



# The Global Forum on Oceans, Coasts, and Islands

Reports from the Third Global Conference on Oceans, Coasts, and Islands

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## CLIMATE AND OCEANS

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*The Global Conference considered the issue of climate and oceans, exploring the effects climate change may have on the world's oceans, coasts, and islands, with an emphasis on ocean acidification, carbon sequestration, Arctic change, and sea level change. The expected outcomes for the panel included consideration of policy implications of wide-ranging effects of climate change on marine and coastal environments and on coastal populations and economies; and whether an "observatory" function, linking emerging scientific findings to analyses of attendant policy issues related to climate and oceans/coasts/islands might be needed.*

*The panel was chaired by Robert Corell, Chair, Arctic Climate Impact Assessment. Panel participants included: Ambassador Gunnar Pálsson, Director, Department of Natural Resources and Environmental Affairs, Ministry of Foreign Affairs, Iceland; Halldór Thorgeirsson, Deputy Executive Secretary, UN Framework Convention on Climate Change (UNFCCC); Ambassador Enele Sopoaga, Tuvalu, Vice-Chair, AOSIS, and Permanent Representative of the Mission of Tuvalu to the UN; John Shepherd, Tyndall Centre Regional Associate Director, Southampton Oceanography Centre; Ellina Levina, Climate Change Analyst, Environment Directorate, Organization for Economic Cooperation and Development (OECD); and Magdalena Muir,*

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### Climate Change Science

The Intergovernmental Panel on Climate Change will present the Fourth Assessment Report to the 13<sup>th</sup> Conference of the Parties to the United Nations Framework Convention on Climate Change in December 2007. Supporting prior reports, this report documents the impact of man-made climate change. The most vulnerable populations and economic sectors are faced with immediate and long-term adaptations for climate change, and some of the key vulnerabilities center on oceans, coasts, and islands. Sea level rise is a significant threat for small islands, coasts, and low-lying lands. Ocean acidification is a new and looming threat that could undermine the marine food web and preclude coral development. Sea level rise and acidification will remain for the next few thousand years. Another emerging threat is the impact of high sea surface temperatures on the intensity of tropical cyclones and hurricanes. Understanding the role of the oceans as a regulator of the earth's climate system is also increasing. The oceans control the timing and magnitude of changes in the global climate system, primarily through the absorption of carbon dioxide and heat. Other climate impacts include arctic sea ice reduction, cyclonic storms, changes in ocean circulation, and changes in biodiversity and fisheries.

In 2005, the Intergovernmental Panel on Climate Change presented a special report on carbon dioxide sequestration. It found that storing captured carbon dioxide in geological formations is a mature technology. Ocean storage, or the direct release into the ocean water column or onto the deep seafloor, has been researched less. This storage option is less permanent than geological storage and significant uncertainty remains on ecosystem impacts. Oceans have slowed the build up of carbon dioxide in the atmosphere by acting as a sink for carbon dioxide. Recent evidence suggests that this carbon absorption has its limits and is resulting in acidification of the oceans.

The Arctic Climate Impact Assessment Scientific Report documents climatic changes in the circumpolar Arctic. One of the key findings suggests that the Arctic has been warming rapidly with much larger changes projected for the future. Increasing temperatures, melting glaciers, reductions in the extent and thickness of sea ice, thawing permafrost, and rising sea level illustrate this warming trend. In the Arctic, changes in sea ice are a key indicator and agent of climate change, affecting surface reflectivity, cloudiness, humidity, exchanges of heat and moisture at the ocean surface, and ocean currents. Changes in sea ice have enormous economic, environmental, and social implications. There are negative impacts on ice-dependent wildlife and northern peoples, like the Inuit, with a traditional subsistence lifestyle based on hunting mammals on or adjacent to sea ice. Changes may also have positive economic effects, as they may facilitate increased marine transportation, economic development, and immigration into the region.

