Hybrid University, Biosphere Reserves as sites to develop Ocean Literacy - Cyprus, 10 Ocotber 2022

Ocean benefits and challenges:

Ocean Literacy as a tool to foster conservation opportunities

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What is Ocean Literacy?

Ocean Literacy has been historically defined as ‘the understanding of the ocean’s influence on us and our influence on the ocean.’

It is not only about increasing awareness on the state of the ocean, but it is also about providing tools and approaches to transform ocean knowledge into actions that promote ocean sustainability.

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The 7 Essential Principles

This section introduces the Essential Principles of Ocean Literacy as described in the document "Ocean Literacy: The Essential Principles and Fundamental Concepts of Ocean Sciences K-12', published in USA.

Adapting the Principles to local contexts

While these principles are broadly applicable, it is important for them to be validated, adapted, translated or adjusted to local cultural and geographic contexts. This can include emphasizing particular ecosystems and features, highlighting local trends, showcasing local livelihoods, among others.

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OL Principles

Ocean Literacy must be adapted to local needs and contexts for it to be relevant.

1 **Earth has one big ocean with many features**

2 **The ocean and life in the ocean shape the features of the Earth**

3 **The ocean is a major influence on weather and climate**

4 **The ocean makes Earth habitable**

5 **The ocean supports a great diversity of life and ecosystems**

6 **The ocean and humans are inextricably interconnected**

7 **The ocean is largely unexplored**

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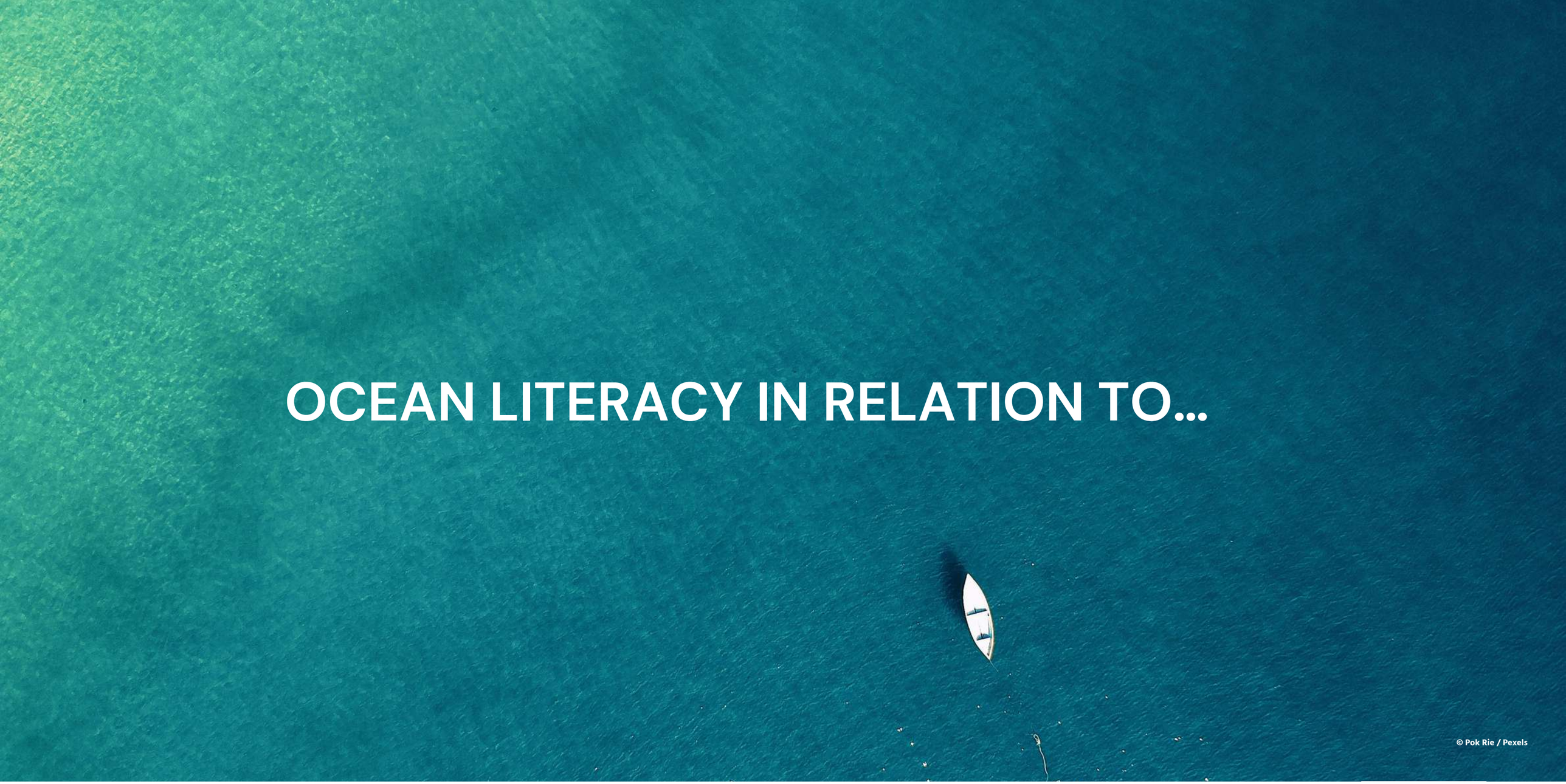
OCEAN LITERACY IN RELATION TO...



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UN Agenda 2030 for Sustainable Development

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
(Our Common Future/Brundtland Report)

SDG14: Life below water

Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
(Our Common Future/Brundtland Report)

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The Ocean Decade supports the 2030 Agenda

With the vision to achieve "The science we need for the future we want", the Ocean Decade supports the achievement of the 17 Sustainable Development Goals of the 2030 Agenda:

1. **Identifying and sharing necessary data and information**
2. **Generating knowledge and communicating ocean issues** in simple, common language.
3. **Increasing the use of ocean knowledge and developing useful skills** to help find solutions for sustainable development.

Ocean Decade vision

The science we need for the future we want

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7 Expected Outcomes by 2030

The Ocean Decade aims to catalyze transformative scientific solutions for sustainable development by connecting people to the ocean. By 2030, work to achieve an ocean that is:

Clean
Because sources of pollution are identified, reduced and/or removed.

Healthy and resilient
In which marine ecosystems are understood, protected, restored and managed.

Productive
Because the sustainability of the food and blu economy is supported.

Predictable
Because society understands and can respond to changing marine conditions.

Safe
Because life and livelihood, his and ours, are protected from any oceanic danger.

Accessible
Because access to data, information, technology and innovation is open and fair.

Inspire and engage
Because society understands and values the relationships between ocean, well-being, sustainability, and culture.

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10 challenges have been identified

The challenges represent the **most immediate and urgent priorities** for achieving the ocean we want and aim to **unite partners in collective action** on a global, regional, national, and local scale.

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Importance of the ocean

Life on Earth depends on the ocean:
It is our planet's main life support system

Between 50 and 80% of the oxygen produced on Earth is produced by the ocean, regulates our climate, provides food security and coastal security. The ocean hosts over 95% of the habitable space on the planet, supporting an immense biodiversity.

It supports livelihoods and development

A wide range of economic activities depend on the ocean, ranging from fisheries and aquaculture to tourism, gastronomy, energy, shipping, pharmaceuticals, among many others.

It is a source of inspiration

People connect with the ocean in a broad array of ways, both culturally and individually.

Elianne Dipp / Pexels

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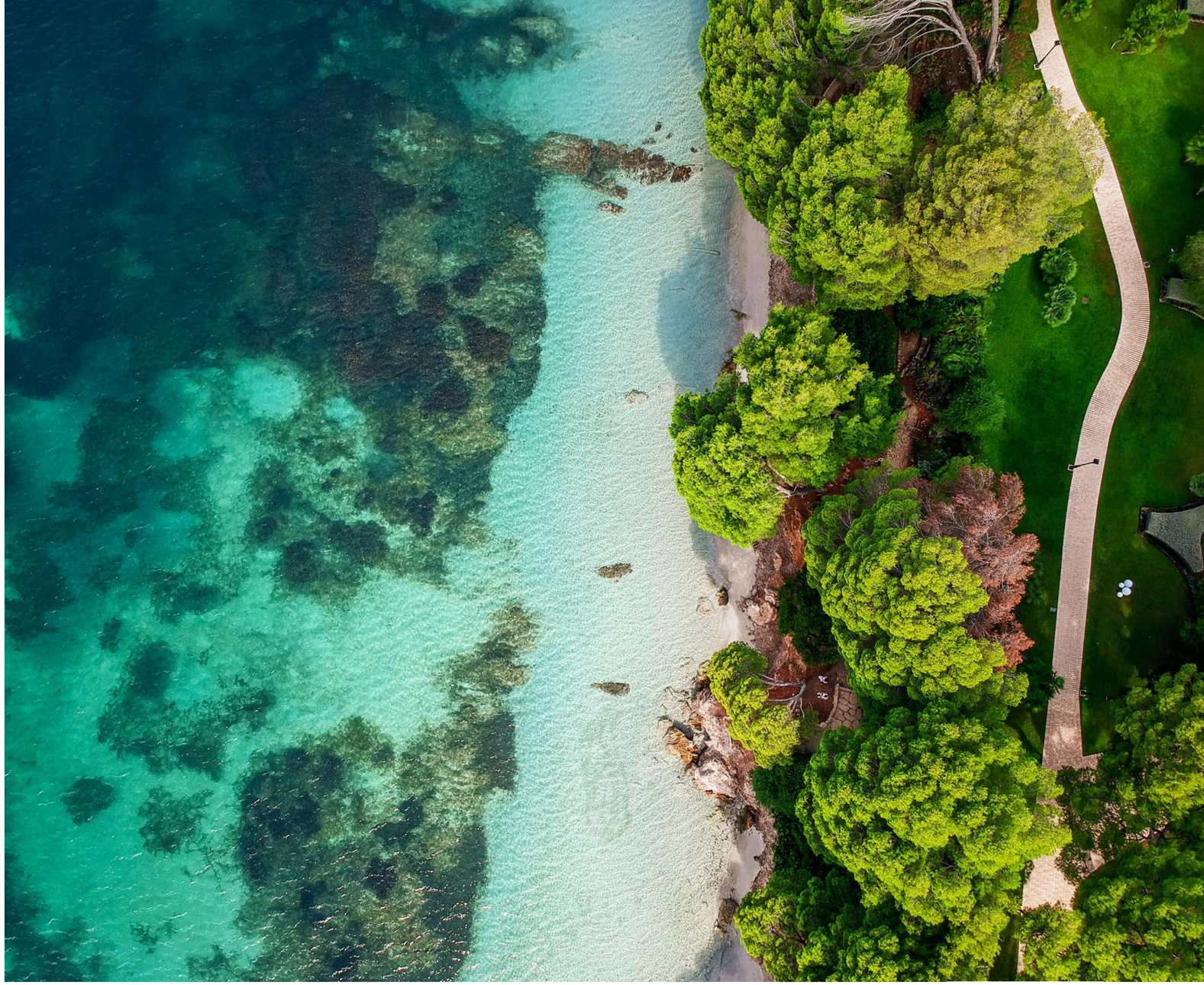
Key environmental roles

- Climate and weather regulation
- Functioning and stability of ecosystems through biological diversity
- Oxygen production
- Carbon cycle and storage
- Soil erosion prevention
- Nutrients cycles
- ...



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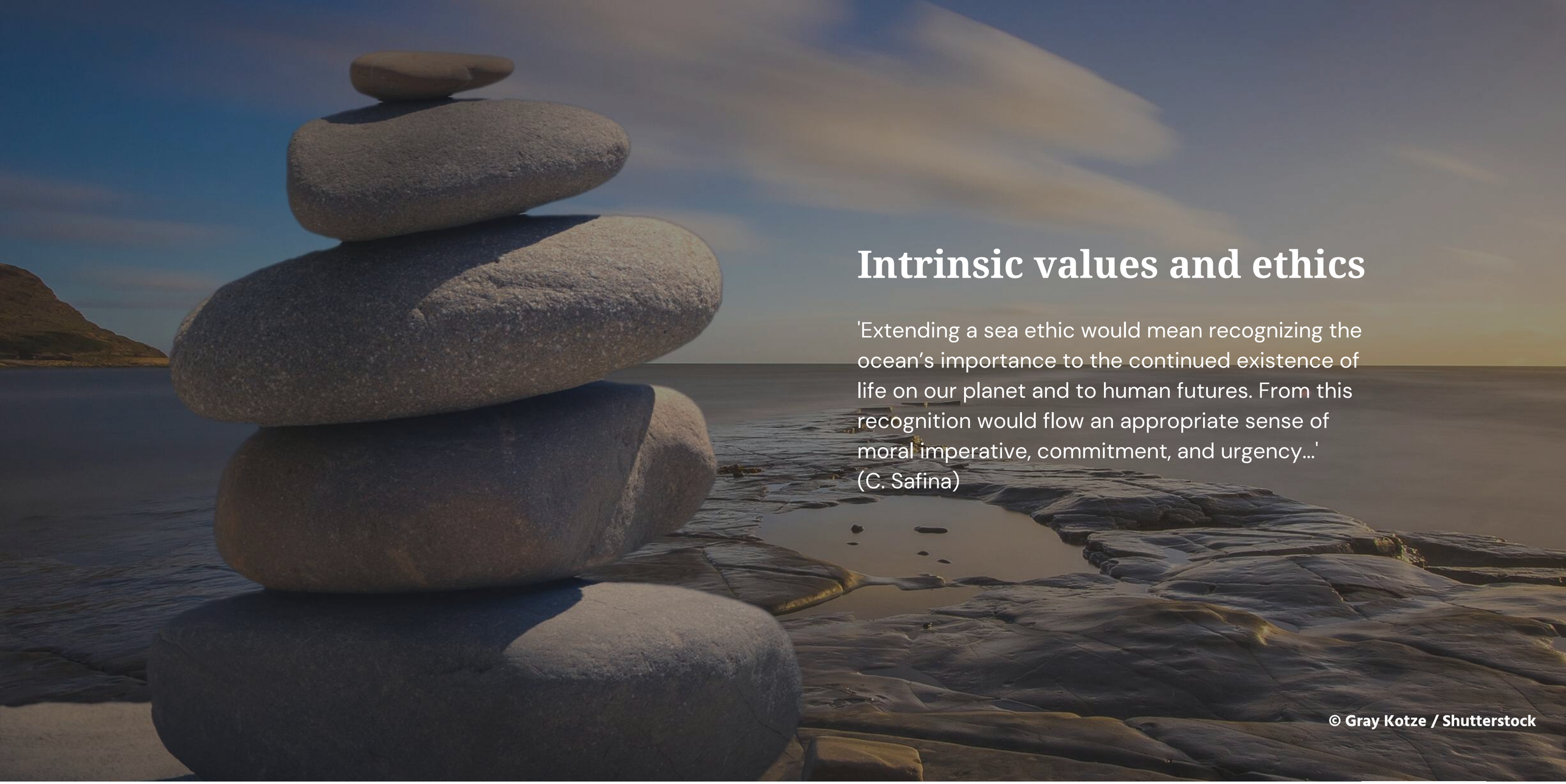
Culture and Identity

