POLITICS & SOCIETY

State of the oceans

Overview report

statista

Deutsche Meeresstiftung
German Ocean Foundation

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A sustainably managed ocean for all

Executive summary

Oceans are an essential component of the planet's ecosystem – for oxygen, food, and water – and it is impossible to sustain life on Earth without them. Oceans play a key role in providing services for climate regulation and are a rich resource for genetic pools, minerals, and, recently, renewable energy. Essentially, they are crucial to the global economy, supporting key industries such as fisheries, tourism, transport, and trade. While the oceans have supported humanity from the beginning, resource consumption in recent centuries has threatened their survival. Some of the major drivers that endanger their health are global warming, pollution, and habitat degradation.

The oceans absorb excess heat and energy trapped in the atmosphere due to increasing greenhouse gas emissions. This excess heat absorbed by the oceans leads to a plethora of cascading effects: extreme weather events, changing ocean currents, rising sea levels, and rapid melting of sea ice and ice sheets.

- Marine habitat degradation leads to biodiversity loss. In April 2024, the fourth global coral bleaching event was confirmed by scientists. One year later, over 80 percent of the world's coral reefs experienced heat stress high enough to cause bleaching.
- Marine ecosystems are not only biodiversity hotspots but also act as massive carbon sequesters, capable of capturing significantly more carbon than terrestrial pools. Considering this potential, marine emission mitigation techniques, like marine carbon removal (see page 48), are being studied as an alternative approach to removing carbon from the atmosphere.
- Most of the waste, pollutants, and contaminants that end up in the oceans are mainly carried as runoffs by waterways such as rivers (page 31). An international treaty to eliminate plastic pollution will be discussed by the end of 2025, bringing a long-awaited tool to help in the fight against the waste hurdle in the oceans.
- In 2015, global leaders adopted a list of Sustainable Development Goals (SDGs). Of the 17 goals, SDG 14 – life below water – was set to conserve and use the oceans, seas, and marine resources for sustainable development (see page 37). As of 2024, no country had yet achieved the goal.

This report aims to further review these topics, giving a status quo on the biggest biome in the world as well as shedding light on all the struggles the marine world is going through and the progress made to protect it.

01

Introduction

- Overview
- Fisheries
- Sea trade
- Ocean energy

Oceans for an environmentally, economically, and socially sustainable future

Humanity’s dependence on ocean resources and marine ecosystems

The ocean plays a crucial part in maintaining and supporting life on Earth. However, human activities are threatening the health of the world’s oceans; entire marine ecosystems are rapidly changing. Alterations in ocean chemistry and many oceanic processes have been recorded, from coral bleaching to sea level rise to higher temperatures, threatening many species of marine animals that cannot cope with these new conditions.

Accounting for the value of the oceans’ global economic contributions has proven to be a powerful instrument to enhance ecosystem protection or sustainable management. Realizing the implication of potentially losing these economic contributions has led the way toward incorporating the value of **ecosystem services** in policies, governance, and investments. **Ecosystem services refer to the benefits people obtain from ecosystems**. The Millennium Ecosystem Assessment (MEA), published in 2005, portrayed a global picture of environmental degradation and biodiversity loss, with risks of severe impacts on society. Since then, ecosystem services have gained traction as a means of linking societal benefits to the ecology and functioning of ecosystems and are now frequently included in decision-making and legislation.

The MEA defined four types of ecosystem services to which marine and coastal ecosystems contribute:

- **Provisioning services:** fisheries and construction materials.
- **Supporting services:** life-cycle maintenance for both flora and fauna, primary and secondary production, and nutrient cycling.
- **Regulating services:** carbon sequestration and storage, erosion prevention, wastewater treatment, and moderation of extreme events.
- **Cultural services:** tourism, recreational, aesthetic, and spiritual benefits.

Sources: Millennium Ecosystem Assessment; OCP

Oceans for an environmentally, economically, and socially sustainable future

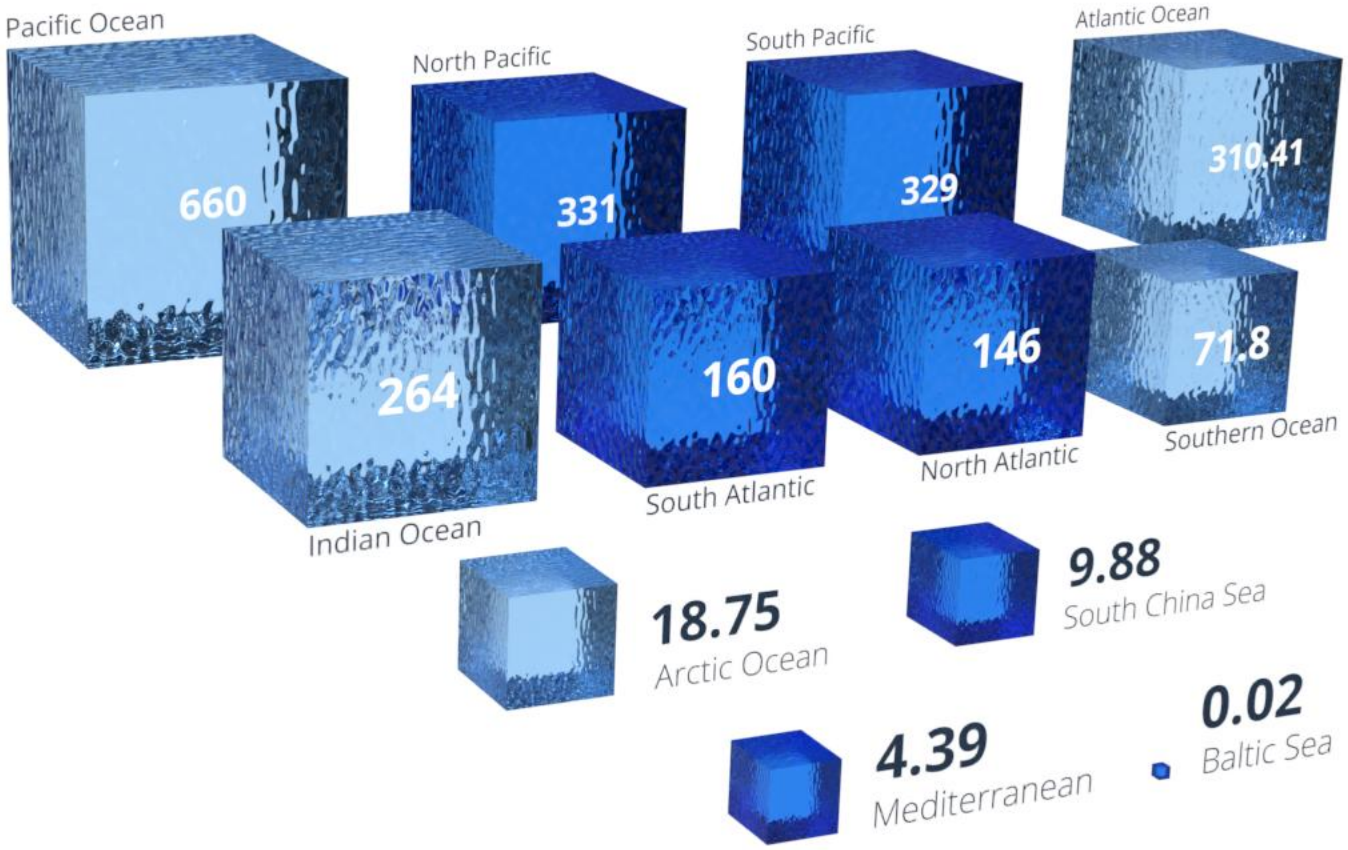
Humanity's dependence on ocean resources and marine ecosystems

ECOSYSTEM SERVICES

- Subsistence harvest
- Aquaculture
- Shoreline protection
- Fishing
- Tourism
- Cultural identity

How many oceans are there?

Volume of global oceans (in million cubic kilometers)



Earth is aptly called the blue planet – about 71 percent of its surface is covered with water. An estimated volume of 1.4 billion cubic kilometers of water resides on Earth.

While by definition there is only one ocean that covers the majority of Earth's surface, due to geographical locations, there are five named oceans: the Atlantic, Pacific, Indian, Arctic, and, since 2000, the Southern (Antarctic).

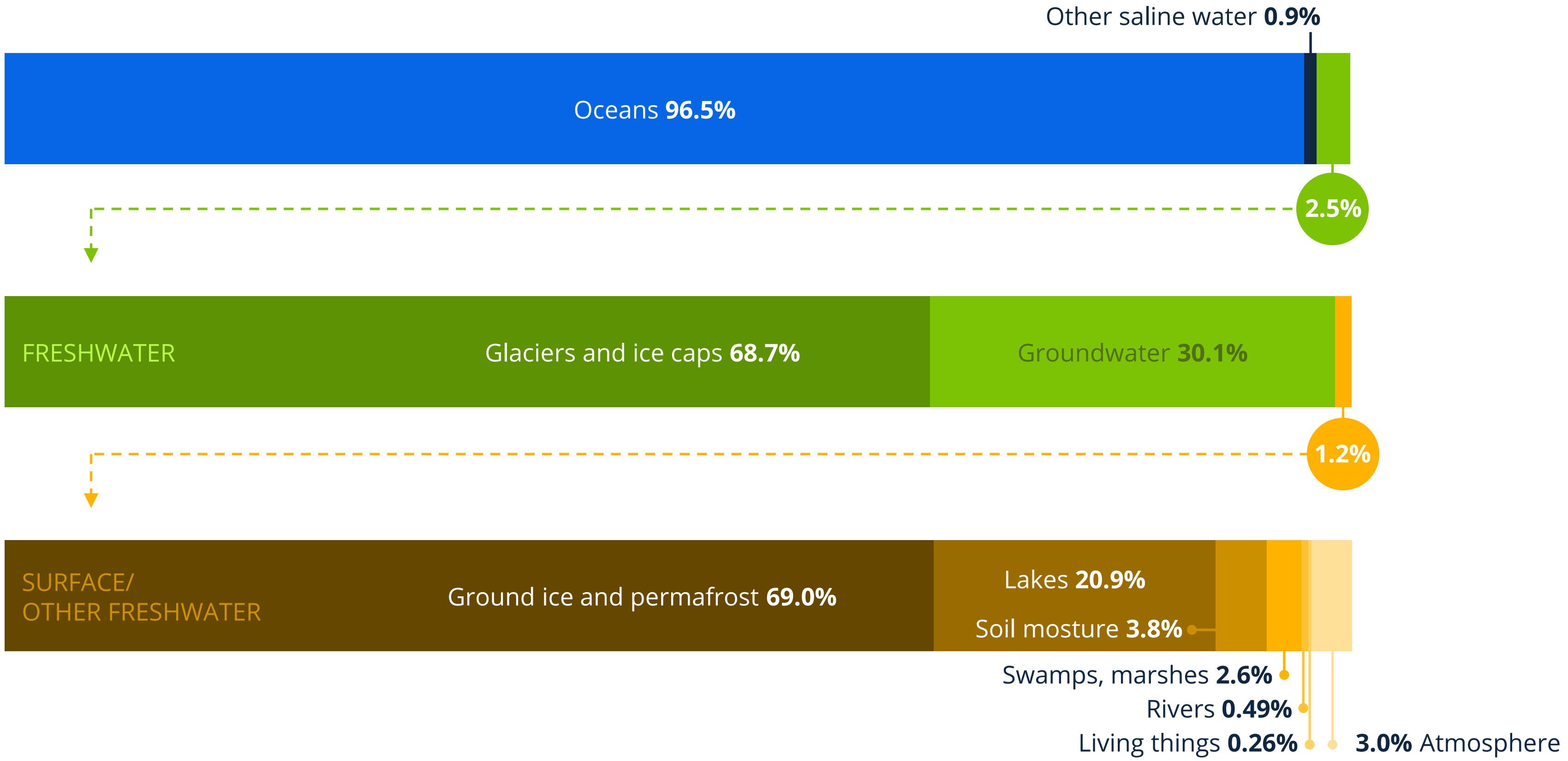
The largest is the Pacific Ocean, which holds approximately 660 million cubic kilometers of marine water.

Notes: Worldwide; dark blue segments indicate a portion of a greater oceanic division

Sources: NOAA; ID: 558451; Text: USGS

About 97 percent of Earth's water can be found in the oceans

Blue planet – how is Earth's water distributed?



Around 97 percent of the Earth's water is saline, with the oceans accounting for the vast majority. The ocean's salinity level plays a vital role in ocean circulation and climate regulation.

One of the major concerns about global warming today is the rapid melting of glaciers and ice caps. As they hold about 69 percent of the world's freshwater, the fast pace of the melting and freshwater entering the ocean affects its salinity. This disrupts many intricate processes, which degrades ocean ecosystems.

Notes: Worldwide; 1993

Sources: Shiklomanov; USGS; ID: 564724; Text: NASA; USGS

Contributions of the ocean to socioeconomic development

Total direct global economic output of marine fisheries, coral reefs, seagrass, and mangroves was **6.9 trillion U.S. dollars** as of 2020

Revenue of the global cruise industry was **42.3 billion U.S. dollars** in 2024

30 percent of annual global carbon emissions are absorbed by the oceans, amounting to an equivalent economic value of **4.3 trillion U.S. dollars** in 2020

Marine trade and transportation contributed **5.2 trillion U.S. dollars** worldwide in 2020

Global seafood market value was **101.5 billion U.S. dollars** in 2024

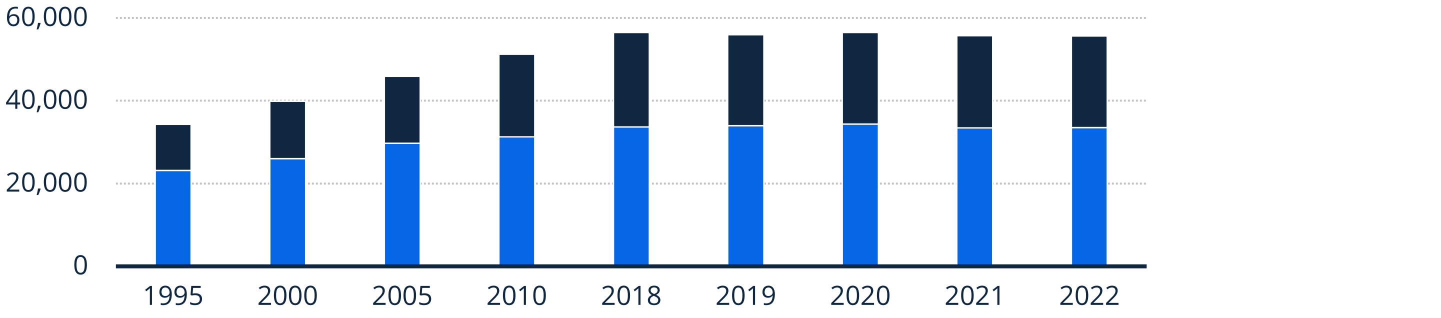
Productive coastlines worldwide contributed **7.8 trillion U.S. dollars** in 2020

Sources: Statista; ID: 1258061; ID: 821023; IMF; Ocean Panel Organization; Visual Capitalist; WWF

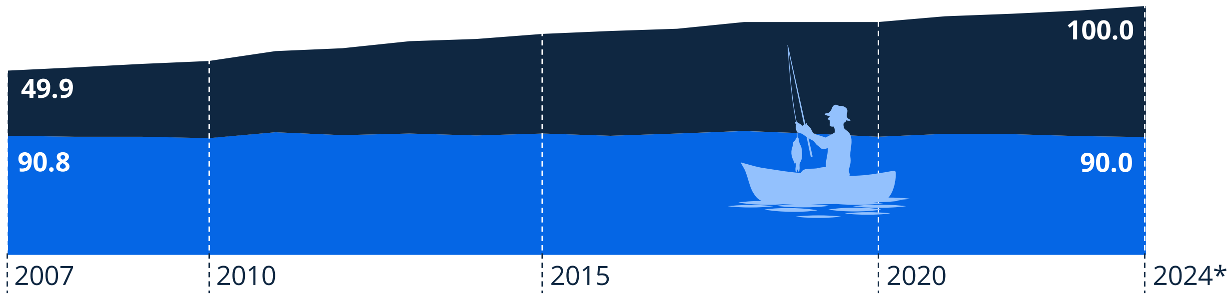
Reliance on fisheries and aquaculture for food and employment

Almost half of the global fish supply now comes from aquaculture

Total number of fishers and fish farmers worldwide from 1995 to 2022 (in 1,000s)



World fish production from 2007 to 2024, by fishing and aquaculture (in million metric tons)



Large populations worldwide rely on fishing as a primary food source, and it is also an important means of employment for many coastal communities. As of 2022, there were over 33 million fishers worldwide, with another 22 million fish farmers working in aquaculture.

Increased global demand for fish and other seafood has led to overfishing. This has resulted in the depletion of naturally available stocks, giving rise to aquaculture to meet the growing global demand.