Small islands are vulnerable to the impacts of climate change, sea level rise, and extreme events because of size and exposure to natural hazards, and more limited adaptive capacity. According to the Third Assessment Report of the Intergovernmental Panel on Climate Change, islands represent early indicators of climate change for the rest of the world. Islands often depend on rainwater and are vulnerable to changes and distribution in rainfall. Like many parts of the equatorial and tropical world, human health is impacted by climate change. For example, diarrhea will increase with rising temperatures and deterioration of water in the Pacific. Vector-borne diseases like dengue fever and malaria will increase, with the Caribbean islands being at greater risk. Shortages of water and drought, as well as contamination of water quality during floods and storms, will increase disease risk, including cholera, diarrhea, and dengue fever. Subsistence and commercial agriculture on small islands will be impacted by sea level rise due to flooding, salt water intrusion in fresh water, salination of the soils, and decline in water quality and quantity. Infrastructure and development are affected by sea level rise and extreme

events, which affect tourism, agriculture, and the delivery of health, fresh water, food, and other essential services. Coral reefs, marine fisheries, and marine resources will also be affected by climate change and climate variability. Small islands with a large Exclusive Economic Zone already have limited capacity to manage those zones, and these management issues will only be compounded by climate change.

Africa is also very vulnerable to climate change, with negative impacts expected for watersheds, coasts, and seas of Africa, worsening desertification in northern and southern Africa, and reductions in the development of the continent overall. The Third Assessment Report predicted that the effects of climate change would be greatest in developing countries in terms of loss of life and relative effects on the investment and economy. Africa was described as the world's poorest region and the continent most vulnerable to the impacts of projected change, because widespread poverty limits adaptation capabilities. There has been limited scientific research on climate change in Africa, but local scientific networks for climate change are developing.

### **Science-Policy Interface for Oceans and Climate Change**

The 11<sup>th</sup> Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) in Montreal in December 2005 initiated a two-track process to develop the future climate strategy, where the Kyoto Protocol is the first track. The second track is an informal Convention Dialogue aimed at exchanging experiences and analyzing strategic approaches for long-term cooperative action. This dialogue is based on the UNFCCC Convention and is not confined to the present Parties to the Kyoto Protocol. It will address technology, adaptation, market-based opportunities, the development context, and voluntary action by developing countries. First meetings of the Convention Dialogue will be held in parallel with the Subsidiary Body meetings of the Kyoto Protocol in Bonn in May 2006.

Climate change mitigation is a major challenge, which goes to energy, economic, technological, and development policy. The UNFCCC process addresses adaptation through understanding of climate impacts, vulnerability, and possible adaptation measures on the one hand and financial and technical assistance to the most vulnerable Parties on the other. Proceeds from the Clean Development Mechanism project activities will fund a new Adaptation Fund under the Kyoto Protocol. The bulk of two other dedicated funds under the Convention are targeted for adaptation to the impacts of climate change by developing countries.

Maintaining the ecosystem services of the oceans is instrumental in achieving the United Nations Millennium

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Development Goals, as at least four of the eight goals are closely linked to the conservation and use of natural resources, including living marine resources. The Millennium Ecosystem Assessment, relying on the Food and Agriculture Organization of the United Nations, identifies fishing as the most important driver of change in the marine ecosystem for the past fifty years. It is now apparent that, aside from pollution and over fishing, climate variability and change, including acidification, may threaten the productivity of oceans. The challenge for governments is to understand the complex processes for oceans and climate change, and to have adequate policies.

On a global and regional level, climate change science and policy need to be added to the oceans agenda, and oceans science and policy need to be inserted in the climate agenda. The Third Global Conference disseminated information on ocean and climate science and policy measures to oceans decision-makers. Information on climate change and related policy issues for oceans needs to be included in the annual United Nations Open-ended Informal Consultative Process on Oceans and Law of the Sea, as well as to the global marine assessment agreed to at the World Summit on Sustainable Development in 2002, which is now in the start-up phase of an assessment of assessments. Additionally, information on oceans and climate sciences and related policy measures should be included in meetings of the Kyoto Protocol Parties and the Convention Dialogue, beginning in May 2006.

