



Ocean Acidification
International
Coordination Centre
OA-ICC



CENTRE
SCIENTIFIQUE
DE MONACO

Ocean Acidification Impacts on Coral Reefs “From Sciences to Solutions”

Summary for Policy Makers of the Fourth Workshop on the Economics of Ocean Acidification

Bridging the Gap between Ocean Acidification Impacts and Economic Valuation

Oceanographic Museum of Monaco - 15-17 October 2017

CREDIT: EMMA CAMP

“More than 60 experts from 22 countries participated in The Fourth International Workshop on the Socio-Economic Impacts of Ocean Acidification in Monaco to discuss vulnerabilities of global coral reef ecosystems. Participants discussed both ecological and socio-economic risks and potential solutions for coral reefs from six distinct regions of the world.”

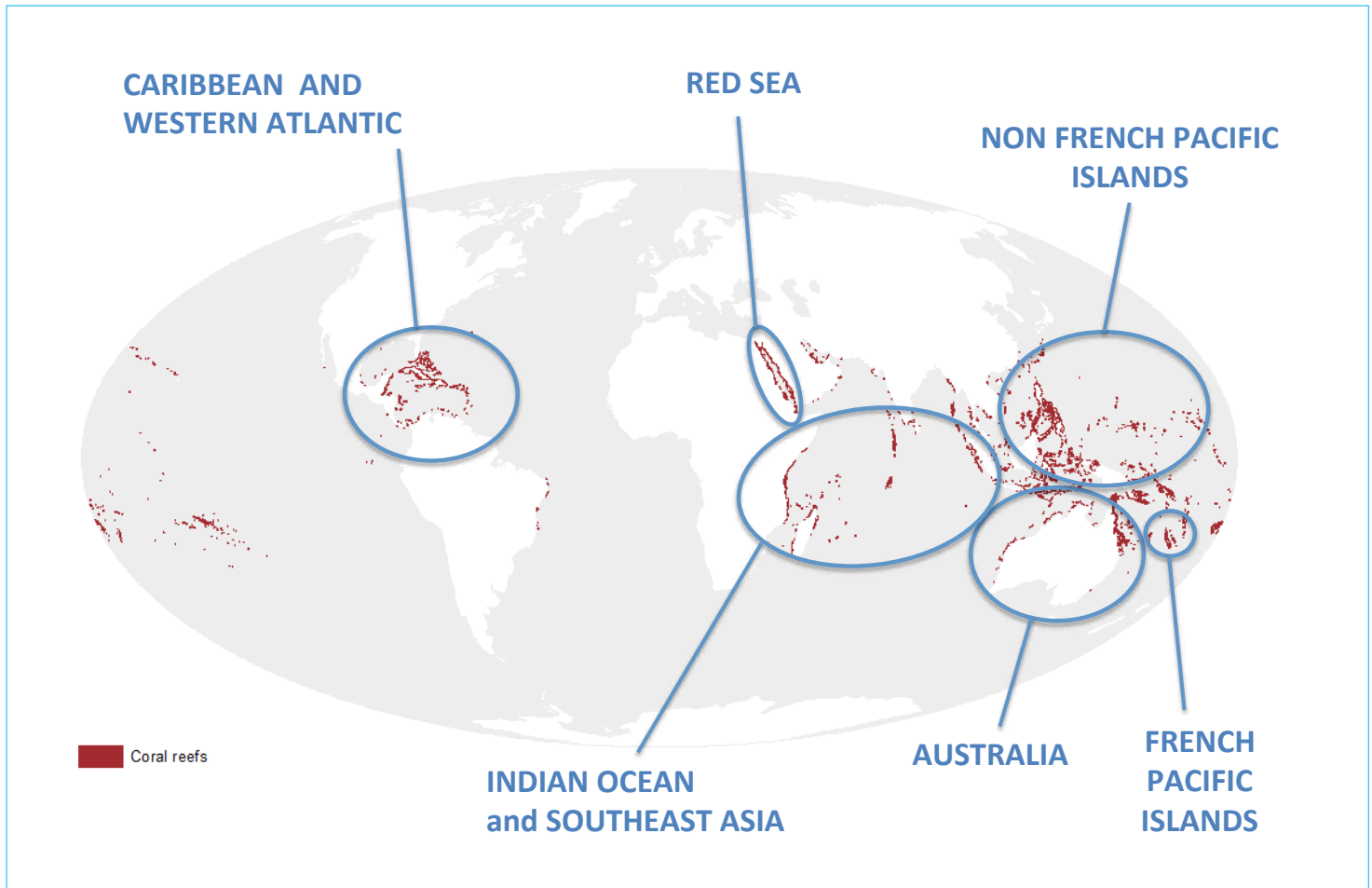


« Coral reefs are among the ocean’s most important ecosystems in terms of their extraordinary biodiversity and their immense value for the human societies that depend upon them. Unfortunately these ecosystems are also among the ocean’s most endangered, sustaining some of the clearest signs of damage that humans are inflicting on the planet. Despite these challenges, initiatives to preserve and restore coral reefs can be models for positive and effective action in marine conservation, particularly in the case of local approaches to ecosystem management.

The fourth edition of the workshop on the economics of ocean acidification was dedicated to science-based solutions that could improve the resilience of coral reefs threatened by Ocean Acidification and other global or local stressors. This workshop is timely, as numerous studies show the increasing rates of degradation of coral reefs, particularly by mass coral bleaching events. Following the *Coral reef life* declaration launched on October 2017 at the Our Ocean Conference in Malta by HRH Prince Charles and by My Foundation, the workshop is a contribution to the United Nations Sustainable Development Goal 14.