"Winds and currents played a critical role in determining routes taken, peoples linked together, environments and the timing of such activities."
(G. Bankoff, 2017)

- Heritage practices
- The ocean is part of our history



Intrinsic values and ethics

'Extending a sea ethic would mean recognizing the ocean's importance to the continued existence of life on our planet and to human futures. From this recognition would flow an appropriate sense of moral imperative, commitment, and urgency...'
(C. Safina)

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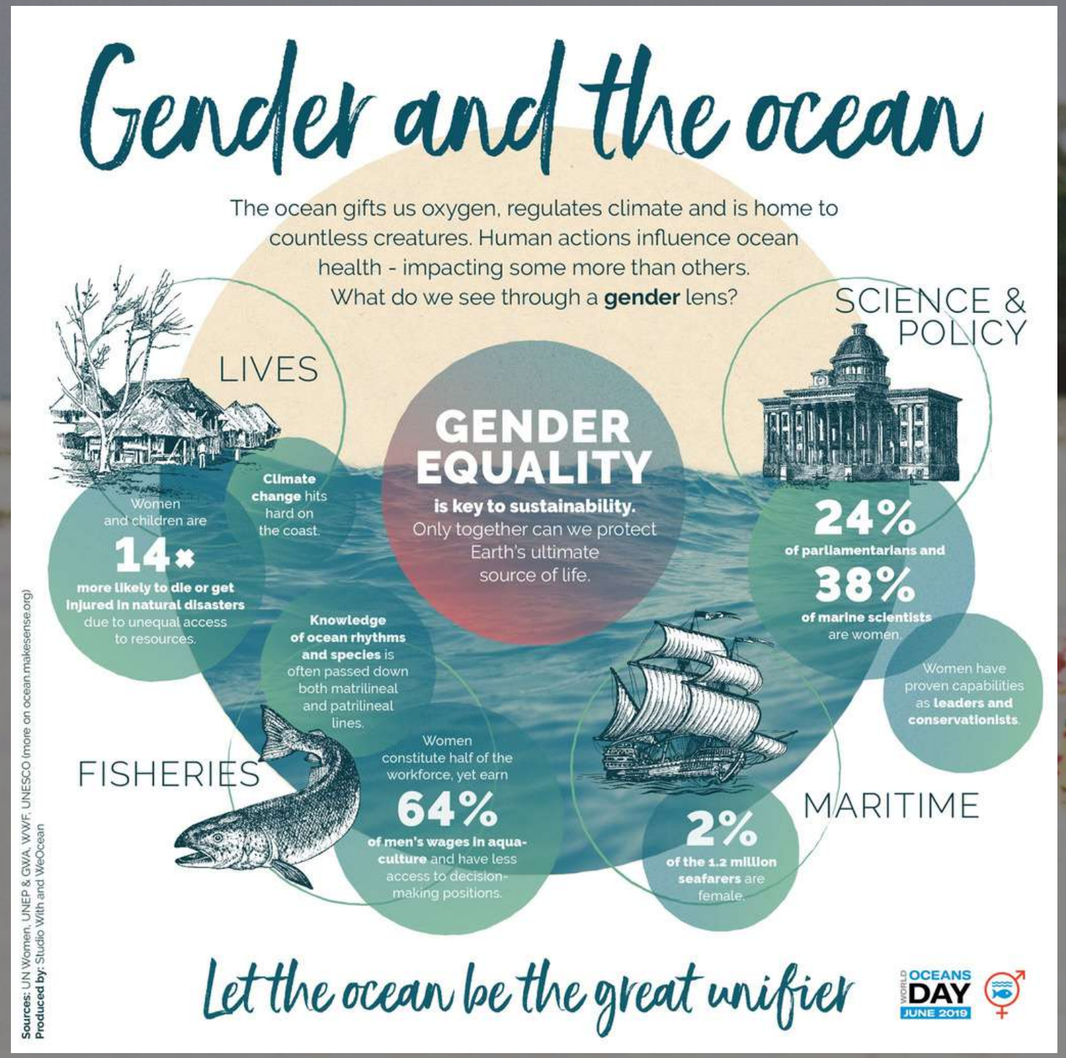

Equity, human rights, gender equality, environmental justice, social cohesion…

- Understand what the benefits associated with marine and coastal biodiversity are and how they are distributed.

.

- Declining ocean health exacerbates poverty.

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Poverty reduction

- Blue Economy can help reduce poverty.
- Understand benefits provided by marine and coastal biodiversity and how these are are distributed

.

- Ocean degradation exacerbates poverty.

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© Club de Inmersión Biologia / Wikipedia

Health

The ocean as a source of food, recreation and medicine affects human health in multiple ways.

Exposure to or ingestion of pathogenic microbes, pollution, or algal toxins can cause human illness.

Scientists have the opportunity to discover new ocean derived pharmaceuticals.

Tunicate *Ecteinascidia turbinata* have anticancer properties. It is found in the shallow waters of the Caribbean Sea, the east coast of Florida, Bermuda, and the Gulf of Mexico.

© Energepic / Pexels

Transportation and shipping

- About 80-90% of world trade is transported by sea.
- Volume of seaborne trade is expected to double by 2030 and quadruple by 2050.

Internet and communication:

- ‘People think that data is in the cloud, but it’s not. It’s in the ocean.’ Even the internet travels underwater.
- 99% of all international data is transferred through a labyrinth of cables stretching across the floor of the ocean.
- The first transatlantic telegraph cable was completed in 1858.

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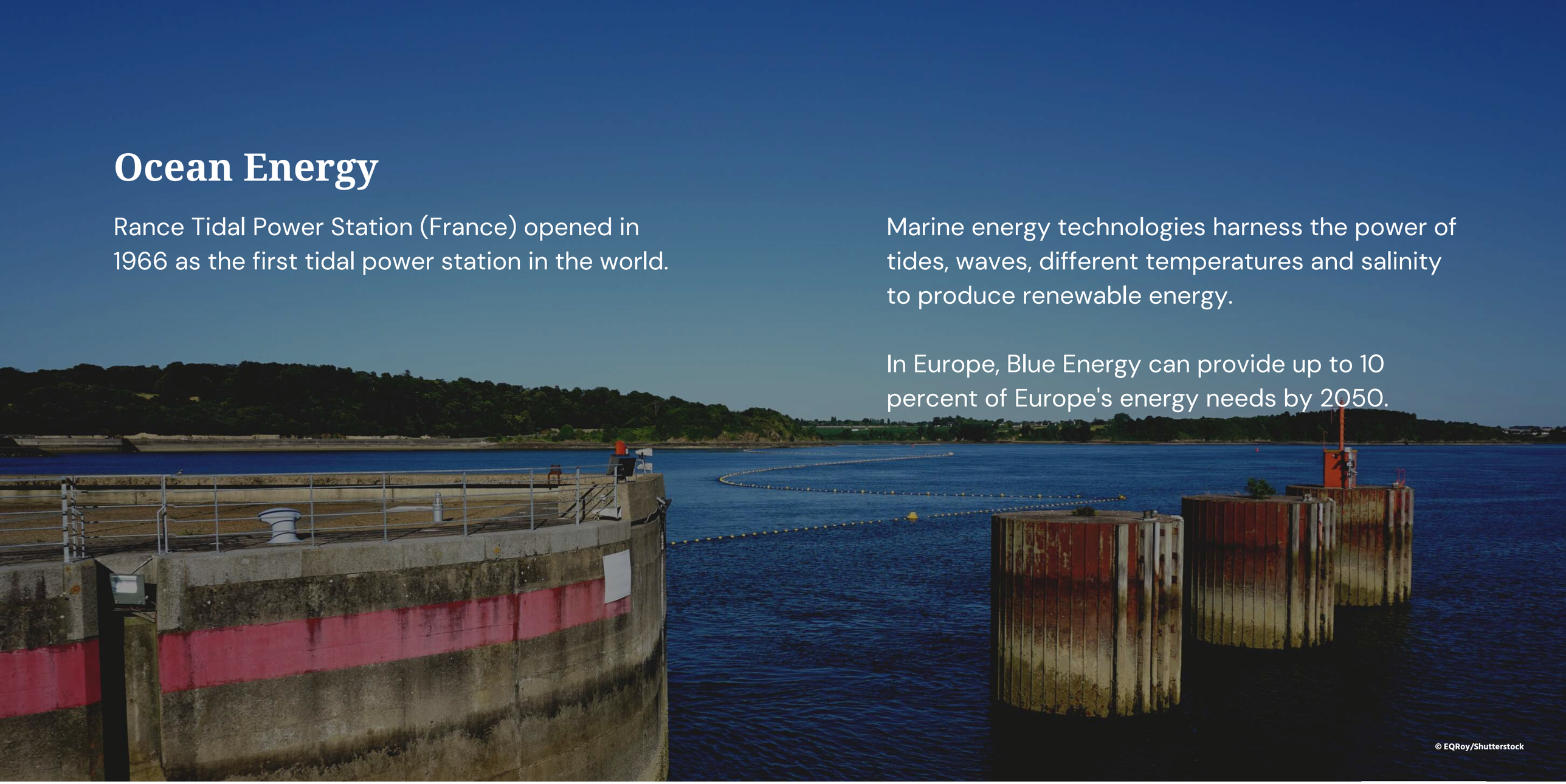
Ocean Energy

Rance Tidal Power Station (France) opened in 1966 as the first tidal power station in the world.

Marine energy technologies harness the power of tides, waves, different temperatures and salinity to produce renewable energy.

In Europe, Blue Energy can provide up to 10 percent of Europe's energy needs by 2050.



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Public benefits
of the ocean

Maritime and coastal tourism

- Worth over 9% of global GDP and support over 100 million jobs—one of the world's largest industries.
- Over 350 million people annually travel to the coral reef coasts of the world.
- Coral reefs drive USD 30 billion per year globally in tourism revenue

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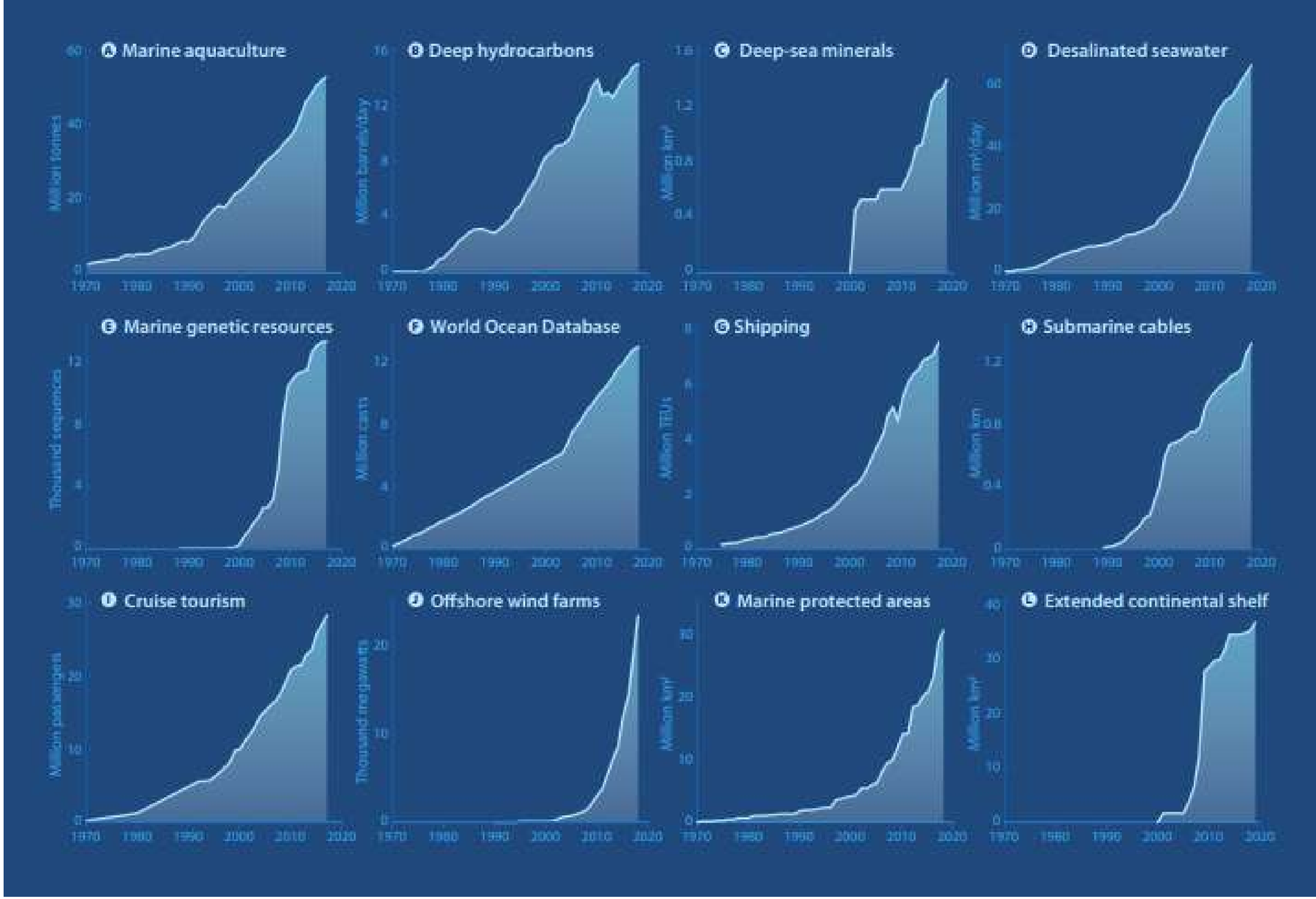
'Blue acceleration'

In the last 50 years, there has been rapid growth in new ocean industries (e.g. mariculture, deep ocean drilling for hydrocarbons and minerals, desalinisation, offshore wind farms...)

Existing maritime communications, transport and tourism industries have expanded rapidly.



