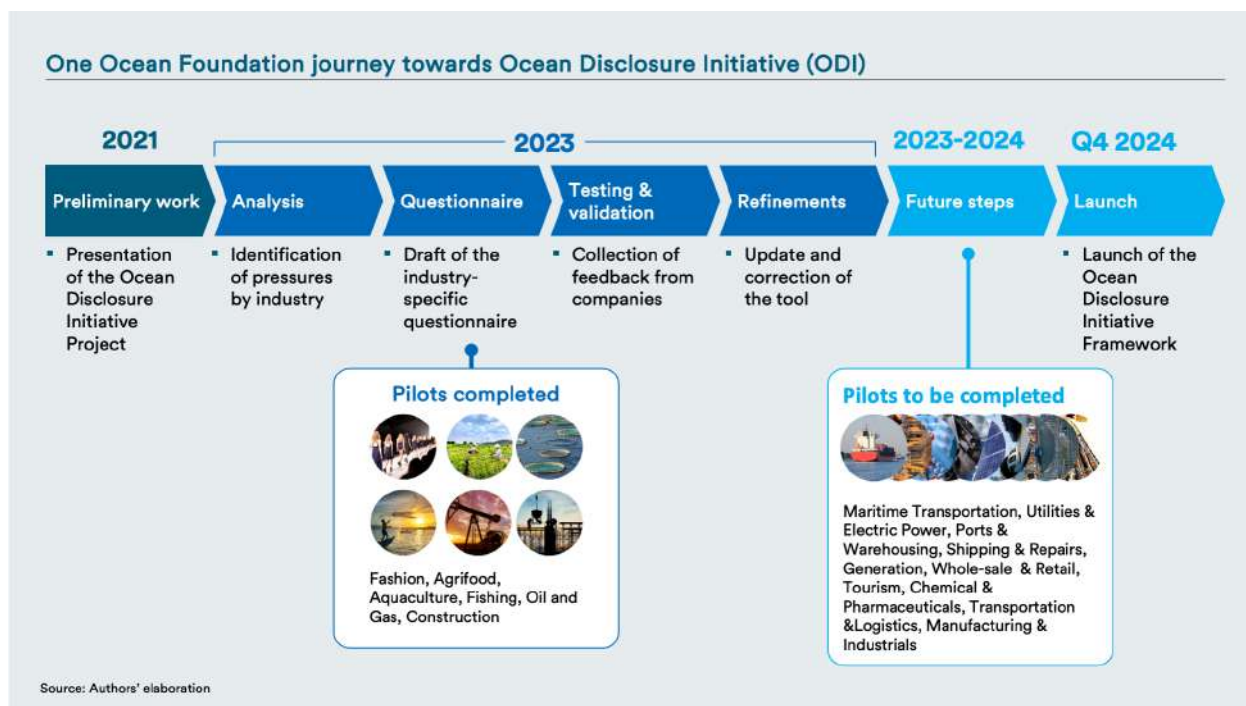
The piloting process of the questionnaire development allows for better refinement and for creating a more representative picture of how each sector deals with different aspects of ocean sustainability, ensuring the tool's effectiveness for the business world. Indeed, we believe that the integration of scientific knowledge with the business and financial perspective is key to designing a business-oriented, impactful and sector-specific framework. The piloting phase is anticipated to conclude by the end of 2024, by which time a full set of questionnaires dedicated to each industry will have been developed (Figure 23).

In addition to the revision of the questionnaires on the basis of the feedback received during the testing phase, the ODI questionnaire will be updated every disclosure year to integrate the inputs received by the stakeholders and reflect the evolution of the sectors in close alignment with current and new legislative and compliance frameworks.

Next steps and beyond

The Ocean Disclosure Framework will be officially launched at the end of 2024 (Figure 22), serving the business and financial communities as the first comprehensive framework of its kind.

FIGURE 22: One Ocean Foundation journey towards Ocean Disclosure Initiative



With regards to the business community, companies that adopt ODI for their ocean disclosure will benefit by improving their sustainability profiles while contributing to crucial efforts in protecting and preserving marine ecosystems.

At the same time, financial actors and investors will have the opportunity to utilize ODI's ocean sustainability profiling and benchmarking scores to mobilize resources and direct investment towards companies whose strategies and operations contribute to preventing and mitigating business pressures on marine ecosystems while addressing their ESG and compliance considerations.

ODI provides the necessary platform for organizations to become agents of change leading the efforts to acknowledge and act in response to ocean-related challenges. Doing so is complex, as it is intertwined with other major challenges of our time, such as climate change and biodiversity loss, as well as poverty, hunger and equality, but it is imperative in order to preserve ocean health and human well-being.

Project team

One Ocean Foundation

Jan Pachner
Giulio Magni
Ambra Cozzi
Giulia Liguori
Maria Rodriguez Beltran

McKinsey & Company (Knowledge Partner)

Federico Fumagalli
Roberta Daminelli
Marta Andreoni
Laura Galvani
Livia Biggi

SDA Bocconi School of Management Sustainability Lab

Francesco Perrini
Stefano Pogutz
Manlio De Silvio
Nikolaos Alexandros Theodorou
Maria Giulia Strina

Consejo Superior de Investigaciones Científicas (CSIC)

Rafael Sardá Borroy

Co-Authors

Carlos M. Duarte
King Abdullah University
of Science and Technology

Ralph Chami
Blue Green Future
& Rebalance Earth

Glossary

Acidification — Reduction in the pH (i.e. increase in acidity) of ocean waters over an extended period of time, caused primarily by the uptake of carbon dioxide (CO₂) from the atmosphere.

Aquaponics — A system for producing food that combines aquaculture and hydroponics. It involves feeding nutrient-rich water from aquaculture to plants grown hydroponically.

Biodiversity — The European Environmental Agency defines biodiversity as the “variety of ecosystems (natural capital), species and genes in the world or in a particular habitat” crucial for human well-being and ecosystem services.

Biological integrity — Regards the pristine status of an environment and its functions before any human alterations.

Blue bond — Financial instrument aimed at financing specifically ocean-friendly projects.

Carbon Capture Utilization and Storage (CCUS) — Technologies aimed at capturing carbon dioxide (CO₂) from fuel combustion or industrial processes, transporting it via ship or pipeline, and either using it as a resource to create products or services or permanently storing it underground.

Carbon sequestration — is a process that involves capturing and storing carbon dioxide from the atmosphere. This method helps reduce the amount of carbon dioxide in the air, which can help mitigate global climate change.

Chemical conditions — Parameters of seawater such as levels of oxygen, nutrients, pH, salinity, and other chemicals.

Contaminants — Substances (i.e. chemical elements and compounds) or groups of substances that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances which give rise to an equivalent level of concern.

DIC — Dissolved inorganic carbon, which is present in all natural waters.

Direct pressure — Pressure on marine and coastal ecosystem that occurs through direct interaction with environmental components (e.g. alteration of the seafloor integrity by trawler fishing, grounding and/or anchoring; direct release of contaminants into seawater etc.)

DOC — Dissolved organic carbon, is a small but important fraction of total soil carbon that is involved in an enormous variety of important interactions with plants, microbes, and minerals.

Ecosystem services — The Millennium Ecosystem Assessment defines ecosystem services as “the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling”.

Eco-tourism — Refers to a type of responsible travel, aimed at preserving natural areas and sustaining the well-being of the local population.

Eutrophication — The process by which a body of water becomes excessively rich in dissolved nutrients (such as phosphates) that stimulate the growth of aquatic plant life usually resulting in the depletion of dissolved oxygen.

Food web — A system of interlocking and interdependent food chains.

Greenhouse Gas (GHG) — Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. The primary greenhouse gases in the Earth's atmosphere are water vapor (H₂O), carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and ozone (O₃).

Hydrographical conditions — The physical parameters of seawater, such as temperature, salinity, depth, currents, waves, turbulence, and turbidity.

