# THE OCEAN AND CLIMATE CHANGE

## COASTAL AND MARINE NATURE-BASED SOLUTIONS TO SUPPORT MITIGATION AND ADAPTATION ACTIVITIES

Climate change and ocean acidification continue to have serious, adverse impacts on the marine environment with significant implications for people.

Several mitigation approaches are being developed and implemented in order to achieve a significant and rapid decrease in GHG emissions. Coastal ecosystem-based mitigation activities can be used alongside other land use change and forestry activities to reduce ongoing emissions and sequester new carbon.

**QUICK FACTS**

The ocean absorbs nearly one third of all the carbon dioxide ($CO_2$) we emit each year.

Increased levels of $CO_2$ in the atmosphere and thus in the ocean cause ocean acidification.

The ocean's capacity to store new carbon emissions is decreasing, thus more significant $CO_2$ mitigation actions are needed in order to lower the impacts of climate change.

Vital coastal carbon sinks are being damaged and lost at a dangerous

## WHAT IS THE IUCN GLOBAL MARINE AND POLAR P

# ACTION RECOMMENDATIONS FOR ECOSYSTEM-BASED ADAPT

Mitigation is absolutely essential to avoid long-term climate change and ocean acidification, the impacts of which are already seen and felt by humans and natural ecosystems in many regions of the world.

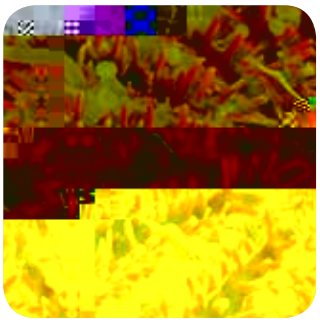
Due to geophysical time-lags, the consequences of ocean warming and ocean acidification will continue to become more pronounced for decades to come. Ecosystem-based adaptation (EbA), as part of larger climate change adaptation portfolios, can support and help people adapt to climate change.

**What is EbA?**

EbA is the sustainable management, conservation and restoration of ecosystems to assure the continued provision of vital services that help people adapt to the adverse effects of climate change.

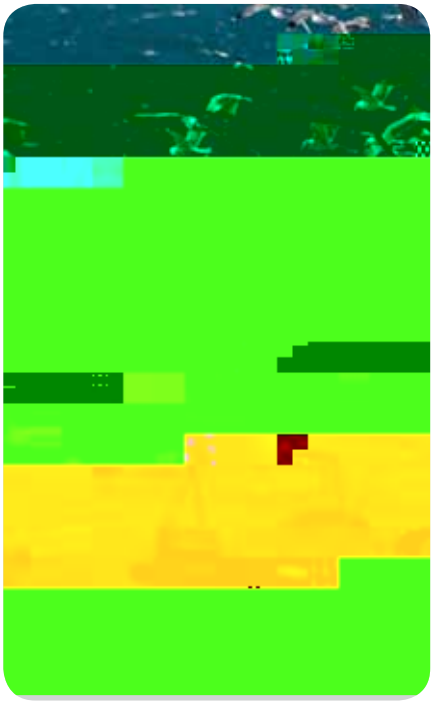
EbA increases ecosystem resilience to reduce human vulnerability in the face of climate change and can be applied to coastal and marine ecosystems to ensure that they are able to continue to provide vital services (e.g. storm protection).

EbA strategies can be more cost-effective than physical infrastructures and engineering projects and are often more accessible to the rural poor.



## CONDUCT VULNERABILITY ASSESSMENTS AND ECOSYSTEM MAPPING

- In order to determine the priorities and urgency with which EbA strategies should be implemented
- Obtain information regarding the relative magnitude of social and environmental impacts and costs of climate change and ocean acidification.
- Gather and analyze information on ecosystems (mapping, service provision, non climate impact assessment)
- Develop EbA plans with properly targeted scenarios and strategies, included in larger national and sub-national planning efforts (national development plans and marine spatial plans) and prepare for adaptive management responses.