Source: Redrawn from Jouffray et al. 2020 / High Level Panel for a Sustainable Ocean Economy

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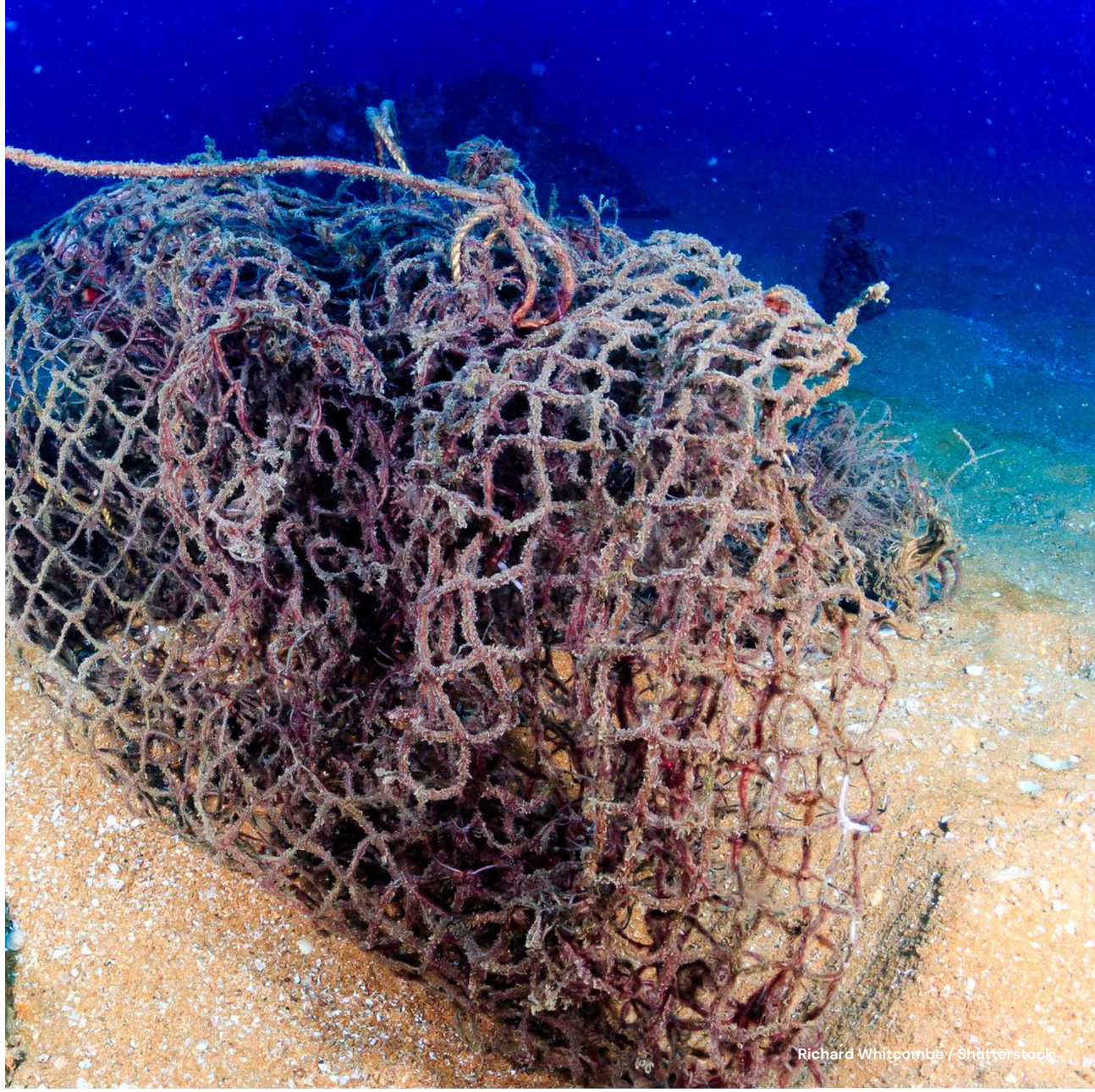
The ocean faces multiple challenges

Ranging from pollution to over-exploitation, from climate change to habitat degradation and ocean acidification, among others. These challenges affect not only coastal cities and communities, but the whole world.

Many people are unaware on how intrinsically connected we are to the ocean.



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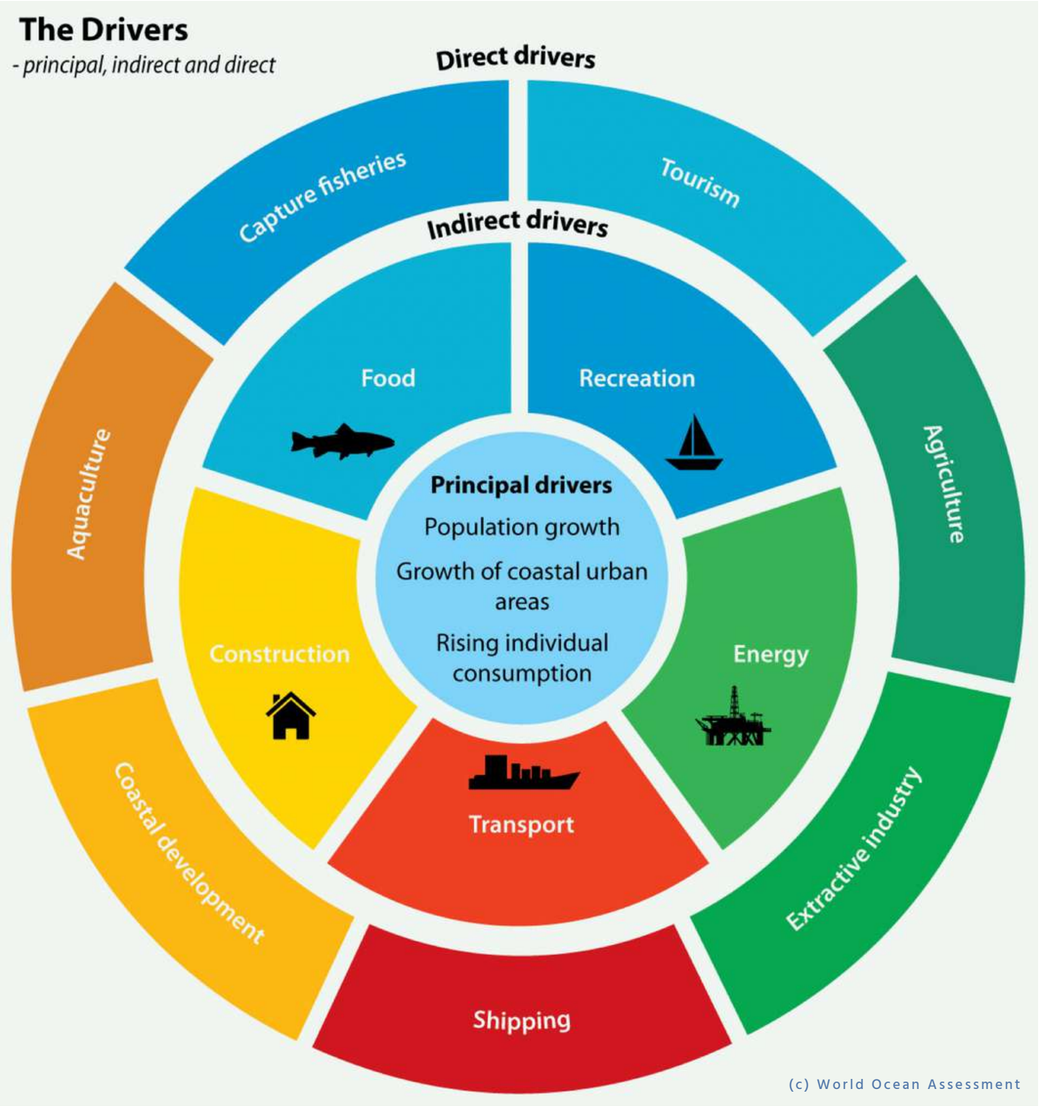
Factors driving change

Human activity is causing widespread changes in the physical, chemical and biological systems of the ocean.

The main drivers of change in the ocean are found outside the marine environment.

The main factors increasing pressures on marine biodiversity and the quality of the marine environment come from activities on land.



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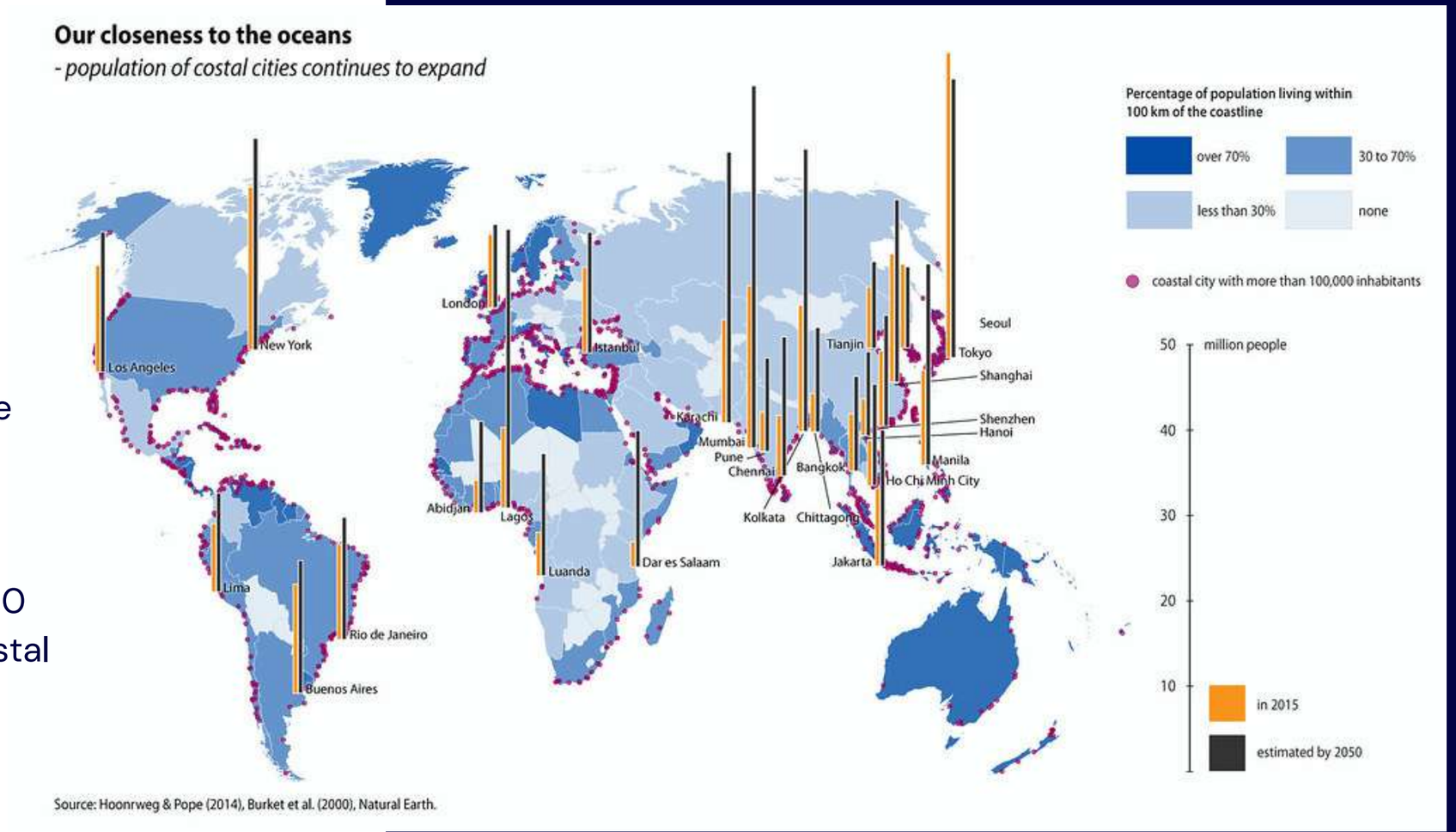
Population living within the coastline

Currently, about 40 per cent of the world's population lives within 100 kilometres of the coast.

In the Mediterranean Sea, about 150 million people are living in the coastal areas.



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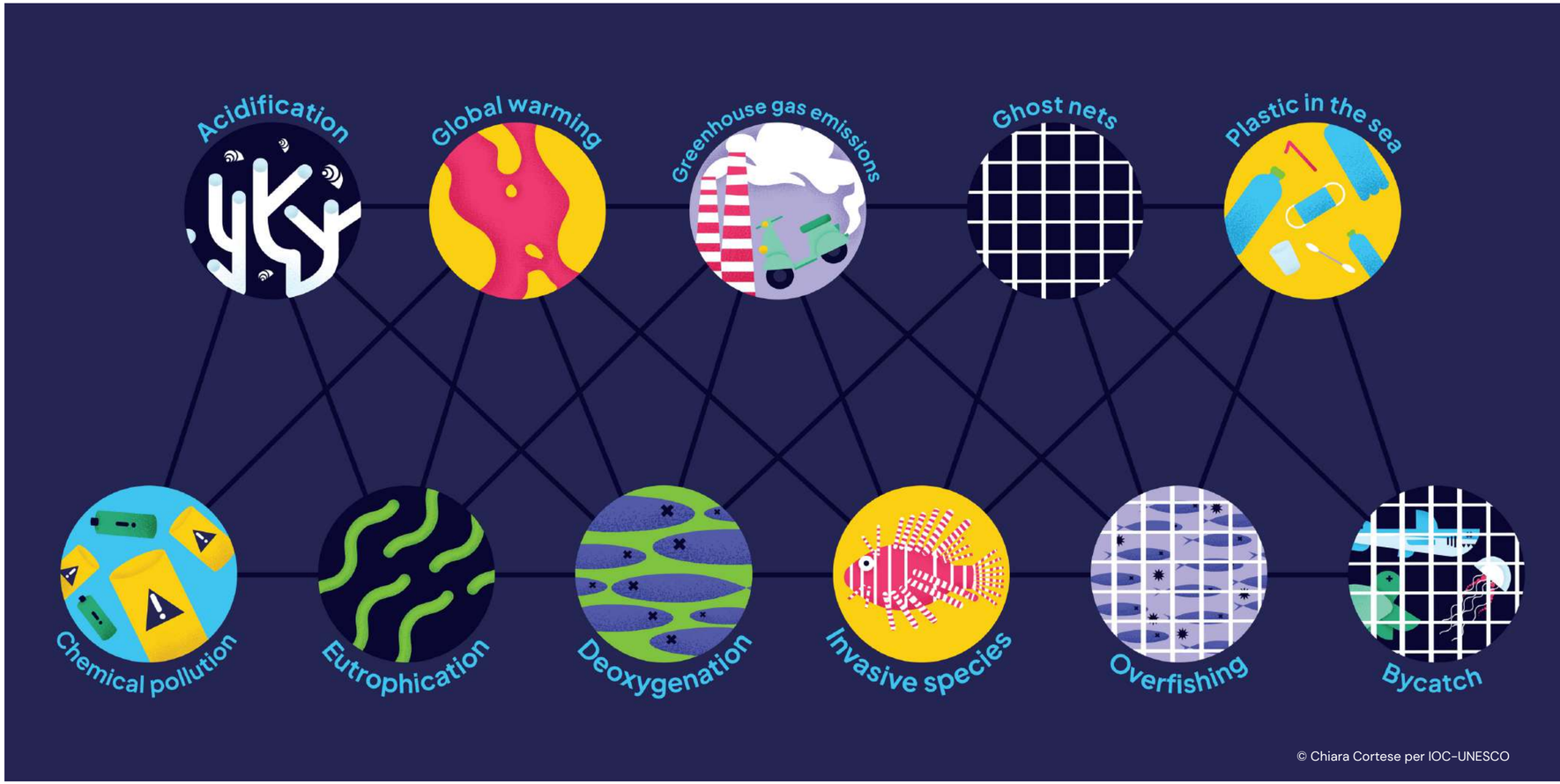
One ocean, multiple stressors

Multiple pressures interact cumulatively in ways that are poorly understood, but which may amplify the effects expected from each individual pressure.