Indirect pressure — Pressure on marine and coastal ecosystems that occurs through indirect interaction with an environmental component (e.g. pollution and contaminants that reach the sea through land-based sources of discharge such as wastewater, dumping grounds and/or fluvial runoff).

Impact investment — Socially responsible investment strategy focused on generating a socio-environmental impact compatible with a medium-long-term economic return.

Marine biodiversity — The variety and abundance of life in the ocean. It includes all animals, plants and microorganisms.

Marine litter — Items that have been deliberately discarded, unintentionally lost, or transported by winds.

NGO — Non-governmental organization.

Non-indigenous species — Species introduced outside their natural past or present range, which may survive and subsequently reproduce, threatening the biodiversity of an ecosystem.

Ocean economy — Ocean economy is defined by the OECD as the sum of the economic activities of ocean-based industries, together with the assets, goods and services provided by marine ecosystems. The ocean economy encompasses ocean based industries (such as shipping, fishing, offshore wind, marine biotechnology), but also the natural assets and ecosystem services that the ocean provides (fish, shipping lanes, CO₂ absorption and the like).

Ocean fertilization — A type of geoengineering that involves adding nutrients to the ocean's upper layer to stimulate the photosynthesis of phytoplankton. The goal is to reduce atmospheric CO₂ levels through this process.

Overfishing — The uncontrolled catch of fish in a water course or sea area, destined to irreparably compromise its reproductive capacity.

Pingers — Pingers are devices that emit short, high-pitched signals at regular intervals. They are used for detection, measurement, or identification purposes.

POC — Particulate organic carbon, consists of particles composed of or containing carbon, primarily the material which composes phytoplankton and some forms of zooplankton.

Pressure — Any action that makes a change to the state of the natural environment, whether adverse or beneficial, wholly or partially resulting from the activity of an organization or the utilization of products or services.

Seafloor integrity — Seafloor integrity regards the safeguarding of the characteristics (physical, chemical and biological) of the seafloor which marine ecosystems depend upon for a healthy structure and functioning.

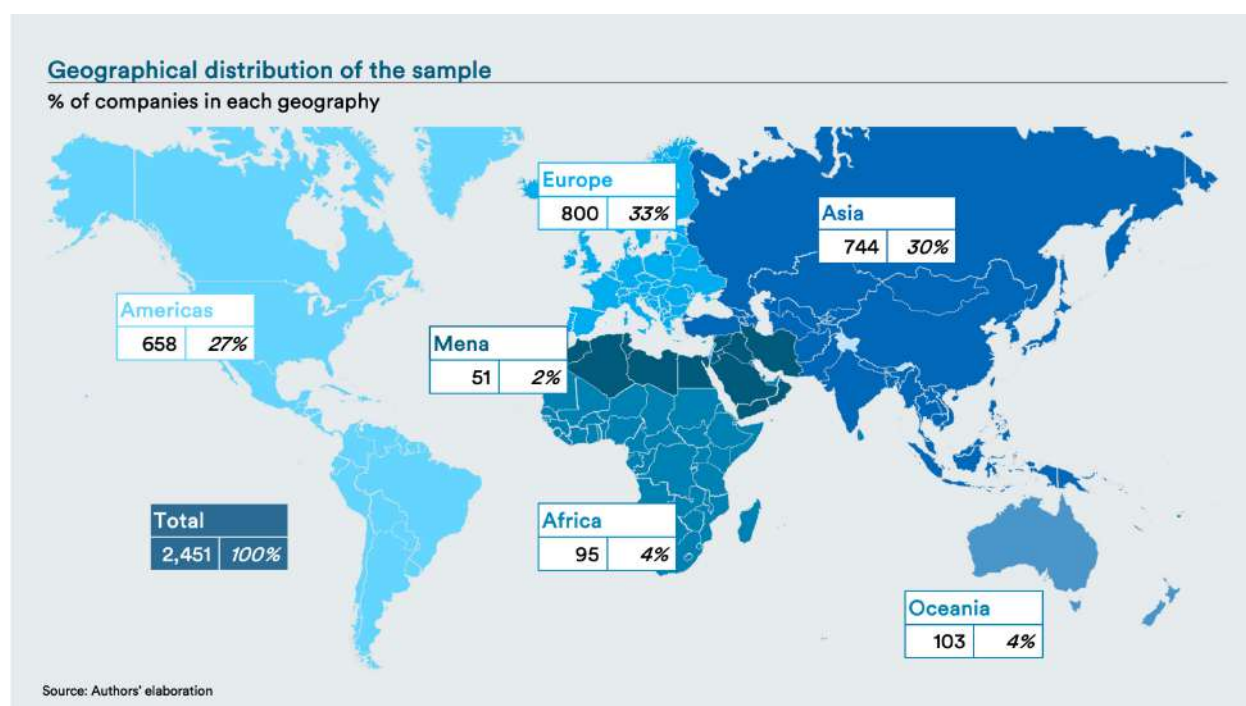
Sustainable Development Goals (SDGs) — The United Nations 2030 Agenda for Sustainable Development was adopted by Member States in 2015. This comprehensive plan includes 17 Sustainable Development Goals that encourage developed and developing countries to collaborate in a global partnership to take action on topics related to poverty, inequality, economic growth, and climate change.



Annex I — Description of the sample and analyses

The research analyzes the Sustainability or Annual Reports published in 2021 by a large sample of about 2,500 companies, among the world's largest by market capitalization. The sample has been expanded compared to the one analyzed in “Business for Ocean Sustainability, Second Edition - A Global Perspective” (2020) and includes the top 100 companies from the 20 leading world stock exchanges, belonging to 17 industrial sectors. In terms of economic dimensions, the sample represents companies with a total market capitalization of about \$65 trillion, accounting for more than 70%⁴⁵ of the world market capitalization. As regards geographical distribution (Figure 23), the sample covers all the continents and mainly comprises European (33%), American (27%) and Asian companies (30%), the remaining companies are located in Oceania (4%), the Middle East and North Africa (2%) and Africa (4%).

FIGURE 23: Geographical distribution of the sample



45. Author's elaboration, calculated based on the global market cap of \$92 trillion as of 31/03/2023, source: Bloomberg

The research encompasses six analyses (Figure 24), that have been run on different sub-samples according to specific objectives and leveraging two different AI-driven approaches, Natural Language Processing (NLP) and Generative AI (GenAI).

FIGURE 24: Overview of analyses, objectives and AI-driven approach applied

#	Analysis	Objective	Sample, #	Sectors, #	AI-driven approach
1	Adoption of Sustainable Development Goals (SDGs)	Identify companies that integrate the framework in their business operations and strategy	2,451	17	NLP
2	Adoption of ESG frameworks, standards, Indexes	Identify ESG disclosure standards, initiatives, frameworks and indexes used	2,451	17	NLP
3	Discussion of "Ocean-related" Topics	Identify companies that discuss oceans or ocean-related matters in their Sustainability reports	2,451	17	NLP
4	Companies' awareness of their pressures on GES Descriptors	Identify companies that mention Good Environmental Status (GES) descriptors in their report to assess the level of awareness	1,106	14	NLP
5	Companies' activation score	Identify "activation score" calculated as the % of actions carried out over the total number of actions tested	424	6	GenAI
6	Risks and Opportunity	Identify the spin used by the companies in the sample when directly addressing Ocean-related topics	163	6	GenAI

Source: Authors' elaboration

As described in Figure 25, Analysis 1: “Adoption of Sustainable Development Goals”, Analysis 2: “Adoption of ESG frameworks, standards, indexes” and Analysis 3: “Discussion of ocean related topics” are based on the largest sample of 2,451 companies across 17 sectors. Analysis 4 “Companies’ awareness of their pressures on GES Descriptors” was run on a sample of 1,106 companies that explicitly refer to “Oceans” across 14 sectors (excluding Financial, Communication and those sectors falling into the category Other). Analysis 5: “Companies’ activation score” was run on a sub-sample of 424 companies across 6 prioritized sectors: Fishing & Aquaculture, Textile & Apparel, Utilities and Electric Power Generation, Agri-food, Construction, Mining and Oil & Gas extraction. Analysis 6 “Risks and Opportunity” was run on a sub-sample of 163 companies across the 6 prioritized sectors selected according to their activation score on ocean-related Managerial Dimensions.

