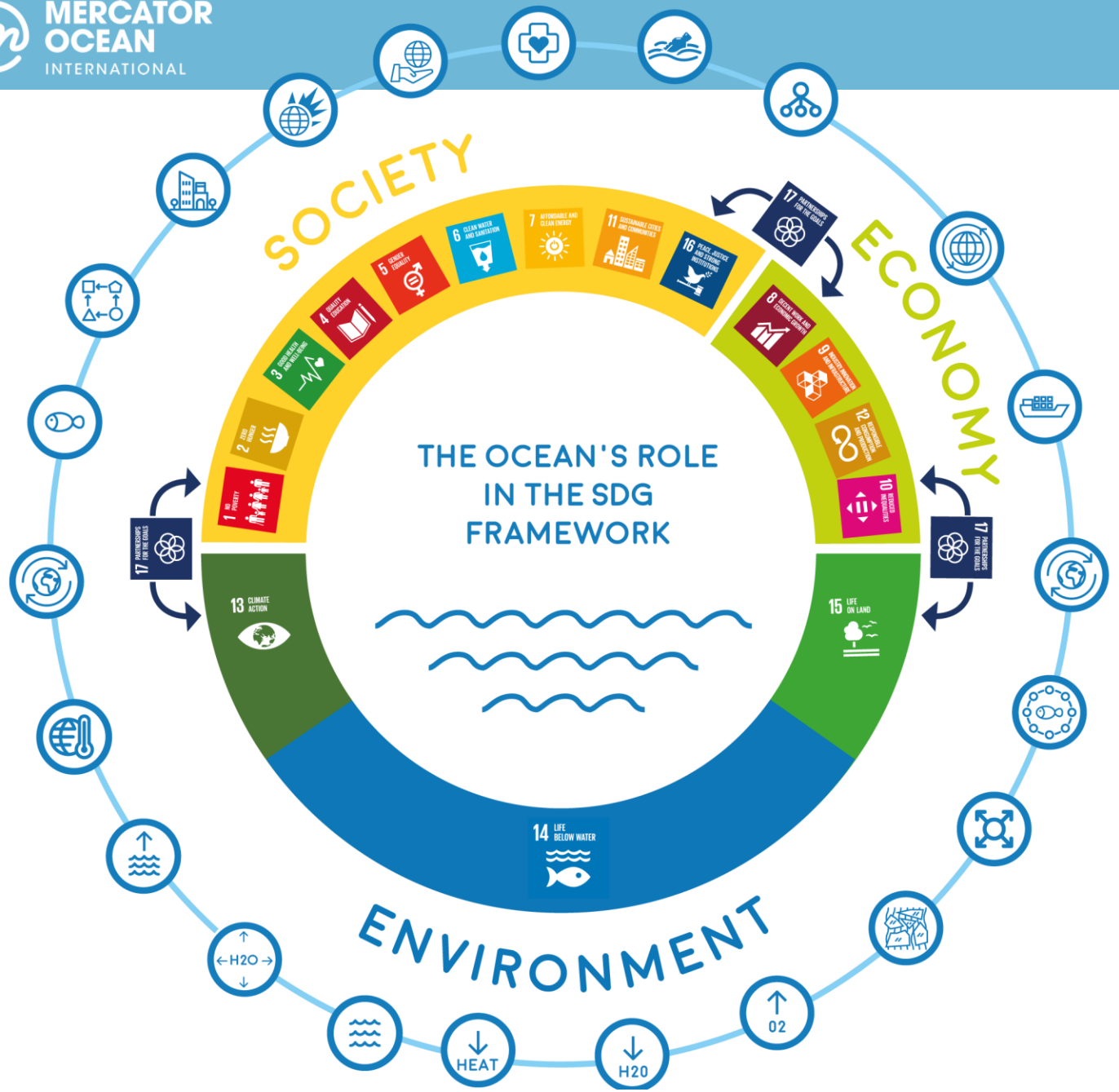
MERCATOR OCEAN INTERNATIONAL

Current state of the ocean

01/07/2025

PLANET EARTH - THE BLUE MARBLE

All people on Earth rely on the ocean, either directly or indirectly, with nearly 28% of the global population living in close proximity to the coasts and maintaining a deep connection with the ocean (IPCC SROCC).

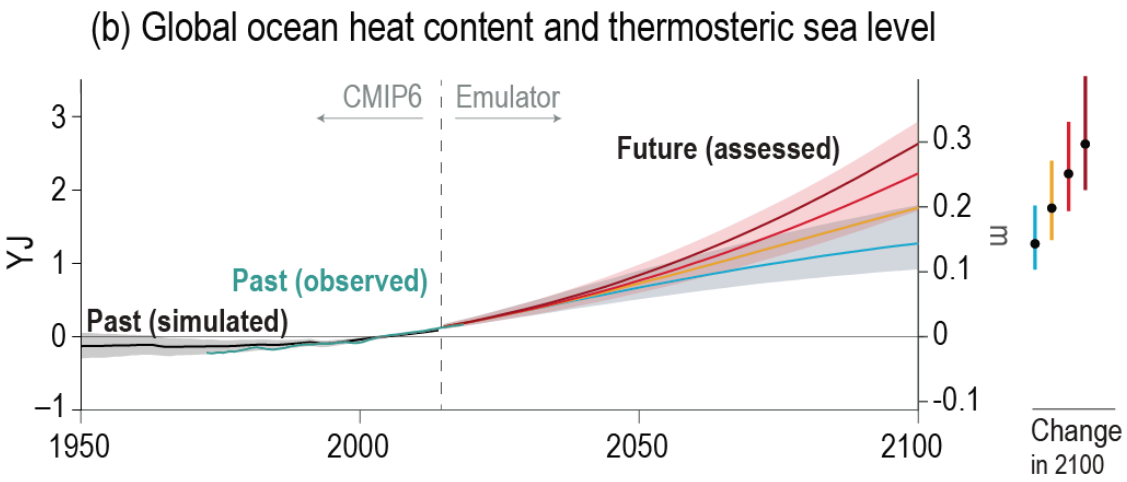


The ocean is vital for sustaining life, regulating Earth's climate, and provides a multitude of services and resources for the livelihood of society, such as sustainable societal resilience, well-being, cultural identity, and economic growth