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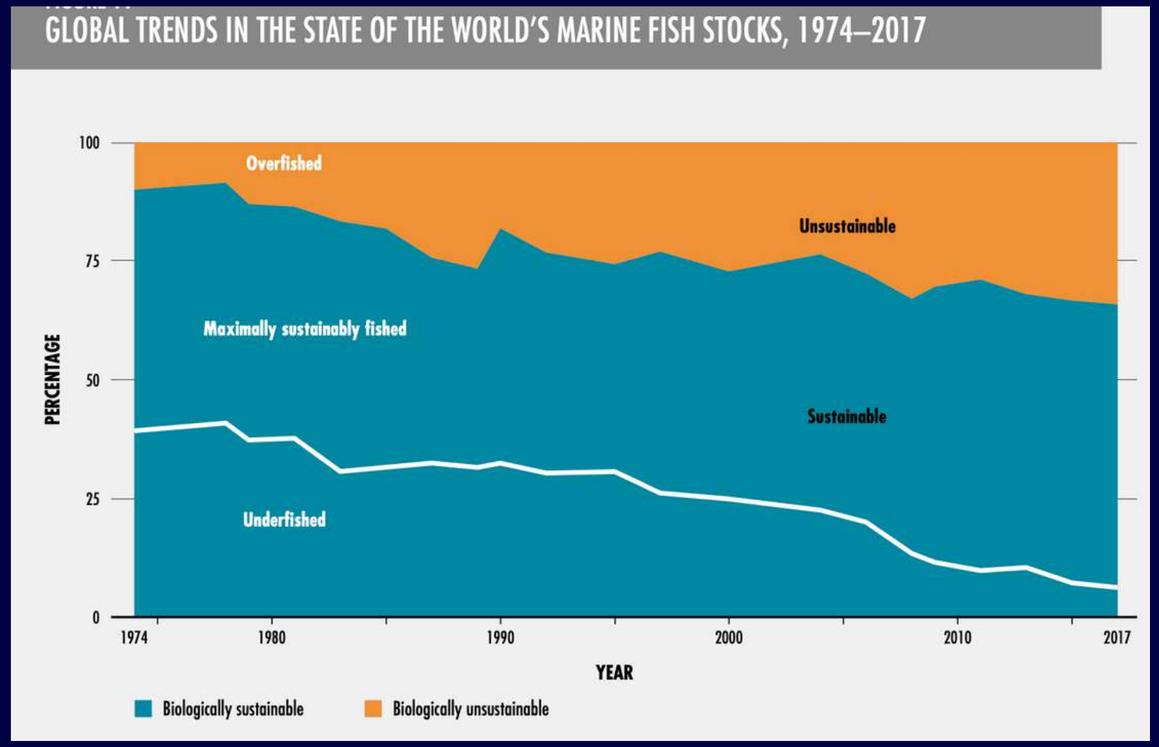
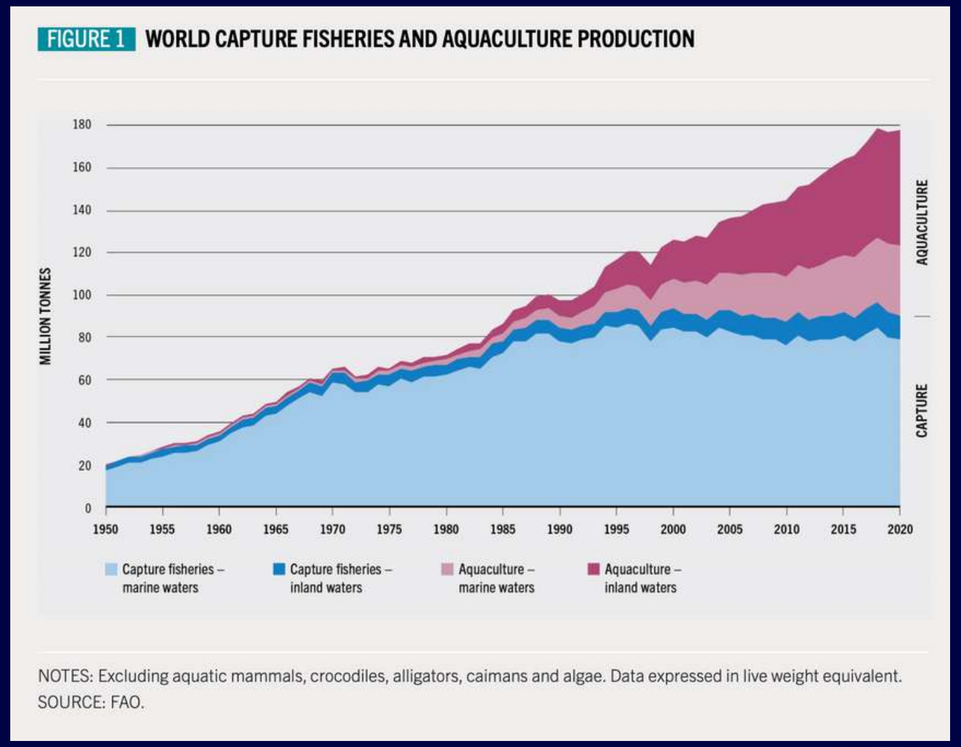
State of fisheries and aquaculture in the world

In a balanced system, individuals have time to reproduce and grow according to their biological rhythms.
In this optimal situation, the number of individuals is always abundant in relation to the catch quota.



© FAO, 2020



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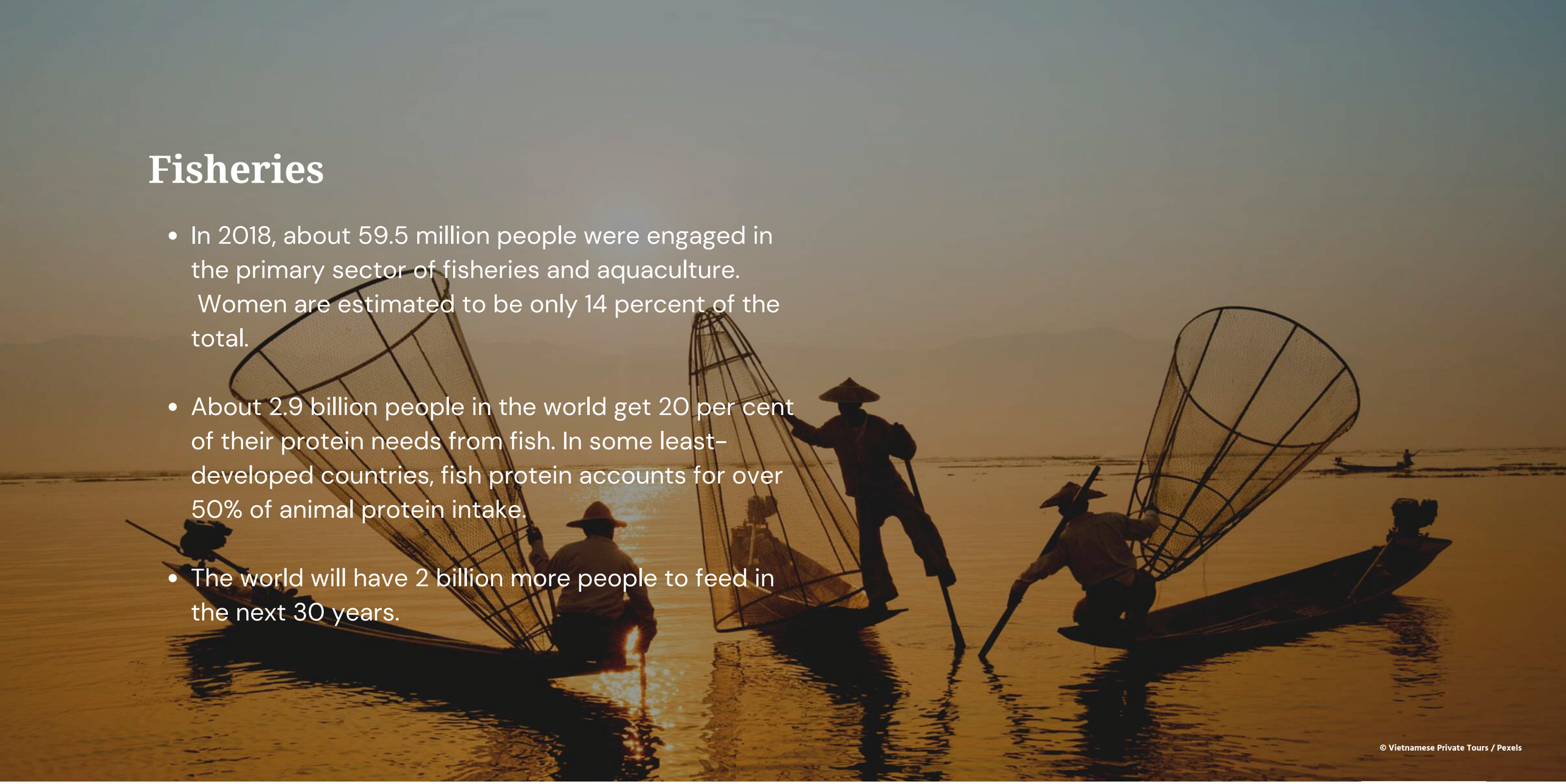
Fisheries

- In 2018, about 59.5 million people were engaged in the primary sector of fisheries and aquaculture. Women are estimated to be only 14 percent of the total.

- About 2.9 billion people in the world get 20 per cent of their protein needs from fish. In some least-developed countries, fish protein accounts for over 50% of animal protein intake.

- The world will have 2 billion more people to feed in the next 30 years.



Aquaculture

- Aquaculture is the fastest growing food sector and provides about 50% of fish for human consumption.

- Nearly 600 aquatic species are farmed in about 190 countries around the world.

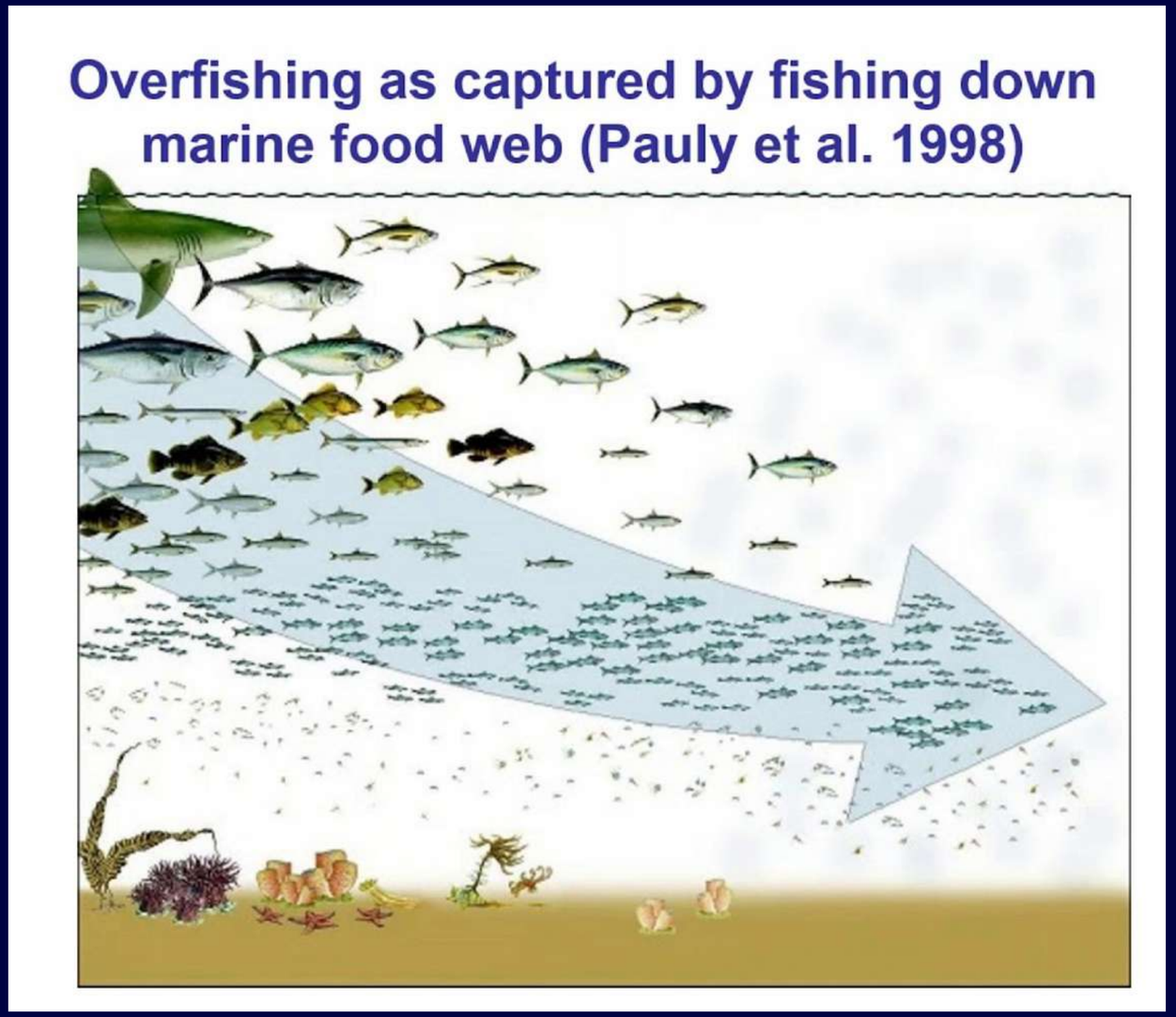
Fish meal algae

Challenges and Threats of the fishing industry

- Destructive, non-selective fishing methods
- Bycatch
- Discards and waste
- Lack of data and monitoring programmes
- Ghost nets
- IUU Fishing

Overfishing effects

- Decline in biodiversity and consequent decrease or extinction of target species in the fisheries market.
- Cascade effect: loss of apex species leads to the decrease of some lower trophic level species.
- Availability of species at a progressively decreasing trophic level.