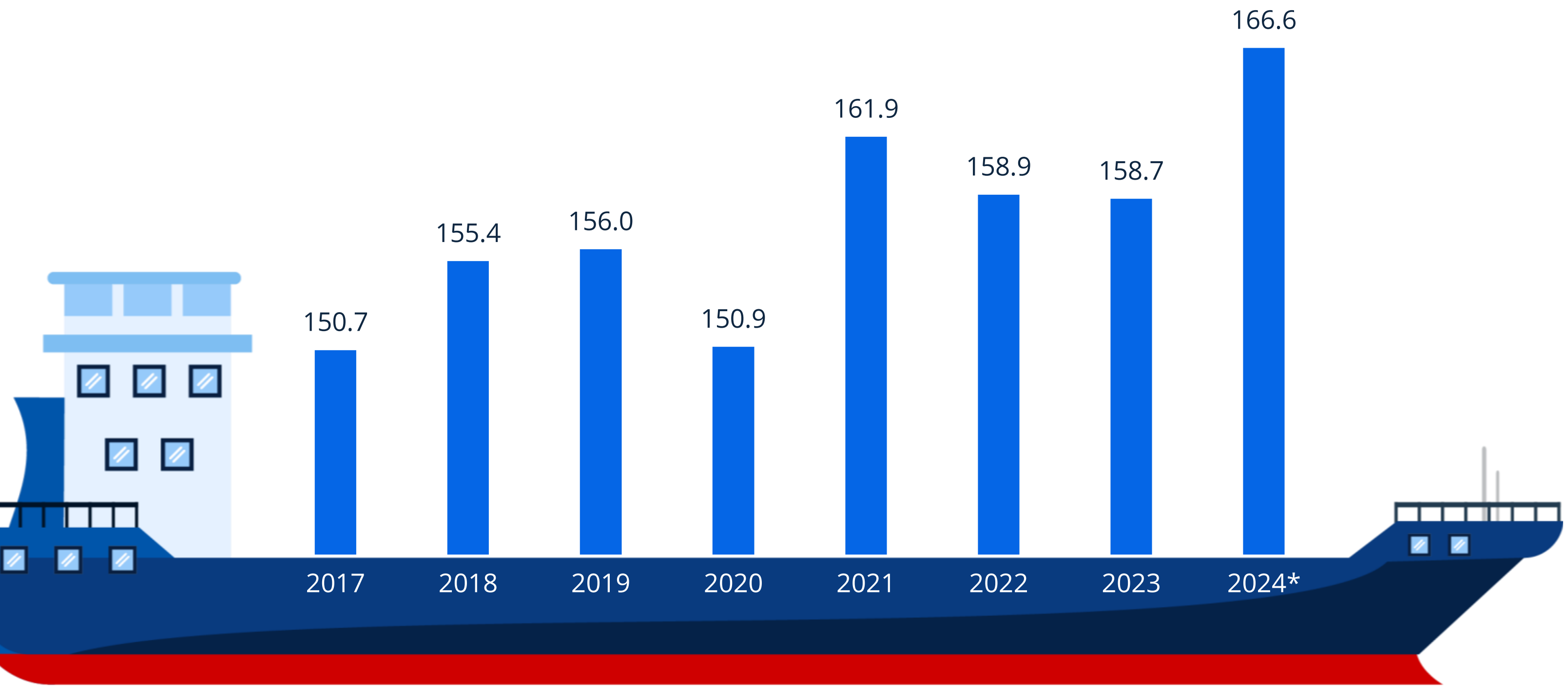
Over the past 17 years, the number of fish produced through aquaculture has more than doubled, reaching 100 million metric tons in 2024.

Notes: (1) Worldwide; 1995 to 2022; (2) Worldwide; 2007 to 2024; *projected

Sources: (1) (2) FAO; ID: 248768; ID: 272311

Seaborne trade – increasing demand creates new sustainability challenges

Transport volume of international seaborne trade carried by container ships from 2017 to 2024
in million TEUs loaded



Oceans form a critical foundation for much of the world's economy, supporting several trade sectors through maritime logistics. Countless shipping lines span the globe, creating a vital supply chain.

The volume of container cargo transported via seaborne trade has not only recovered from the COVID-19 pandemic but also surpassed pre-pandemic levels. The transport volume has increased more than 10 percent since 2020, from 150.9 million TEUs loaded to over 166 million TEUs in 2024.

Nearly all these cargo ships are powered by fossil fuels. The pollution caused by this method of transport has been in the spotlight for several years. In 2023, international shipping emitted some 706 million metric tons of carbon dioxide into the atmosphere, more than the CO_2 emissions of Germany in that year. Today, this sector must transition toward a sustainable future.

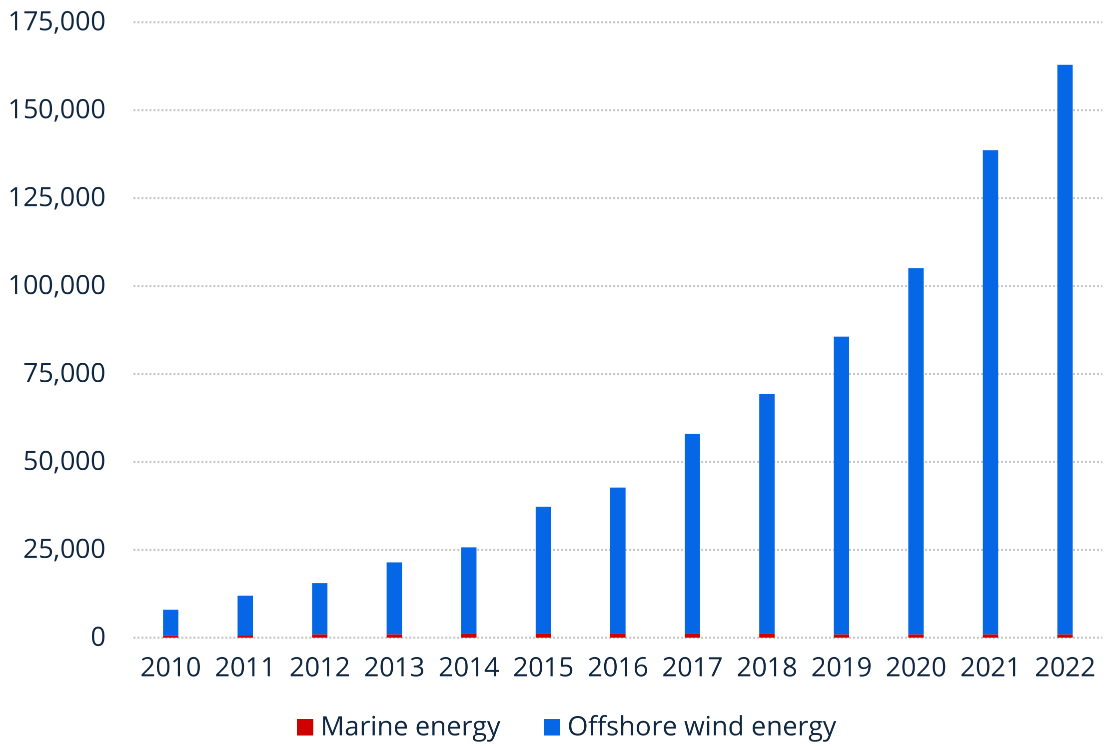
Notes: Worldwide; 2017 to 2024; *forecast

Sources: MDS Transmodal; UNCTAD; ID: 253987; Text: Crippa et al.; EDGAR; European Commission; IEA; ID: 1291468; Energy Institute; Kearney; KPMG; ID: 1171389

Harnessing energy from the ocean

The oceans are the world's largest untapped source of renewable energy

Ocean energy production in gigawatt-hours (GWh)



Ocean energy, or marine energy, refers to all forms of renewable energy derived from the sea. Global marine energy capacity reached 494 megawatts in 2024 after nearly doubling at the beginning of the previous decade. South Korea and France currently have the highest installed marine power capacity, holding about 255 and 212 megawatts, respectively (see next page).

When also including offshore wind energy – whereby turbines are mostly located on the high seas – the global energy generation from the ocean amounted to some 162,000 gigawatt-hours in 2022, an almost 22-fold increase compared to 2010.

Ocean power cannot only help solve the energy crisis but can also help mitigate climate change. According to IRENA's scenario for 1.5 degrees Celsius of global warming, offshore wind, ocean energy, and floating solar will all experience enormous expansion in the ensuing decades. For instance, offshore wind capacity could grow from 37.5 gigawatts in 2020 to 500 gigawatts by 2030. By 2050, the capacity of offshore plants would need to reach around 2,500 gigawatts to still be able to reach the 1.5-degree-target.

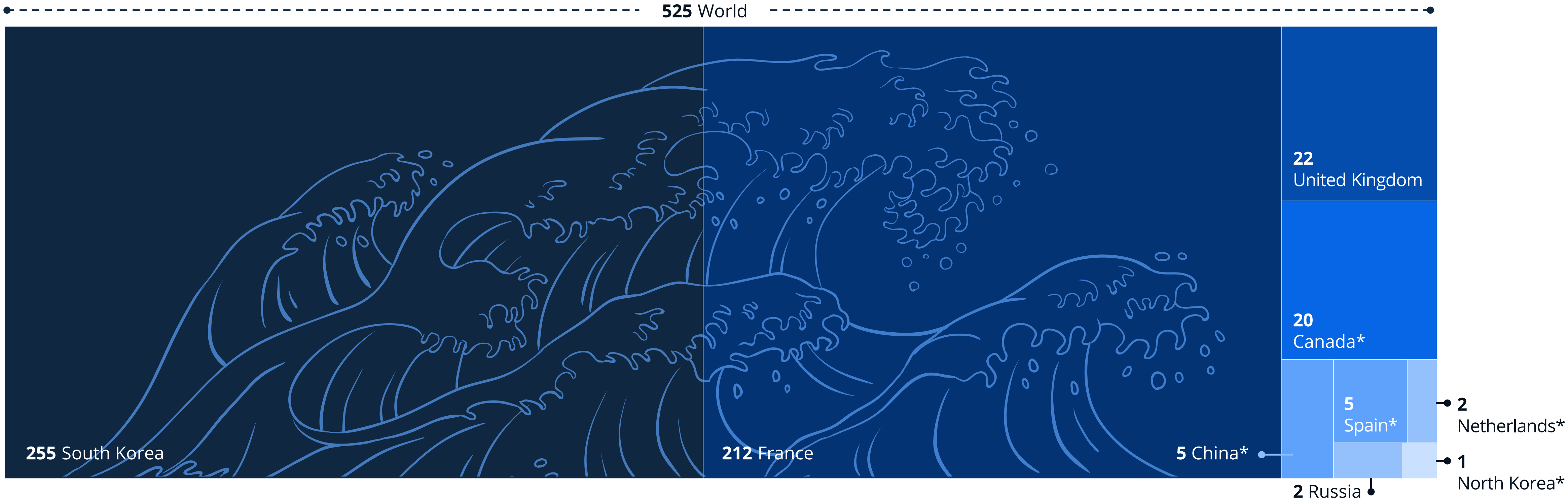
Notes: Worldwide; 2010 to 2022

Sources: IRENA; ID: 1334849; Text: IRENA; ID: 476267

Harnessing energy from the ocean

Leading countries in installed marine energy capacity in 2024

Marine capacity in megawatts



Notes: Worldwide; 2024; *estimate

Sources: IRENA; ID: 1031127

02

Impacts of climate change

- Ocean warming
- Sea level rise
- Ocean acidification
- Loss of biodiversity
- Weakening of the AMOC

How is climate change impacting the world's oceans?

A tale of warming oceans, melting glaciers and sea ice, sea level rise, and biodiversity loss

Anthropogenic climate change has already contributed about 1.3 degrees Celsius to global warming. The heat storage in the oceans significantly contributes to sea level rise through thermal expansion. Additionally, ocean warming affects ocean currents, impacts tropical cyclones, and is a major player in ocean deoxygenation processes and carbon sequestration into the ocean. These imbalances can lead to dramatic changes in ecosystems and biodiversity and can cause population extinctions, coral bleaching, the spread of infectious diseases, as well as redistribution of marine life (page 24).

According to the IPCC Sixth Assessment Report, climate change has already caused substantial damages and irreversible losses in coastal and open ocean ecosystems. In the future, a scenario of continued emissions will further disturb all major natural climate system components. For land and ocean carbon sinks, an increase in CO_2 emissions will mean a decrease in the proportion of emissions they can take up.

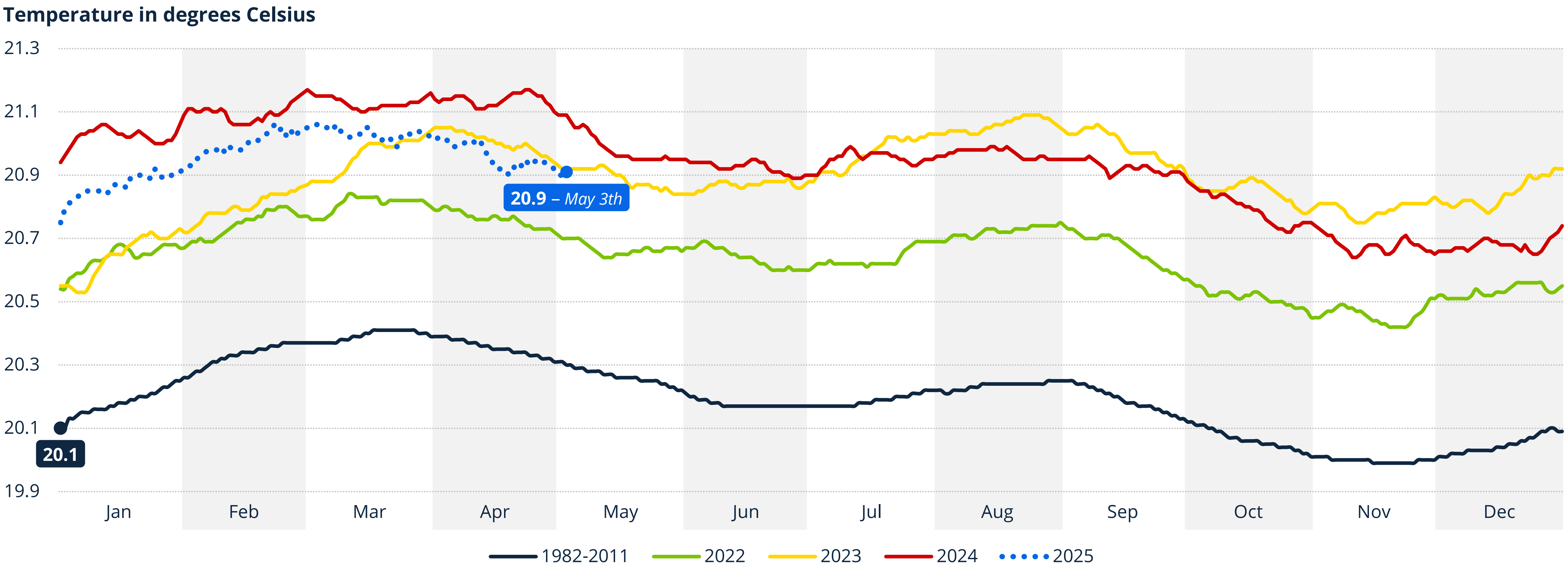
Among the various threats to coastal regions from rising global temperatures, coastal flooding caused by sea level rise is considered one of the most severe risks to human populations. The mean sea level has increased by around 10 centimeters in the past three decades. Under a very low emissions scenario, the global sea level is estimated to increase by up to 38 centimeters by 2100 (page 22).

With the help of long-term observations of ocean parameters such as surface temperature, sea ice, sea level rise, and acidity, the effects of climate change on ocean environments can be monitored. This not only provides a deeper understanding of the processes in general but also provides information for developing mitigation strategies to better protect the oceans.

Sources: CAT; ID: 1278800; IPCC; UN; WEF

Ocean temperatures on a record-breaking streak

Daily global ocean surface temperature average from 1982 to 2011 and in the years 2022, 2023, 2024, and 2025



Notes: Worldwide; 1982 to 2025

Sources: Climate Reanalyzer; NOAA; ID: 1468603

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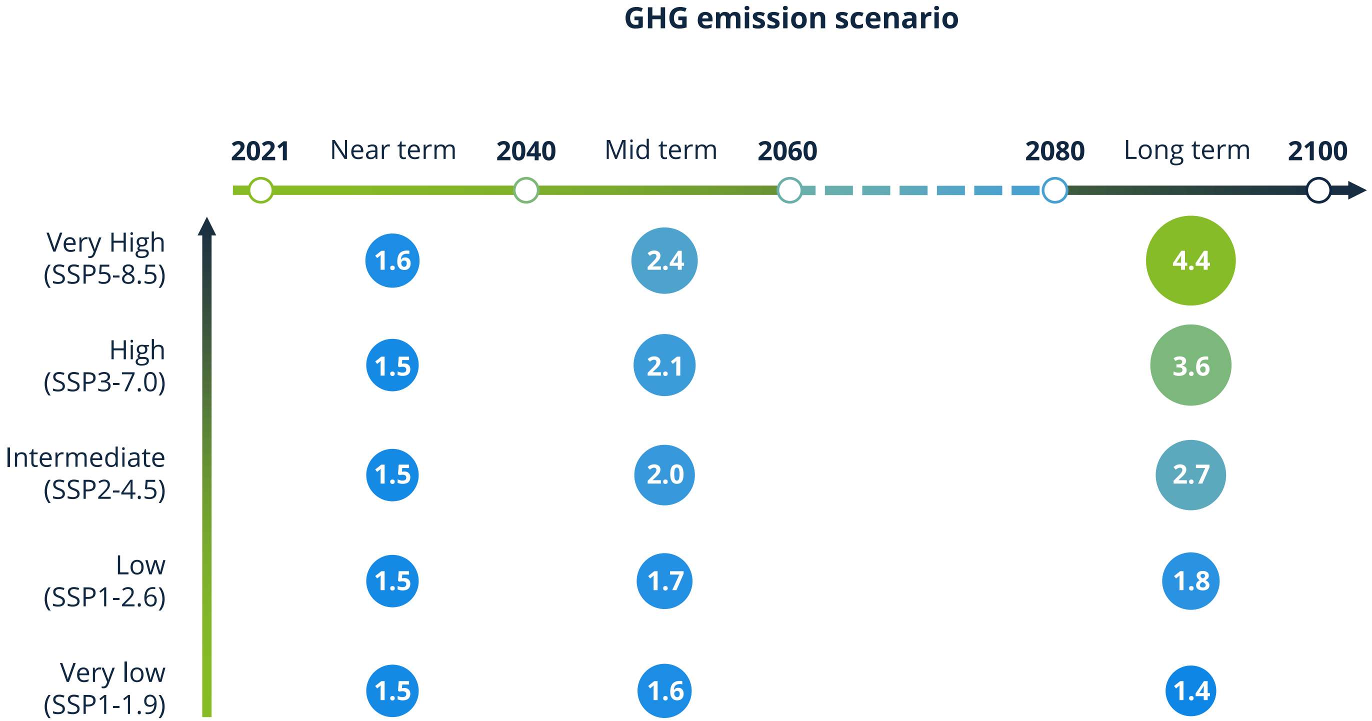
Surface temperatures will continue to increase under all emission scenarios

Estimated increase in global surface temperature from 2021 to 2100, by scenario (in degrees Celsius)



Global surface temperatures will continue to increase until at least the middle of the century under the expected range of all emissions scenarios. Based on the intermediate, high, and very high GHG emissions scenarios, surface temperatures are likely to exceed two degrees Celsius of warming in the medium term (2041 to 2060) and the long term (2081 to 2100). This temperature rise, in turn, brings about cascading effects like the melting of sea ice and glaciers, sea level rise, and extreme weather.