von Schuckmann et al., 2020, Journal of Marine Policy

CHANGE & PRESSURE IN THE OCEAN: THE TRIPLE PLANETARY CRISIS

CLIMATE CHANGE

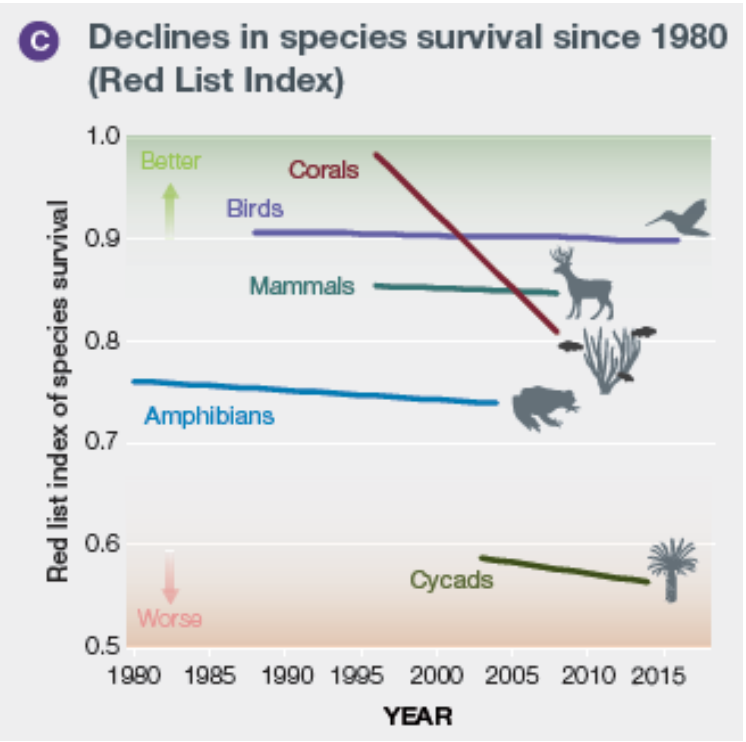


IPCC, 2021

POLLUTION

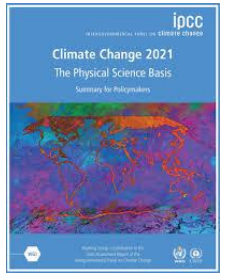
Geoblueplanet.org

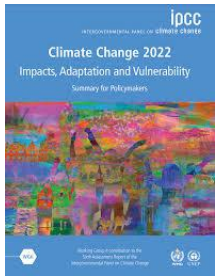
BIODIVERSITY LOSS

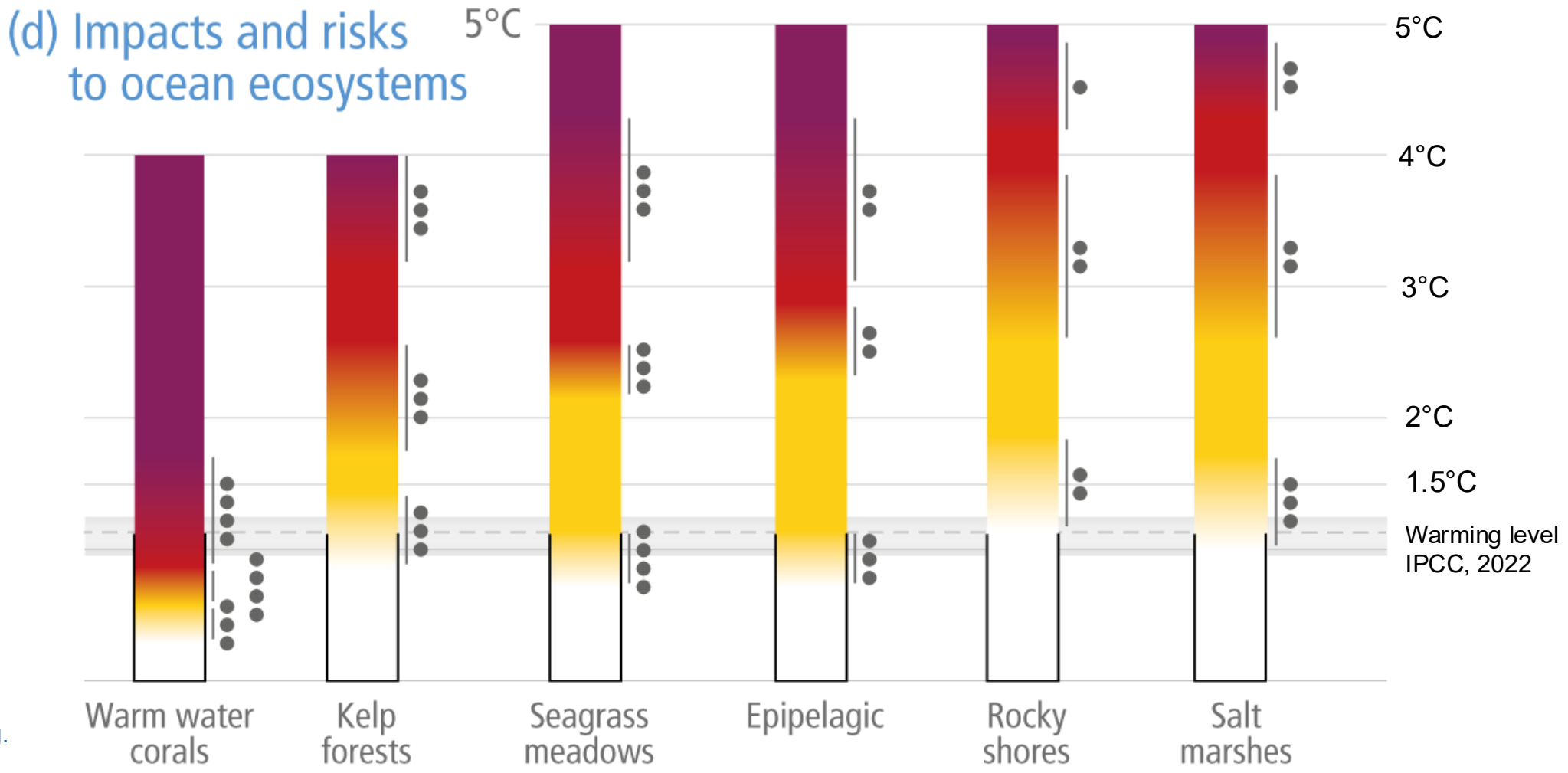


IPBES SPM, 2021

CHANGE & PRESSURE IN THE OCEAN: CLIMATE CHANGE





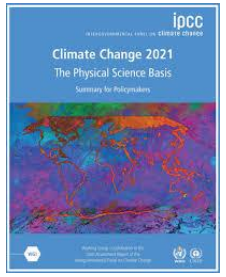


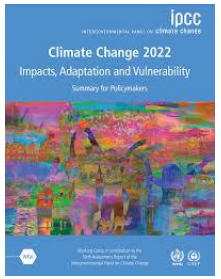
IPCC, WG1 & WG2, Fig. SPM.3 (WG2)