FIGURE 25: Description of sample and industrial sectors’ funnel

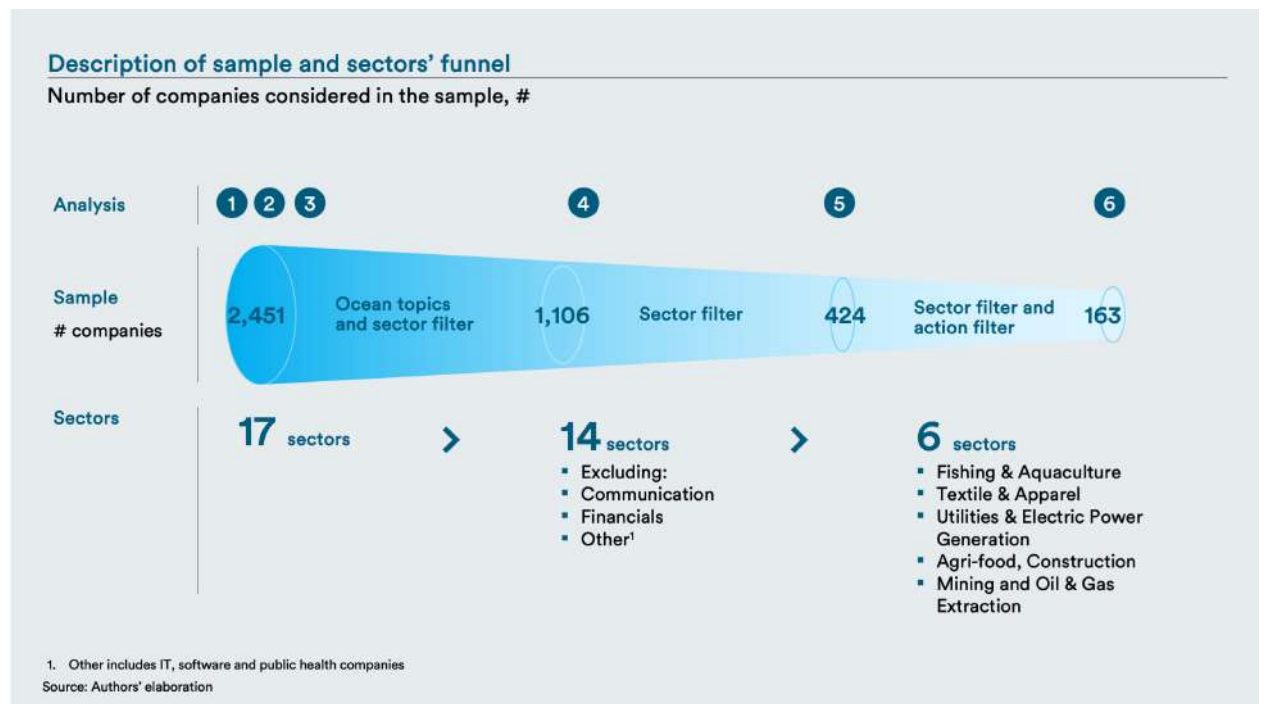


Figure 26 illustrates the distribution across industrial sectors of the different sub-samples considered in the report and Figure 27 provides the definition of the industry sectors.