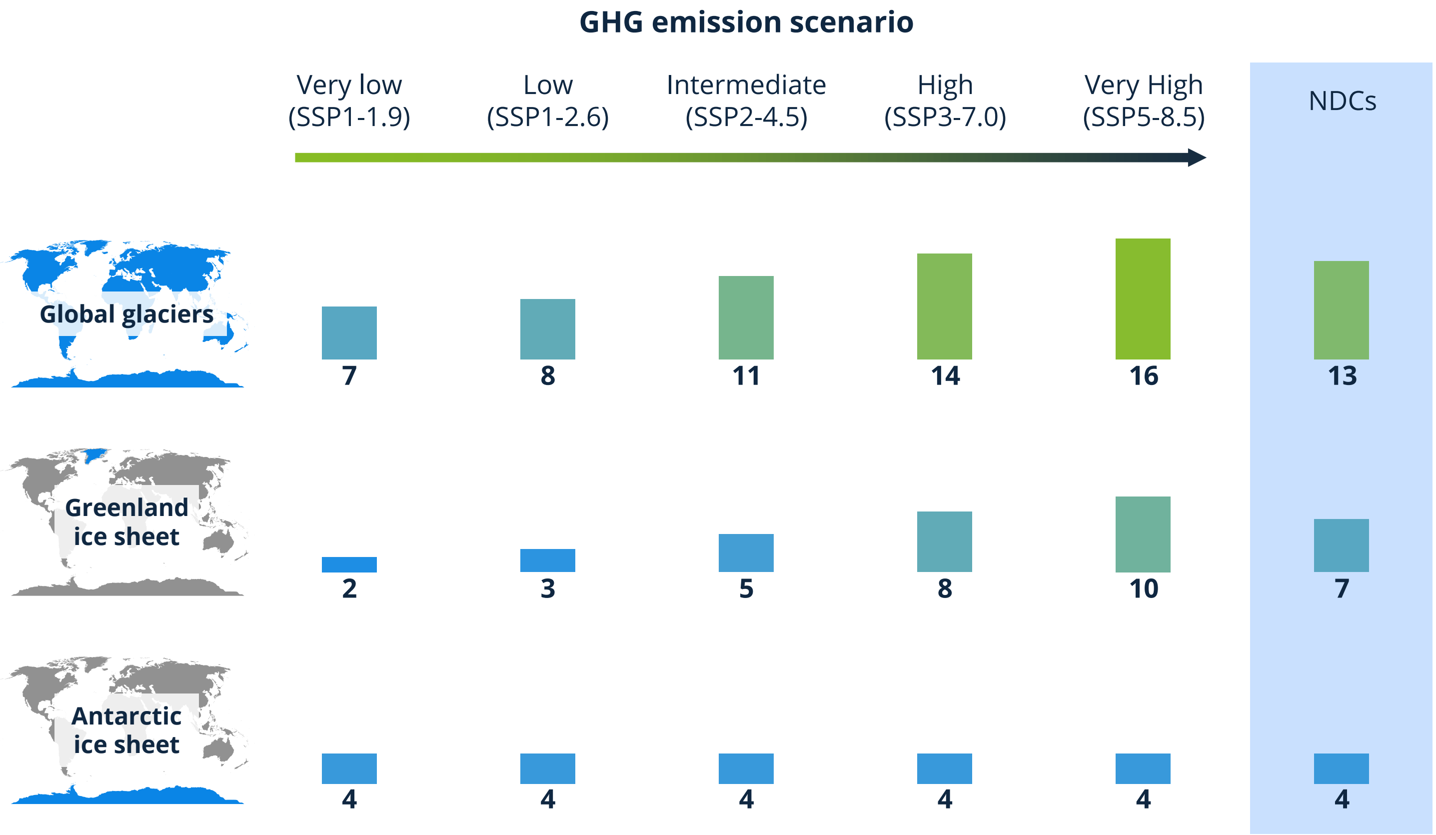
Even if limiting surface temperature is managed, it will not prevent continued change in climate system components with long timescales of response, such as deep ocean warming and ice sheet melt.

Notes: Worldwide; 2021; temperature differences relative to the average global surface temperature of the period 1850 to 1900; for SSP definition, see Glossary

Sources: IPCC; UNEP; WMO; ID: 1257473; Text: IPCC

How much are glaciers contributing to sea level rise?

Land ice contributions to global sea level rise until 2100, by scenario (in centimeters)



Among the various land ice types, the largest contribution to sea level rise was estimated to be from glaciers across all emission scenarios. Glacier melting worldwide has accelerated over the past decades, and models show that even under the lowest emission scenario, glaciers are estimated to drive around seven centimeters of sea level rise by 2100. Under the same scenario, another six centimeters would be added by melting ice sheets.

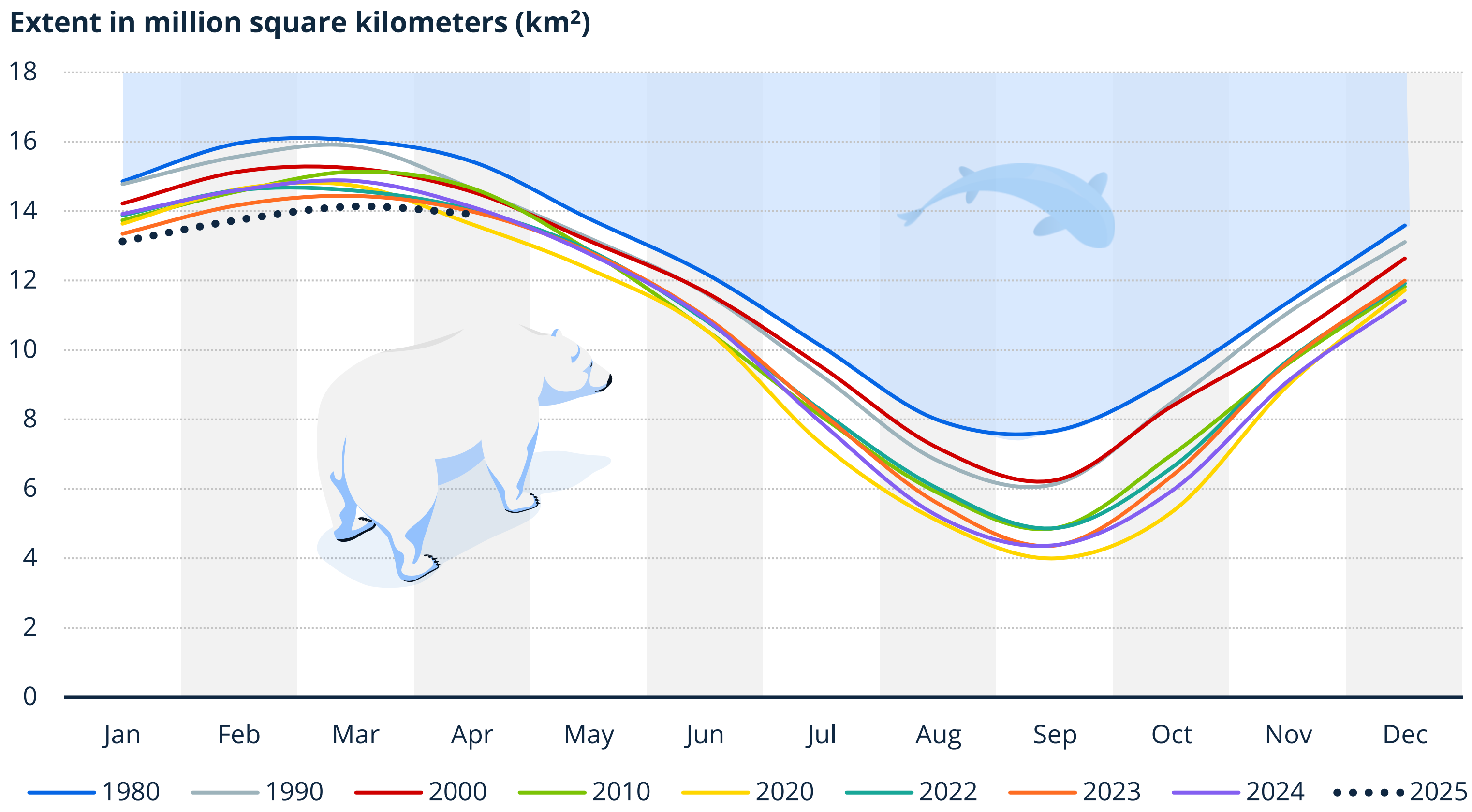
More than 11,000 cubic kilometers of ice sheets in Greenland and Antarctica have already been lost since the 1970s, equivalent to a rise of three centimeters. According to NASA, the world's most expansive glacier – the Thwaites Glacier, located on the West Antarctic ice sheet – is expected to increase sea level by 487 centimeters (16 feet) if it melts completely.

Notes: Worldwide; 2021

Sources: Carbon Brief; Edwards et al.; ID: 1276983; Text: Climate Nexus; Copernicus Marine Service; IPCC; NASA

Arctic sea ice extent is reaching record lows

Northern Hemisphere sea ice extent per month from 1980 to 2025



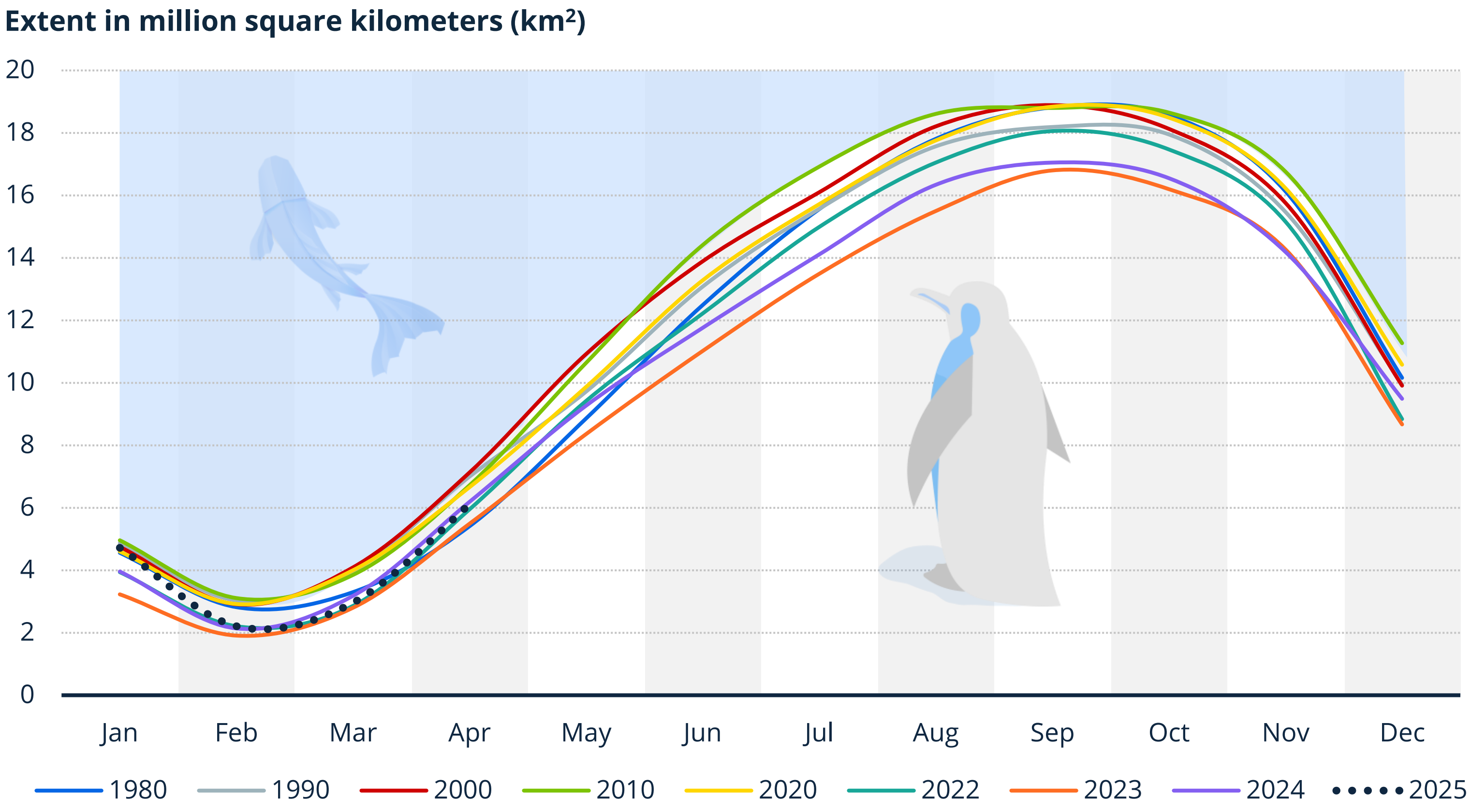
In recent decades, the Arctic has been warming much faster than the rest of the world. This amplification is primarily caused by melting sea ice, where older and thicker sea ice becomes thinner and more mobile. The Arctic sea ice has steadily declined in extent and thickness since the 1980s. Summer (September) sea ice has followed a downward trend since 1979, falling 13 percent per decade, with record lows of sea ice levels in 2020. The figures reported for the first quarter of 2025 are alarming, recording the lowest sea ice extent in the first three months of the year since records started. The continued loss of Arctic sea ice will hasten the erosion of Arctic coastlines and is already causing a disturbance in global weather patterns. With sea ice loss, accessibility to these remote areas will increase, leading to increased human activity and further disturbance of Arctic ecosystems.

Notes: Worldwide; 1980 to 2025

Sources: National Snow and Ice Data Center; ID: 1299082; Text: International Science Council

The Antarctic is also reacting to the rising temperatures

Southern Hemisphere sea ice extent per month from 1980 to 2025



Sea ice in the Southern Hemisphere tends to behave differently than that in the Northern Hemisphere. The Antarctic was showing more resilience to the rise in global sea surface temperature. That said, this pattern seems to have reached a tipping point.

In 2023, sea ice cover extent in Antarctica reached record low levels. Particularly in winter, when the sea ice area is at its highest, ice cover drifted drastically away from average.

A strong El Niño phenomenon in 2023 might have caused the abnormal behavior, though researchers are already arguing if this is a temporary effect or if the Southern ice sheet is at the beginning of a new regime of low sea ice.

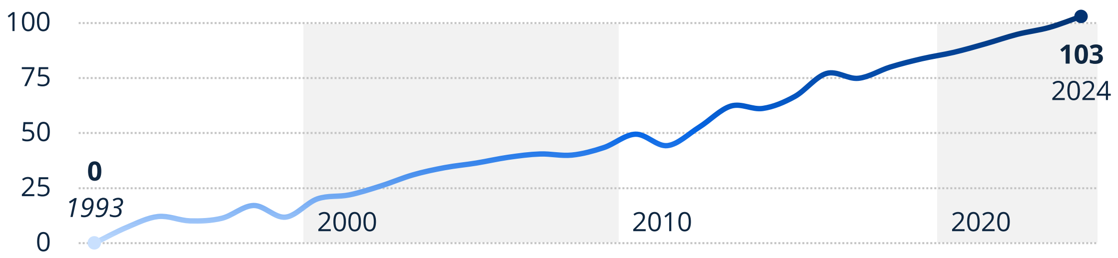
Sources: Worldwide; 1980 to 2025

Notes: National Snow and Ice Data Center; ID: 1299104; Text: Carbon Brief

Rise in sea surface temperature and sea level is occurring globally

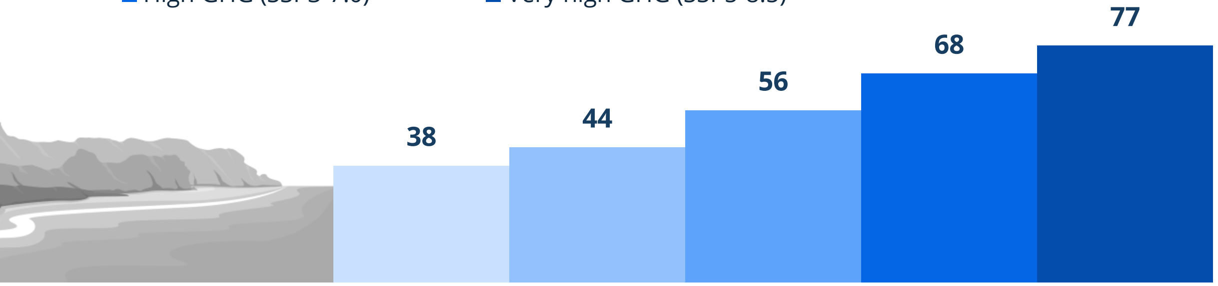
Sea levels are expected to continue rising even in a low-emissions scenario

Mean sea level variation worldwide from 1993 to 2024 (in millimeters)



Projected global sea level rise by 2100, by scenario (in centimeters)

Very low GHG (SSP1-1.9) Low GHG (SSP1-2.6) Intermediate GHG (SSP2-4.5)
High GHG (SSP3-7.0) Very high GHG (SSP5-8.5)



The melting of land-based and sea ice sheets is not the only cause of sea level rise. Thermal expansion, caused by the warming of the oceans, also plays an important role, accounting for one-third of mean sea level variation since the beginning of the century. The global mean sea level is a critical indicator that accounts for the combined effect of thermal expansion and melting land ice. Between 1993 and 2024, mean sea level variation increased by 10 centimeters. It is projected that, even in a very low GHG emissions scenario, global sea level will rise by as much as 38 centimeters by 2100.

The magnitude of the rise in sea level will naturally change depending on the location, with some coastal cities expected to be more affected than others (see next page). In cities like New York (U.S.) or Manila (Philippines), the rise is projected to be around one meter by the end of the century. The risks of sea level rise to coastal areas include an escalation in coastal erosion, more frequent and intense storm surges and flooding, and damage to wildlife habitats such as marshes and wetlands.

According to the IPCC, even with a halt to emissions, sea levels will continue to rise beyond 2100 and will remain elevated for thousands of years.