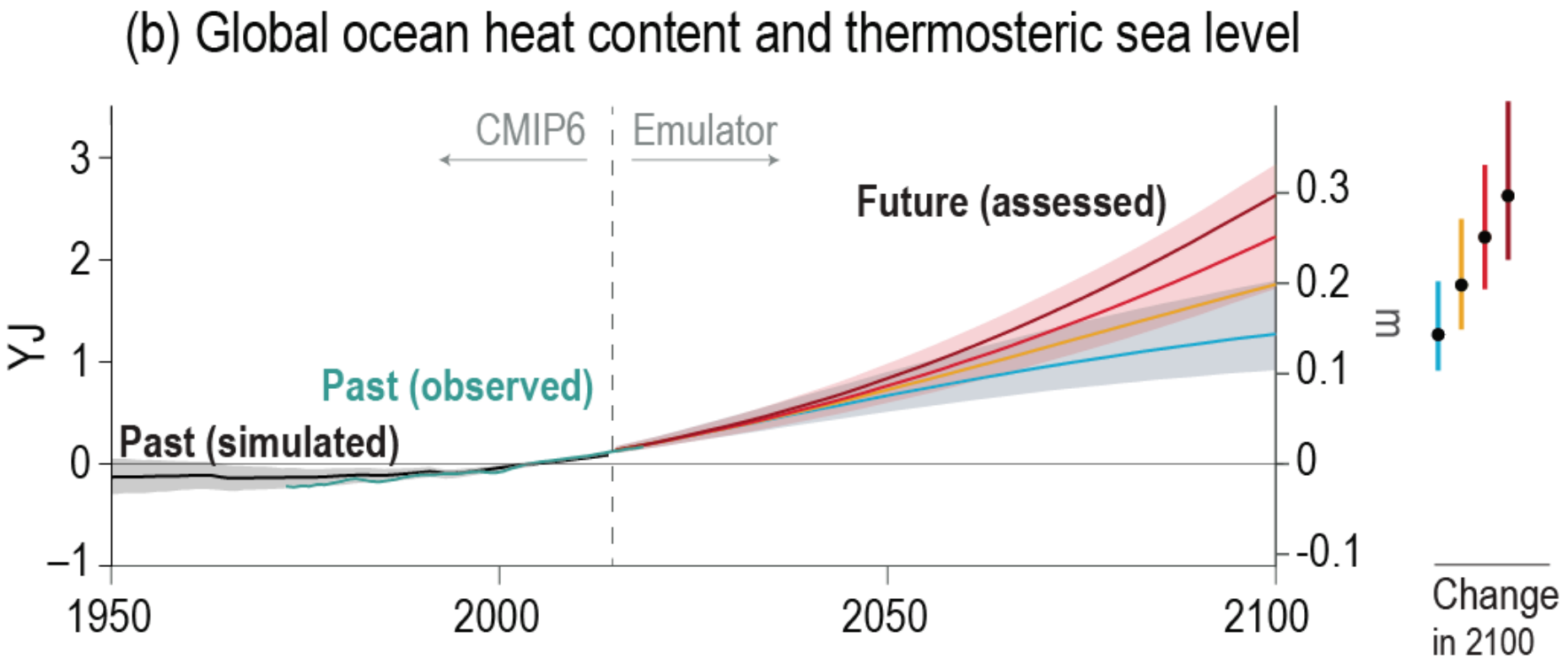
Any further delay in concerted global action will miss the brief, rapidly closing window to secure a livable future.

CHANGE & PRESSURE IN THE OCEAN: CLIMATE CHANGE

There's no going back from some changes in the climate system – particularly in the ocean. Many changes are irreversible for centuries to millennia.



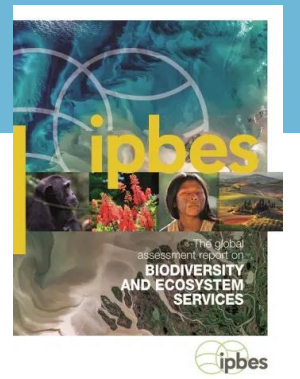




IPCC, WG1 & WG2, Fig. SPM.3 (WG2)

However, some changes could be slowed and others could be stopped by limiting warming.