FIGURE 26: Distribution of samples across sectors

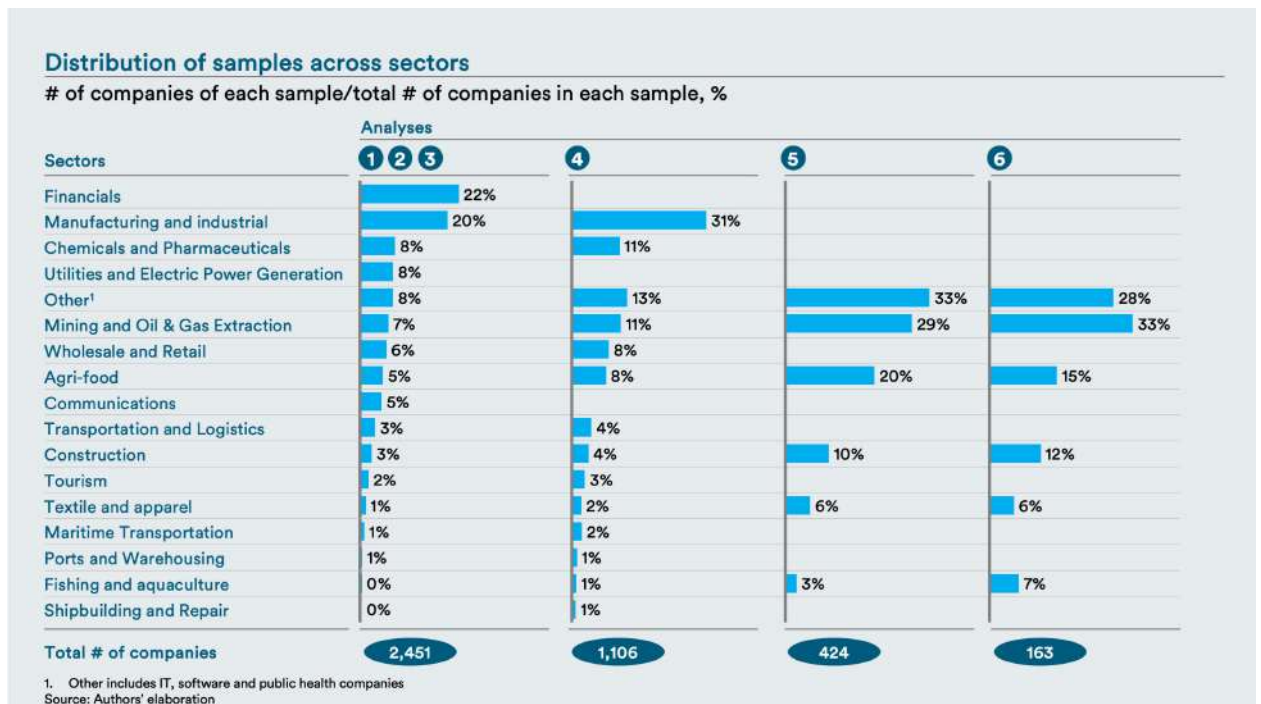


FIGURE 27: Definition of industry sectors

Definition of industry sectors		
Sector ¹	Definition	
 Agri-food	<p>Economic activities related to soil cultivation, crop production, forest management, raising livestock (except living marine organisms), and in varying degrees to the preparation and marketing of the resulting products</p> <p>Economic activities related to food raw materials processing, packaging and distribution. This includes fresh, prepared foods as well as packaged foods, and alcoholic and nonalcoholic beverages. This sector includes tobacco products manufacturing</p>	
 Chemical and pharmaceutical	<p>Economic activities related to the basic preparations of chemicals, resins, synthetic rubber and fibers, pesticides, fertilizers, paints, coatings, adhesives, soaps, cleaning compounds and toiletries, and pharmaceutical and medicine manufacturing</p>	
 Communications	<p>Economic activities related to publishing and broadcasting (except internet), telecommunications, producing motion picture and sound recordings</p>	
 Construction	<p>Economic activities related to the construction of buildings, utility systems, highways, streets, bridges and other heavy civil engineering</p>	
 Utilities and electric power generation	<p>Economic activities including energy transmission and distribution, water supply, sewage and waste management, use of fossil fuels (e.g. coal, oil, or gas) and renewable sources (e.g. hydroelectric, solar, wind) to produce electric energy</p>	
 Financials	<p>Economic activities related to finance and insurance, meaning the creation, liquidation, or change in ownership of financial assets and/or facilitating financial transactions</p>	
 Fishing and Aquaculture	<p>Economic activities related to catching and farmed production of living marine organisms for both food and non-food purposes</p>	
 Manufacturing and industrial	<p>Economic activities related to traditional manufacturing (e.g. paper, wood, rubber, plastic, leather products etc.) and to the production of industrial components and systems)</p>	
 Mining and oil and gas extraction	<p>Economic activities related to the extraction of naturally occurring mineral solids (e.g. coal and ore), liquid minerals (e.g. crude petroleum) and gases (e.g. natural gas); and beneficiating (e.g. crushing, screening, washing and flotation) and other preparation at the mine site, or as part of mining activities</p>	
 Ports and warehousing	<p>Economic activities related to the operation and management of ports, such as storage, loading and unloading activities and cargo handling</p>	
 Shipbuilding and repair	<p>Economic activities related to the manufacturing, repair and maintenance of ships, boats, offshore platforms and offshore supply vessels</p>	
 Textiles and apparel	<p>Economic activities related to the production of textiles and fabrics from basic fibers and to the transformation of these fabrics into clothing and other accessories</p>	
 Tourism	<p>Economic activities related to hotels and motels, other traveler accommodations, food and drink service establishments</p>	
 Transportation and logistic	<p>Economic activities related to providing transportation of passengers and cargo, warehousing and storing goods, scenic and sightseeing transportation, and to supporting these activities</p>	
 Water transportation	<p>Economic activities related to water transportation of passengers and cargo using watercraft, such as ships, barges and boats, and scenic and sightseeing water transportation</p>	
 Wholesale and Retail	<p>Economic activities that intermediate the sale of goods or services to retailers or to customers through multiple channels of distribution</p>	

¹ Other includes IT, software and public health companies

Source: Authors' elaborations on Orbis Database

Annex II — Methodology: Natural Language Processing and Generative AI approaches

The analyses in the study leverage two AI-driven approaches, Natural Language Processing (NLP) and Generative AI (GenAI), as each method has unique strengths in analyzing text and extracting information on sustainable actions taken by the companies in scope. NLP-based methods focused on analyzing existing text data to extract information using statistical and rule-based techniques, while the Generative AI approach extracted and elaborated text data based on patterns and trends without relying on rule-based methods.

Natural Language Processing (NLP)

The application of Natural Language Processing (NLP) techniques in the analyses involved a multi-step process that comprised of text pre-processing and text analytics:

- Text pre-processing: set of techniques to clean and standardize raw text data from reports, including tokenization (the process of breaking down a document into its individual words or tokens), lemmatization (the process of grouping together different forms of a word so that they can be analyzed as a single entity), and the removal of punctuation and stop words. The primary purpose of text pre-processing is to enhance the accuracy and reliability of the subsequent text analytics by adding a layer of sophistication to the keyword matching process, rather than relying solely on exact matches
- Text analytics: matching of a predefined set of keywords in the text, done using direct or window matching; where the former checks whether the (clean) keyword appears in text whereas the latter identifies an occurrence of a keyword, only if a specific word appears in its proximity (context of 10 words before and after the keyword)

Generative AI (GenAI)

Generative AI was employed to conduct an analysis to investigate the specific actions implemented by companies that contribute to ocean sustainability.

The architecture of the GenAI Solution adopted incorporates 3 steps: Data Pre-Processing for the preparation of the 450 Annual and Sustainability Reports of approximately 50k pages and the writing of the prompts, API-call to OpenAI's GPT4 model for question answering and text generation, and Data Post-Processing for validation of the results.

- Data Pre-Processing: raw reports were elaborated using text-processing techniques to identify the most relevant sections to answer a given question. Prompts engineering was carried out to design the questions that would best aid the Generative AI model to generate meaningful and relevant responses. This included identifying the specific information that was required from the documents and formulating questions in a way that would elicit that information. The resulting questions related to over 300 unique prompts
- API-call: The Generative AI model that elaborated the questions to generate text response was the GPT4 Large Language Model, an OpenAI Tool, one of the state-of-the-art tools in the field
- Post-processing: the Gen-AI model's answers were validated both automatically and by human feedback to evaluate the performance of the model

The solution adopted involves the following steps:

- Content Understanding: the model was interrogated on which actions the companies in each sector were carrying out, to provide a comprehensive view of the trends and patterns in ocean sustainability. The outputs were validated by a group of experts (i.e. an Environmental Engineer and a Construction Engineer specialized in Sustainability)
- Single Report analysis: the model was interrogated on the individual companies' Sustainability Reports and asked to provide details on the specific sustainable actions they were undertaking. It was also asked to provide exhaustive responses that included direct quotes from the reports as well as the source to aid the validation step
- Automatic Validation: automatic qualitative checks of the consistency of the models' answers were performed and responses that were not consistent with the questions were iterated
- Score Calculation: the responses gathered on each company's actions were then post-processed and used by authors to calculate an activation score measuring commitment and level of activity on ocean sustainability practices
- Model assessment: a team of experts manually checked entire sets of questions and answers across different sectors, to assess the validity and reliability of the model's answers. The final accuracy score was 88%, ensuring overall reliable responses.

Annex III — Science based analysis of pressures on Good Environmental Status (GES) descriptors












The science-based analysis of the sectors' direct and indirect pressures on ocean health at the heart of the research is based on the solid scientific review conducted in 2020 by 56 natural and social scientists from leading research institutes and universities across Europe, North and South America and Australia.

As pointed out in the Commission Decision 2010/477/EU, the criteria for the achievement of GES are the starting point for the development of coherent approaches in the preparatory stages of marine strategies, including the determination of characteristics of GES and the establishment of a comprehensive set of environmental targets, to be developed in a coherent and coordinated manner within the framework of regional cooperation. The GES descriptors introduced by the EU Marine Strategy Framework Directive represent the main components of healthy marine ecosystems, whose preservation and good status is paramount for a fully functional ocean.

The report clusters the 11 GES in three ocean domains (Figure 28) on which the awareness analysis (Chapter 2) is conducted:

1. **Marine biological integrity and diversity:** includes the preservation of biological diversity, protection from adverse alterations due to the introduction of non-indigenous species, conservation of healthy populations of commercial fish and shellfish, and the preservation of food webs to ensure long-term abundance and reproduction of aquatic life.
2. **Marine water contamination and chemical conditions integrity:** focuses on the prevention of the release of litter or contaminants liable to directly or indirectly enter marine ecosystems, thus leading to absorption by seafood, acidification or eutrophication of marine waters.
3. **Seawater and/or seabed physical conditions integrity:** considers the physical characteristics of the water and bottom of the sea. It includes the permanent alteration of hydrographical conditions (e.g. temperature, salinity, depth, currents, turbidity). It also includes the prevention of the introduction of energy (including underwater noise) and direct damage to the seafloor.