Notes (1) Worldwide; 1993 to 2024; (2) Worldwide; as of 2023; sea level rise relative to a 1995 to 2014 baseline

Sources: (1) NASA; ID: 603821; (2) IPCC; NASA; ID: 1341703; Text: NASA; ID: 1350878; IPCC

Coastal cities will be largely affected

Projected global sea level rise by 2100 in selected cities (in meters)

Notes: Worldwide; as of 2021; in a scenario with high GHG emissions (SSP3-7.0); sea level rise relative to a 1995 to 2014 baseline

Sources: IPCC; NASA

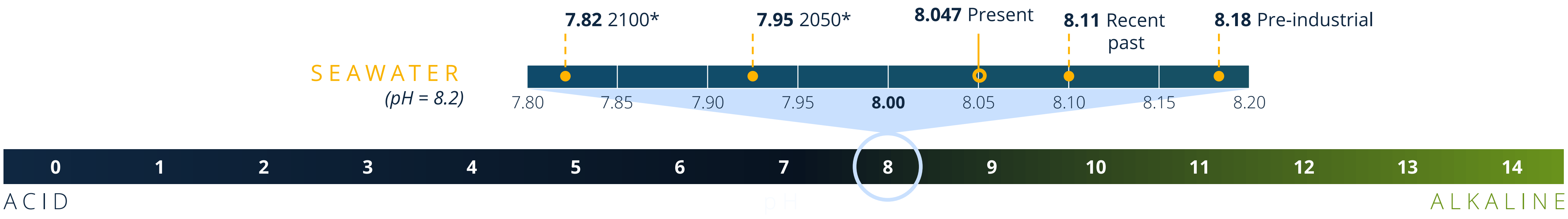
Increased absorption of CO_2 by marine waters leads to ocean acidification

Changes in marine chemical composition

Oceans can absorb atmospheric carbon dioxide and help in carbon sequestration (more information on page 50). With the increase in atmospheric CO_2 from human activity, such as burning fossil fuels, there is an increase in the amount of CO_2 absorbed by the ocean. While oceans absorb around one-quarter of the annual emissions of anthropogenic CO_2 from the atmosphere, it comes at the cost of altering the chemical composition of seawater. Between 1985 and 2022, the average pH value of the oceans fell from 8.11 to 8.047.

Marine life, such as oysters and corals, make hard shells and skeletons by combining calcium and carbonate from seawater. However, carbonate is less available as acidity increases. In addition, under such conditions, and with the effects of severe acidification, shells and skeletons made from calcium carbonate can dissolve. This has been a major cause of concern, causing corals to experience a massive loss of colonies that once formed a haven for other marine animals.

Furthermore, the CO_2 absorption capacity of the ocean is limited. As the acidity and temperature of the ocean increase, its capacity to absorb CO_2 from the atmosphere decreases, impeding the ocean's role in moderating climate change.



Notes: *Projections

Sources: Copernicus Marine Service; EEA; ID: 1338869; Text: EPA; Virginia Institute of Marine Science; WMO

Consequences of ocean warming on coral reefs

Bleaching events are becoming ever more frequent

The health and functioning of the ocean strongly depend upon marine biodiversity. However, rising temperatures risk irreversible damage to ecosystems that support ocean life. For instance, diverse ecosystems, such as coral colonies found in the tropics and subtropics, are sensitive to water temperature and quality changes. Despite only covering less than one percent of the sea floor, coral reefs provide shelter to more than 25 percent of marine species. Warming caused by climate change, overfishing, unsustainable coastal development, and declining water quality affects the proliferation of such vital ecosystems.

According to the IPCC, in the transition to 1.5 degrees Celsius of warming, changes to water temperatures are expected to drive some marine species to relocate to higher latitudes. This increase is detrimental to coral colonies: A warming of 1.5 degrees Celsius threatens to destroy 70 to 90 percent of coral reefs, and an increase of two degree Celsius might wipe them out completely.

Even at current levels of warming, large-scale coral bleaching events have become more common and severe in recent decades. The fourth global coral bleaching event was confirmed in April 2024, and it is already the largest on record. From February 2023 to April 2025, approximately 84 percent of the world's corals were experiencing heat stress high enough to cause bleaching (see next page).

Coral reefs can recover from bleaching events. However, the increasing frequency of these events impedes the proper recovery of coral colonies, eventually causing the reef structure to collapse. According to climate models, every reef on the planet will suffer from severe bleaching on an annual basis between 2040 and 2050.

+1.5°C
9 out of 10 coral reefs at risk from severe degradation

+2.0°C
All coral reefs disappear

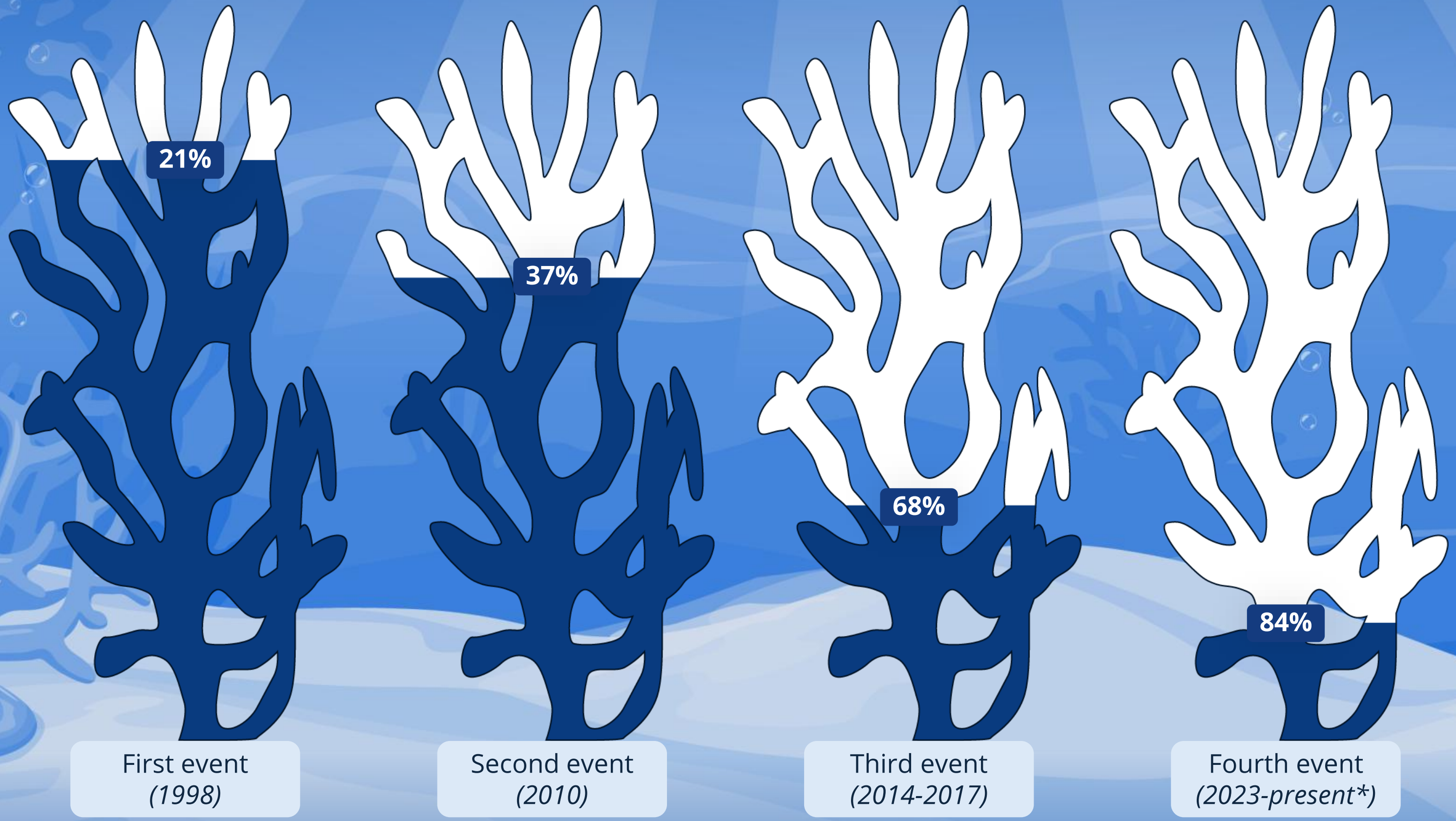
+3.0°C
Marine ecosystems may collapse

+4.0°C
Half of all plant and animal species face local extinction

Sources: Climate Nexus; Coral Reef Alliance; IPCC; NOAA; The Guardian

The extent of global coral bleaching events

Share of coral reefs worldwide that experienced heat stress high enough to cause bleaching on each declared global bleaching event

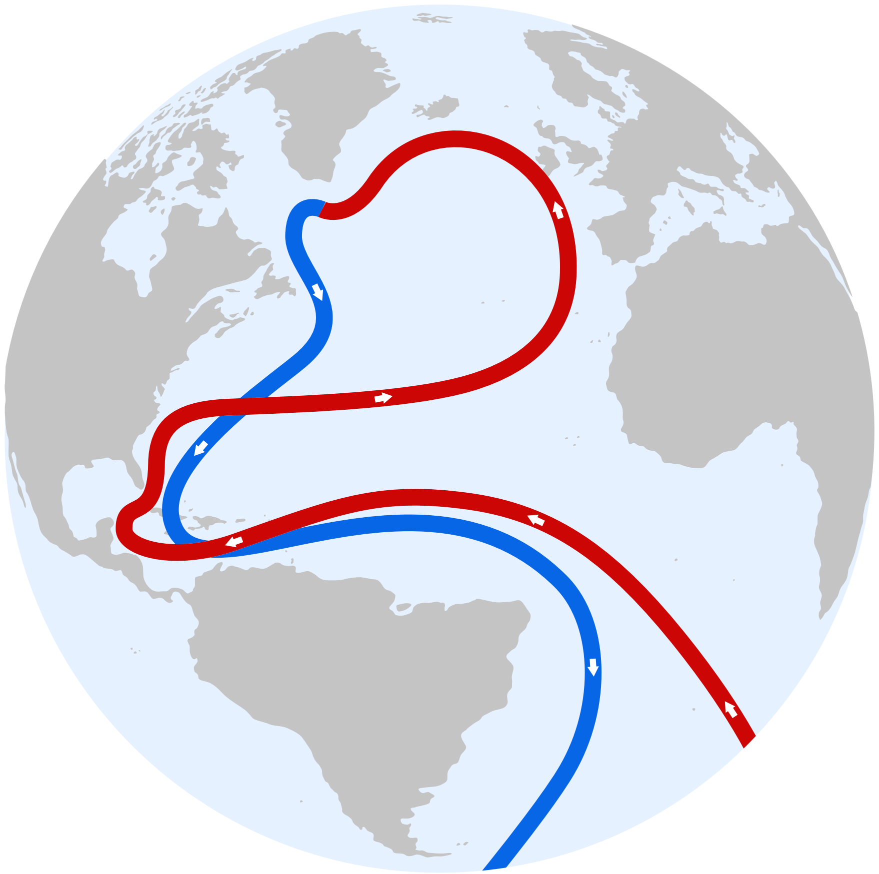


In 2024, the fourth global bleaching event was confirmed in all the oceans where warm water coral reefs grow (Pacific, Atlantic, Indian), affecting at least 83 countries and territories, like Australia, the U.S., Mexico, and Tanzania.

Notes: *As of April 2025

Sources: GCRMN; NOAA; The Guardian; ID: 1465461

Is the AMOC approaching its tipping point?



The Atlantic Meridional Overturning Circulation (AMOC) is a group of currents in the Atlantic Ocean that carries carbon, nutrients, and heat from the tropics to the Arctic, where it cools down and sinks into the deep ocean. Such vital circulation helps modulate the impact of anthropogenic global heating.

Due to a drop in salinity levels in the ocean, caused by the influx of freshwater from the melting of sea ice, the AMOC could collapse – perhaps sooner than expected. According to Van Westen et al., the AMOC tipping is a theoretical concept that seems to be more present than ever. As of 2024, the circulation had declined around 15 percent in comparison to 1950, and if it follows such a trend, a tipping point could be imminent in the coming decades.

If the AMOC continues to weaken and eventually collapses, the consequences could be catastrophic. The weather patterns could suffer abrupt changes, like a southward shift of the tropical rain belt. Other effects would include additional sea level rise along the American Atlantic coast, and a reduction of ocean CO_2 uptake and oxygen supply to the deep ocean, leading to a breakdown of marine ecosystems. Adapting to those conditions will be almost impossible, which highlights the importance of acting as soon as possible to protect the balance in our oceans.

Sources: Rahmstorf; Text: Rahmstorf; The Guardian; Van Westen et al.

03

Marine pollution

- Marine/coastal environment degradation
- Oil spills
- Plastic pollution
- International Coastal Cleanup

The ocean is used as a waste bin

Vast quantities of solid and liquid waste have been flowing into the oceans over the past decades. Improper waste management on land and deliberate discarding of waste and toxins by ships and vessels in the ocean are the primary causes of marine pollution. Due to regulatory gray areas for international waters, the oceans have been used as illegal dumping grounds.

Plastic pollution is a planetary threat, affecting nearly every marine and freshwater ecosystem. According to the IUCN, at least 14 million metric tons of plastic enter the ocean annually, with plastic alone accounting for some 80 percent of all marine debris. As the most abundant form of litter in marine environments, debris from plastic waste has been found everywhere, from surface waters to deep-sea sediments (page 33).

Based on the sources of plastic pollution in oceans, plastic debris can be distinguished as land-based (improper waste disposal, overflow of rivers) and ocean-based (fishing and aquaculture). Due to many countries lacking proper waste management infrastructure, plastic leakage mainly occurs through ocean waterways (page 31). Plastic waste often degrades into smaller particles. As marine life accidentally ingests these smaller pieces of plastic, plastics eventually enter the food chain in a trophic transfer process.

The fifth session of the Intergovernmental Negotiating Committee (INC-5) on Plastic Pollution, held in South Korea in 2024, concluded without reaching a final agreement on a global treaty to curb plastic pollution. Negotiations will continue in Switzerland in August 2025 in an attempt to reach a consensus.

Oil spills – a major threat to marine organisms

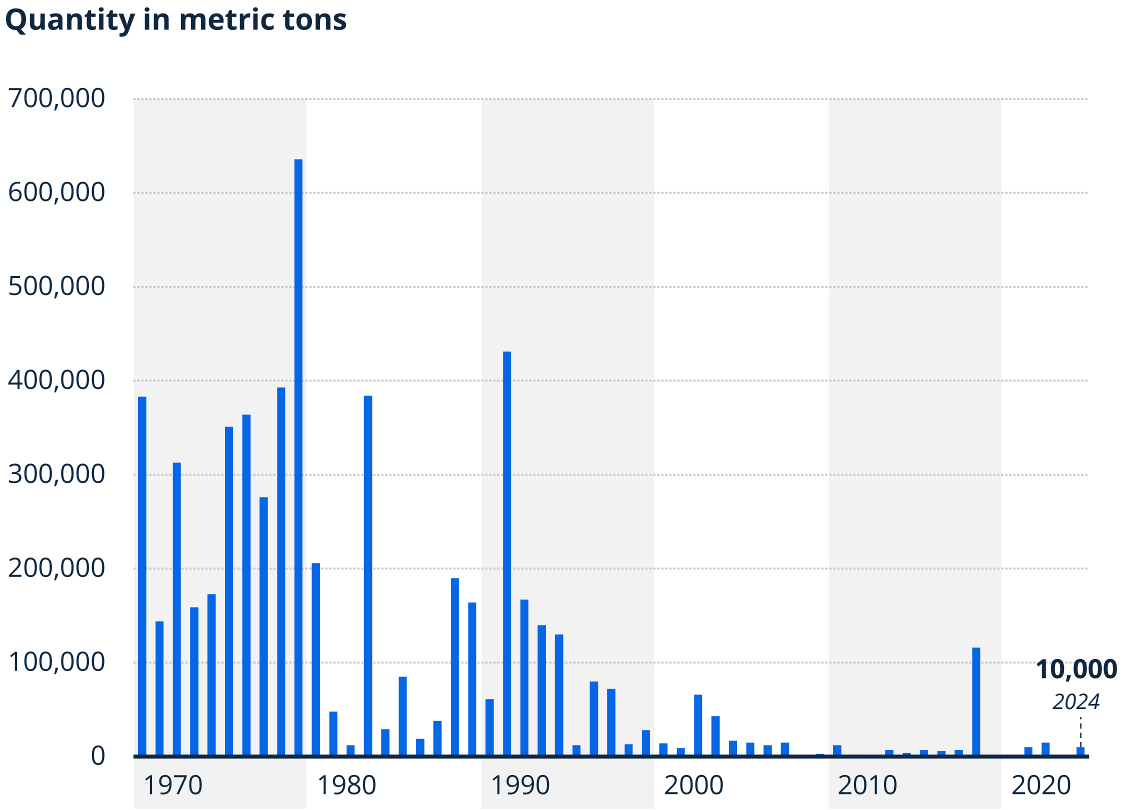
Oil spills, which happen primarily in the ocean, are caused by accidents involving tankers, barges, pipelines, refineries, drilling rigs, and storage facilities. Additionally, ships and boats that use fossil fuels inevitably release fuel residue and waste products into the ocean over the course of operation. Because oil is less dense than water, oil spills spread rapidly across the surface to form a thin oil slick. The presence of oil on the ocean surface is detrimental to marine birds and other animals that can either ingest oil or get covered by the oil slick, causing them difficulties with movement that, if left unaided, result in their injury or death.

To tackle such issues, international treaties including OILPOL and MARPOL were agreed in the 1950s and 1970s, respectively, leading to a consequent tightening of local legislation on the matter. As a result, the number of oil spills has decreased significantly since the turn of the century.

Sources: IMO; IUCN; UNEP

Oil spills remain a concern, but the quantity of oil spilt has decreased

Global oil tanker spills from 1970 to 2024, by volume



Most crude oil and natural gas traded between continents are transported across the sea via shipping tankers or undersea pipelines. In 2024, the global volume of crude oil in seaborne trade reached two billion metric tons. Accidental leaks from oil tankers are uncommon, but their effects are catastrophic.

The incident rate of oil spills has dropped significantly since the beginning of the century. The largest leak in recent history was recorded in 1979, adding up to 636,000 metric tons. By way of comparison, the oil leaked from tanker incidents worldwide amounted to about 10,000 metric tons in 2024.