CHANGE & PRESSURE IN THE OCEAN: POLLUTION

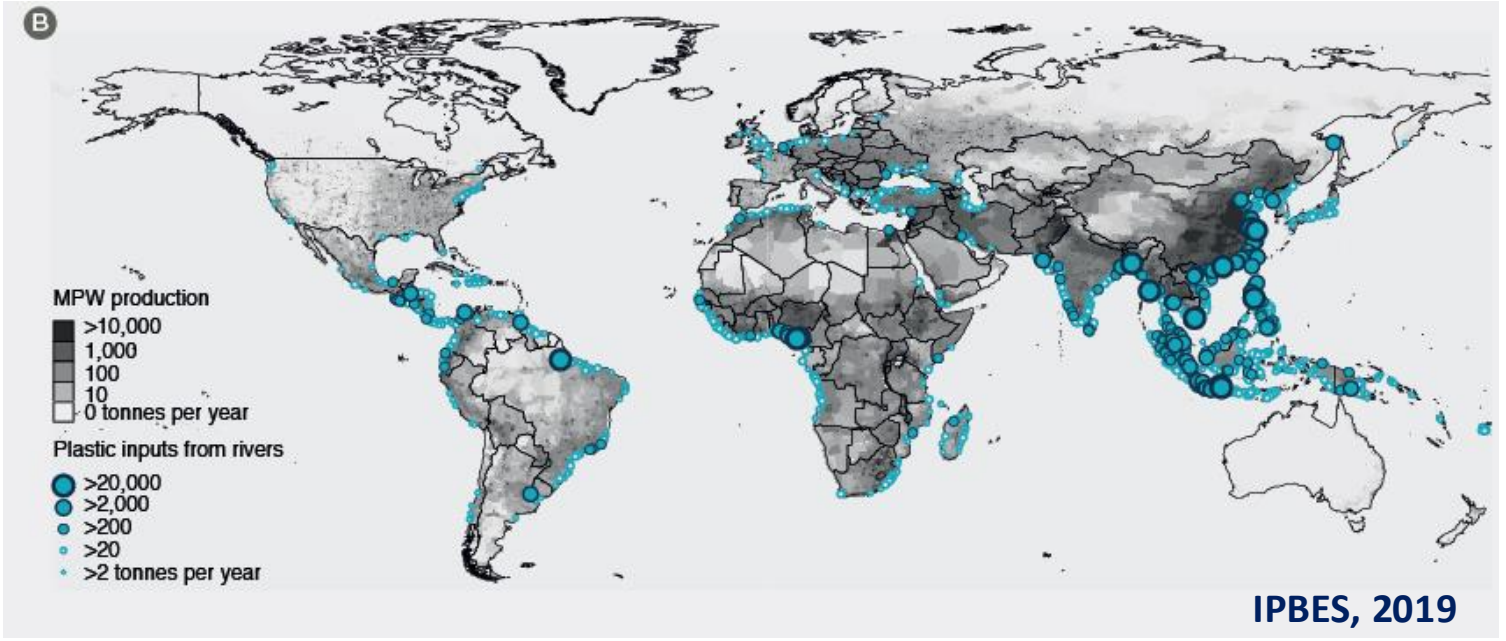


Water quality has fallen over the last five decades, with key environmental and societal impacts.

Major sources include:

- untreated urban sewage and industrial and agricultural runoff
- erosion
- airborne pollution
- salinization
- oil spills
- dumping of substances

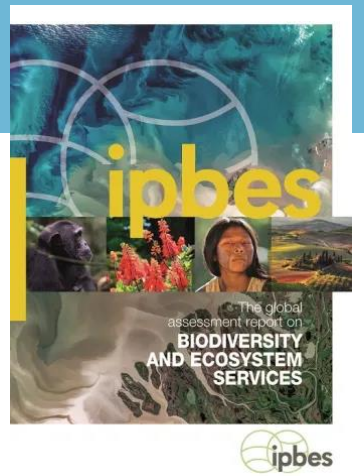
It is estimated that over 80% of urban and industrial wastewater is released to freshwater systems without adequate treatment, a volume six times as large as that in all of the world's rivers, i.e., 300–400 million tons of contaminants



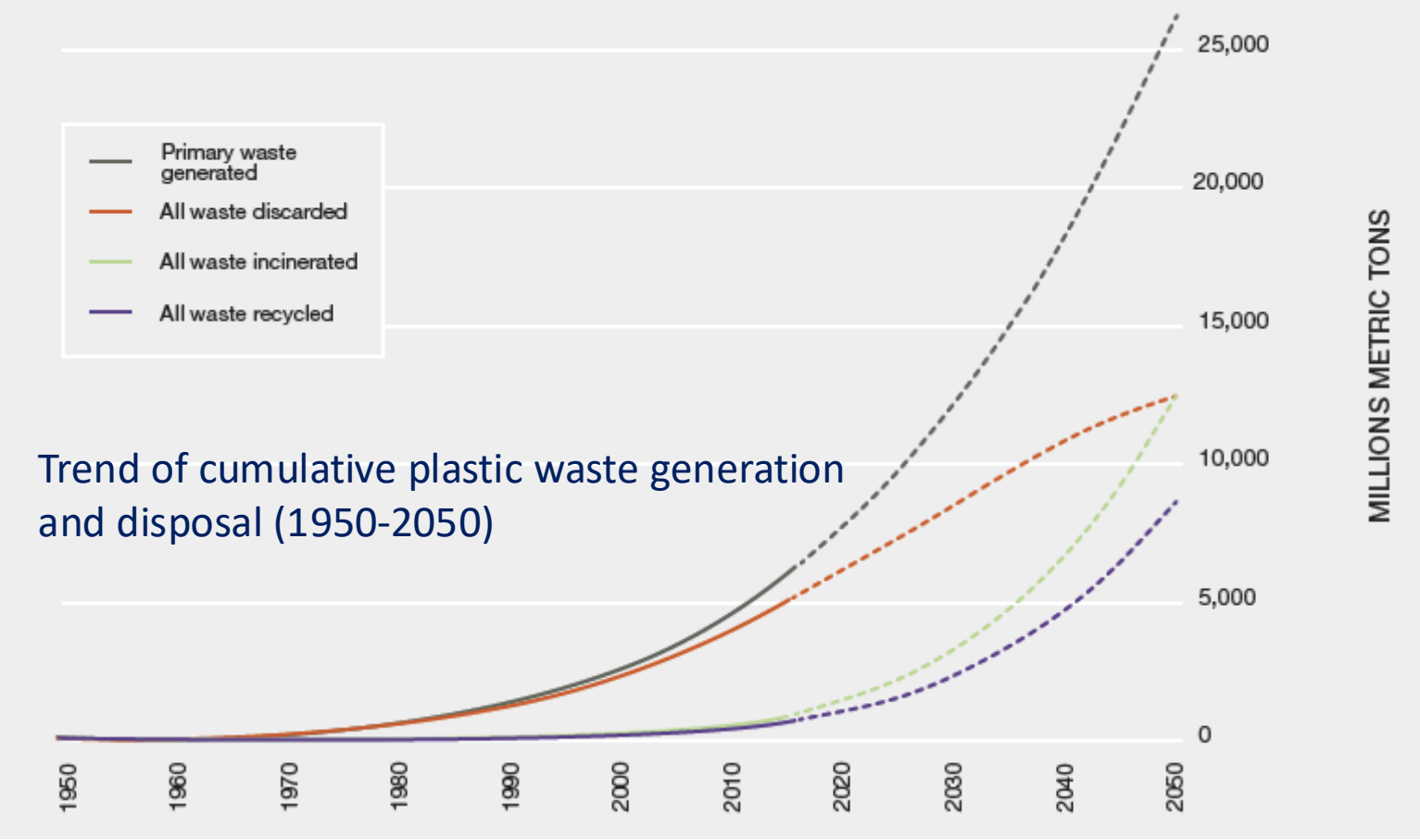
Flow of river plastic waste into the ocean

