International Union for Conservation of Nature
ISSUES BRIEF
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OCEANS AND CLIMATE CHANGE (I)

- Oceans are being **disproportionately impacted** by increasing CO_2 and greenhouse gas emissions from human activities.
- This causes **changes in water temperature** and **oceanic circulation**, **deoxygenation**, **rising sea levels**, **increased storm intensity** and **ocean acidification**, as well as **changes in the diversity and abundance of marine species**.
- Degradation of coastal and marine ecosystems **threatens the physical, economic and food security of coastal communities**, which constitute up to 60% of the world population.
- Climate change weakens the ability of oceans and coasts to perform **critical ecosystem services** such as **carbon storage, oxygen generation and the preservation of food security**, as well as to **support nature-based solutions to climate change adaptation and mitigation**.
- Globally ambitious efforts are needed to **reduce the use of fossil fuels**, **increase the use of renewable energy systems** and **enhance energy efficiency.**
- **A low carbon emissions trajectory** is indispensable, and **the sustainable management, conservation and restoration of coastal and marine ecosystems** are vital to support the continued provision of ecosystem services on which people depend.

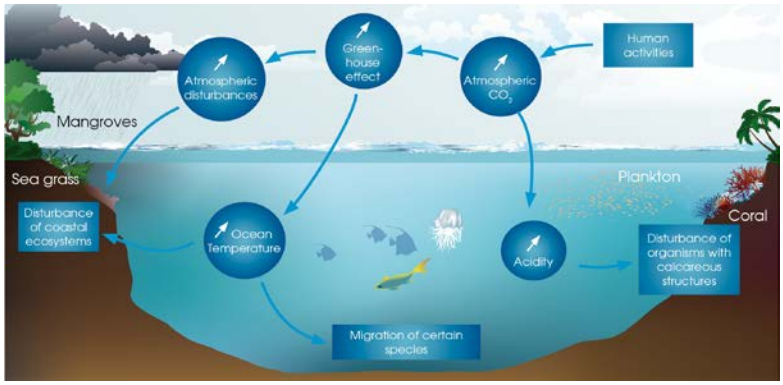
What is the issue?

At the front line of climate change, the global oceans, their coastlines and coastal communities are being disproportionately impacted by increasing carbon dioxide (CO_2) and other greenhouse gas (GHG) emissions from human activities.

The oceans play a central role in **regulating the Earth's climate** and have thus far absorbed 93% of the extra energy from the enhanced greenhouse effect, with warming now being observed at depths of 1,000 m. As a consequence, this has led to increased **ocean stratification** (prevention of water mixing due to different properties of water masses)**, changes in ocean current regimes**, and **expansion of depleted oxygen zones**. Changes in the **geographical ranges of marine species** and shifts in growing seasons, as well as in the diversity and abundance of species communities are now being observed. At the same time, **weather patterns are changing**, with extreme events increasing in frequency.

Atmospheric warming is leading to the **melting of inland glaciers and ice** and causing **rising sea levels** with significant impacts on shorelines (coastal erosion, saltwater intrusion, habitat destruction) and coastal human settlements. Global mean sea level rise is projected to increase by 0.40 [0.26–0.55] m for 2081–2100 compared with 1986–2005 for a low emission scenario and by 0.63 [0.45–0.82] m for a high emission scenario. Extreme El Niño events are predicted to increase in frequency due to ongoing GHG emissions.

CO_2 emissions are also making the oceans more acidic, and many marine species and ecosystems are becoming increasingly vulnerable. **Ocean acidification** reduces the ability of many key marine organisms, such as corals, plankton and shellfish, to build their shells and skeletal structures. It also exacerbates existing physiological stresses (such as impeded respiration and reproduction) and reduces growth and survival rates during the early life stages of some species.



Why is this important?

Local fishermen, Indigenous and other coastal communities, international business organisations and the tourism industry are already seeing the effects of climate change and have begun to adapt to those changes, but more needs to be done. The **degradation of coastal and marine ecosystems** endangers the **physical, economic and food security of coastal communities** (60% of the world

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population) including island nations, particularly for Small Island Developing States (SIDS) and many of the Least Developed Countries (LDCs).