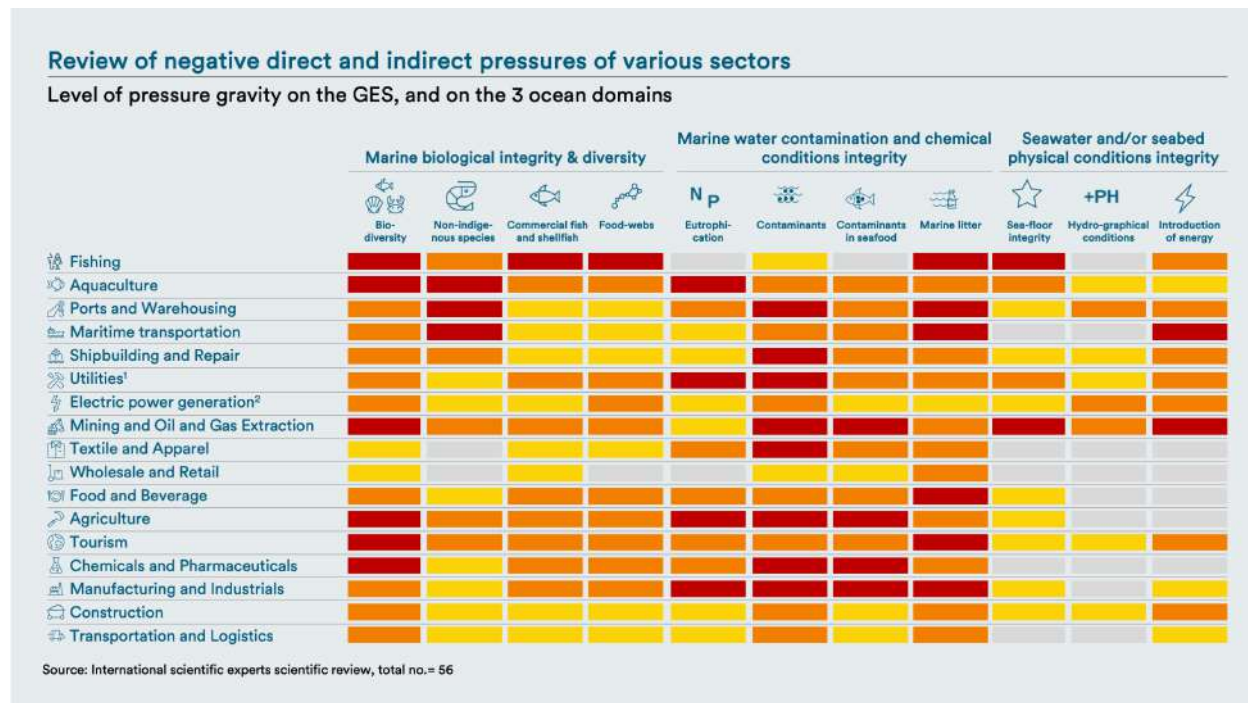
FIGURE 28: 3 ODI Ocean Domains and 11 GES descriptors

3 ODI Ocean Domains and 11 GES descriptors			
Marine biological integrity & diversity		Biodiversity	Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions
		Non-indigenous species	Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem
		Commercial fish and shellfish	Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock
		Food webs	All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity
Marine water contamination and chemical conditions integrity		Eutrophication	Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom water
		Contaminants	Concentrations of contaminants are at levels not giving rise to pollution effects
		Contaminants in seafood	Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards
		Marine litter	Properties and quantities of marine litter do not cause harm to the coastal and marine environment
Seawater and/or seabed physical conditions integrity		Sea-floor integrity	Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected
		Hydrographical conditions	Permanent alteration of hydrological conditions (i.e. physical parameters of seawater: temperature, salinity, depth, currents, waves, turbulence, turbidity) does not affect marine ecosystems
		Energy incl. underwater noise	Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment

Source: https://ec.europa.eu/environment/marine/good-environmental-status/index_en.htm

According to the experts' independent assessment, all industries directly or indirectly interacting with the ocean/seas potentially exercise negative pressures on most of the 11 Good Environmental Status Descriptors (GES) (Figure 29).

FIGURE 29: Review of negative direct and indirect pressures of various sectors



Annex IV — Activation analysis – Deep dive by sector

Annex IV presents an in-depth examination of the actionable initiatives that companies in the six prioritized sectors (i.e. Textiles and Apparel, Agri-food, Fishing and Aquaculture, Construction, Utilities and Electric Power Generation, and Mining and Oil & Gas) are implementing regarding ocean sustainability.

As illustrated in Chapter 3 (Figure 8), the total activation score was calculated considering 4 Managerial Dimensions and 11 actionable initiatives. Actionable initiatives can be further classified as **ocean-related**, if explicitly undertaken by companies to address ocean sustainability or as **non-ocean related** if not explicitly designed to address ocean sustainability, but still having a positive impact on it.

The actionable initiatives classified as **ocean-related** are:

1. **Ocean policy:** the existence of an ocean-related policy or a section on the ocean within a company's broader sustainability policy
2. **Board oversight:** the presence of board-level oversight for ocean-related issues, which can help to ensure that these issues receive appropriate attention and resources
3. **Risk analysis on ocean-related issues:** the implementation of ocean-related risk assessments or analyses, which can help companies to better understand and manage their impacts on the ocean
4. **Ocean related targets and KPIs:** the establishment of ocean-related targets to prevent or mitigate negative impacts on the ocean
5. **Innovation for the ocean:** the development and implementation of technologies or initiatives specifically aimed at promoting ocean sustainability

- 6. **Partnerships:** partnerships aimed at raising awareness about ocean-related issues and promoting sustainable practices
- 7. **Engagement, education and awareness initiatives:** Engagement initiatives or ones aimed at raising awareness about ocean-related issues and promoting sustainable practices
- 8. **Ocean-related certifications:** the attainment of ocean-related certifications, which can help to demonstrate a company's commitment to ocean sustainability

The actionable initiatives classified as **not-ocean-related** are:

- 9. **Product innovation:** actions related to product innovation, such as the upcycling or recycling of raw materials
- 10. **Process innovation:** actions related to process innovation, such as the reduction of energy consumption and GHG emissions
- 11. **Supply chain innovation:** actions related to supply chain innovation such as the use of sustainable packaging and proximity to suppliers

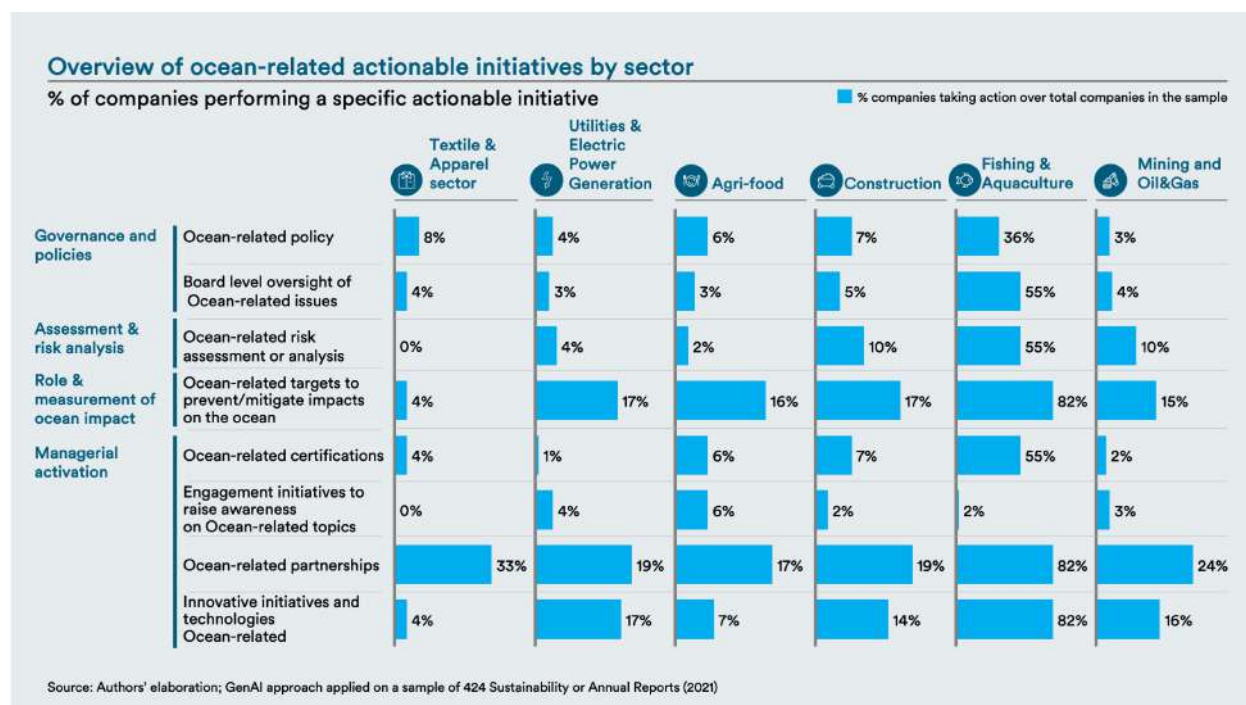
Ocean-related actionable initiatives

From an analysis of **ocean-related actionable initiatives** (Figure 30), it emerges that that few companies have already implemented structured governance and specific policies for the ocean, as well as assessment and risk analysis procedures, or processes aimed at measuring ocean impacts. Companies in the Fishing & Aquaculture sector, due to their nature and characteristics, seem ahead of the others, having structured more thorough ocean-related governance, such as allocating responsibilities at the board level, introducing ocean-related policies or dedicating sections of their environmental policy to ocean and marine ecosystems protection.