IPBES, 2019

CHANGE & PRESSURE IN THE OCEAN: POLLUTION



Plastic pollution in the ocean has increased tenfold

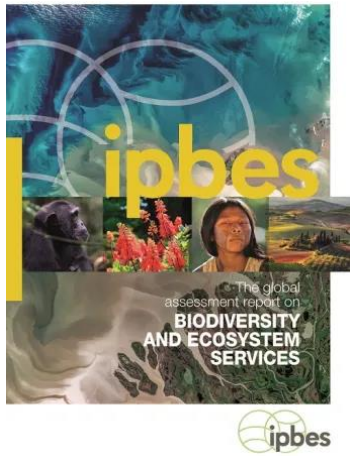


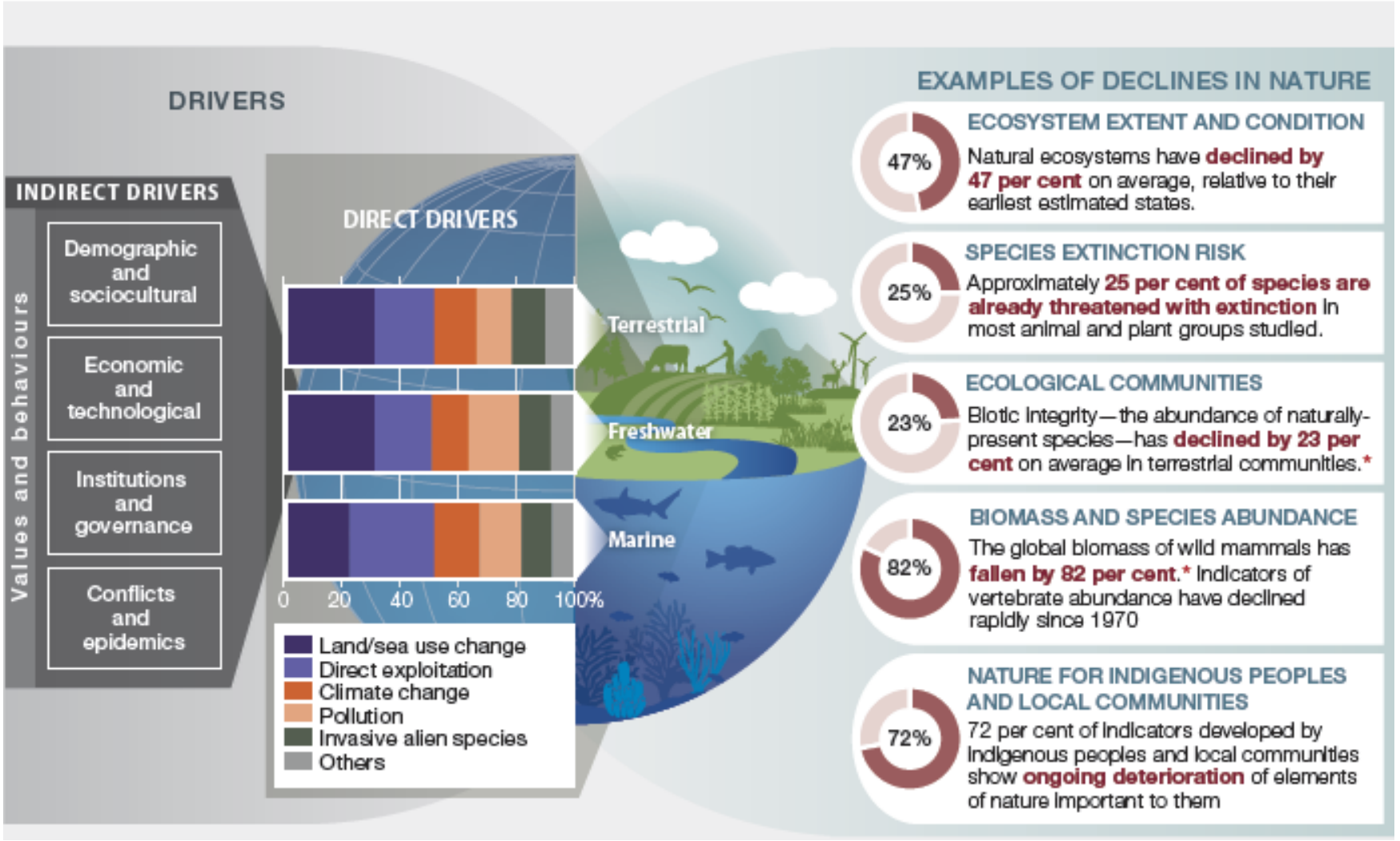
Trend of cumulative plastic waste generation and disposal (1950-2050)

IPBES, 2019

CHANGE & PRESSURE IN THE OCEAN: BIODIVERSITY LOSS

Examples of global declines in nature, including the ocean, emphasizing declines in biodiversity, that have been and are being caused by direct and indirect drivers of change