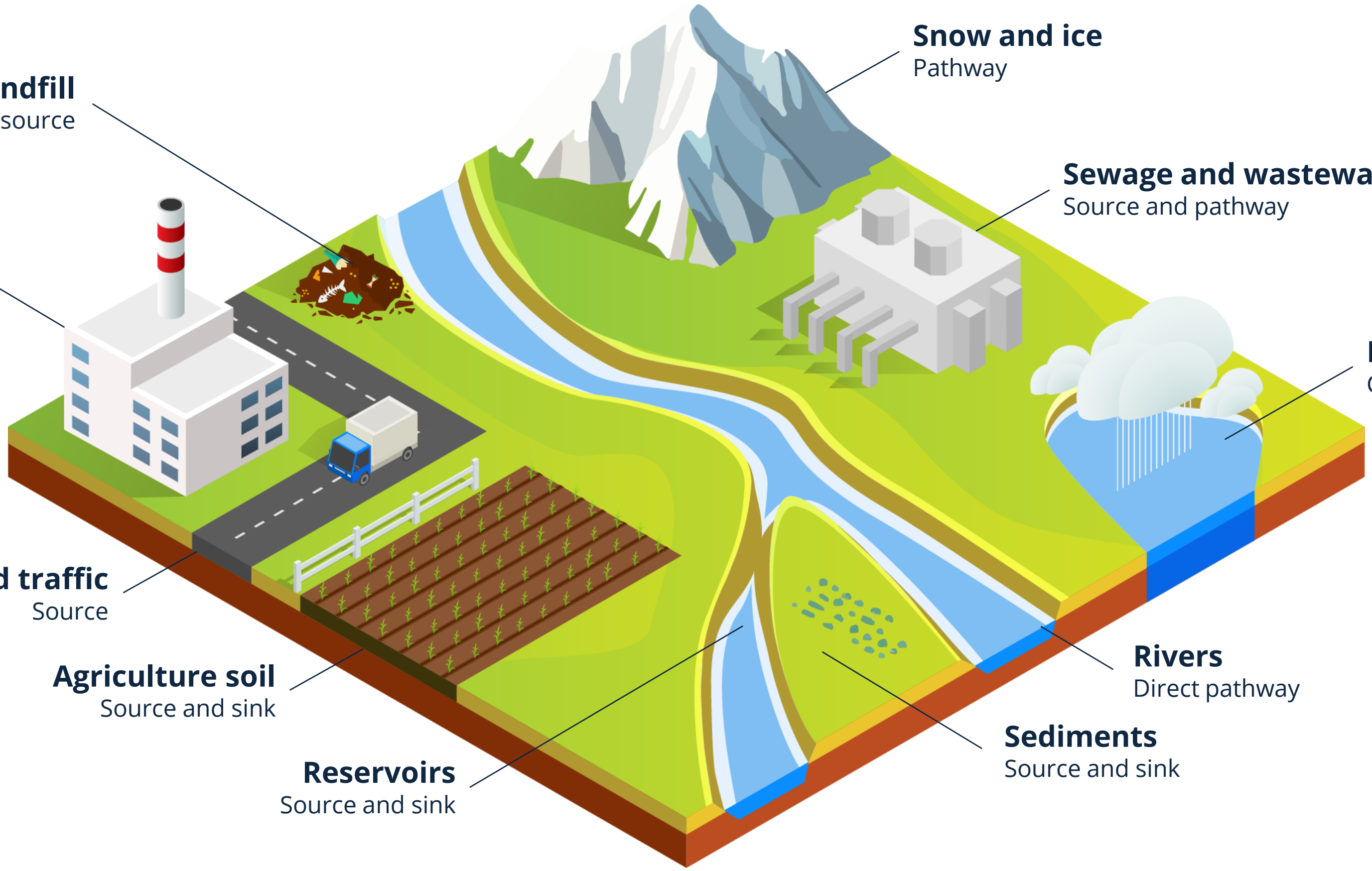
Despite the lower volume of leakage, the amount of oil leaked in a single incident can be devastating. The damage caused depends on several factors, from the environmental conditions to the sensitivity of affected areas. The clean-up of such leaks requires a massive effort, as oil floats on the surface and can disperse from the point of the leak to affect a far larger area.

Notes: Worldwide; 1970 to 2024

Sources: ITOPF; ID: 268557; Text: ITOPF; ID: 268553; Vortexa; ID: 264013; Clarkson Research Services; VSM

How does human-generated plastic waste enter the marine environment?

The major sources and pathways of plastic waste to the oceans



Sources: UNEP

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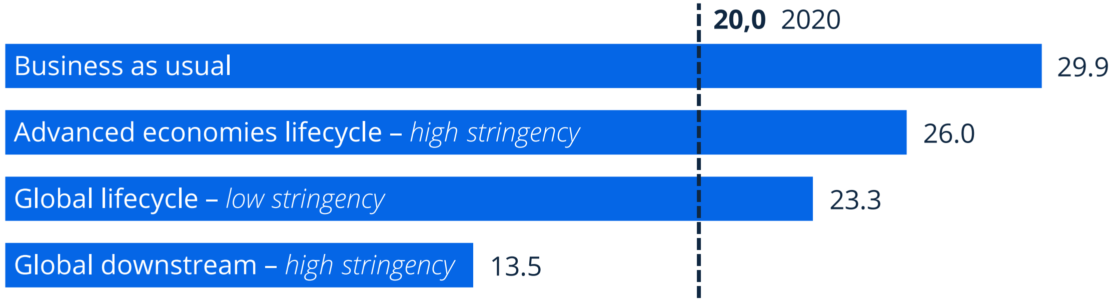
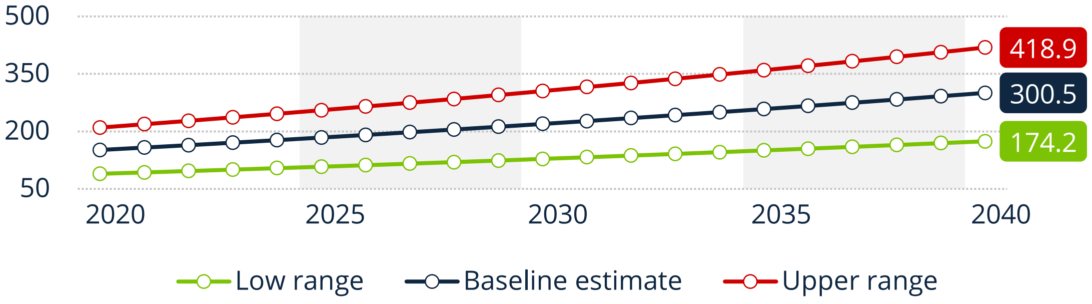
Plastic waste is projected to continue accumulating in the oceans

Plastic leakage worldwide in 2020 and projections for 2040, by policy scenario
(in million metric tons)



Projected stocks of plastic accumulated in aquatic environments worldwide from 2020 to 2040
(in million metric tons)



In 2020, approximately 20 million metric tons of plastic leaked into the environment, contributing to an estimated 152 metric tons of accumulated plastic waste in rivers and oceans. Without new and effective policies, annual plastic leakage is projected to increase by 50 percent by 2040, reaching 30 metric tons.

Under a baseline scenario (continuation of current policies), plastic waste generation will rise from 360 metric tons in 2020 to 617 metric tons in 2040, 119 of which being mismanaged waste, and only six percent of plastics used will come from recycled sources in that year.

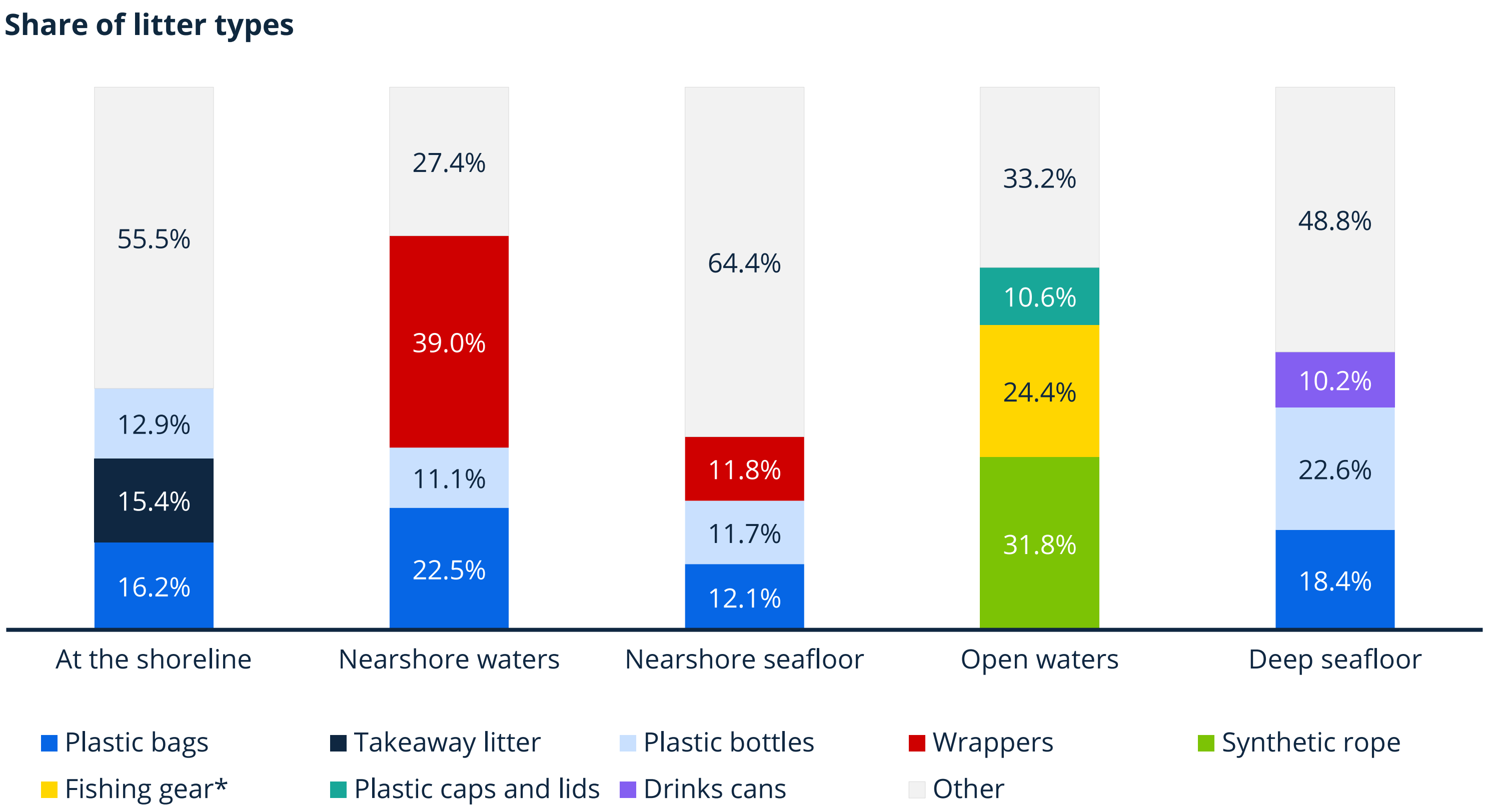
Plastic waste enters the marine environment through a variety of land- and sea-based pathways (see previous page). Poor waste management, urban runoff, industrial discharges, and tourism are major land-based contributors, while lost fishing gear, shipping, and aquaculture activities represent key sea-based sources. Plastic debris from these sources is often carried to the ocean by rivers and coastal winds, highlighting the urgent need for upstream interventions across sectors.

Notes: (1) (2) Worldwide; 2020

Sources: (1) (2) OECD; ID: 1560460; ID: 1552807; Text: UNEP

The reach and composition of marine plastic pollution

Distribution of litter types found in oceans worldwide as of 2021



Plastic is seemingly everywhere, with several types of litter found in most marine environments. In a 2021 global study of ocean litter, plastic bags accounted for more than 16 percent of the waste found at the shoreline.

Levels of marine plastic pollution and the effects on species vary significantly depending on the geographic location and subsequent exposure. Nevertheless, fish, seabirds, sea turtles, and marine mammals can get entangled in or ingest plastic debris, causing suffocation, starvation, and drowning.

Furthermore, microplastics and nanoplastics found in oceans enter the marine food chain and eventually reach humans during seafood consumption.

Notes: Worldwide; as of 2021; *excludes nets

Sources: Morales-Caselles et al.; The Guardian; ID: 1337754; Text: WEF

Response efforts to global marine pollution

Global waste items found in oceans in 2023

Number of items

Many organizations and governmental agencies have taken initiatives to manage and control the waste that ends up in the oceans.

One such effort is the International Coastal Cleanup. The annual event, which has taken place every year since 1986, is organized by the nonprofit organization Ocean Conservancy. The movement gathers thousands of volunteers in more than 70 countries to remove waste from the coasts.

Cigarette butts made up around 1.9 million of the more than 14 million waste items collected on coasts worldwide in 2023. Almost 1.4 million plastic beverage bottles were also picked up.

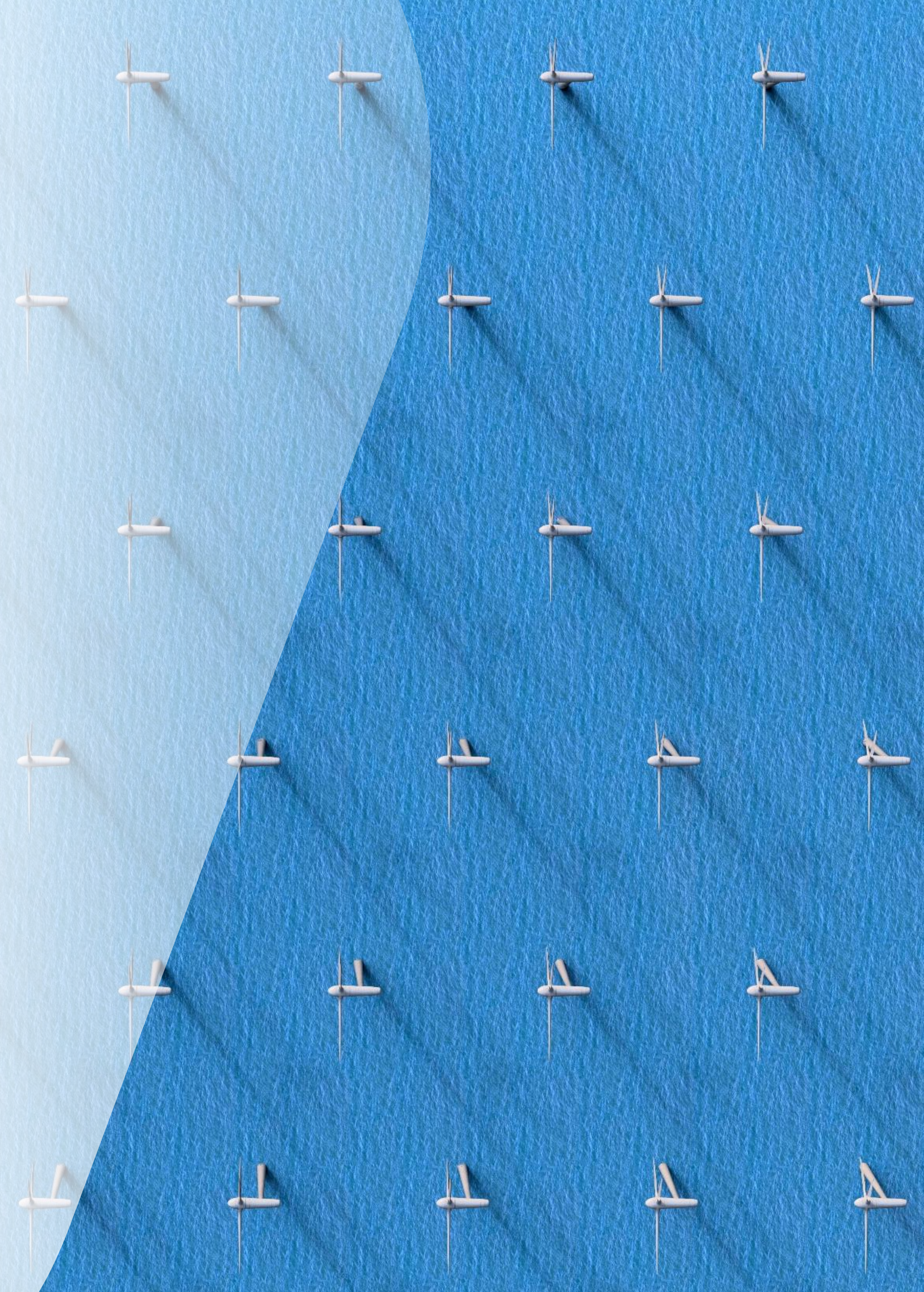
Notes: Worldwide; 2023

Sources: Ocean Conservancy; ID: 726724

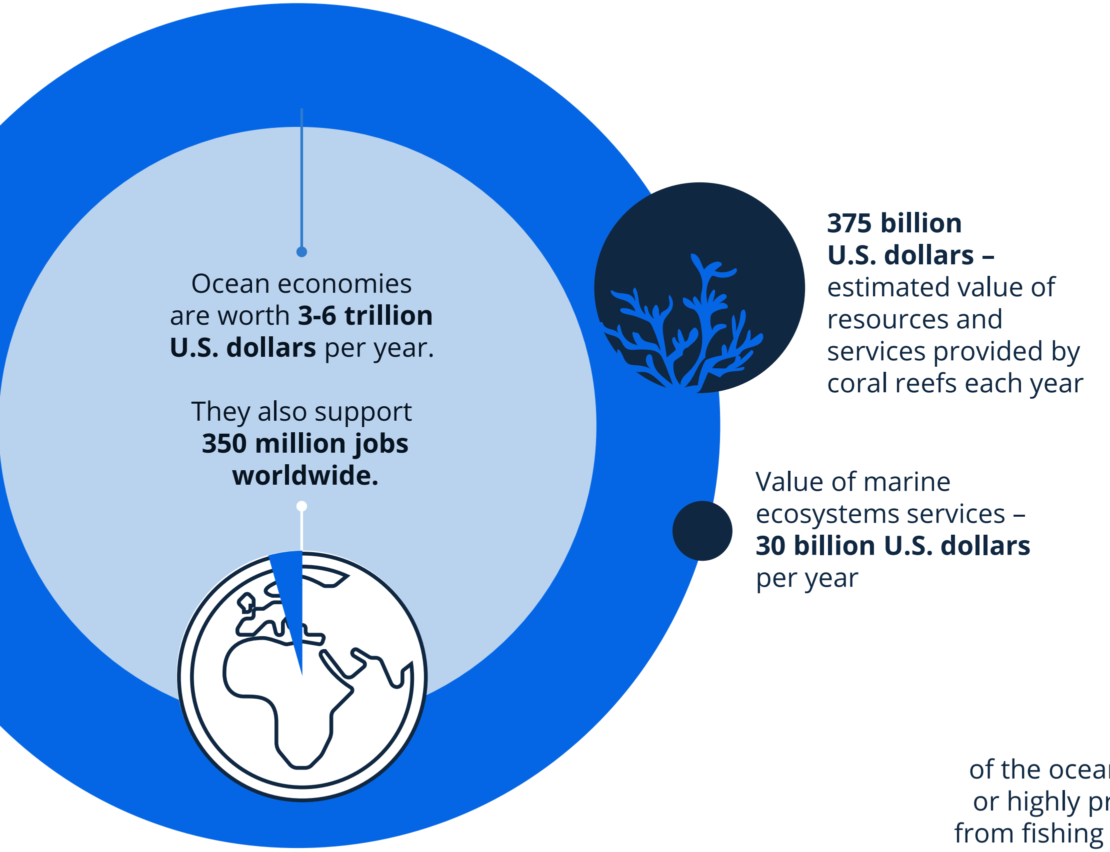
04

Sustainable Development Goals (SDGs)

- Status quo
- SDG 14 goals
- SDG 14 investments

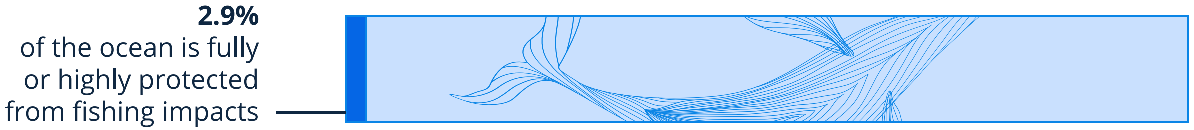


The actions toward conserving oceans are not purely for environmental reasons



Oceans and fisheries continue to support the global population's economic, social, and environmental needs. Despite the critical importance of conserving oceans, decades of irresponsible exploitation have led to alarming degradation. With the proven and continued benefits of ocean conservation, nurturing the marine environment has never been more important.