The number of companies conducting pressure, dependence and risk assessment on ocean-related topics is slightly higher in those sectors with a higher probability of operating in direct contact with the marine environment, such as Fishing & Aquaculture, Mining Oil & Gas and Utilities & Electric Power. However, the number of companies that formalize such risk assessment remains low.

The measurement of companies' pressures on the ocean, with the introduction of KPIs and/or targets is relatively widespread, with examples of companies monitoring the release of polluting substances that might affect marine biodiversity and habitats, while others are engaged in conducting regular inspections of the maritime areas they operate on.

FIGURE 30: Overview of ocean related actionable initiatives by sector



Non-ocean-related actionable initiatives

The analysis of non-ocean related actionable initiatives is distributed over three relevant dimensions: product innovation, process innovation and supply chain.

- **Product Innovation:** in recent years, there has been a growing demand from consumers for sustainable and green products, energy, food and resources. As a result, many companies have started to invest in the development of products that meet these criteria.
- **Process Innovation:** it is evident that the vast majority of companies analyzed are placing a significant emphasis on reducing their greenhouse gas (GHG) emissions. This is due to the well-established scientific consensus that GHG emissions are a primary contributor to climate change and environmental degradation. In addition to focusing on GHG emission reduction, many companies are also prioritizing other sustainable practices that can help reduce their environmental impact. One such practice is energy efficiency, water and waste reduction and the introduction of circular economy practices that aim at minimizing the need for virgin resources and preventing waste from being sent to landfills.
- **Supply Chain Innovation:** despite the increasing focus on sustainability, it is concerning that many companies still do not have effective measures in place to monitor their suppliers' scope 3 greenhouse gas (GHG) emissions or incorporate Environmental, Social, and Governance (ESG) requirements into their procurement choices. This represents a missed opportunity for companies to leverage their purchasing power and influence to drive positive sustainability outcomes throughout their supply chain. ESG criteria in the purchasing phase and suppliers' engagement are also important aspects of responsible procurement. By working closely with suppliers, companies can identify areas for improvement, share best practices, and develop solutions that benefit all parties involved.

Figures 31-36 present the key insights from the Gen AI analysis conducted sector by sector to identify the most relevant non-ocean-related initiatives.

FIGURE 31: Textile & Apparel | Overview of non-ocean-related actionable initiatives

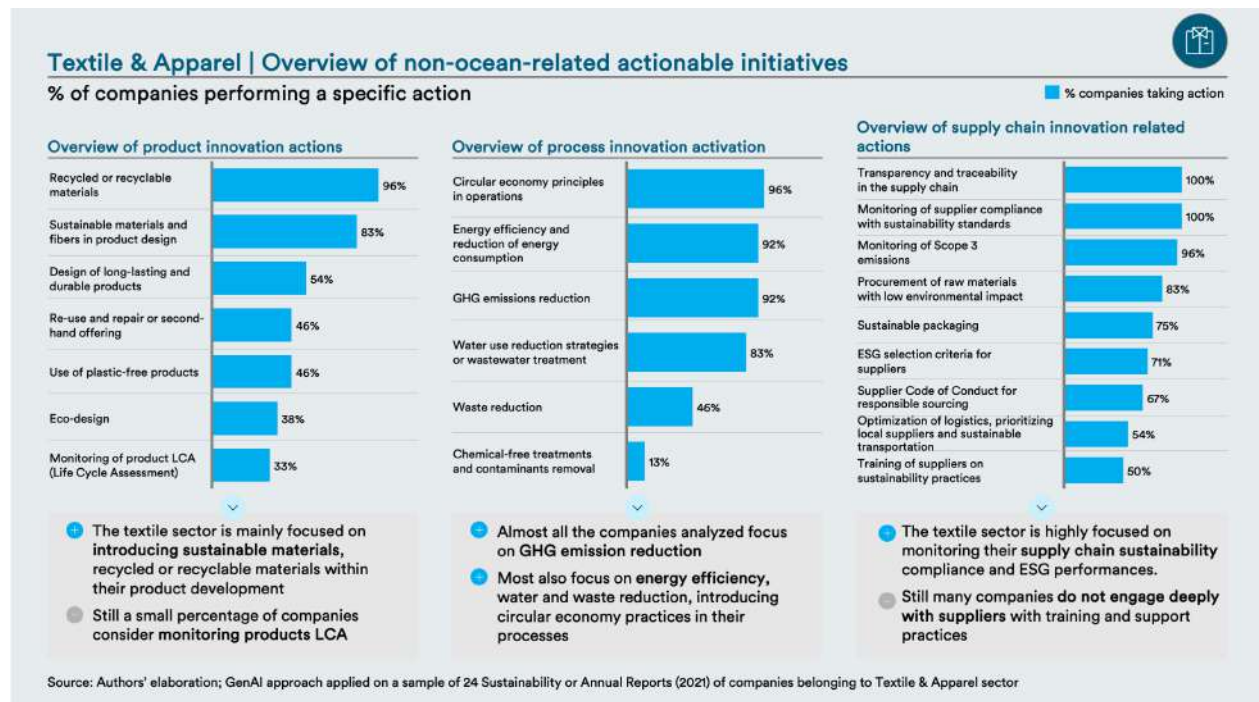


FIGURE 32: Utilities & Electric Power Generation | Overview of non-ocean-related actionable initiatives