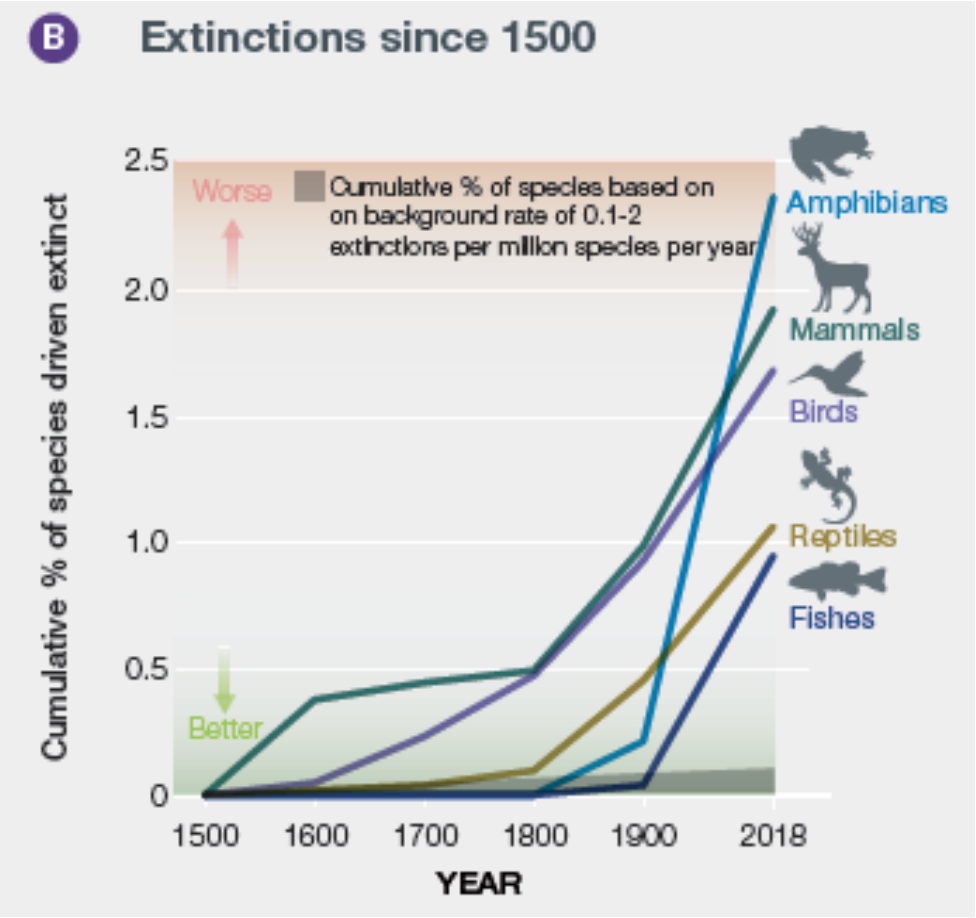


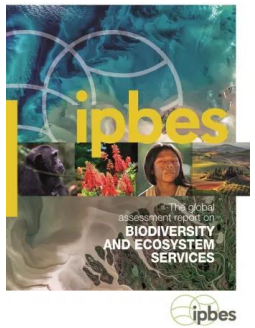


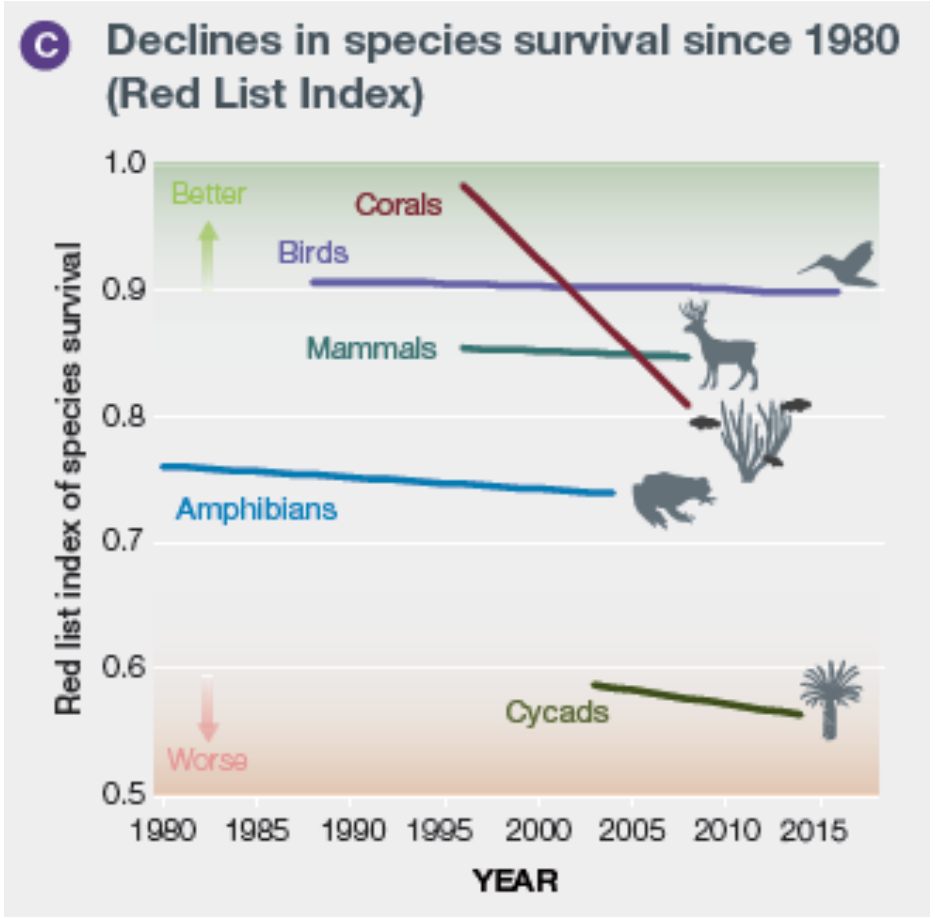
IPBES, 2019

CHANGE & PRESSURE IN THE OCEAN: BIODIVERSITY LOSS

A substantial proportion of assessed species such as in the ocean are threatened with extinction and overall trends are deteriorating, with extinction rates increasing sharply in the past century







IPBES, 2019

Now more than ever, there is an urgent need to monitor and report on the state, variability, and change of the ocean, as it faces mounting pressures from the triple planetary crisis and overexploitation—threatening both marine ecosystems and human well-being.

An InterGovernemental Organisation for ocean monitoring and forecasting

Multinational governance

Entrusted entity by the EC

Public interest mission

120 persons based in Toulouse

International network

DESCRIBE THE OCEAN AND ENVIRONMENTAL CONDITIONS

Provide an open **service worldwide**.