Moreover, increased **GHG emissions exacerbate the impact of existing stressors** on coastal and marine environments from land-based activities (e.g. urban discharges, agricultural runoff and plastic waste) and the ongoing, unsustainable exploitation of these systems (e.g. overfishing, deep-sea mining and coastal development). These cumulative impacts weaken the ability of oceans and coasts to continue to perform **critical ecosystem services** (such as carbon storage, oxygen generation and the preservation of food security) and support nature-based solutions to climate change adaptation and mitigation. Weakened or even lost ecosystems undermine States' ability to implement adaptation and disaster risk reduction measures, as provided for in the Cancun Adaptation Framework.

What can be done?

Globally ambitious efforts are needed to reduce the use of fossil fuels, increase the use of renewable energy systems and enhance energy efficiency to reduce the impacts of CO_2 and other GHGs on the oceans. Recent studies show that a 2°C rise in global temperatures would have dramatic and widespread impacts on ocean species, ecosystems and their services. For example, the current amount of CO_2 in the atmosphere is already far too high for coral reefs to thrive – we are now experiencing the **third global bleaching event** on record. Therefore, our **current emissions trajectory is unsustainable**, a **low carbon emissions trajectory is indispensable**, and the **sustainable management, conservation and restoration of coastal and marine ecosystems are vital to support the continued provision of ecosystem services on which people depend**.

Global oceans and their coastlines offer **nature-based solutions to climate change mitigation** (often referred to as 'blue carbon') and **adaptation** (ecosystem-based adaptation (EbA)). For example, management efforts such as Marine Protected Areas (MPAs) that protect coastal and marine habitats (e.g. barrier islands, coral reefs, mangroves and wetlands) reduce human vulnerability in the face of climate change and provide vital natural infrastructure (e.g. storm protection). These key services provided by healthy coastal and marine ecosystems **support both ecosystem and community resilience** – the ability to recover from harmful climate impacts.

Coastal ecosystems like mangroves, salt marshes and seagrasses also play a vital role in **carbon storage and sequestration**. Per unit of area, they sequester carbon faster and far more efficiently than terrestrial forests, and dedicated efforts are needed to ensure these habitats continue to play this role. Conserving these systems will significantly **reduce emissions arising from land use changes whilst stimulating new carbon sequestration through the restoration of coastal habitats**.

The impacts of warming and acidification on coastal and marine species and ecosystems are already observable, supporting the view that dramatic cuts in emissions are needed.

The United Nations Framework Convention on Climate Change (UNFCCC) refers to the need for sustainable management of oceans, and in particular coastal and marine ecosystems, for climate change mitigation and adaptation. There is currently no single-sector mechanism such as REDD+ dedicated to ocean issues. However, all ecosystem-based activities (especially on adaptation) can be addressed through the Nairobi Work Programme, or through the implementation of decisions and outcomes of the UNFCCC Conference of the Parties, where all ecosystems have been recognised. The key will be to harness existing opportunities, such as for certain coastal carbon ecosystems under REDD+ or Nationally Appropriate Mitigation Actions (NAMAs), as well as for the implementation of adaptation actions (e.g. National Adaptation Plans).

Strong, permanent protection of at least 30% of the oceans is urgently needed – a goal IUCN is working towards on many fronts.

Where can I get more information?

- **iucn.org/marine**
- IUCN (2015) *Oceans and Climate Change brochure*. Gland, Switzerland
- Herr, D., Isensee, K., Harrould-Kolieb, E. and Turley, C. (2014) *Ocean Acidification: International Policy and Governance Options*. Gland, Switzerland: IUCN. iv + 52pp.
- Gattuso, J.-P. et al. (2015) *Contrasting futures for ocean and society from different anthropogenic CO_2 emissions scenarios*. Science, 349(6243)

More on IUCN at COP21:

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