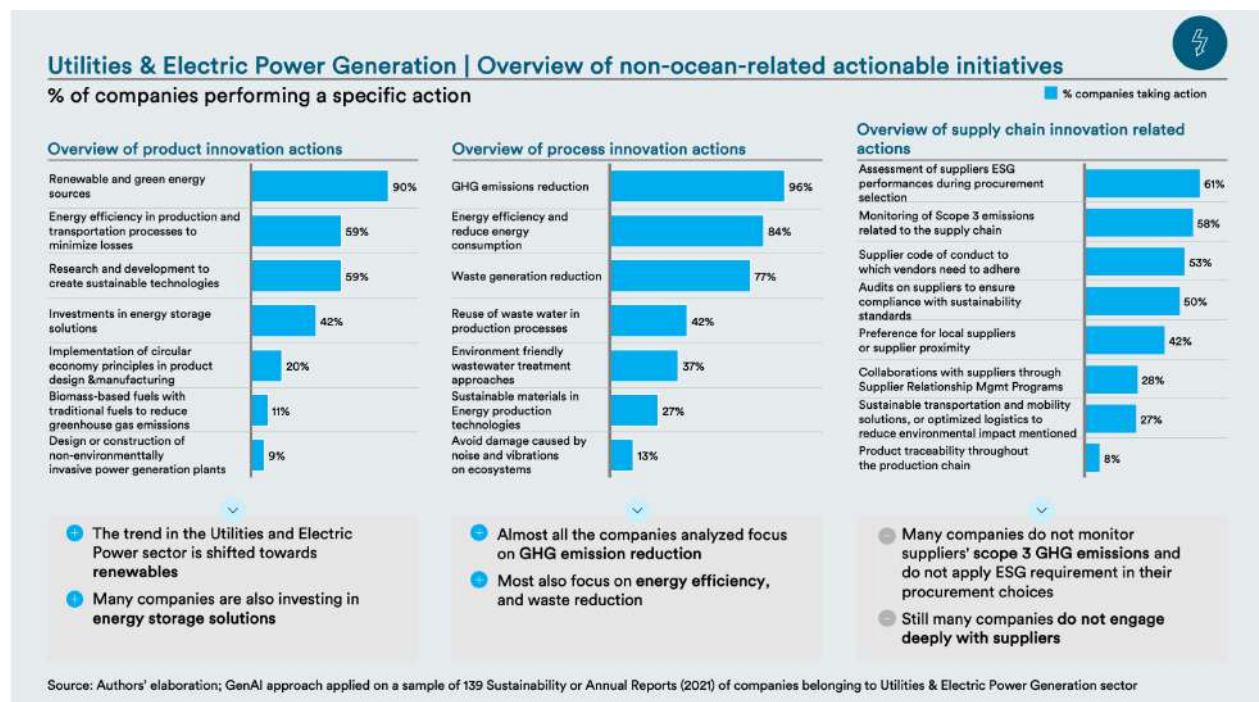


FIGURE 33: Agri-food | Overview of non-ocean-related actionable initiatives

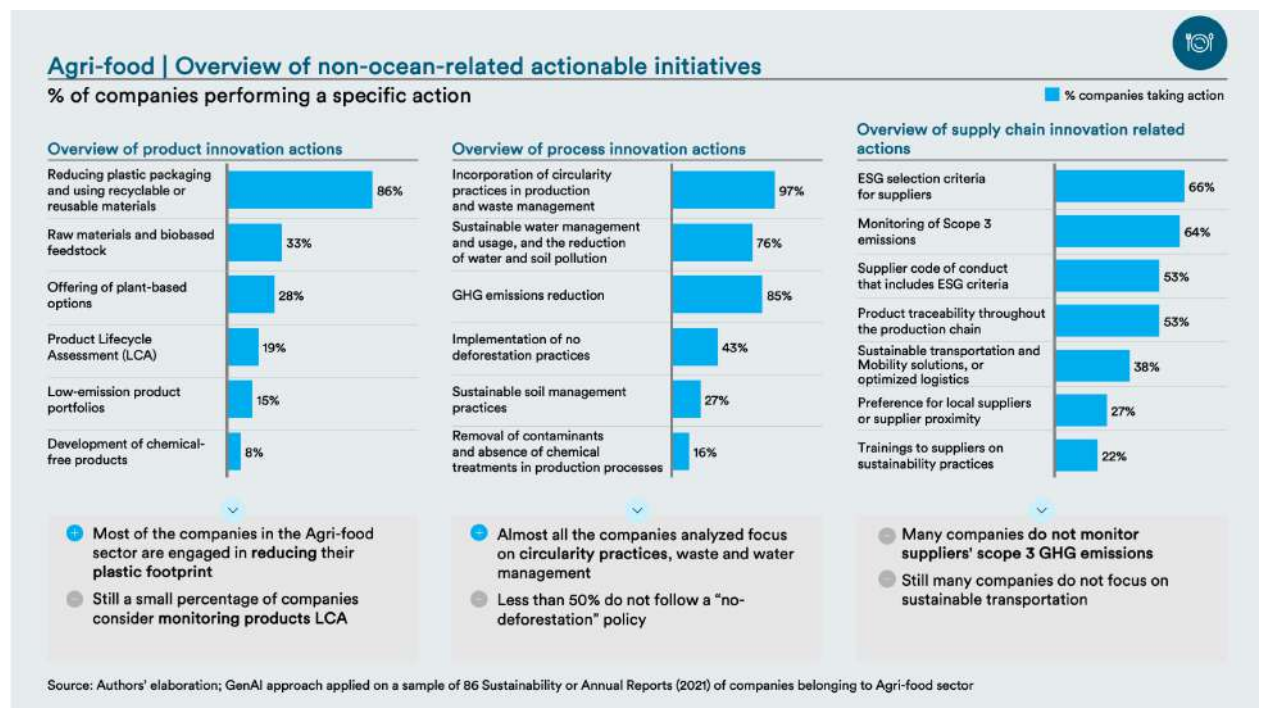


FIGURE 34: Construction | Overview of non-ocean-related actionable initiatives

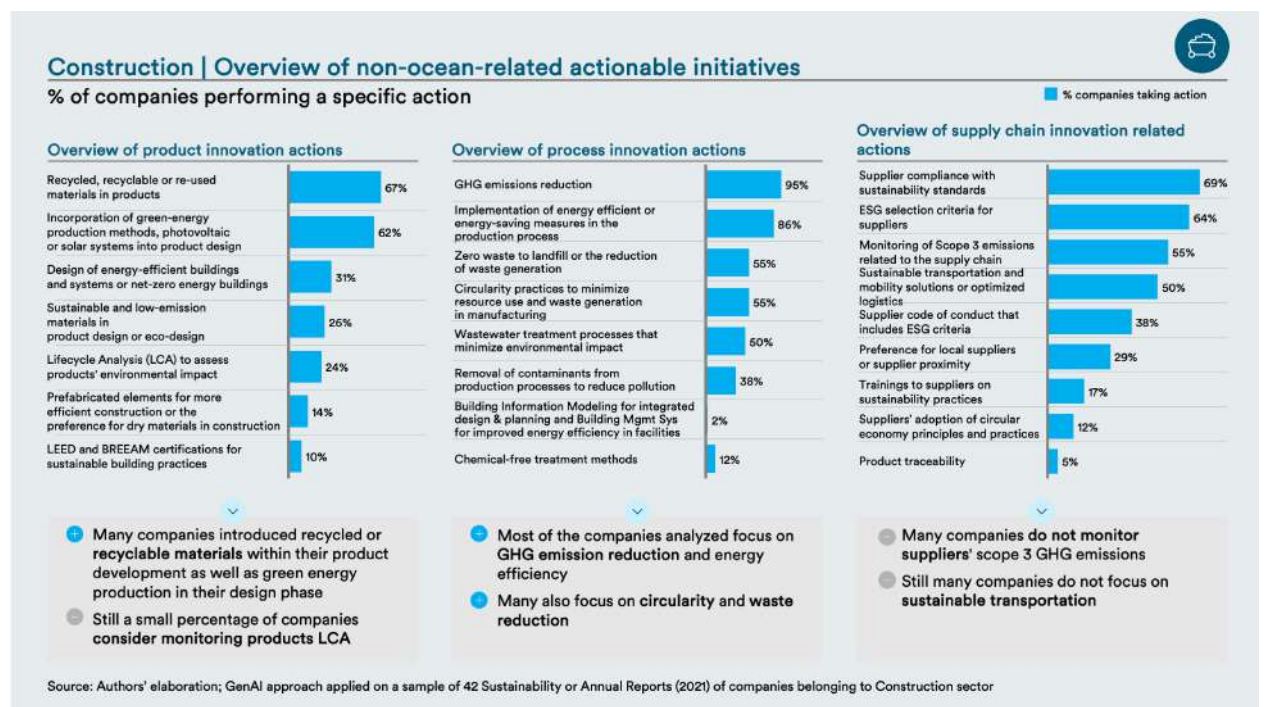


FIGURE 35: Fishing & Aquaculture | Overview of non-ocean-related actionable initiative