SUPPORT CAPACITY DEVELOPMENT

Reinforce capacities and **international collaboration**

IMPLEMENT AND SERVE

Act as the reference in the domain of **operational ocean forecasting**

Europe

PROGRAMME OF THE EUROPEAN UNION

Copernicus
Europe's eyes on Earth

Copernicus Space Component

Copernicus Land Monitoring Service

Copernicus Atmosphere Monitoring Service

Copernicus Marine Environment Monitoring Service

Copernicus Climate Change Service

Copernicus Emergency Management Service

Copernicus Security Service

esa EUMETSAT

European Environment Agency

ECMWF

MERCATOR OCEAN INTERNATIONAL

ECMWF

Joint Research Centre JRC

FRONTEX

ARCTIC HUB
COASTAL HUB

MERCATOR OCEAN INTERNATIONAL

Mercator is mandated by the EC to:

Copernicus Marine Service

Implement the Copernicus Marine Service

EDITO
European Digital Twin Ocean

Build the EU DTO

EU4OceanObs
INTERNATIONAL OCEAN GOVERNANCE
EU COMPONENT TO GLOBAL OCEAN OBSERVATIONS

Coordinate EU actions with international partners

International Partnerships
OPERA

Develop capacities in Africa

GEO BLUE PLANET

G7 FUTURE OF THE SEAS & OCEANS INITIATIVE

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

BLUE OCEAN
Currents, temperature, waves, sea level, ...

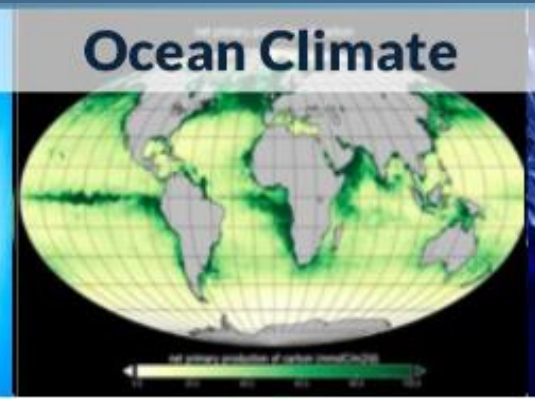
WHITE OCEAN
Ice coverage, velocity, concentration, Icebergs ...

GREEN OCEAN
CO2, nutrients, oxygen, primary production, ...

Copernicus Marine Service in COPERNICUS 2 :

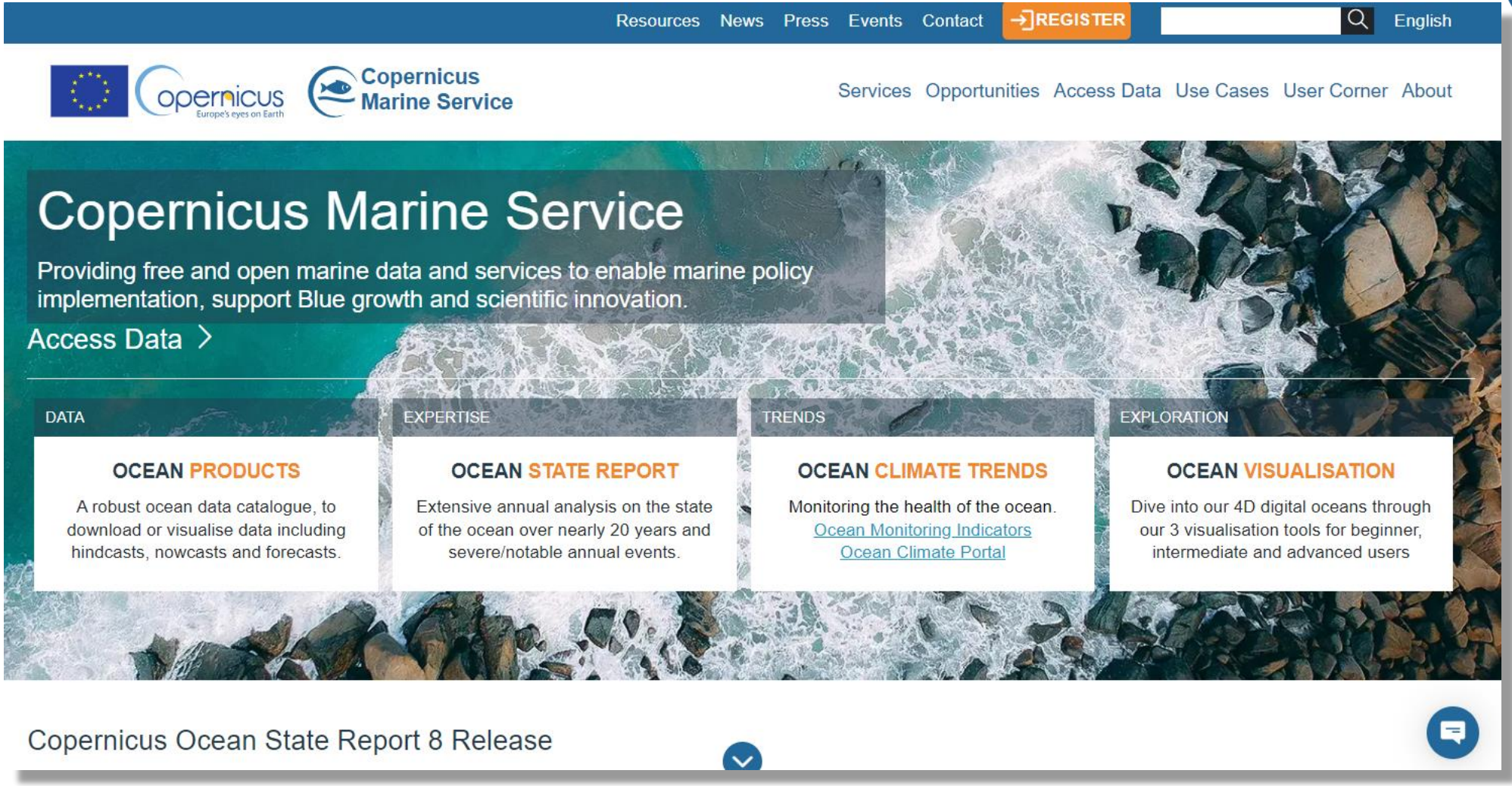
Regular incremental improvements to the current Offer