Adaptation is not enough; mitigation is also required through the reduction of greenhouse gases and the shift to renewable energy and energy efficiencies. It is necessary to think globally, plan regionally, and act locally. Due to their complexity, climate issues require input from many disciplines and the integration of ecosystem-based and other integrated approaches. There is a need for a constant dialogue between scientists and decision-makers. Scientific data and analysis, from accurate and timely predictions of hurricanes, to improved global and regional forecasts of future sea level rise, and the impacts of ocean acidification, lay the foundation for adaptation policy discussions and the development of climate strategies. In order to be effective, this data and analysis need to be communicated to decision-makers on a timely basis and in an appropriate language.

The timing of policy development and science must be synchronized, so that the long and short-term windows for science and decision-making can be synchronized accordingly. Short-term windows for decision-making may be advantageous as they allow the inclusion of new and more detailed information and predictions. In the future, data may make it possible for scientists to

accurately predict climate variability and change. The challenge will then be how to convert these predictions into adaptation policies for fisheries management, harbour development, or civil emergency planning. Global climate change scenarios need to be checked against more specific studies at regional and sub-regional levels. As policies adapt to climate change and variability, it is important to consider opportunities as well as risks. With accelerating climate change and variability, reliable scientific information becomes crucial for formulating policy on a wide variety of issues, including fisheries, marine infrastructure, and transportation. Therefore, more resources need to be devoted to ocean climate research, paying attention to the short and medium term, to the regional impacts as well as the global impacts, to monitoring and management approaches across vulnerable coastal and marine ecosystems, and to the benefits as well as the risks of climate change.

The integration and communication of climate science and policy to governments, decision makers, civil society, and the public is viewed as crucial for both the developed world and the developing world in order to build support for the necessary mitigation and adaptation measures. There will be common problems in adapting to climate change by Small Island Developing States (SIDS) and less developed regions and countries within Africa, Asia, the Caribbean, Central and South America, and the Pacific. Similar to Arctic coasts, SIDS are early indicators of climate impacts for the rest of the world, this linkage being recognized under the UNEP Grid-Arendal project, *Many Small Voices – Building Strategies for Climate Change Awareness and Adaptation among Vulnerable Regions: The Arctic and Small Island Developing States*.

For SIDS, there is a need to enhance economic, ecological, and social resilience in an integrated manner. Effective implementation of adaptation measures is critical to ensure sustainable development, and SIDS governments are already incorporating adaptation measures into national sustainable development strategies for infrastructure, economic development, disaster management, environment, conservation and biodiversity. SIDS urgently need financial resources and technical support, as recognized and committed under the UNFCCC process, including funding arrangements for the development and transfer of renewable energy and energy efficiency technologies as a way of reducing carbon dioxide emissions. The integration of the Mauritius Strategy for the sustainable development of SIDS in the work programme of the UNFCCC is crucial to address SIDS concerns on climate change. The appeal of the SIDS through the Alliance of Small Island States (AOSIS) for discussion of implementation of the Mauritius Strategy should be considered. The SIDS

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strongly oppose carbon dioxide sequestration and nuclear power as options to address climate change. Funding and technical assistance to support the continuation of the Small Islands Developing States Network (SIDSnet) website in New York is also requested.

As a region and a political entity, Europe is responding to climate change in its coasts and oceans. It is addressing mitigation and adaptation through global initiatives and regional and local actions, and is thus developing useful experiences and strategic approaches for the Convention Dialogue under the UNFCCC. The European Climate Change Program II has working groups for coasts and oceans issues: the Impacts and Adaptation Working Group; the Renewable Energy Working Group; and the Carbon Sequestration and Storage Working Group. The European Union is sponsoring research for climate changes for oceans and

coasts, including: monitoring, governance, and security initiatives under the European Space Agency; the European Network for Coastal Coordination Action; the European Spatial Planning: Adapting to Climate Change; the Coupled European Ocean Atmospheric Processes & Climate Change; and the EUROSION and Floodscape projects. The European Union is currently implementing the Water Framework Directive for rivers and watersheds, including a coastal component that links fresh waters and oceans. The EU is also undertaking consultation on a Marine Strategy and a Maritime Strategy. The Maritime Strategy includes the Marine Strategy and addresses sustainable economic uses in Europe's coastal and marine waters, considering climate change as a crosscutting theme. Europe also shares the Mediterranean Sea with northern Africa and Asia. Europe and member states like Italy implement regional initiatives for that sea, which consider economic and environmental factors, including climate change.