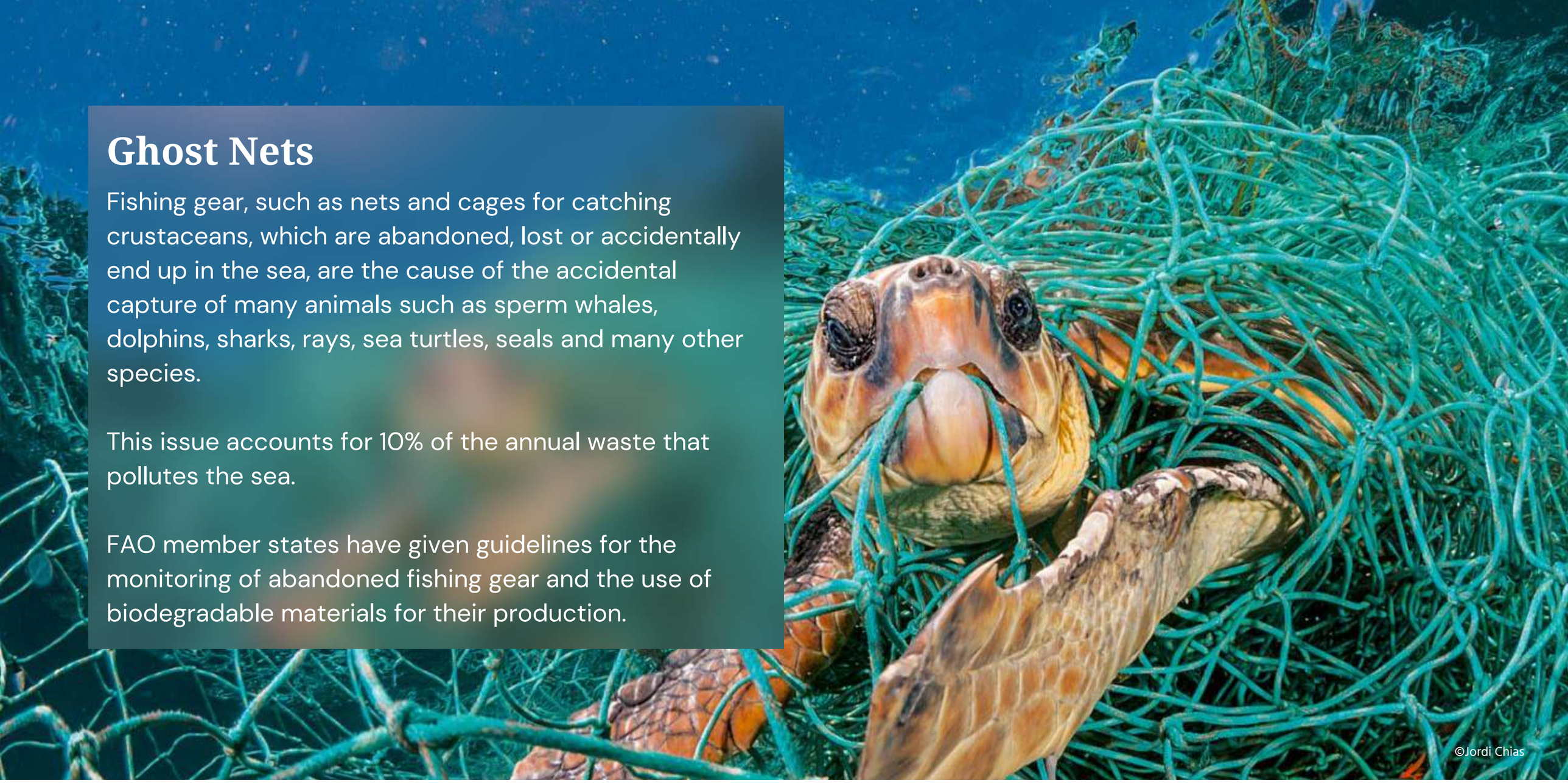


Ghost Nets

Fishing gear, such as nets and cages for catching crustaceans, which are abandoned, lost or accidentally end up in the sea, are the cause of the accidental capture of many animals such as sperm whales, dolphins, sharks, rays, sea turtles, seals and many other species.

This issue accounts for 10% of the annual waste that pollutes the sea.

FAO member states have given guidelines for the monitoring of abandoned fishing gear and the use of biodegradable materials for their production.



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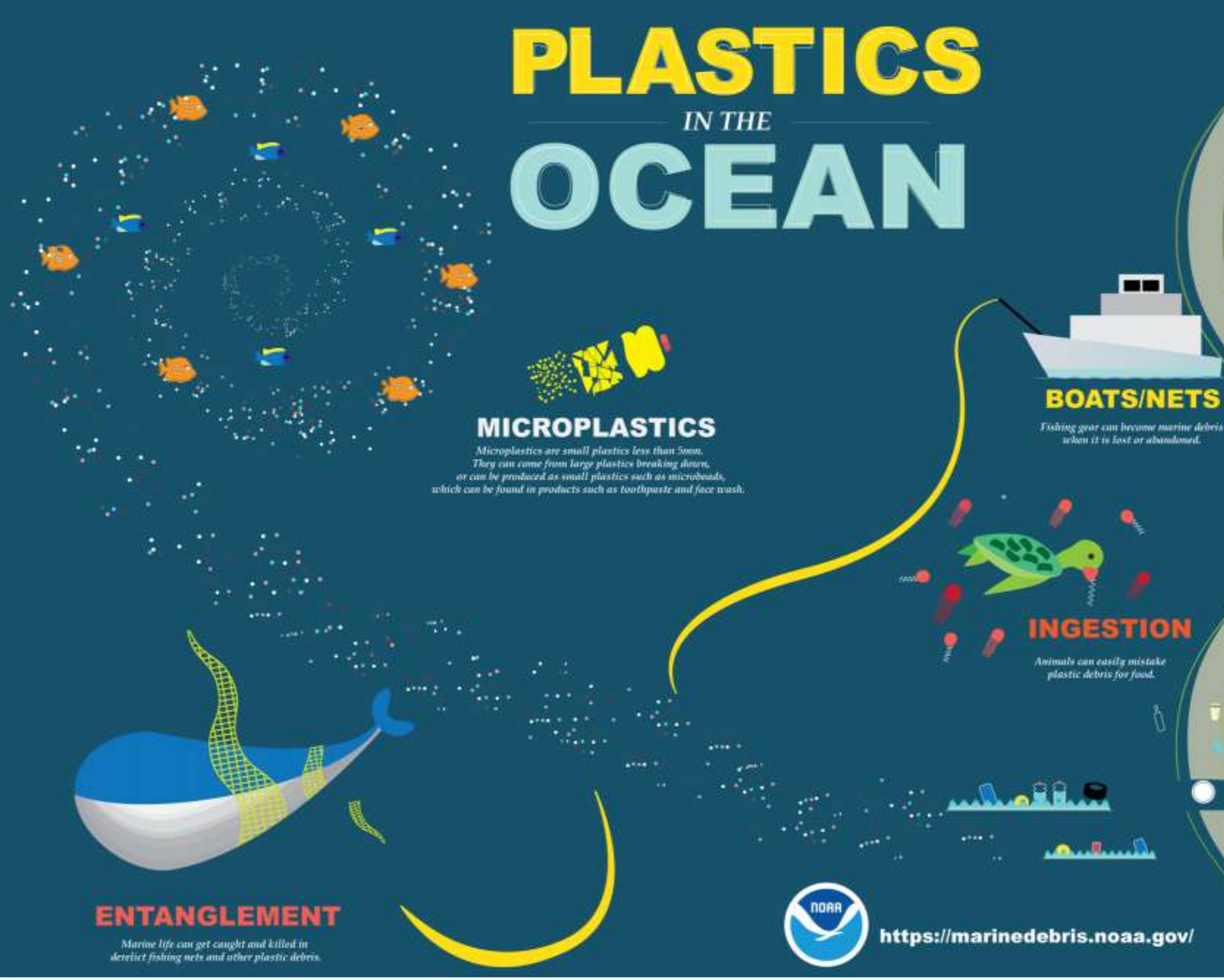
PLASTICS IN THE OCEAN

Plastics are the most common form of marine debris. They can come from a variety of land- and ocean-based **SOURCES**, **ENTER THE WATER** *in many ways, and* **IMPACT** *the ocean and Great Lakes. Once in the water, plastic debris never fully biodegrades.*

COMMONLY FOUND PLASTICS

HOW TO HELP?



MICROPLASTICS

Microplastics are small plastics less than 5mm. They can come from large plastics breaking down, or can be produced as small plastics such as microbeads, which can be found in products such as toothpaste and face wash.

BOATS/NETS

Fishing gear can become marine debris when it is lost or abandoned.

INGESTION

Animals can easily mistake plastic debris for food.

ENTANGLEMENT

Marine life can get caught and killed in derelict fishing nets and other plastic debris.

RAIN & WINDS

Rain and wind can sweep debris into nearby waterbodies.

LITTERING

Intentional littering or improper disposal of trash can cause marine debris.

STREAMS & STORM DRAINS

Streams and storm drains can carry debris directly into the ocean or Great Lakes.

NOAA

https://marinedebris.noaa.gov/

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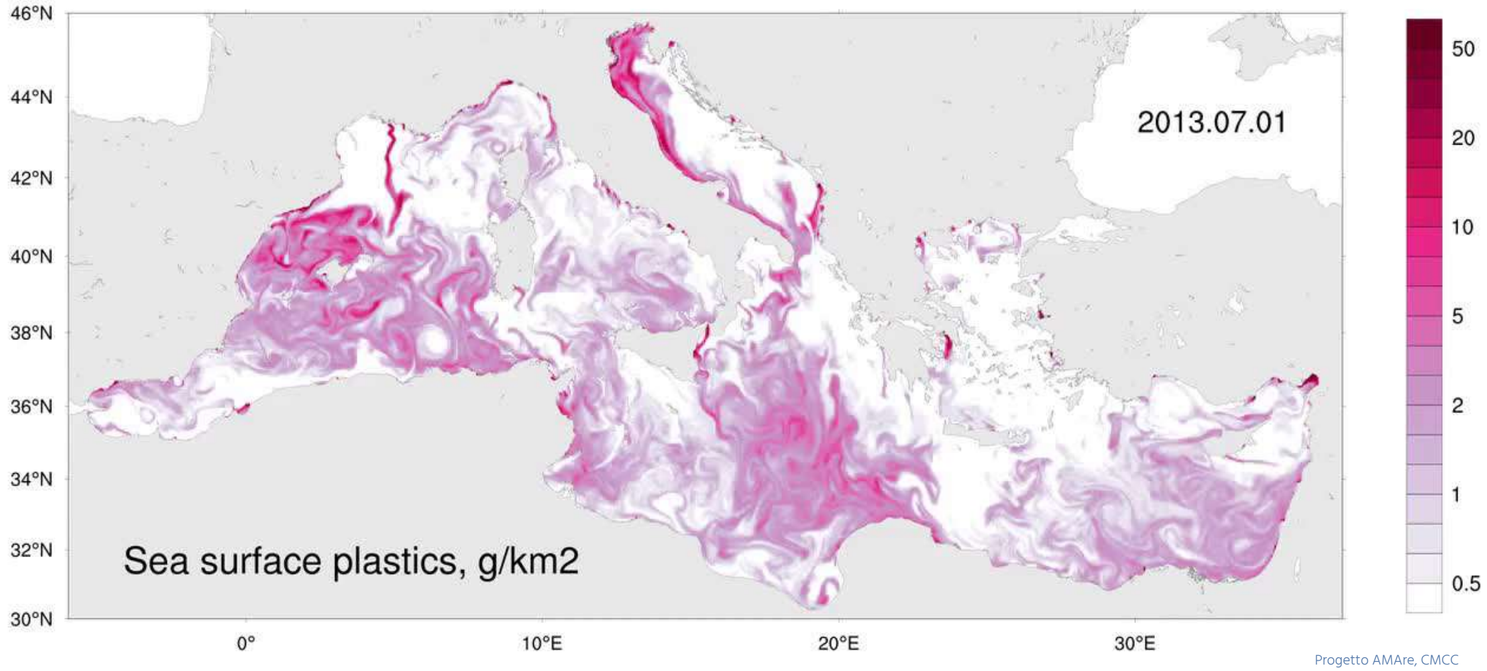
It is estimated that around 100,000 tonnes of plastics are dumped in the Mediterranean Sea every year:

- 50% of which, 50,000 tonnes per year, come from coastal communities
- 30% (30,000 tonnes in one year) from rivers
- 20% (20,000 tonnes in one year) are dumped at sea along the main shipping lanes.



Progetto AMAre, CMCC

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Greenhouse gases

Human activities influence the climate and thus the ocean.

Greenhouse gases are gases that have the ability to retain heat in the atmosphere, for example carbon dioxide and methane.

Some greenhouse gases have a natural origin, others comes from our daily activities.

The increase in the amount of these gases in the atmosphere causes a generalised and rapid warming of planet Earth, including the ocean.