\+ a series of major evolutions



A single entry point

https://marine.copernicus.eu



Copernicus Marine Service

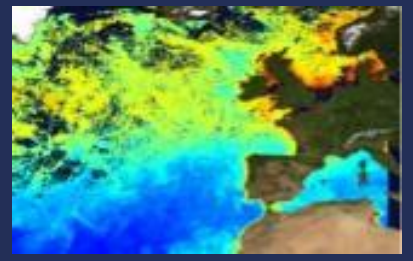
- Online catalogue
  marine.copernicus.eu
- Nearly 300 scientifically qualified products & Ocean monitoring indicators
- User driven
- Common format
  (Netcdf)
- Open and Free

COPERNICUS MARINE SERVICE PORTFOLIO

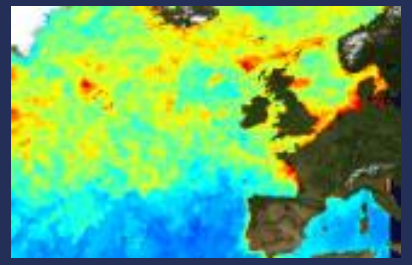
Copernicus Marine Service

Satellite observation data

- **L3** – daily composite products, single/multi sensor (Along Track or gridded product)



- **L4** – daily interpolated and weekly/monthly composites

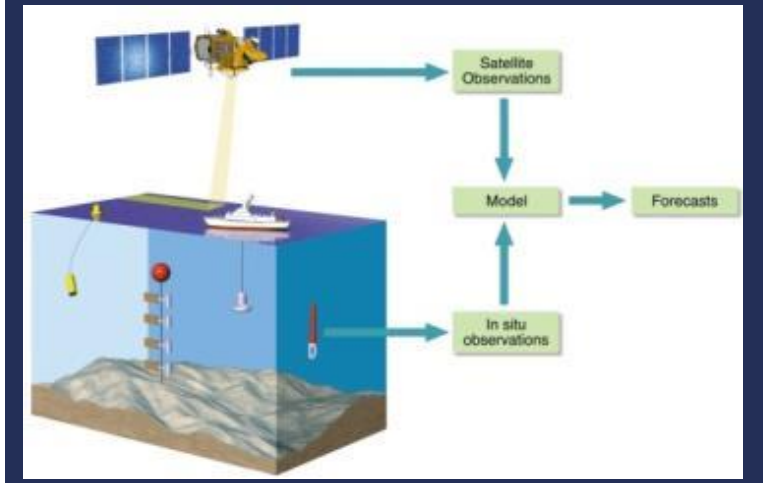


InSitu observation data

From different networks and platforms

Model data

From 3D numerical representation of the ocean with an assimilation of « real » data

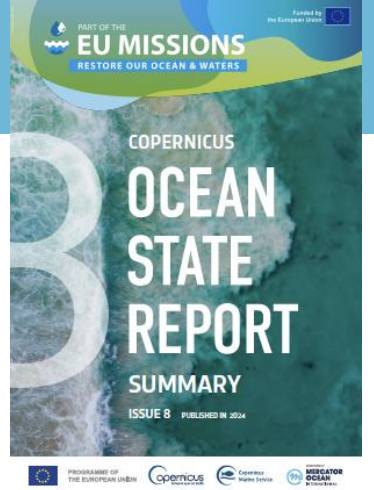


- **ISSUE 9:** accepted/under review
- **ISSUE 10:** in preparation

- Annual publication of Copernicus Marine Service, implemented by Mercator Ocean International.
- Provides a state-of-the-art reference for the variability, changes, and state of the ocean, incl. new methods & tools, relevant scientific knowledge, and recent unusual events
- Provides key inputs that support major EU and international policies & initiatives
- Collaboration of more than 150 scientific experts from more than 25 European institutions

https://marine.copernicus.eu/access-data/ocean-state-report

MERCATOR OCEAN INTERNATIONAL



THE REPORT AT A GLANCE

Unprecedented Marine Heatwaves

Strong and extreme marine heatwaves have grown in frequency, duration, intensity and geographical spread over the past four decades.

22 %
of the global ocean surface experienced at least one severe to extreme marine heatwave event in 2023

Marine Heatwaves in Europe/Northeast Atlantic and Adjacent Seas

In the northeast Atlantic Ocean and nearby seas, marine heatwaves grew stronger, more frequent, larger and longer over the past few decades. Areas of this region suffering marine heatwaves in any given year grew from around 20 % to over 90 % between 1982 and 2023.

Rising Ocean Heat Content

A new method to measure Earth's energy budget shows a significant positive trend of 0.75 W m² over the period 1993–2022, indicating continued warming of the ocean.

Unexpected Bloom

An extreme phytoplankton bloom was detected southeast of Crete in 2022, caused by a strong and unusual cold spell across the eastern Mediterranean Sea. The event led to a 35 % rise in annual primary productivity in the area, which may have impacted marine life across food chains.

↑ 35 %
rise in annual primary productivity

Sea Ice

2023 saw the lowest sea ice on record in the world's polar regions. The Arctic region lost 4 % of sea ice per decade during the period 1979–2023, followed by an increase in surface water temperature in the region. Meanwhile, the Antarctic region reached the lowest ever sea ice value since the beginning of satellite observations.

↓ 4 %
mean annual sea ice lost in the Arctic per decade since 1979

Deep Marine Heatwaves

A marine heatwave in the Mediterranean Sea reached up to 1,500 m below the surface. While heatwaves were more frequent at the surface, temperatures rose further and for longer beyond 150 m.

Record-Breaking Wave Events

The tallest 5 % of global ocean waves have grown much higher in recent years. A violent storm that struck Melilla, Spain in April 2022 broke several records at once, with towering, enduring waves sweeping over the port and disrupting maritime operations.

Key Ocean Innovations

New tools and technologies are helping to monitor the ocean and support our society. This includes safeguarding marine life to bolster aquaculture, state-of-the-art wave analysis which could improve coastal protection, and a pioneering technique to power heat pumps with thermal energy from the ocean.

THANK YOU

Any questions ? karina.von.schuckmann@mercator-ocean.fr