As the International Year of the Reefs 2018 begins, the present workshop conclusions are a call for action to reinforce the scientific knowledge of coral reefs through research and scientific expeditions like the Explorations of Monaco and Tara Pacific, both of which involve the Centre scientifique de Monaco.»

HSH Prince Albert II



This map was created using the Global Distribution of Coral Reefs (<http://data.unep-wcmc.org/datasets/1>) 2010 data layer.

CARIBBEAN AND WESTERN ATLANTIC REGION

ECOLOGICAL SOLUTIONS

- Manage pollution discharges (e.g., sediment, nutrients) by reducing pollution input; introducing natural barriers or filters (e.g. mangroves) and by redirecting pollutants away from reef ecosystems.
- Reduce unsustainable fishing practices by developing a hierarchy of fishing rights for stakeholders, removing destructive fishing practices; investing in Marine Protected Areas (MPAs), and promoting healthy and sustainable fish stocks.
- Develop and implement new ecological engineering methods such as selective harvesting approaches to enhance coral settlement and resilience, and by applying reef restoration techniques.

SOCIO-ECONOMIC AND POLICY SOLUTIONS

- Increase regional communication and resource mobilization through the establishment of a regional reef secretariat.
- Adapt Blue Economy Principles to coral reef economic sectors that incorporate increased investment in reef management.
- Initiate a reef label or certification program that provides positive rewards for corporations that become partners in reef restoration.

THE INDIAN OCEAN AND SOUTHEAST ASIA REGION

ECOLOGICAL SOLUTIONS

- Establish a network of locally-managed Marine Protected Areas (MPAs).
- Strengthen all collaborations that adopt science-based best practices for monitoring ocean acidification and coral condition, while taking into account the local and national interests.
- Adopt coral reef restoration programs.
- Promote non-destructive use of marine resources to reduce the stress of coral reefs and hence increase their resilience to the impact of ocean acidification.