## IDENTIFY AND ENSURE EFFECTIVENESS OF EBA AS AN ADAPTATION OPTION

- Conduct cost-benefit analysis and consider, as appropriate, linking EbA with hard(er) infrastructure
- Increase ecosystem resilience and ensure continued provision of ecosystem services by reducing other human stressors on the marine environment, including: pollution, destructive fishing practices, habitat destruction and unsustainable coastal development.
- Protect natural buffers and plan for inward migration of coastal ecosystems such as mangroves and wetlands.
- Integrate the full suite of EbA actions into poverty reduction, sustainable development plans and disaster risk reduction strategies, whenever possible.

## STRENGTHEN AND DEVELOP LONG-TERM MONITORING AND RESEARCH PROGRAMS

- Ensure long-term monitoring to allow for adaptive management actions.
- Incorporate socio-economics into environmental monitoring projects.
- Determine top research priorities and support the most appropriate existing institutions in their implementation.
- Support local and regional scientific institutions so that low-resolution, global findings can be applied to local and regional stakeholders.

WHAT IS IUCN GMPP

# OCEAN ACIDIFICATION AND OCEAN WARMING

## OCEAN ACIDIFICATION

**Part of the atmospheric $CO_2$ dissolves in the ocean and reduces its pH level (i.e. the ocean becomes more acidic)**

## WHY DOES OCEAN ACIDIFICATION MATTER?

- A reduced or functionally impaired capacity of the ocean to store carbon leaves more $CO_2$ in the atmosphere. This requires more significant $CO_2$ emission reductions in order to lower the impacts of climate change.
- As calcifcation rates of corals decrease, coral reefs are eroding at a faster rate than they are created. This loss has negative effects on the reproduction and life cycle of organisms that depend on reefs, as well as severe implications for the people who rely on them for shore protection, food and income.
- Ocean acidifcation has direct edضا l'

## OCEAN WARMING

**The ocean interacts with the atmosphere by exchanging and storing heat.**

### CLIMATE REGULATION

The ocean plays an integral part in influencing the global climate.

Impacts include:

- Increased intensity of extreme weather events
- Changes in ocean currents

### ECOSYSTEMS

Ocean warming negatively impacts many marine organisms and ecosystems.

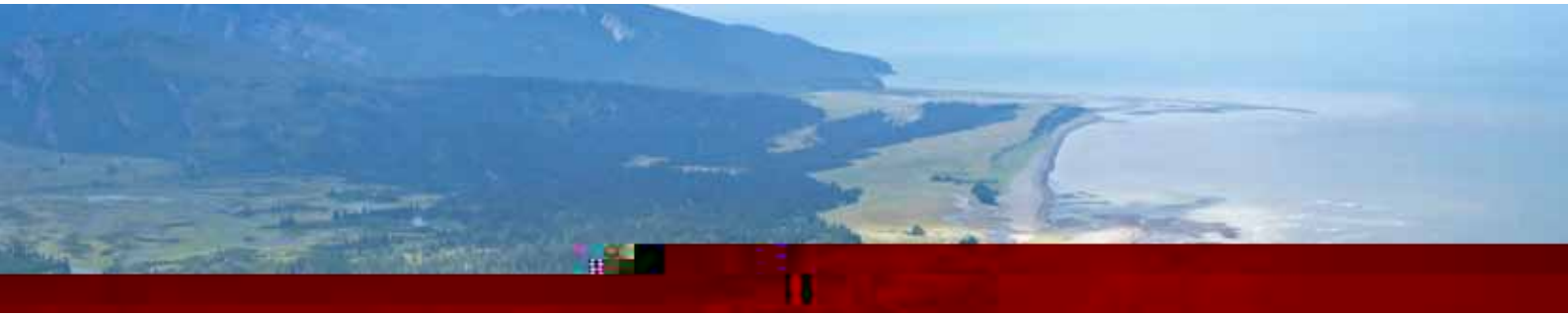
Impacts include:

## WHY DOES OCEAN WARMING MATTER?

- An increase in extreme weather events endanger coastal populations and damage coastal infrastructure.
- Instabilities in ocean currents could lead to shifts in regional climate and weather patterns and trigger human migration.
- Ocean stratification impedes the mixing of ocean layers and prevents valuable nutrients from reaching surface waters.
- Permanent migration of species to higher latitudes and deeper depths could cause changes in local availability, endangering food supply and altering traditional fishing grounds and rights.
- Impacts on primary producers such as phytoplankton cause changes in species composition and biomass in pelagic communities. These changes could affect all levels of the marine food web.
- Some marine organisms could approach physiological thresholds in temperature (e.g. coral bleaching).
- Rising sea levels increase beach erosion and saltwater intrusion jeopardizing shore protection and coastal infrastructure, impacting human health, and risking human displacement.

## ... TO THE ATMOSPHERE

The ocean plays an integral part in influencing the global climate. Both regional and global climate patterns depend on long-term interactions between the ocean and the atmosphere: heat storage, transportation of heat around the globe, wind, evaporation and precipitation patterns, freezing and thawing in polar regions, gas storage and exchange (including $CO_2$).



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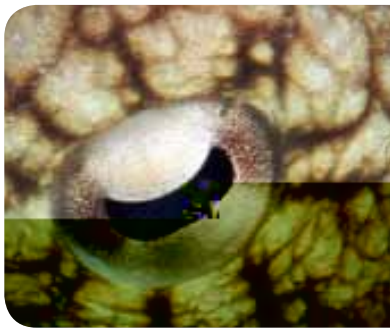

# THE NEED FOR IMMEDIATE ACTION

## THE COSTS OF POLICY INACTION

Several studies have concluded that the economic damage resulting from future climate change will be much higher than the costs for current climate change mitigation and adaption actions. Although it is extremely difficult to present exact economic numbers on the costs of inaction, they will be substantial.

Numerous reports outline the value that ocean economic activities (e.g. tourism and recreation, transportation, living and mineral resource extractions) contribute to national economies, foreign exchange receipts, government tax revenues and employment.

Governments cannot afford to ignore proper management and conservation strategies or overlook nature-based solutions for climate change mitigation and adaptation. Many projects have started around the world, but further, long-term planning and in investments in the management, conservation and protection of ecosystems and their services will not only help to build social resilience to climate change, but will provide vast development returns by reducing poverty, strengthening livelihoods and supporting sustainable economic growth.

Investments in risk reduction strategies are within the commercial interests of private landowners and the tourism and insurance industries. Furthermore, projected additional impacts of climate change on fish populations should serve to warn the fisheries sector of the risk to the industry and the importance of conserving current stocks.

## THE NEED TO CONNECT CLIMATE AND OCEAN MANAGEMENT AND POLICY MAKING

Better conserved and restored coastal and marine ecosystems provide coastal communities with direct adaptation benefits (i.e. coastal protection) while globally supporting mitigation activities. On top of that, they also support various economic sectors, including small- and large-scale commercial fishing activities, tourism and shipping.

An integrated approach is necessary to ensure the myriad of ecosystem services stay intact or are restored and impacts – global to local – are addressed. This requires thorough analysis and harmonization of existing polices and measures which use policy and financial incentive mechanisms jointly from a climate change as well as coastal and marine management perspective. Tools such as Marine Spatial Planning need to be effectively deployed and linked up with national climate change and development planning needs and efforts.

When financing and implementing climate change mitigation and adaptation strategies, it is important to understand and demonstrate the dependence of world economies on healthy ecosystems, both in terms of their market and non-market values. Increased dialogue and collaboration amongst economists and natural scientists should be promoted, in order to provide more accurate policy-relevant valuation of ecosystem services, including for climate change adaptation and mitigation.

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