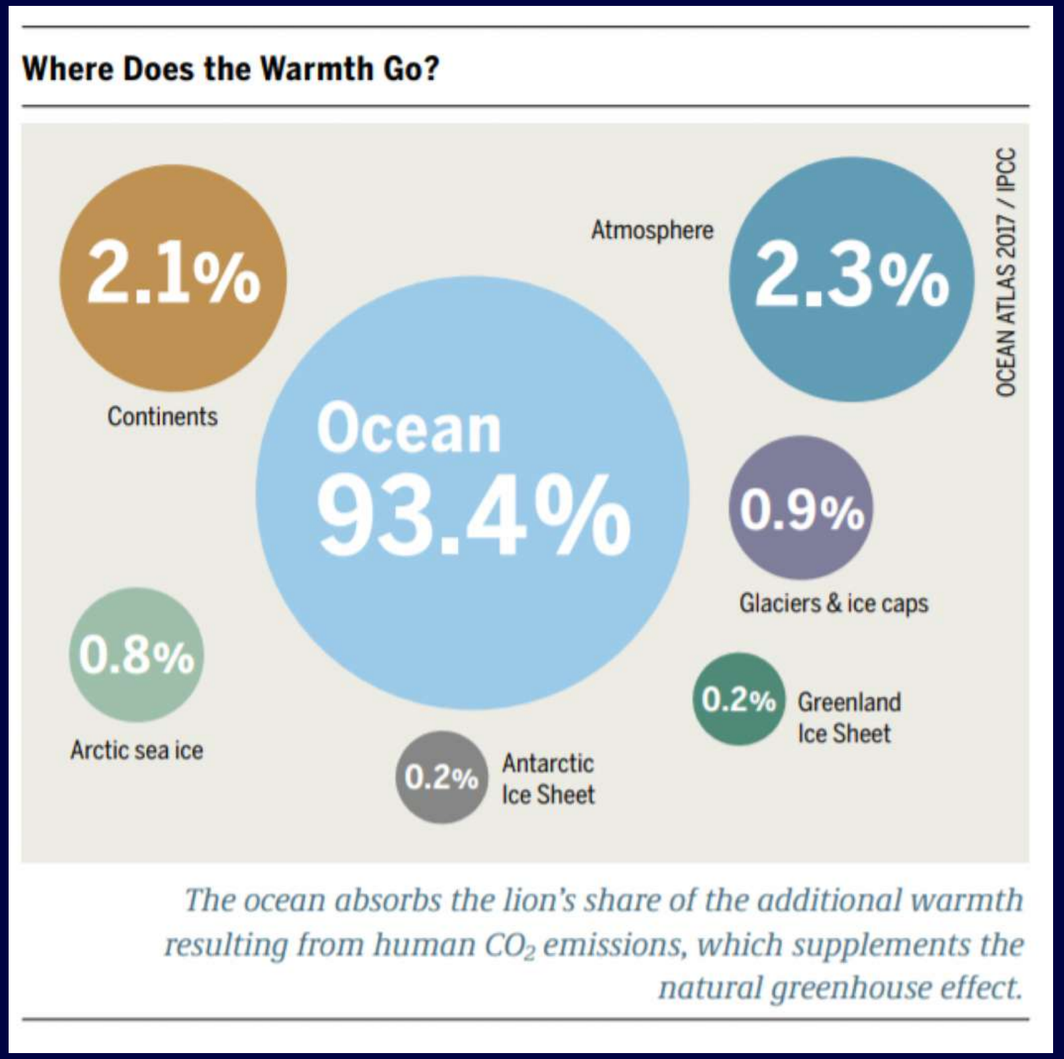
The IPCC report, published in 2021, states that recent climate crisis effects are widespread, rapid, intensified and unprecedented in thousands of years.

Where does the warmth go?

The ocean is an excellent ally in mitigating the planet's temperature, if we do not exceed its limits.

While land can heat up and cool down very quickly, the ocean heats up and releases heat more slowly, taking a long time to significantly change its temperature.

Because of this, the deep layers of the ocean will warm up less quickly than the land.



The ocean absorbs the lion's share of the additional warmth resulting from human CO_2 emissions, which supplements the natural greenhouse effect.

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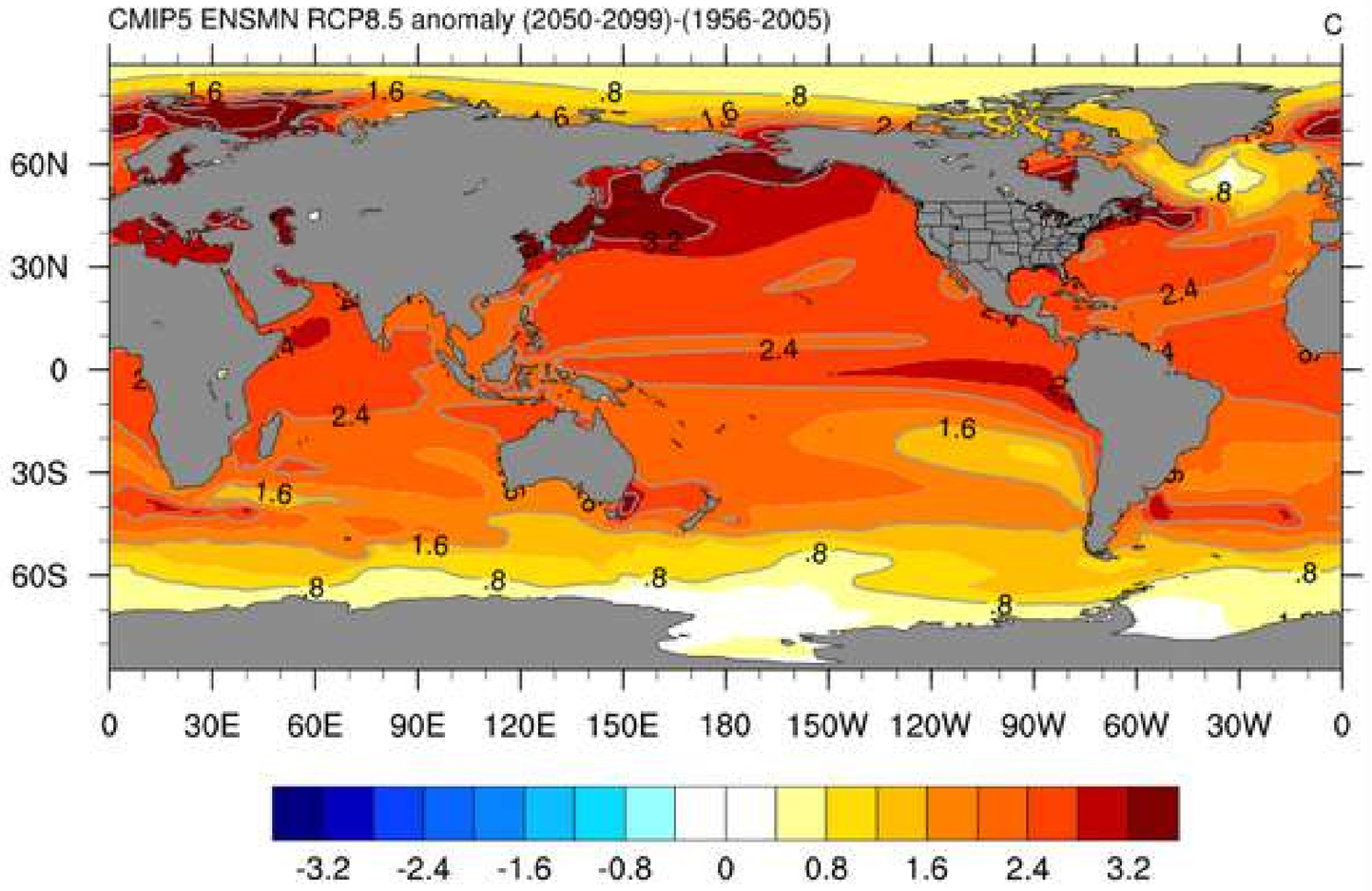
Global warming

Change in mean sea surface temperature for the second half of the 21st century compared to the second half of the 20th century.

The warming of the ocean will be greatest in the northern hemisphere, where the change in average surface temperature reaches up to +3°C.



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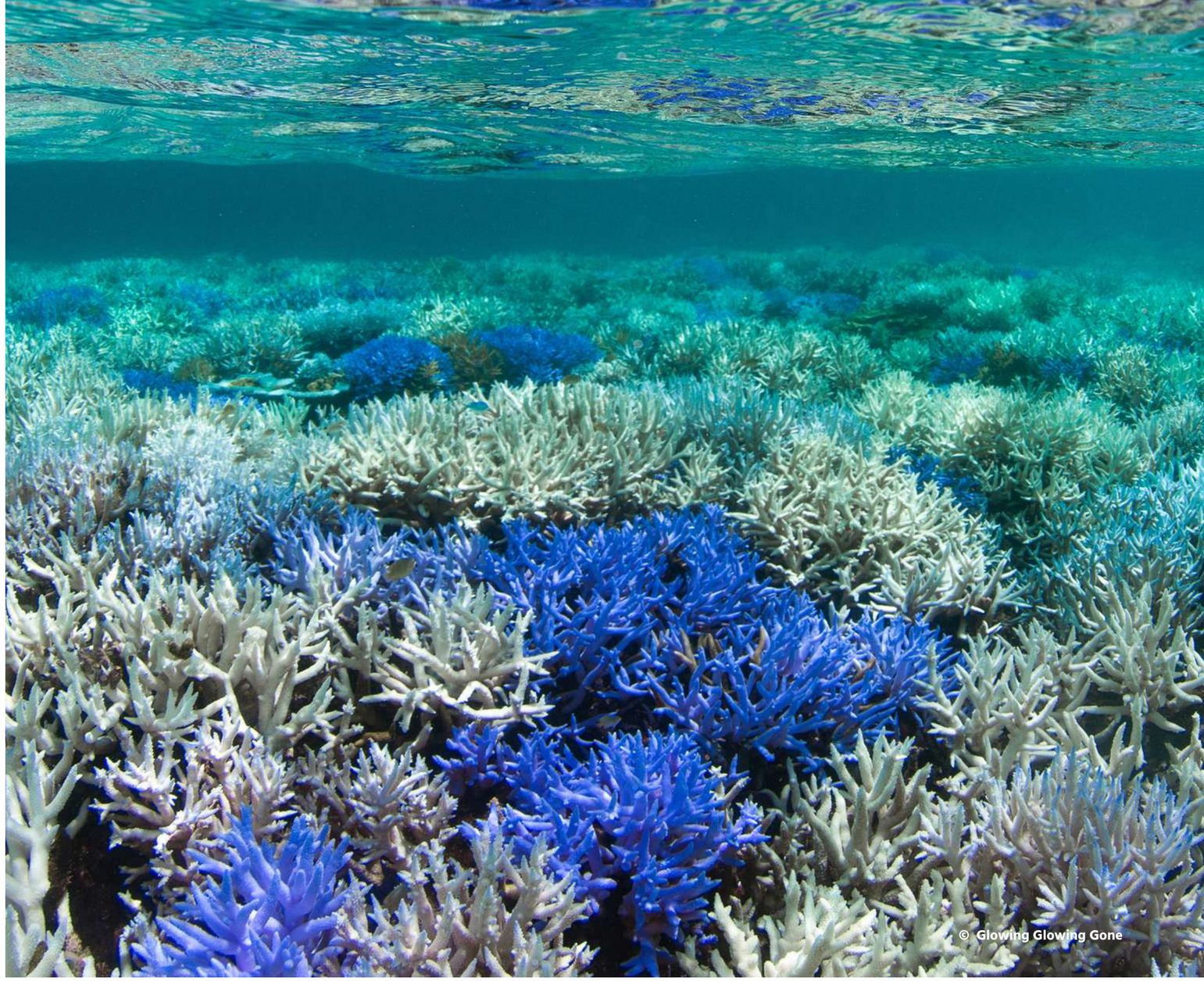
Effects of climate crisis in the ocean

- degradation of ecosystems, loss of habitats and biodiversity
- biodiversity loss: migration, extinction and proliferation of certain species
- change in physical and chemical properties of seawater
- sea level rise
- increase of the frequency and intensity of extreme events: typhoons and hurricanes, floods, droughts, etc.
- security challenges, increased risk and economic losses



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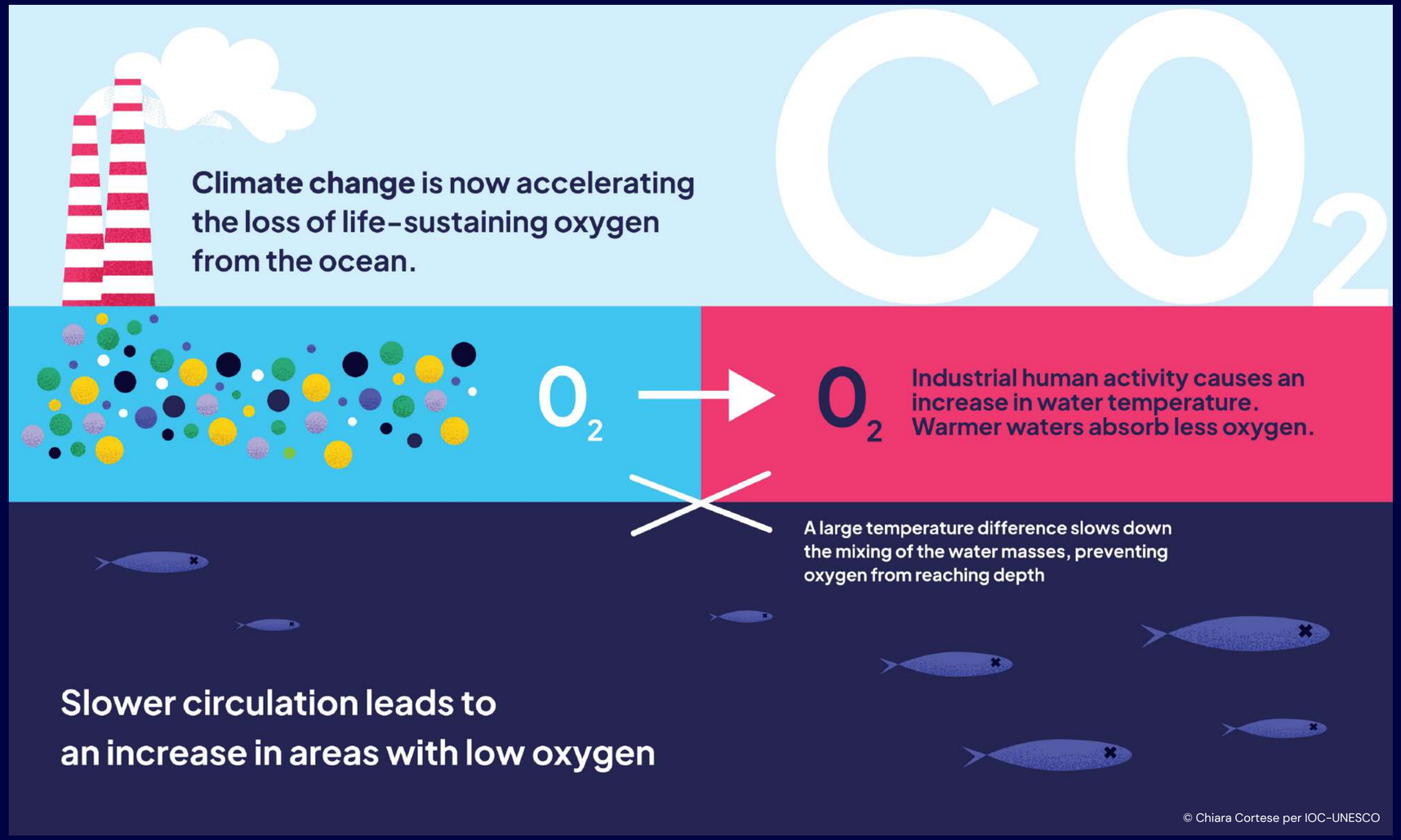