SOCIO-ECONOMIC AND POLICY SOLUTIONS

- Work towards lowering global CO₂ emissions by reducing demand for emission-intensive goods and services, and encouraging lower-carbon technologies.
- Implement a realistic cost-benefit analysis to ascertain that the cost of proposed alternatives is lower than the cost of inaction.
- Increase public and political awareness on the value of coral reef ecosystems and their services.
- Need to address sustainable use of marine resources in education programs, such as renewables, low-carbon food production and sustainable fishing practices.
- Involve community in resource management and policy actions.

RED SEA REGION

ECOLOGICAL SOLUTIONS

- Increase our understanding of Red Sea coral resilience; the Red Sea harbours some of the most thermo-tolerant corals.
- Control pollution discharges into coral reef systems.
- Enhance coral reef resilience by employing traditional conservation methods to increase the number and size of MPAs.
- Regulate artisanal fishing.
- Create coral repositories to preserve vital local genotypes and rare coral species.
- Invest in coral reef restoration efforts (i.e., coral restoration toolbox).
- Apply ecological engineering approaches to enhance acclimation and adaptation of corals.
- Build regional collaborations to protect Northern Red Sea coral reef refuges.
- Support international research, monitoring, and regulatory efforts.

SOCIO-ECONOMIC AND POLICY SOLUTIONS

- Sustainably manage the Red Sea tourist/hospitality industry.
- Develop and populate a socio-economic database.
- Allow better monitoring and implementation of conservation policies in the region through a centralized coordination center
- Educate local stakeholders on the cultural, economic, and ecological values of coral reef ecosystems.
- Promote capacity building across the region.
- Encourage citizen science to assist in public monitoring and research activities.
- Explore business opportunities on reef resources, e.g., Blue Technologies.

FRENCH PACIFIC ISLANDS REGION

- Identify climate refuges and establish MPA networks to protect climate change-resistant corals.
- Promote growth of resistant corals.
- Restore and protect native vegetation (e.g., mangroves) for CO₂ sequestration.
- Promote Pacific Islanders as guardians of their oceans.
- Promote traditional coastal management practices for sustainable use of marine resources.
- Plan and potentially relocate/develop activities according to projected climate change impacts

ALL SOLUTIONS NEED TO ACCOUNT FOR LOCAL SOCIAL, ECONOMIC AND ECOLOGICAL CONTEXT:

- Engage local communities at all steps to ensure buy-in and sustainability of solutions.
- Perform long-term monitoring to uncouple trends in ecological, socio-economic and cultural sub-systems (French Polynesia and New Caledonia could be a model for coral reef resilience).
- Integrate traditional and scientific knowledge at the regional scale.
- Invest in communication to reach broad audiences.

NON FRENCH PACIFIC REGION

ECOLOGICAL SOLUTIONS

Two categories of ecological solutions are proposed for the region: mitigation (atmospheric and ocean CO₂ reduction) and adaptation (resilience of coral reefs):

- Reduce pollution and greenhouse gas emissions (e.g., land-based sources of pollution, sediment).
- Invest in more numerous and effective marine protected areas (MPAs).
- Develop innovative strategies that provide better baseline information and greater capacity for real-time monitoring to better understand how ocean acidification is affecting these ecosystems and how vulnerability differs across sites.

SOCIO-ECONOMIC AND POLICY SOLUTIONS

- Support education and communication at all levels to build an informed community that has the capacity to implement solutions efficiently and effectively, as well as promote stakeholder buy-in of proposed solutions.
- Commit funding for research and development to build capacity for effective protection of ecosystems.
- Promote regional collaborations and networking between developed and developing nations with the desired goal to develop solutions in one part of the region and implement in another.
- Engage in ecologically sustainable agriculture, industry, and services.
- Provide infrastructure for effective implementation and enforcement of laws and regulations.
- Create alternative incentive models (offsets/quotas/taxes, tourism, military, fisheries).