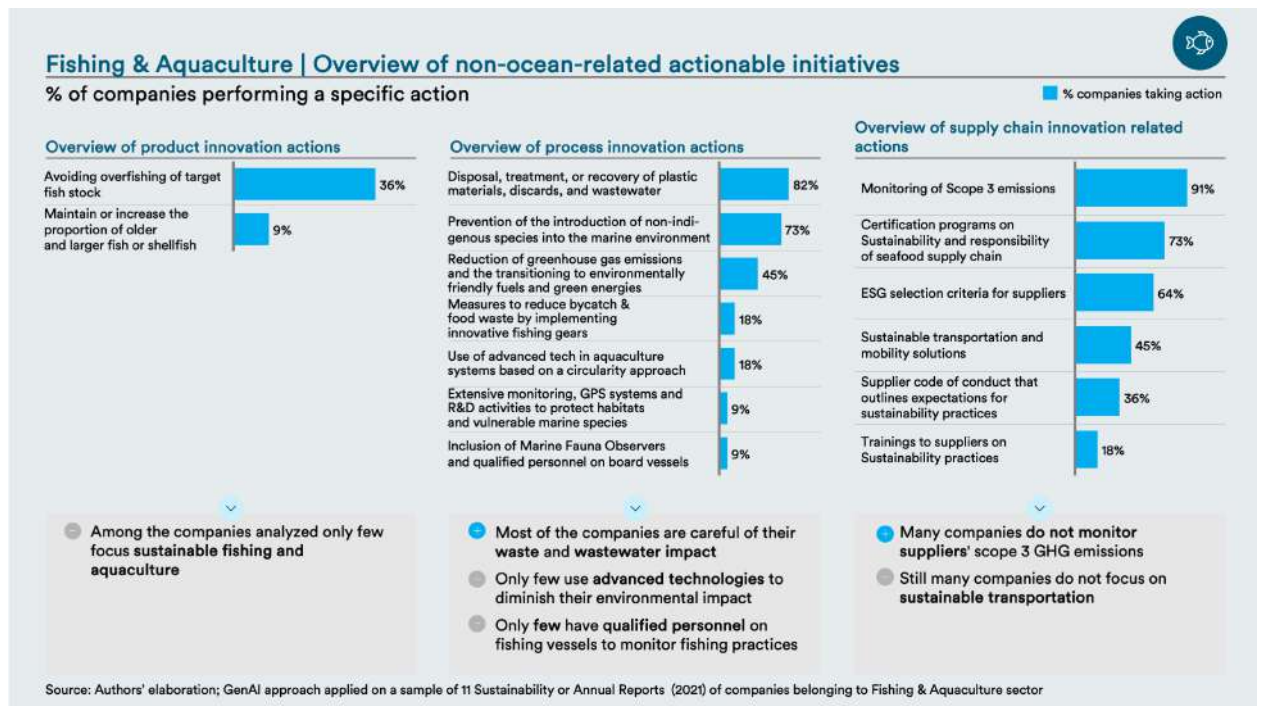
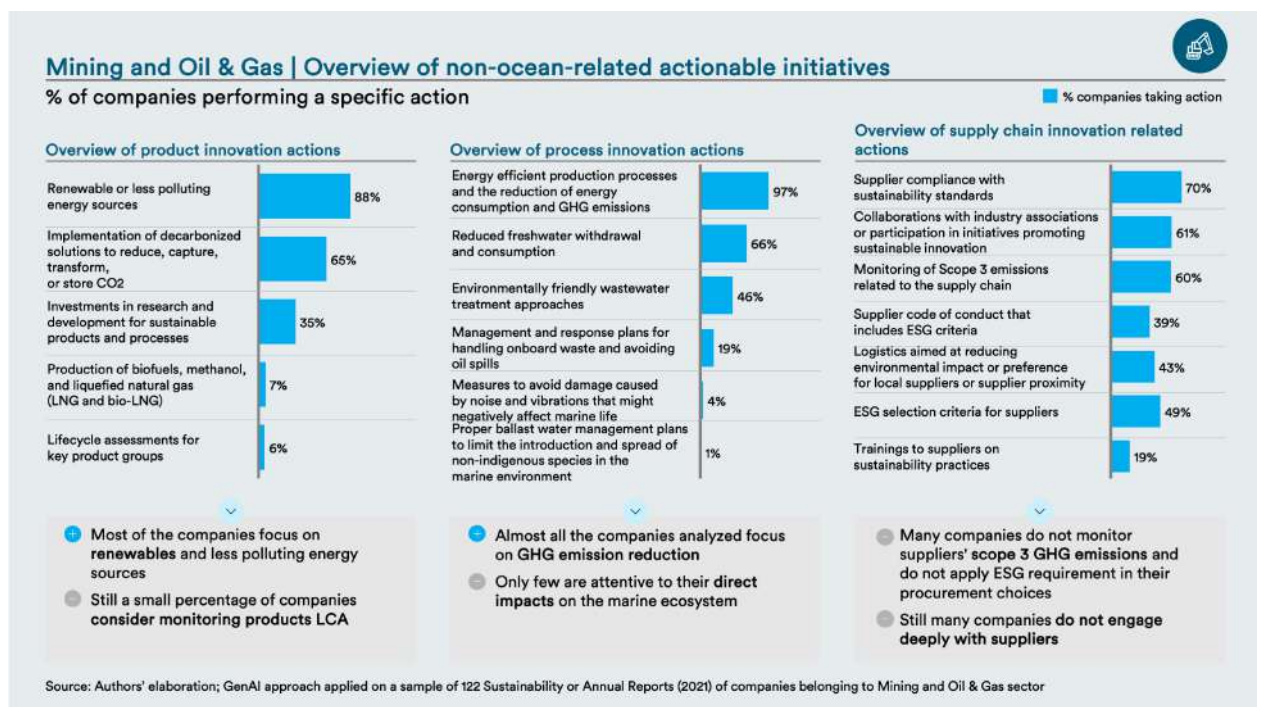


FIGURE 36: Mining and Oil & Gas | Overview of non-ocean-related actionable initiatives



About the One Ocean Foundation

This research is an initiative of the One Ocean Foundation, as part of its commitment to the diffusion of ocean literacy.

The mission of the Foundation is to accelerate solutions to ocean issues by inspiring international leaders, institutions, companies and people, promoting a blue economy and enhancing ocean knowledge through ocean literacy. The Foundation intends to develop a leading platform bringing together and strengthening the voices speaking out on behalf of the ocean around the world.

The distinctive feature of the One Ocean Foundation is its scientific scope and, at the same time, its strong educational drive, in order to increase awareness and establish constructive relationships between all stakeholders engaged in marine preservation at different levels.

Thanks to its relevant network of partners, the One Ocean Foundation is engaged in numerous unique, innovative and high added - value projects related to its mission of ocean protection, in three main areas: education, environmental research, blue economy.

Our Governance

BOARD MEMBERS



Guido Krass
Board Member



Riccardo Bonadeo
President



Giacomo Campora
Board Member



Paul Rose
Board Member



Ted Janulis
Board Member



Lady Owen Jones
Board Member



Giulio Magni
Operations Director



Jan Pachner
General Secretary



Carlo Zamparelli
Legal, Finance & Accounting
Manager



Ambra Cozzi
Project Manager



Gaia Peretti
Project Assistant



Ginevra Boldrocchi
Scientific Project
Coordinator



Giulia Liguori
Sustainability Specialist



Giuliano Luzzatto
Communications

THE TEAM

One Ocean Foundation is supported by a scientific committee, composed of six representatives of accredited academic and scientific bodies with recognized expertise and experience in the sector. The Scientific Committee is an independent body that guarantees authoritative scientific guidance.

SCIENTIFIC COMMITTEE



Sandro Carniel
Member (CNR - ISP, Italy)



Stefano Pogutz
President
(Bocconi University, Italy)



Rafael Sardá
Member (National Council
of Research, Spain)



Evangelia Drakou
Member
(Harokopio University, Greece)



Sam Dupont
Member (University
of Gothenburg, Sweden)



Marco Frey
Member (Sant'Anna School –
Global Compact Network, Italy)

BOARD OF AUDITORS

Maurizio Interdonato — President
Michele Grattagliano — Statutory Auditor
Angelo Martorana — Auditor
Jlenia Rossi — Substitute Auditor
Umberto Torre — Substitute Auditor

For information please contact
the One Ocean Foundation at:

secretariat@1ocean.org
Tel: +39 02796145
Via Gesù 10, Milan — Italy

To see the latest One Ocean Foundation
contents please visit:

www.1ocean.org

All pictures are kindly provided
by the photographers:

Kurt Arrigo — kurtarrigo.com
Carlo Borlenghi — carloborlenghi.com