- 90 percent of global trade moves by marine transport.
- 95 percent of global communication is through submarine cables.
- 15 percent of the annual animal protein consumption comes from fisheries and aquaculture.
- 30 percent of the global gas and oil is extracted offshore.
- Five percent of global GDP comes from coastal tourism.
- 13 of 20 megacities are coastal.



Sources: UN; Text: IUCN; UNCTAD

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What are Sustainable Development Goals (SDGs), and why are they needed?

To combat the planet's massive economic, social, and environmental challenges, governments worldwide set up Sustainable Development Goals (SDGs). The 17 global goals, adopted by the United Nations member states in 2015, are an urgent call for action and are intended to be achieved by 2030.

The development agenda "provides a shared blueprint for peace and prosperity for people and the planet, now and into the future." The SDGs evolved from the UN Millennium Development Goals of 2000 and the principles contained in the 1992 Rio Declaration on Environment and Development.

SDG 14, which aims to "Conserve and sustainably use the oceans, seas, and marine resources for sustainable development," directly addresses the need for ocean conservation and sustainable management in light of the environmental issues currently troubling the world's oceans.

Sources: UN

SDG 14: Conserve and sustainably use the oceans, seas, and marine resources

An overview of SDG 14 subgoals

14.1

By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

14.2

By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration to achieve healthy and productive oceans.

14.3

Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels.

14.4

By 2020, effectively regulate harvesting and end overfishing, illegal, unreported, and unregulated fishing and destructive fishing practices, and implement science-based management plans, to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

14.5

By 2020, conserve at least 10 percent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

14.6

By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported, and unregulated fishing, and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation.

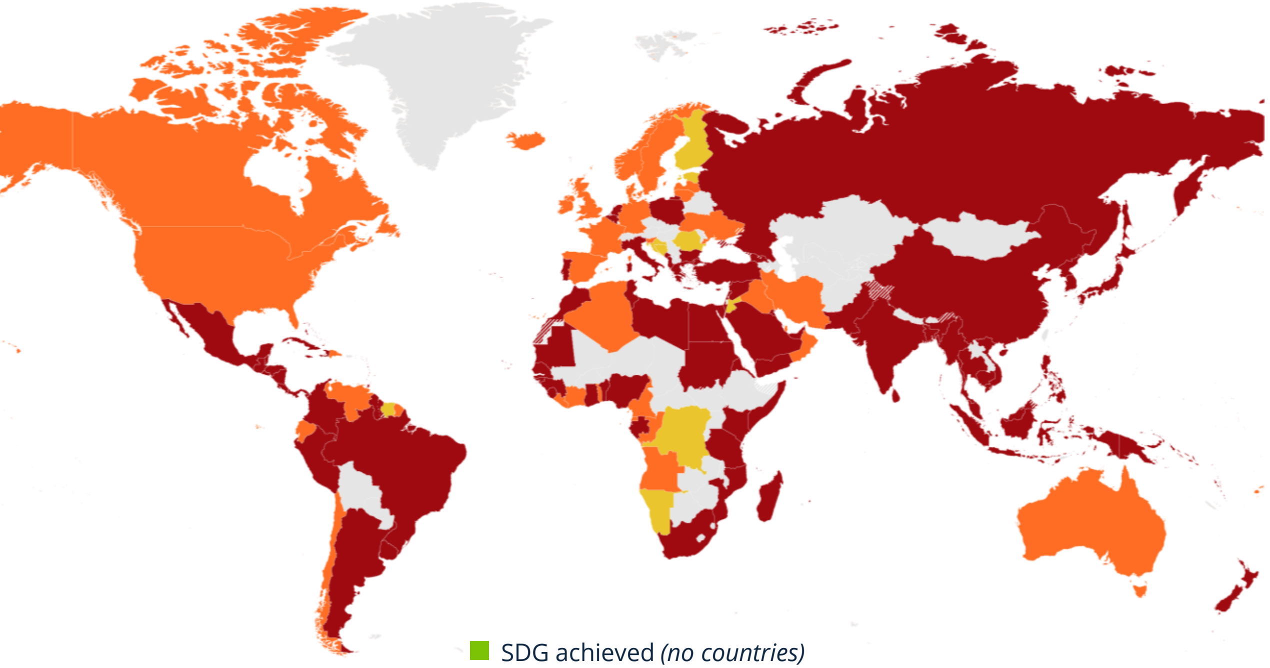
14.7

By 2030, increase the economic benefits to Small Island Developing States (SIDS) and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture, and tourism.

Sources: UN

SDG 14: Conserve and sustainably use the oceans, seas, and marine resources

How is the world progressing on these goals and subgoals?



- SDG achieved *(no countries)*
- Challenges remain *(nine countries)*
- Significant challenges remain
- Major challenges remain
- Information unavailable

Disputed areas

Several of the subgoals of SDG 14 expired in 2020 without being successfully implemented. According to the Sustainable Development Goals Report 2024, the ocean is in an emergency state battling against eutrophication, worsening acidification, rise in temperatures, declining fish stocks, and widespread pollution, among other issues.

Progress has been made in some areas, such as increasing marine protected areas or combating illegal fishing, but the actions are not advancing at the speed required. The deadline to reach the remaining targets is 2030, and no countries had achieved the goals as of 2024. At the time, only nine countries, including Suriname, Namibia, and Croatia, had a realistic possibility of reaching the goal.

The lack of progress is, in most cases, related to the absence of funding, along with sporadic reporting and limited data. To flip this trend, cooperation between nations needs to be boosted to increase ocean science funding, intensify conservation actions, and turn the tide on climate change, the biggest menace for the ocean's ecosystems at the moment.

Notes: Worldwide; 2024

Sources: SDSN; Text: OECD; UN

SDG 14 was one of the least targeted ESG assets by sustainable investors

ESG ETFs aligned to the 17 SDGs worldwide as of May 2025, by assets

Assets under management in billion U.S. dollars

13.	Climate action	116,9
9.	Industry, innovation, and infrastructure	15,4
6.	Clean water and sanitation	10
7.	Affordable and clean energy	7,9
16.	Peace, justice, and strong institutions	5,8
11.	Sustainable cities and communities	4,7
1.	No poverty	2,3
3.	Good health and well-being	1,6
15.	Life on land	0,95
17.	Partnerships for the goals	0,82
5.	Gender equality	0,69
12.	Responsible consumption and production	0,67
8.	Decent work and economic growth	0,61
10.	Reduced inequalities	0,25
14.	**Life below water**	**0,13**
2.	Zero hunger	0,1
4.	Quality education	0

Exchange-traded funds (ETFs) based on environmental, social, and governance (ESG) factors give investors a way to invest in issues that are important to them. These ETFs incorporate environmental, social, and corporate governance considerations into their investment approach. Of the 17 global goals, SDG 14 was among the least targeted by global ESG ETFs as of May 2025, with assets totaling around 129 million U.S. dollars.

As part of his closing statement at the UN Ocean Conference in 2024, the Executive Secretary of the Intergovernmental Oceanographic Commission, Vidar Helgesen, remarked on the need for ocean investments, with priority to science infrastructure for observations and collection of data. The conference, held in Barcelona, concluded with a critical roadmap (Barcelona Statement) for the years to come, touching on pressing matters like encouraging sustainable small-scale fisheries and aquaculture, scaling up climate mitigation, allowing timely understanding of marine carbon capturing initiatives, and deepening ocean science and knowledge.

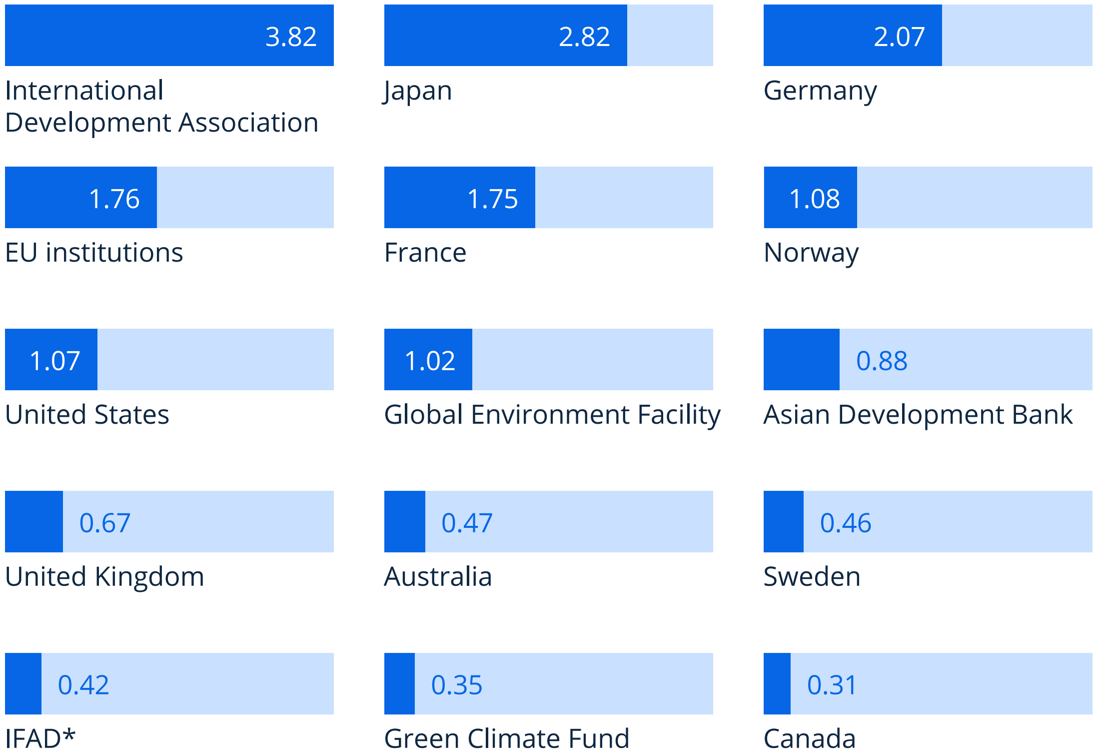
Notes: Worldwide; 2025

Sources: Trackinsight; ID: 1297621; Text: UN

The global effort to invest in SDG 14 is insufficient to reach its goal

Largest SDG 14 official development assistance providers globally from 2010 to 2022

Economic assistance in million U.S. dollars



Official development assistance is government aid that promotes and specifically targets the economic development and welfare of developing countries. Between 2010 and 2022, the International Development Association provided the most assistance toward SDG 14, with total disbursement amounting to 3.8 billion U.S. dollars.

Of all the global goals, SDG 14 – life below water – is by far the least funded, receiving 3.5 billion U.S. dollars in 2022. It is estimated that 175 billion U.S. dollars are needed per year to achieve SDG 14 by 2030.

In this scenario, the United Nations Decade of Ocean Science for Sustainable Development, running from 2021 to 2030, is the current hope to bring about action and funding for ocean science. It is an effort to reverse the decline in ocean health and to gather global ocean stakeholders together using a common framework to ensure that ocean science can support countries in improving the conditions for sustainable ocean development.

Notes: Worldwide; 2010 to 2022; * International Fund for Agricultural Development

Sources: OECD; ID: 1334608; Text: OECD; UN; UNESCO

05

Conservation and protection of marine environments

- Marine Protected Areas
- Legislative measures – NDCs
- Nature-based solutions

Marine protected areas (MPAs) are vital for global ocean protection

Aichi Target 11

By 2020, at least 17 percent of terrestrial and inland water and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative, and well-connected systems of protected areas and other effective area-based conservation measures and integrated into the wider landscapes and seascapes.

SDG 14.5

By 2020, conserve at least 10 percent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

Marine protected areas are an effective tool for restoring ocean biodiversity and ecosystem services. As a policy instrument, they can potentially prevent overfishing, habitat exploitation, and destruction. In addition, coastal protection aids in buffering against storms and erosion and encourages tourism and recreation.

Under the Convention on Biological Diversity (Aichi Target 11) and the Sustainable Development Goals (specifically SDG 14.5), signatories agreed to conserve 10 percent of marine and coastal areas by 2020.

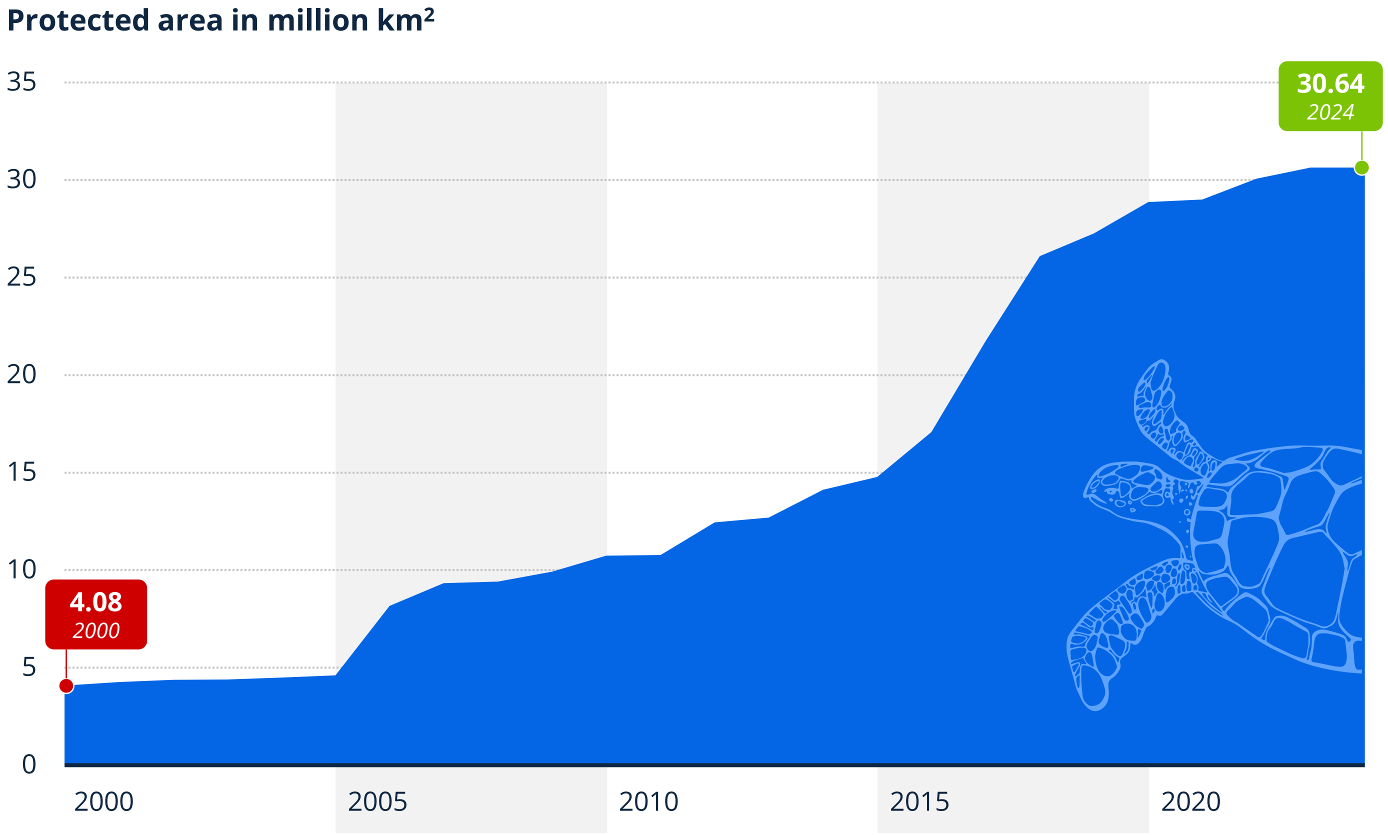
Since this was proving to be insufficient, due to an escalating biodiversity loss and climate crisis, the Aichi Target got a more ambitious update. As a next step, in a landmark agreement during the UN Biodiversity Conference in Montreal in December 2022, representatives of over 180 governments agreed to put 30 percent of coastal and ocean areas under protection by 2030, the so-called “30x30” target.