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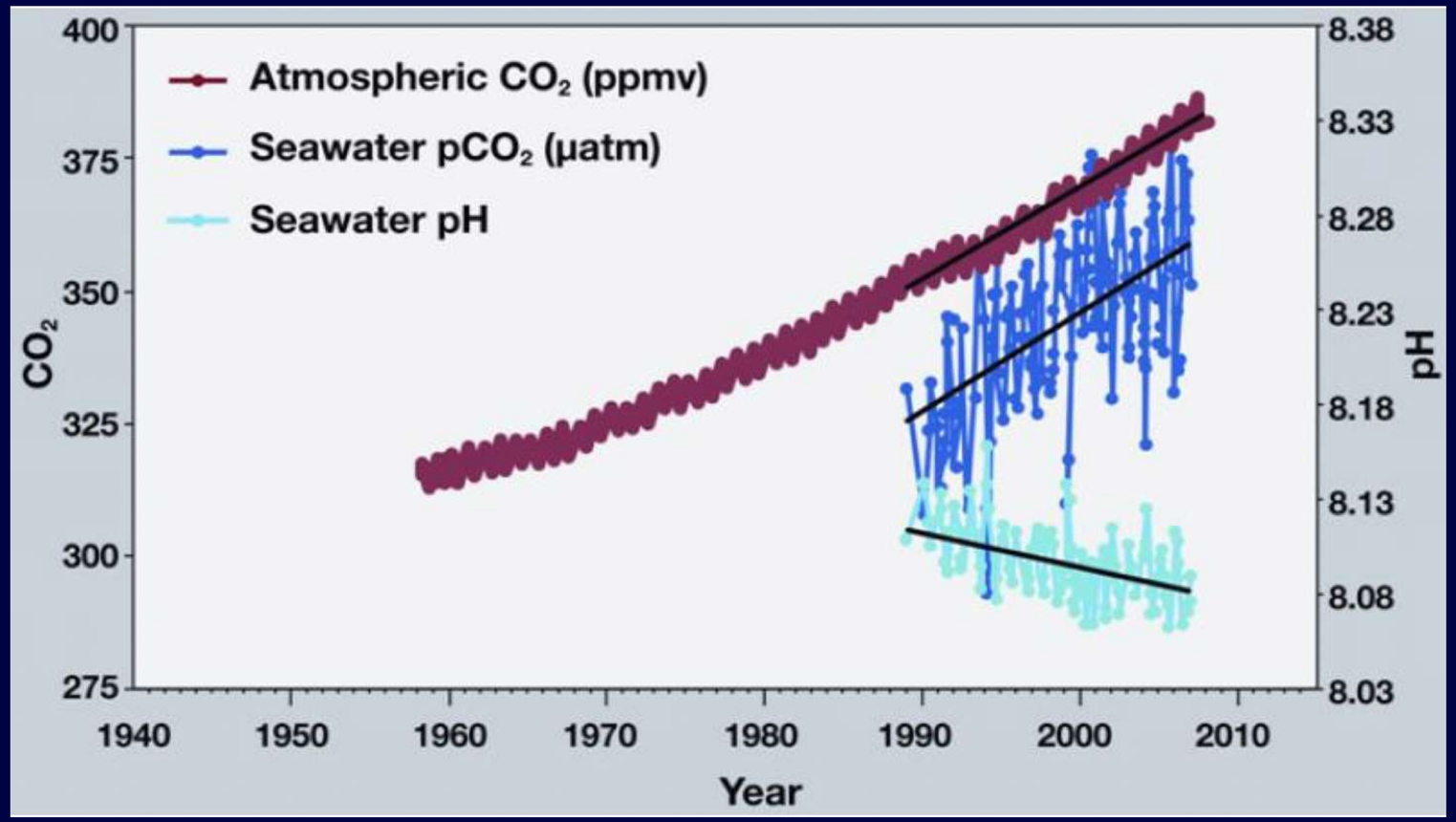
Ocean acidification

This graph shows the variation of various parameters off Hawaii:

- increase carbon dioxide in the atmosphere
- increase carbon dioxide in the ocean
- decrease in seawater pH due to increase amount of carbonic acid (H2CO3) and hidrogen ions (H+)



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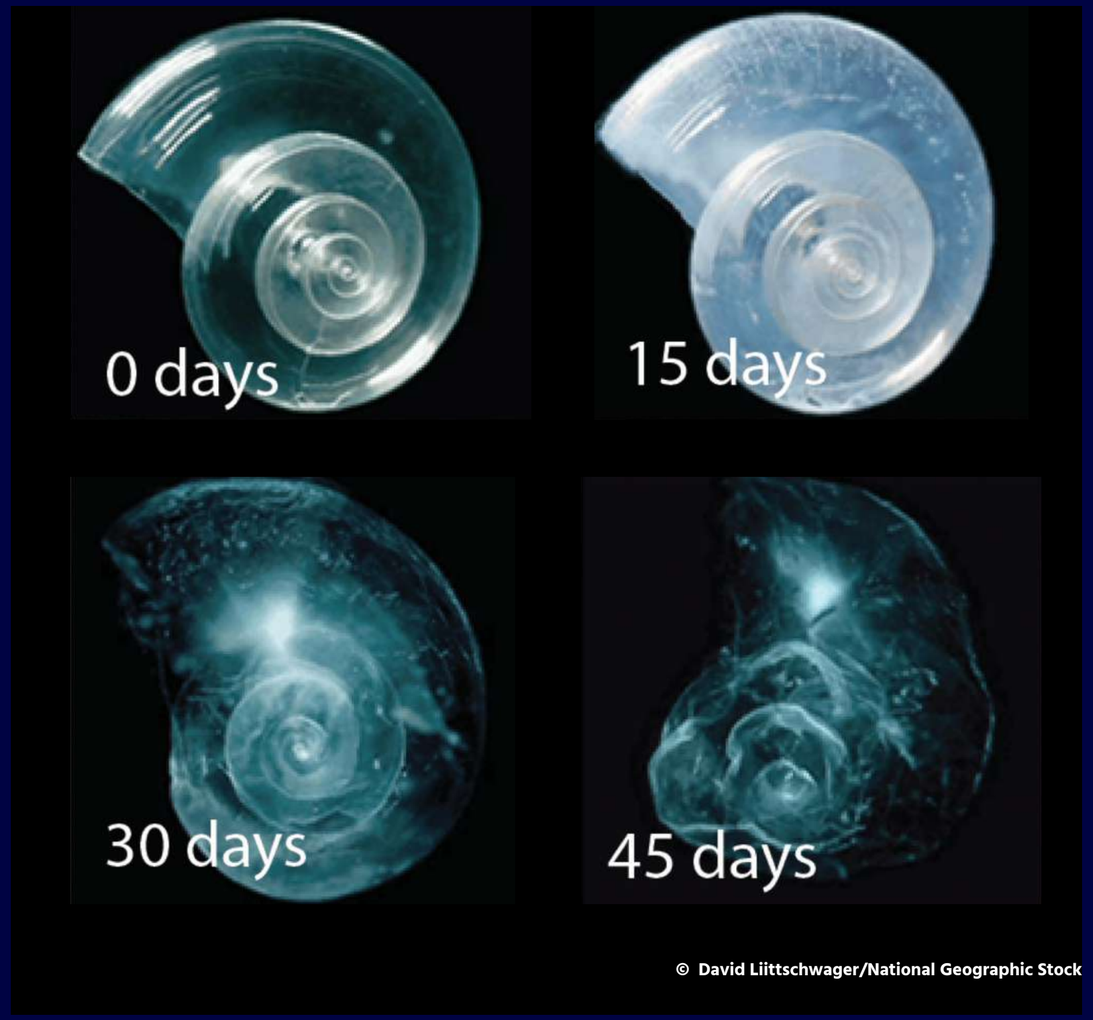
The pteropod is a gastropod. Pteropods are a fundamental food source for whales and juvenile salmon in the North Pacific.

The photos show the 45-day dissolution of a pteropod shell when placed in seawater at the pH and carbonate level predicted for the year 2100.



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Coral bleaching occurs due to several causes, including:

- increase in water temperature
- rising sea level
- exposure to strong sunlight
- presence of pollutants
- presence of parasites, viruses and bacteria
- decrease in water pH

Image: Coral bleaching, Lizard Island, Great Barrier Reef, before (March 2016) and after (May 2016)

Sea level rise

According to the IPCC, the global average sea level has risen at a rate of about **4 millimetres per year over the past decade.**
Sea levels are expected to rise a **further 15–30 cm by 2050**, regardless of how much the amount of greenhouse gases emitted into the atmosphere.

Various processes cause sea level rise, but the main ones are:

- thermal expansion of ocean water
- melting of land glaciers

Photo by Egor Gordeev on Unsplash

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Alien species

Species transported voluntarily or accidentally by humans outside their area of origin.

Not all alien species are invasive, only those that find optimal conditions in the area of introduction to reproduce and spread, causing ecological, economic and health damage, become so.

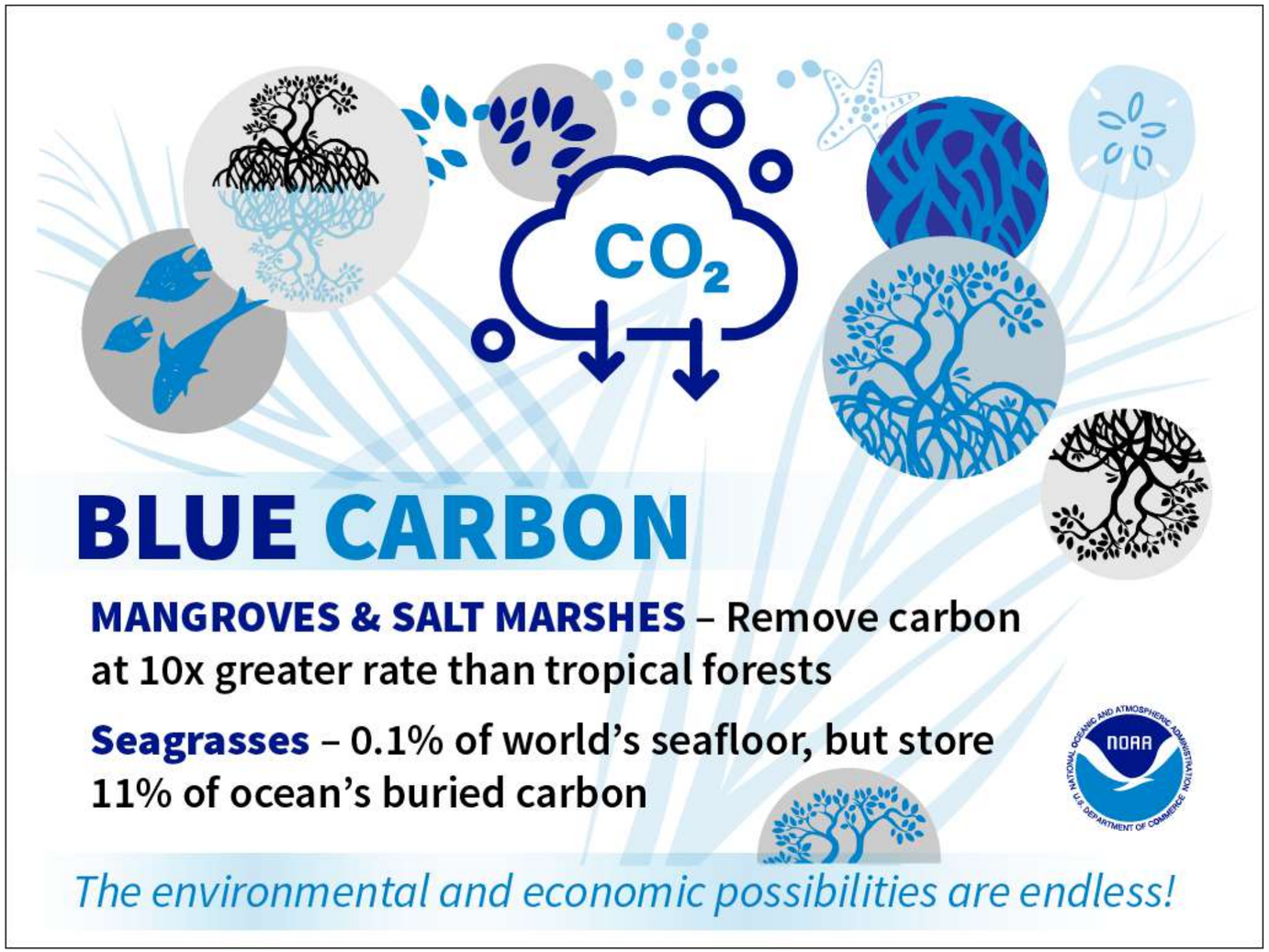
Invasive species can be unintentionally transported through ballast water discharge or hull fouling, or escape from aquaculture facilities or aquariums.

Some species entered the Mediterranean from the Red Sea through the Suez Canal.

Blue carbon ecosystems

Blue Carbon ecosystems have big capacities to absorb and store carbon in the seabed for ages.

Their protection and restoration is fundamental to mitigate the effects of the climate crisis.



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Disaster Risk Reduction

Ocean Literacy projects

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The importance of educators and teachers in Ocean Literacy

Citizens and communities around the world, have a key role to play in enhancing Ocean Literacy and increasing ocean sustainability.