AUSTRALIA - THE GREAT BARRIER REEF REGION

An extensive program of management actions has been implemented since the creation of the Great Barrier Reef Marine Park in 1975. Measures to build resilience include:

Existing measures relevant to building resilience to ocean acidification include:

ECOLOGICAL SOLUTIONS

- Reduce man-made CO₂ emissions.
- Maintain ecologically sustainable fishing practices.
- Develop comprehensive tourism permitting arrangements.
- Implement controls on wastewater discharge.
- Invest in programs that reduce land-based sources of pollution (especially from agriculture).

SOCIO-ECONOMIC AND POLICY SOLUTIONS

- Enhance measures that build resilience to climate change, e.g., climate policy that addresses ocean acidification, including targets for emissions level, development of emissions, renewable energies, and efficiency.
- Support the adaptive capacity of reef-dependent sectors (vulnerability assessments, adaptation strategies, metrics for success).
- Enhance ocean acidification literacy among the public and decision-makers, including accountability for climate dedicated government infrastructure.
- Increase compliance with area-based management, especially for coral reef refuges.
- Invest in ocean acidification research and development.
- Improve policy alignment and coherence across jurisdictions and sectors, including commitment to evidence-based decision-making that is consistent within and between governmental departments.

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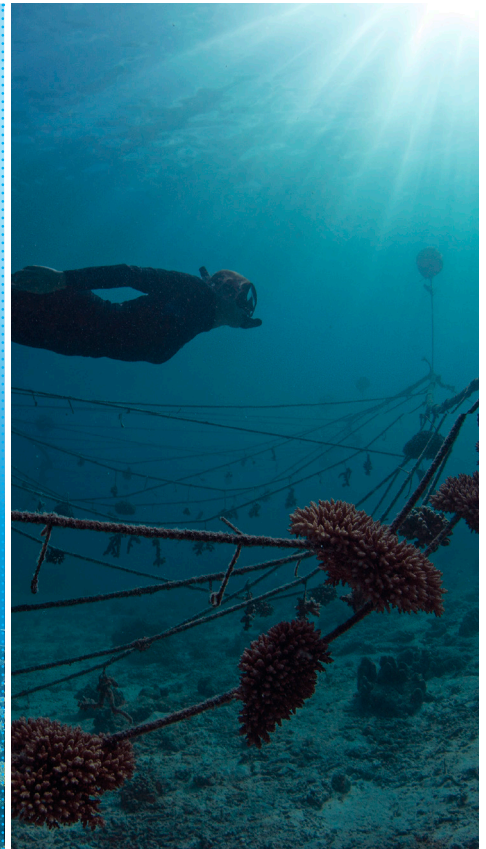
CORAL FACTS

- Coral reefs cover only 0.16% of the sea surface but host about 30% of all known marine species: coral reefs are the biggest bioconstruction of the world.
- Coral reefs are essential to about 500 million people and have a conservative value of US\$1 trillion which generates at least \$300-400 billion each year in terms of food and livelihoods from tourism, fisheries, coastal protection and medicines.
- Coral reefs are the most endangered marine ecosystems to global change (global warming-induced bleaching and ocean acidification): about 30% of the world's coral reefs are already destroyed and 58% are potentially threatened.
- The extinction of coral reefs poses a critical threat for people in some of the world's developing countries.

CREDIT: THE OCEAN AGENCY / XL CATLIN SEAVIEW SURVEY

COMMON SOLUTIONS FOR ALL REGIONS

- Reduce global CO₂ emissions.
- Implement controls on local land-based pollution.
- Promote marine conservation, e.g. through expanding Marine Protected Areas (MPAs).
- Create coral repositories to preserve particularly threatened species.
- Promote sustainable economies (tourism, fishing, agriculture, Blue Economy).
- Promote social resilience (e.g., stakeholder engagement, alternative incentive models).
- Invest in monitoring of coral reef health and scientific research, e.g. to identify resilient coral species.
- Invest in creative restoration / ecological engineering activities, e.g. selective harvesting or out-planting of more resilient coral species.
- Promote effective communication and increased awareness about the value of coral reefs and the risks they face.



CREDIT: THE OCEAN AGENCY

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