Despite that, the global coverage of marine protected areas stood at only 8.4 percent in 2024. Only 2.8 percent of the world’s ocean was protected effectively, based on MPA criteria.

Sources: CBD; Marine Protection Atlas; UN

The rise of marine protected areas

Protected marine area worldwide from 2000 to 2024



In the past quarter-century, the number of protected marine areas has increased considerably. As of 2024, over 30 million square kilometers were considered protected, a more than 10-fold increase since 2000. This recent growth is a result of international conservation targets and intense advocacy, which have led to the establishment of large-scale marine protected areas.

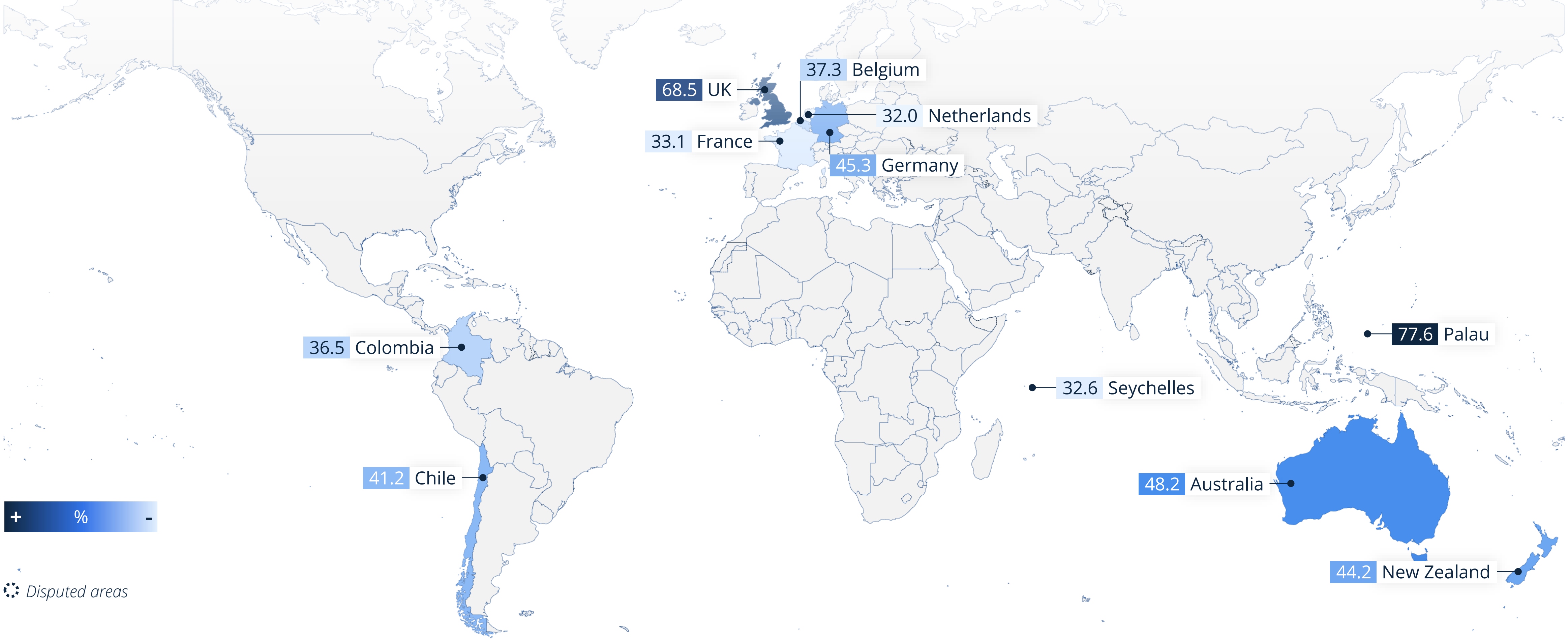
Despite the progress made in protected area coverage, further efforts are needed to meet existing targets, such as the 30x30 commitment agreed at the UN Biodiversity Conference (see previous page). As of September 2024, only 11 countries had reached the ambitious target of protecting more than 30 percent of their marine areas (see next page). The island nation of Palau is the nation with the highest marine protection rate in the world, with more than 70 percent of its waters under some degree of protection.

Notes: Worldwide; 2000 to 2024

Sources: IUCN; UNEP; ID: 1356440; Text: OECD; UN

Countries that have reached the 30x30 target for marine areas

Proportion of marine protected areas in EEZ as of September 2024, by select country



Notes: Worldwide; 2024

Sources: National Geographic Society; University of California, Santa Barbara; ID: 1334647

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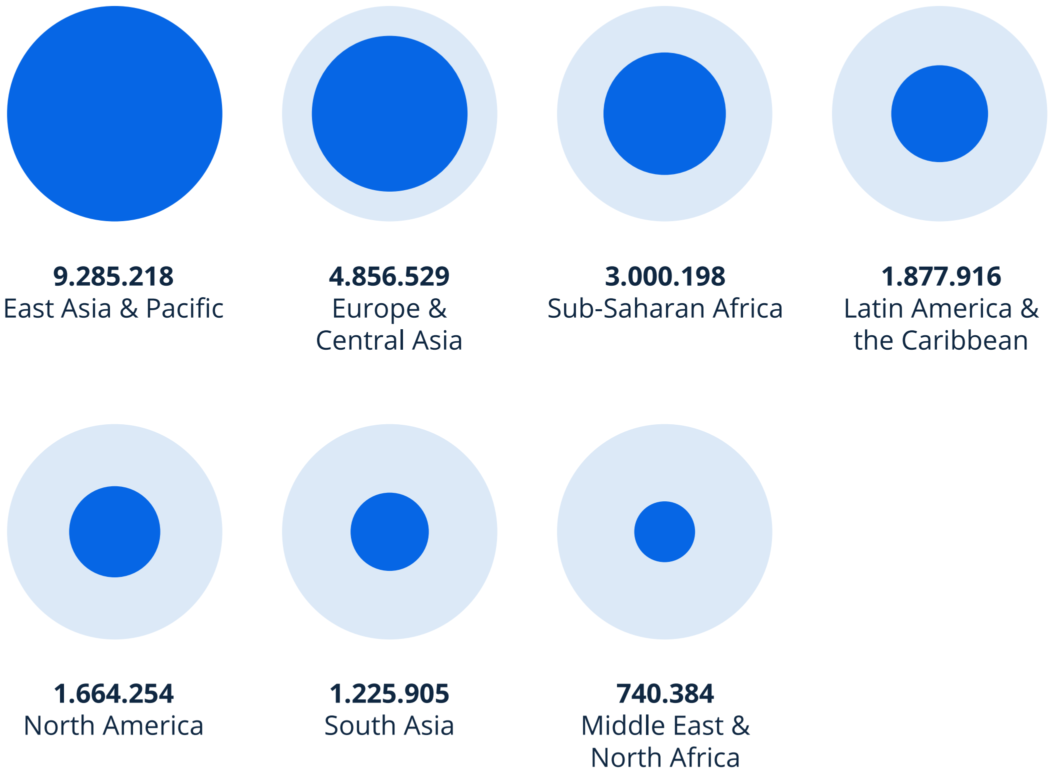
30x30 target: a hard goal to reach

Protected marine area still needed to reach the 30x30 target as of September 2024, by region

Area in km²



The clock is ticking to meet the 30x30 target deadline of 2030, and the world's oceans are not even half as protected as they should be. As of September 2024, more than 22 million square kilometers still needed to be protected to reach the 30x30 target. The largest marine area to be protected is in the East Asia and Pacific region, with almost 9.3 million square kilometers. According to estimates by Anthony et al., the total annual funds needed to manage a 30x30 MPA system amount to about 7.9 to 14.4 billion U.S. dollars globally. These costs could be significantly offset if harmful subsidies for intensive fishing, estimated at 35.4 billion U.S. dollars annually worldwide, were to be redirected to this marine conservation project.

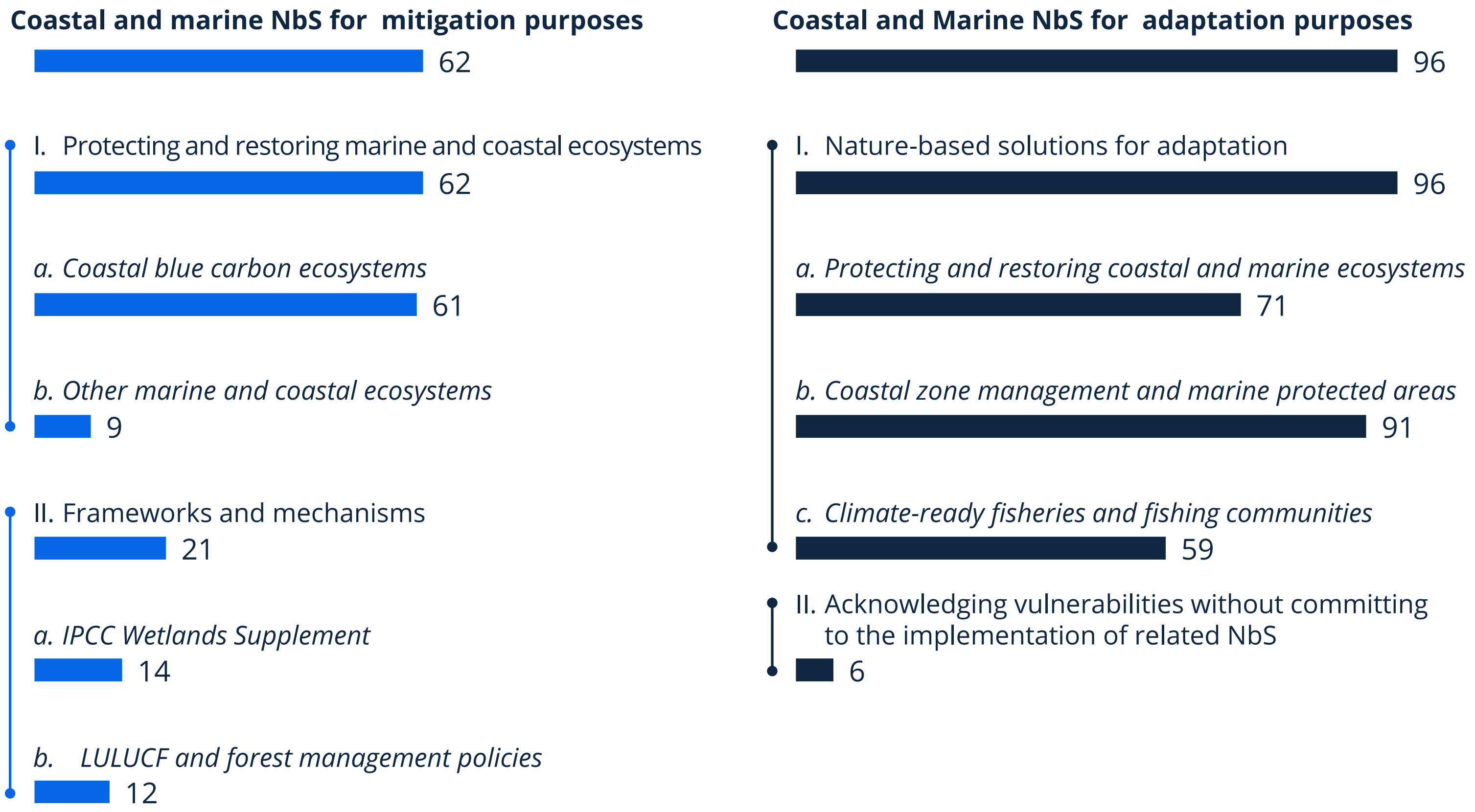
Another hurdle to reaching the ambitious goal is the ratification of the UN's High Seas Treaty. Approximately 60 percent of the world's oceans are in international waters, outside the jurisdiction of any nation. Without the protection of the high seas, the 30x30 target will be impossible to reach. Therefore, it is vital to agree on a legal mechanism to create MPAs in international waters. Discussions are to be held at the UN Ocean Conference in Nice, France, in 2025.

Notes Worldwide; 2024

Sources National Geographic Society; University of California, Santa Barbara; ID: 1612714; Text: Anthony et al.; Sumaila et al.

Countries are putting more focus on adaptation than mitigation

Number of countries with ocean-related nature-based solutions in their NDCs globally as of 2023, by type



Nationally Determined Contributions (NDCs) are at the core of the Paris Agreement. They are commitments by countries to reduce emissions and adapt to the impacts of climate change. As of October 2023, 97 countries had included coastal and marine nature-based solutions (NbS) in their NDCs. 61 of them were planning to adopt both adaptation and mitigation strategies to fight against climate change. Only one country was limiting its NDC measures to mitigation efforts, while 35 countries were solely focusing on adaptation efforts.

There is a dire need for more countries to focus their efforts on protecting the ocean. Even though NDCs are not legally binding, they form a critical tool for accelerating ocean-based climate action. Commitment to such targets not only helps to collectively develop solutions but also prepares nations to adjust more quickly to the changes that occur.

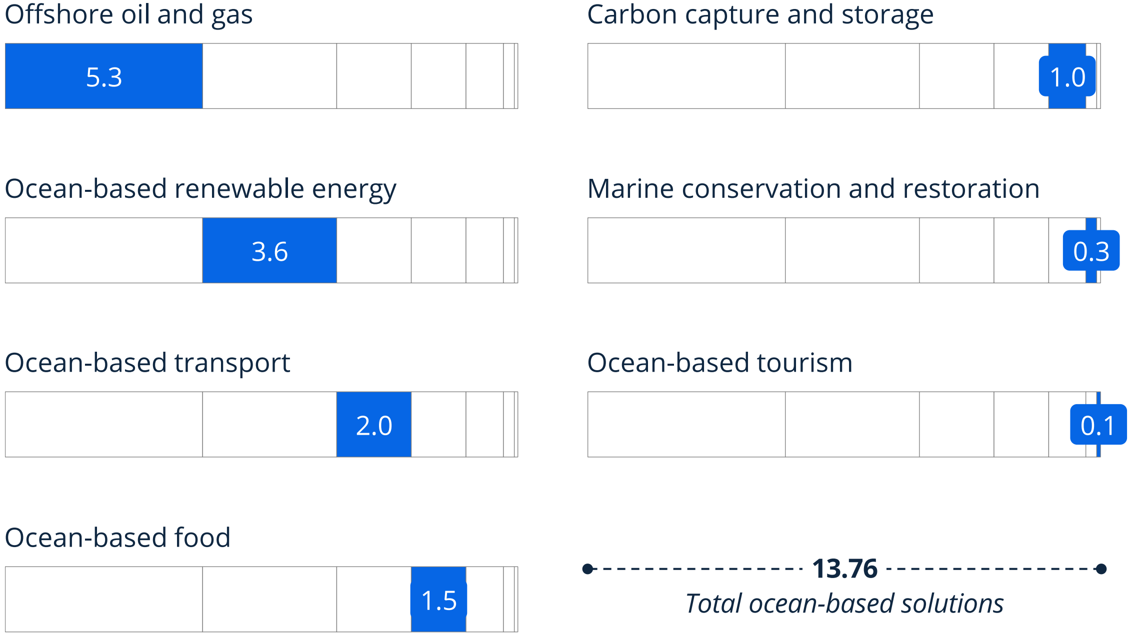
Sources: Worldwide; 2023; countries may include both adaptation and mitigation efforts in their NDCs

Notes: IUCN; OCP; Rare; The Nature Conservancy; Wetlands International; WWF; ID: 1334832

Ocean-based solutions are vital to climate change mitigation

Significant reductions in global emissions are needed every year to stay below a 1.5 degrees Celsius increase

Maximum annual emission reduction by 2050
in gigatonnes of carbon dioxide equivalent ($GtCO_2e$)



According to the IPCC's latest assessment report, it can be stated with high confidence that climate change has already caused increasingly irreversible losses in terrestrial, freshwater, cryospheric, coastal, and open ocean ecosystems, and with every additional increment of global warming, changes in extremes continue to become larger.

Ocean-based climate actions are vital in reducing the world's carbon footprint. In total, ocean-based climate action can achieve a third of the annual greenhouse gas emission cuts by 2050 to limit global temperature rise to 1.5 degrees Celsius. Clean energy technologies hold the greatest emission reduction potential of all ocean-based climate solutions, with ocean-based renewable energy potentially saving up to 3.6 gigatonnes of CO_2 equivalent annually. The ocean could also work as a reservoir to remove atmospheric CO_2 and store it long-term. Such techniques, also known as marine carbon dioxide removal, could save up to one gigatonne of CO_2 equivalent annually by 2050.

Notes: Worldwide; 2023

Sources: High Level Panel for a Sustainable Ocean Economy; ID: 1338655; Text: IPCC; WEF

How the ocean can help us to remove CO_2 from the atmosphere

Expert
deep dive

Prof. Dr.
Andreas Oschlies

Expert for marine Carbon Dioxide Removal (mCDR)

Prof. Oschlies is co-speaker of the interdisciplinary research mission CDRmare, in which more than 200 researchers investigate promising marine approaches for carbon dioxide removal and storage. They assess the options' CO_2 removal potential as well as economic, political, social, and legal implications and develop a transdisciplinary evaluation framework for marine CDR options. This framework will help to develop pathways for a sustainable use of the ocean's carbon uptake and storage potential.

The science is clear: Humanity will only curb global warming and the resulting climate impacts and risks if it reduces its carbon dioxide (CO_2) emissions to net zero. Human-caused CO_2 emissions result from the burning of fossil fuels and from changes in land use such as draining of peatlands or the degradation of salt marshes and mangroves. So far, nobody knows how humankind can avoid 100 percent of these emissions in the future in an environmentally and socially responsible way.

On the contrary, experts assume that many countries will still be emitting residual CO_2 and other greenhouse gases in the middle of the 21st century. In optimistic scenarios, their level is estimated at 5 to 20 percent of current emissions [1]. These are difficult-to-avoid emissions, for example, in cement production, air and heavy goods transport, but also in agriculture and waste incineration.