- Educators, teachers and professors help shape knowledge, attitudes, behaviours, and actions towards ocean sustainability.
- Critical for both coastal and inland communities, rural and urban areas.
- Multi-stakeholder networks and collaborations are built and operate at a local level, fostering sustainable action for ocean issues.

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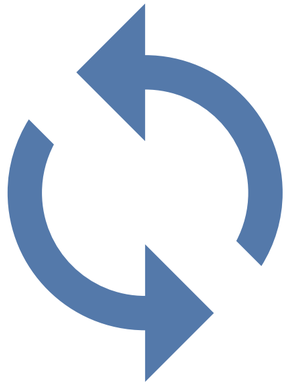
Strategic Planning

Communication and relationship building

Co-creation

Promote Multiplier Effects



Knowledge Exchange

Identify and Invest in local leaders

Sustained Efforts

Monitoring and Evaluation

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Incorporating Ocean Literacy

Diversity of implementation strategies:

- **Community engagement** (e.g. citizen science, ecotourism, etc.)
- **Communicating** about the ocean: stories and emotions to create empathy, what connects us as individuals, nature connection, justify urgency and opportunities to act.
- Art and science
- **Awareness** raising campaigns
- **Interpretation** centers

Diversity of fields and contexts (e.g. recycling, traditional knowledge, social enterprises, cultural organizations).

Save The Wave - network

A wave to protect and restore the ecosystems of the Mediterranean Sea.

Save the Wave is a project of and coordinated by IOC-UNESCO in the context of the Ocean Decade with the **aim of protecting and restoring marine ecosystems in the Mediterranean basin**, with particular focus on *Posidonia oceanica* meadows.

The project **promotes citizen engagement to increase the awareness** of the critical role of marine and Blue Carbon ecosystems in mitigating climate change and achieving a healthy, resilient, and productive ocean by 2030.

IOC-UNESCO **collaborates with companies, universities, research centers, and non-profit organizations** that are directly involved in restoring marine ecosystems and have many years of experience in this area.

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SAVE *the* WAVE

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Ocean&Climate Village co-creation

Ocean&Climate Village is the **first traveling, interactive and educational exhibition of IOC-UNESCO dedicated to the ocean and climate** in the context of the Ocean Decade.

Ocean&Climate Village is a multi-sensory and educational experience designed with **co-creation, collaboration and knowledge sharing in mind to reconnect people with the ocean.** The exhibition targets different age groups and sectors of society.

Link to the OCV trailer: https://www.youtube.com/watch?v=QxNS5rhcLA8

Link to the OCV website: https://ocv.decenniodelmare.it

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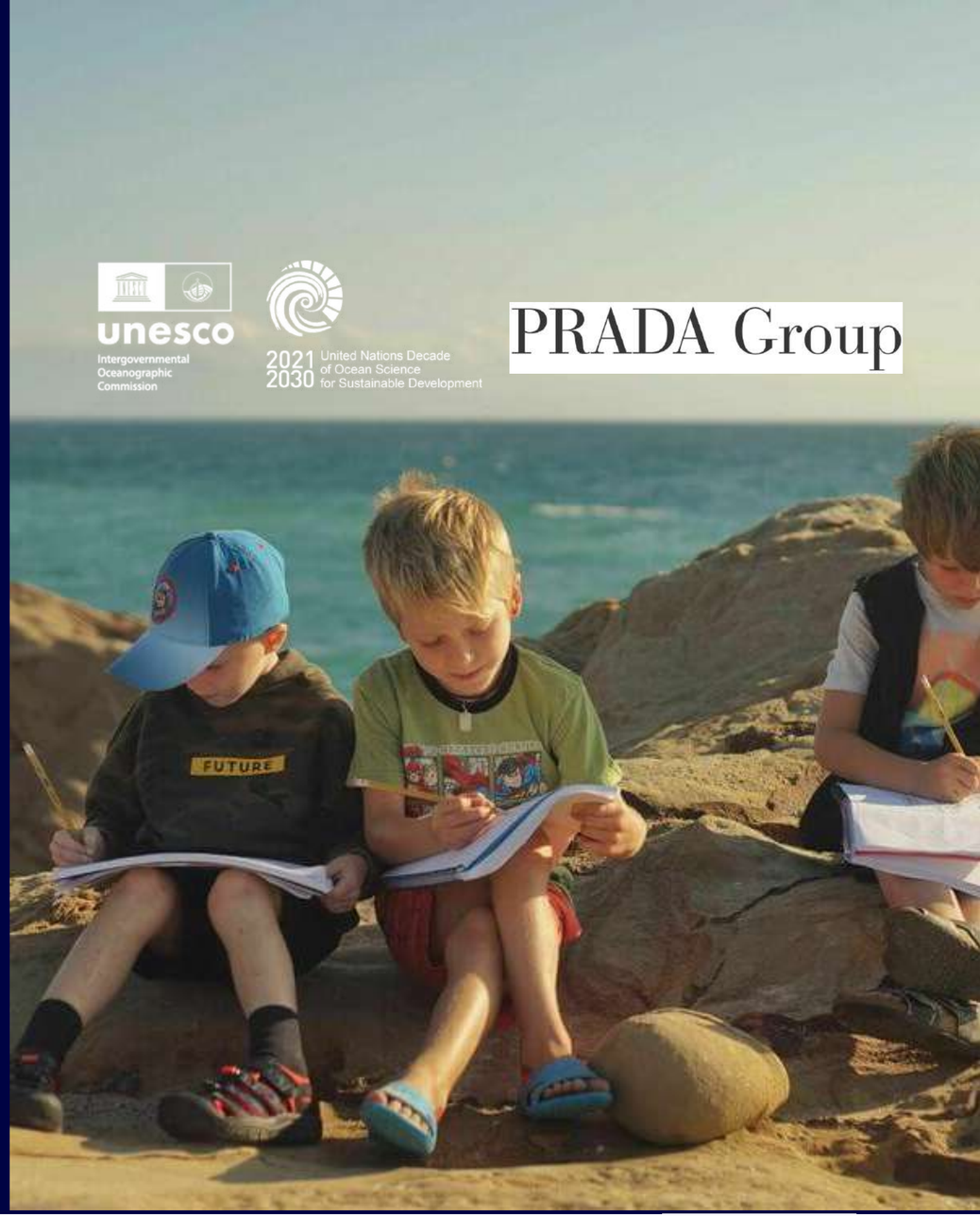
Sea Beyond
co-creation and literacy

SEA BEYOND, promoted by the Prada Group and UNESCO's Intergovernmental Oceanographic Commission (IOC), is an educational programme to raise awareness of sustainability and ocean preservation.

Since its debut in 2019, the initiative has trained more than 600 international secondary school students, and in 2022 won the Sustainable Ocean Award from the Italian Fashion National Chamber.

The second edition of the project is composed of three main initiatives:

- a new educational module for students all over the world
- Kindergarten of the Lagoon – a programme of outdoor lessons for children in preschool
- educational path specifically designed for the 13,000+ employees of the Prada Group



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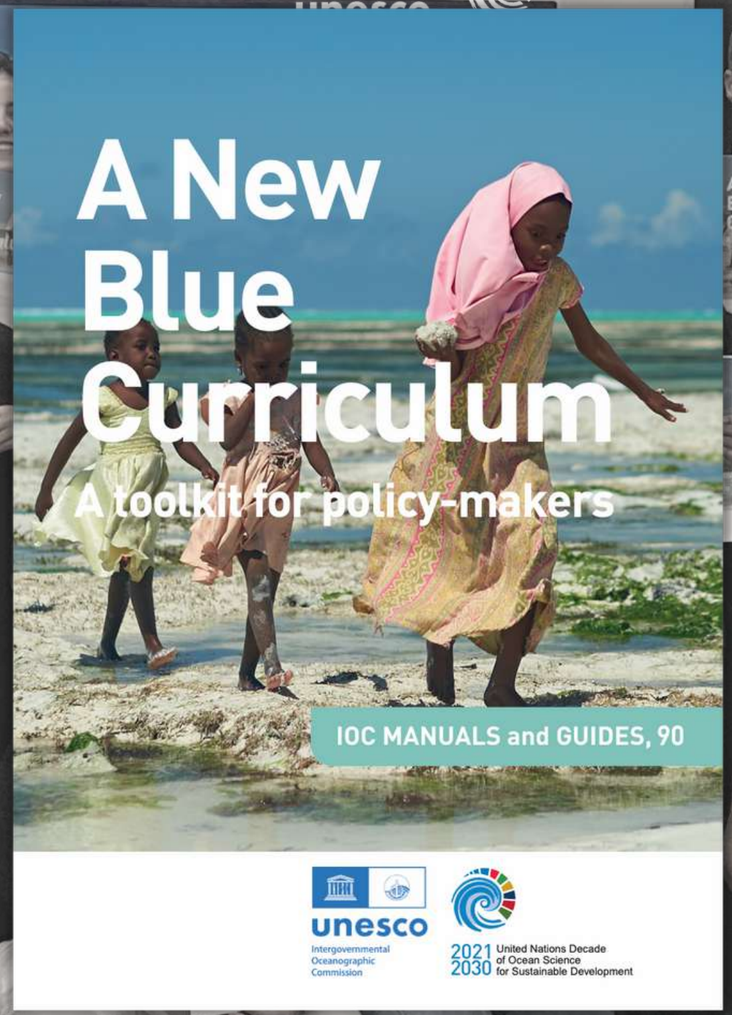
Workshop Blue Curriculum

A new blue curriculum: Toolkit for policymakers was launched in the context of the UN Ocean Decade. During the UNOC 2022 was organized a training to support Member States to include Ocean Literacy in the national curriculum frameworks and educational policies around the world.

The workshop was organized by the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) in collaboration with the International Bureau of Education (IBE-UNESCO) and supported by AXA XL.

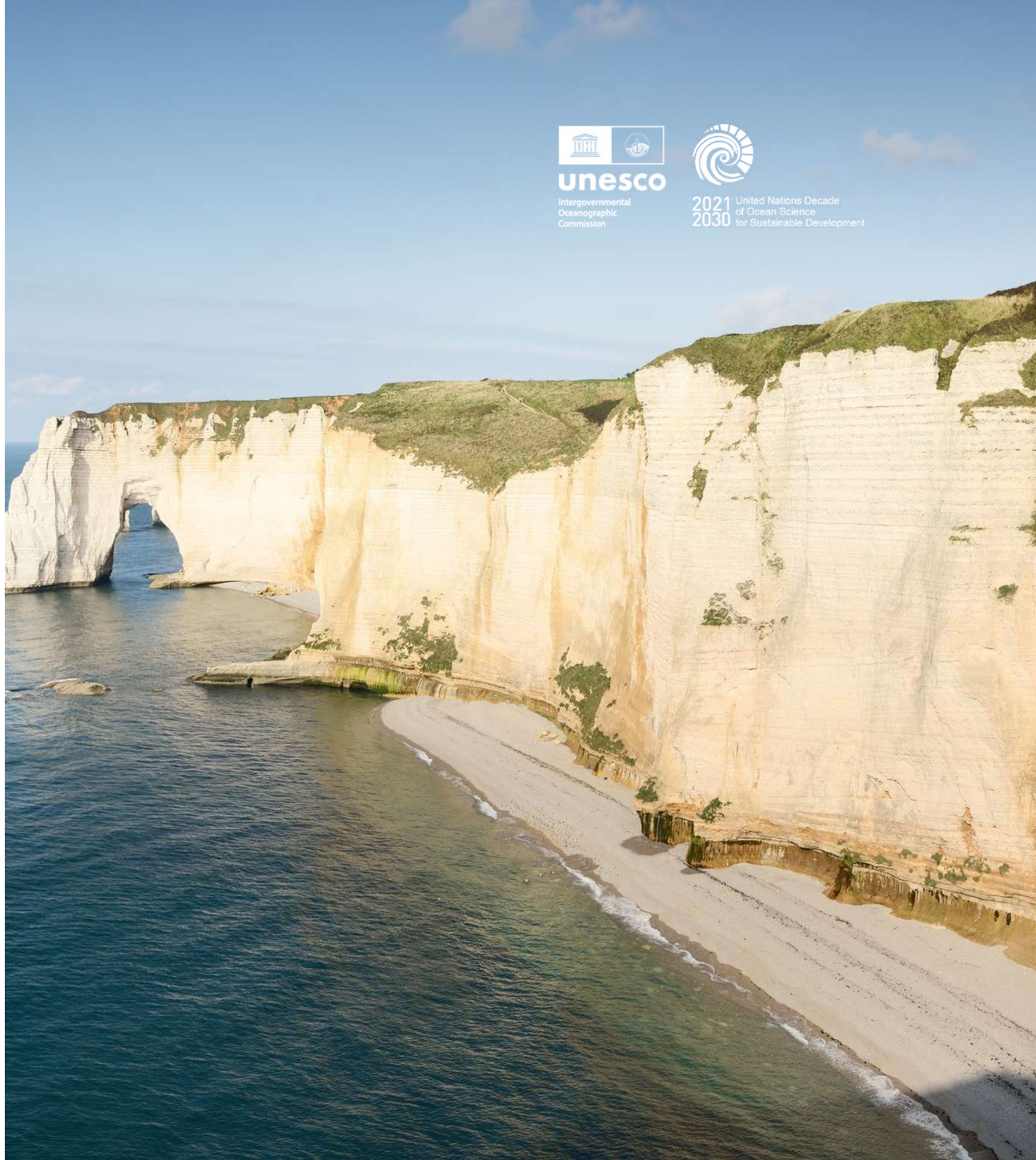


EU4Ocean Coalition

European Commission and IOC-UNESCO joined the forces to widen the EU4Ocean network by promoting the Blue Schools network, the Youth4Ocean Forum and the Eu4Ocean Platform.

The EU4Ocean Coalition aims to **connect entities, projects, people and educational initiatives** with the ultimate goal of contributing to the achievement of the SDGs of the United Nations 2030 Agenda, with a particular focus on SDG14 "Life Below Water".

The Blue Schools Network and the Youth4Ocean Forum are part of a broader EU4Ocean initiative, which schools, youth, companies, organizations, foundations and institutions can work together to protect the ocean.



Workshop Communication

The Workshop on Science Communication and Blue Storytelling was held in Lisbon as part of the green zone activities within the framework of the UN Ocean Conference 2022.

The aim of the workshop was to train youth on different means of communication and inspire local ocean literacy actions.

The workshop was organized by IOC-UNESCO in collaboration with EU4Ocean and the UN Decade Advisory Group with the participation of the Schmidt Ocean institute, SkyTG24 and Science Crunchers.

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Thank you!

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