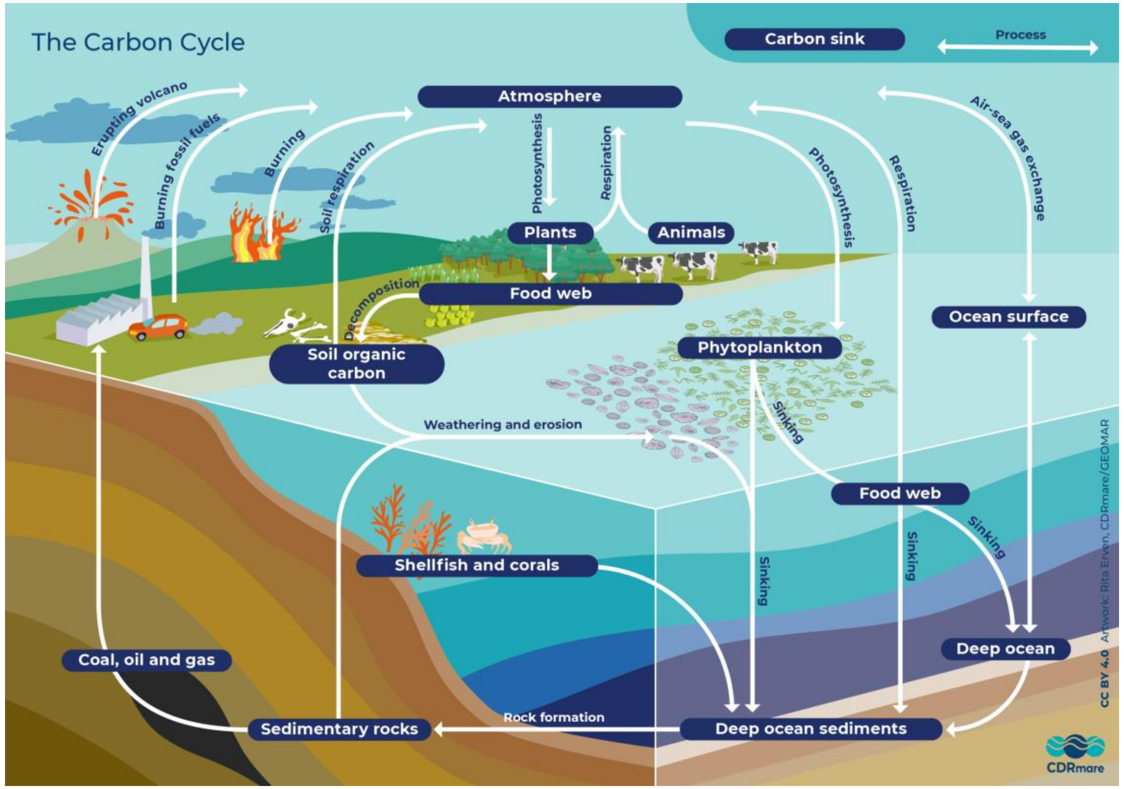
To reach net zero, residual emissions will need to be offset with some type of CO_2 removal from the atmosphere (CDR). In addition, some residual emissions can be prevented if the CO_2 is captured at the emission source and subsequently stored geologically (Carbon Capture and Storage, CCS). This is important for those industrial sectors that have intrinsic process emissions (e.g., cement production) or that cannot currently avoid emissions of fossil origin (e.g., waste incineration).

Many CO_2 removal and storage approaches are land-based. Since land is already a scarce resource, ocean-based approaches are being increasingly explored.

Sources: [1] Smith et al., 2024

How the ocean can help us to remove CO_2 from the atmosphere

Expert
deep dive



In recent decades, the world ocean has absorbed around 25 percent of the CO_2 emissions produced by human societies, thus retarding the progress of climate change significantly [2]. This climate service is achieved through three natural marine carbon pumps. Taken together, they are the reason that the world ocean is the largest carbon reservoir on Earth that exchanges with the atmosphere on climatically relevant time scales. It contains around 40,000 billion tons of carbon, about 50 times as much as the atmosphere.

CO_2 uptake by the ocean occurs at the sea surface, where CO_2 from the air is dissolved in the seawater. A chemical equilibrium reaction is consequently initiated in the surface waters that leads to the carbon from the carbon dioxide being chemically fixed as carbonic acid and its dissociation products. The carbon then begins its journey through the sea and may be stored for millennia at great water depths. The journey can occur in different ways: through the ocean currents (physical carbon pump), through the food web and sinking of organic particles (organic biological carbon pump), or by the formation and sinking of calcareous shells and skeletons (inorganic biological carbon pump). In the latter two, a portion of the carbon is even stored in the sea-floor sediments, which means it is locked away for millions of years.

Sources: [2] IPCC, 2021

How the ocean can help us to remove CO_2 from the atmosphere

Expert deep dive

The CO_2 removal potential of the ocean's meadows and forests

Coastal vegetated ecosystems, such as salt marshes, seagrass beds, mangrove, and kelp forests, grow on less than one percent of the ocean and coastal area, but contribute a significant portion of the natural carbon sequestration in the seabed, as well as many other services (food, coastal protection, biodiversity hotspot etc.).

Plans to expand these habitats to enhance their natural carbon dioxide uptake sound promising. However, our latest research and measurements show that their CO_2 sequestration rate, carbon storage, and the stability of their stocks differ significantly among ecosystem types and regions. Local environmental conditions are the major determining factor here and will have to be considered when expanding the areas of the ocean's meadows and forests as nature-based solutions for climate change mitigation and adaptation through what we call "Ecosystem Co-Design" [3].

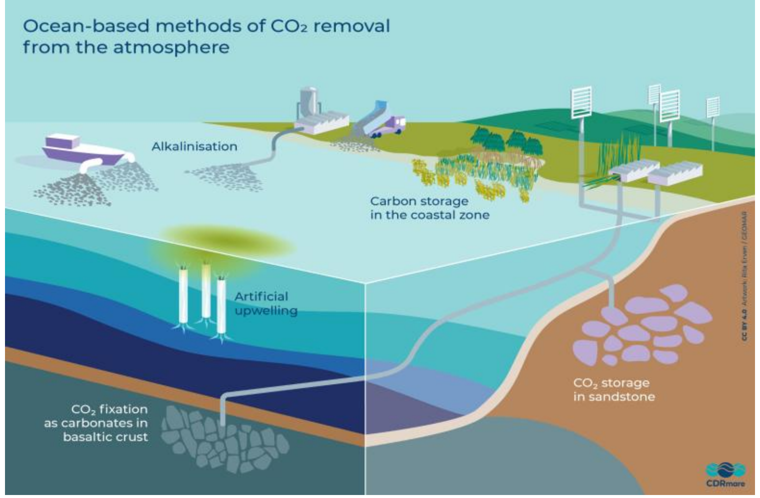
Based on our new data on above- and below-ground carbon stocks, dissolved organic matter pools, greenhouse gas emissions, and areal extent of coastal vegetated ecosystems, we can now model local CO_2 storage potentials to identify suitable areas for the (re)establishment of salt marshes, seagrass beds, mangrove, or kelp forests. Once these steps are concluded, follow-up studies of potential and realized (re)establishment sites will investigate if these ecosystems can durably increase their carbon uptake and storage. This additionality and durability are major preconditions: Only additionally sequestered CO_2 stored for decades and longer can be used for compensating residual human-made emissions.

Ecosystem Co-Design means to plant or restore coastal ecosystems in a way that both humans (especially the local population) and nature benefit in a maximum way.

Sources: [3] Alongi DM, Zimmer M (2024)

How the ocean can help us to remove CO_2 from the atmosphere

Expert
deep dive



Minerals for enhanced carbon dioxide uptake by the ocean

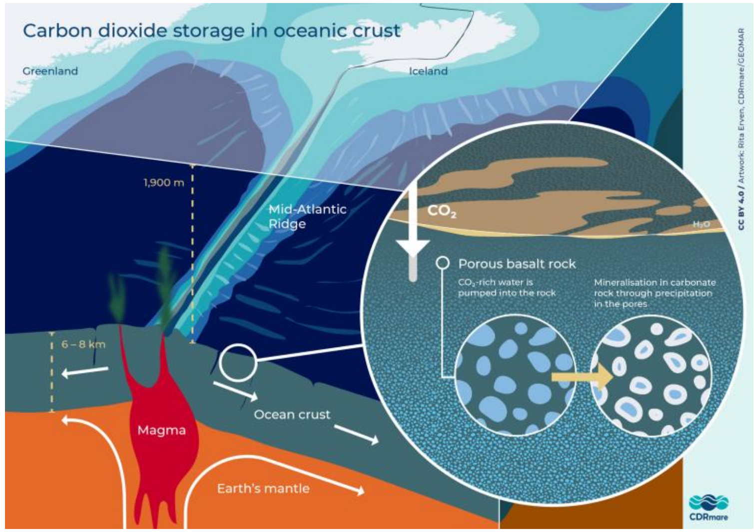
The amount of CO_2 that the ocean can absorb without becoming highly acidic depends on the alkalinity of its surface water. This term refers to the number of acid-binding components of mineral origin that were previously dissolved from weathered rock and washed into the ocean. The question now is: Could a targeted input of such mineral dissolutions help to increase the marine CO_2 uptake without unbalancing the chemistry and life in the ocean? The theoretical CO_2 removal potential for ocean alkalinity enhancement (AE) is higher than for any other ocean-based CDR option.

We have investigated the potentials, feasibility, and side effects of the various AE methods in different laboratory and mesocosm experiments as well as in computer simulations and from a social and economic perspective. Our results show for instance that CO_2 removal efficiency and potential are high, but that critical levels of carbonate oversaturation and subsequent abiotic precipitation of carbonate need to be avoided.

The ecological impact depends on the chosen rock material, the location of the deployment, and the material's dilution. Olivine-rich rock like Dunite for example can contain high concentrations of nickel – a toxic heavy metal that is harmful to the environment at high concentrations. Further studies and field experiments are needed to analyze if the CO_2 removal benefits that might be achieved could justify the effort, the costs, and any environmental impacts that might arise.

How the ocean can help us to remove CO_2 from the atmosphere

Expert
deep dive



CO_2 storage beneath the ocean's floor

CO_2 storage in the deep subsurface of shelf regions such as the North Sea is technically feasible and has been practiced for decades beneath Norwegian waters, for instance. For storage, liquid CO_2 is transported by pipeline or by ship to the relevant ocean site and injected through one or more boreholes into deep porous sandstone formations. In the rock pores, the CO_2 then spreads and collects at the highest point of the reservoir under the barrier layer (clay or salt stone). Over time, the CO_2 dissolves in the formation water and reacts with minerals contained in the surrounding sandstone. In this process, minerals are formed in which the CO_2 is permanently bound. However, several centuries will pass before this happens.

Sandstone formations are not the only potential CO_2 storage site beneath the ocean. In CDRmare, we are also investigating the option of injecting CO_2 into ocean regions where huge areas of highly reactive basalt crust lie at medium to great water depths. One possible advantage: Due to the high pressure in the deep sea subsurface, the CO_2-water mixture would be heavier than seawater, making leakage from the underground unlikely. With the help of the world's first deep-sea research experiment on CO_2 storage on cooled flanks of the Mid-Atlantic Ridge we want to find out if this type of CO_2 storage would be technically feasible and economically viable. The site for the experiment has been selected. Now, baseline measurements are made to check if the local conditions allow a CO_2 injection.

How the ocean can help us to remove CO_2 from the atmosphere

Expert **deep dive**

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Key takeaways

Conclusion

The ocean not only works as a food source or transport medium. It also regulates the climate, generates most of the oxygen on Earth, and is home to a plethora of species. Nevertheless, human activity is disturbing the delicate balance of marine ecosystems, threatening not only their existence but life on Earth itself.

Impacts of climate change

Oceans strongly affect climate and weather patterns, transferring heat and moderating carbon dioxide levels in the atmosphere, acting as a carbon sink. However, an increase in global temperatures has brought about cascading effects that threaten the physical and chemical composition of sea waters, subsequently threatening both humans and marine flora and fauna.

Pollution and habitat degradation

According to the WEF, the world's oceans will contain more plastic than fish by weight by the year 2050, ultimately threatening many more life forms in the ocean, not only on the surface but also on the ocean floors.

SDGs

SDG 14 (Life below water) is unlikely to be met by 2030 if drastic changes are not made now. To achieve this goal, a sustainable ocean economy backed by sufficient financing mechanisms that generate, invest, align, and account for financial capital is the need of the hour. Achieving this will require immediate action and efforts in both implementation and monitoring throughout the UN Decade of Ocean Science.

Conservation and protection of marine environments

Important steps have already been taken to protect marine ecosystems. The world has agreed to designate 30 percent of the oceans as protected areas by 2030, is currently finalizing a treaty to stop plastic pollution, and has started to ban harmful fishery practices, among other efforts. Actions through global policy do take time to bear fruit, though, and the implementation speed of such measures is showing to be too slow for the pace needed.

Sources: WEF

Glossary

Biodiversity
Variability among living organisms.

Carbon sequestration
The process of capturing and storing carbon.

Carbon dioxide (CO_2)
Carbon dioxide is one of the most important greenhouse gases.

Dead zone
A common term for hypoxia, which refers to reduced oxygen levels in water. Dead zones either kill the marine life living there or the marine species leave the area if they are mobile.

Ecosystem services
Many of the basic services required to make life on Earth possible are provided by ecosystems. Services include plants cleaning the air and filtering water, bacteria decomposing waste, tree roots holding soil in place and preventing erosion, and bees pollinating flowers. Ecosystem services can be broken down into four main types (see also pages 6 and 7): provisioning services, regulating services (which have been described above), cultural services, and supporting services.

Eutrophication
A process in which bodies of water become enriched with nutrients such as nitrogen and phosphorus, which in turn allows for increased plant and algal blooms that can cause low-oxygen waters and can kill fish and seagrass.

Exclusive economic zone (EEZ)
Under the 1982 United Nations Convention on the Law of the Sea, an EEZ is an area of the sea where a sovereign state has special exploration and marine resource usage rights. These rights include energy production from wind and water.

Fossil fuels
Carbon-based fuels from fossil hydrocarbon deposits, including coal, crude oil, and natural gas.

Greenhouse gas (GHG)
Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths. Gases include carbon dioxide, methane, nitrous oxide, water vapor, ozone, and certain fluorinated compounds.

Global coral bleaching event
When coral bleaching cases are confirmed within each ocean basin during the same period of time.

Glossary

Global warming
The long-term increase in the global average temperature.

Ice sheet
A mass of glacial ice that is more than 50,000 square kilometers (19,000 square miles) in size. Ice sheets contain about 99 percent of the freshwater on Earth and are sometimes called continental glaciers.

Marine protected areas (MPAs)
Marine protected areas are areas where human activities are restricted or managed to protect important natural resources.

Mean sea level (MSL)
The average height of the entire ocean surface.

Nationally Determined Contributions (NDCs)
The outline of emission reduction and climate change adaptation/mitigation efforts that each signatory party of the Paris Agreement commits to achieving. These NDCs should be republished every five years.

Nature-Based Solutions (NbS)
Actions to address societal challenges through the protection, sustainable management, and restoration of ecosystems.

Ocean deoxygenation
A decline in the level of oxygen in oceanic and coastal waters, largely because of warming ocean temperatures and excessive algae growth.

Shared Socioeconomic Pathways (SSPs)
Scenarios of projected worldwide socioeconomic changes up to 2100. They are used to generate greenhouse gas emissions scenarios with different climate policies. There are five possible scenarios; the lower the ranges indicated in the scenario name, the lower the emissions, according to the IPCC.

Small Island Developing States (SIDS)
A group of developing countries that are situated on small islands. SIDS includes 38 United Nations (UN) member states and 20 non-UN member states, which face similar challenges regarding sustainable development.

Sustainable Development Goals (SDGs)
A collection of 17 goals to achieve a better and more sustainable future for all.

Trophic level
The group of organisms within an ecosystem that occupies the same level in a food chain.

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High Level Panel for a Sustainable Ocean Economy
International Energy Agency (IEA)
International Maritime Organization (IMO)
International Monetary Fund (IMF)
Intergovernmental Panel on Climate Change (IPCC)
International Renewable Energy Agency (IRENA)
International Science Council
International Tanker Owners Pollution Federation Limited (ITOPF)
International Union for Conservation of Nature (IUCN)
Kearney
KPMG
Marine Protection Atlas
Millennium Ecosystem Assessment
MDS Transmodal
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National Aeronautics and Space Administration (NASA)
National Geographic Society
National Snow and Ice Data Center
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Ocean Conservancy
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Organization for Economic Co-operation and Development (OECD)
Rare
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The Guardian
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U.S. Geological Survey (USGS)
Verband für Schiffbau und Meerestechnik e. V. (VSM)
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Visual Capitalist
Vortexa
Wetlands International
World Economic Forum (WEF)
World Meteorological Organization (WMO)
World Wildlife Fund (WWF)

Maps

Polygons, boundaries, and disputed areas: World Bank and Natural Earth data

Map projection: Miller cylindrical

Created with flourish.studio

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German Ocean Foundation

Deutsche Meeresstiftung

The oceans are the common heritage of mankind. They cover two-thirds of the Earth's surface and supply us with oxygen. Every second breath we take comes from the sea.

But the oceans are under threat: from overfishing, waste, noise, and excessive warming, among other things. That is why we must take responsibility for them together – for the future of our climate and our food.

The German Ocean Foundation is committed to working with partners from business, science, and society to preserve this habitat for the benefit of future generations. On the media and research ship ALDEBARAN, we undertake research expeditions on topics such as coral dieback or plastics in the waters. With our ocean competition, we have been motivating young scientists to do their best for our oceans for 17 years. We produce educational materials for all age groups on marine topics of all kinds. We develop measuring instruments and methods to detect plastic waste and banish it from our oceans. We are collaborating with a large number of partners in the context of the UN Decade of Ocean Exploration for Sustainable Development, for example through a permanent exhibition on the museum ship Cap San Diego in Hamburg or the Ocean Festival in Berlin.

We are closely associated with the Foundation of Prince Albert II of Monaco and were jointly awarded the European Culture Award in 2018. We are supported by our ocean ambassadors: professional yachtsman Boris Herrmann, surfing world champion Sonni Hönscheid, extreme swimmer André Wiersig, and professional mermaid and apnea diver Mermaid Kat.

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Further reading

If you would like to know more about this topic and related topics, check out our recommendations below:

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Global climate change
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Global biodiversity loss
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Melting glaciers and sea ice
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Global sea level rise
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