Oceans and climate change

I. Background

The oceans play a vital role in the global climate system, generating oxygen and absorbing carbon dioxide from the atmosphere, while also providing essential goods and services for sustaining life on Earth. Changes to the climate, brought about by increasing levels of greenhouse gases in the atmosphere, will thus lead to changes in the oceans, including sea-level rise and ocean acidification, which will put marine ecosystems and coastal communities at risk.

The General Assembly has reiterated its serious concern over the current and projected adverse effects of climate change on the marine environment and marine biodiversity, and it has emphasized the urgency of addressing this issue (see resolution 64/71, preamble). It has also expressed its concern over the current and projected adverse effects of climate change on food security and the sustainability of fisheries (see resolution 64/72, preamble). More specifically, the General Assembly has reiterated its deep concern over the vulnerability of the environment and the fragile ecosystems of the polar regions, including the Arctic Ocean and the Arctic ice cap, particularly affected by the projected adverse effects of climate change (see resolution 64/71, preamble). It has also expressed concern that climate change continues to increase the severity and incidence of coral bleaching throughout tropical seas, and weakens the ability of reefs to withstand ocean acidification, which could have serious and irreversible negative effects on marine organisms, particularly corals, as well as to withstand other pressures, including overfishing and pollution (see resolution 64/71, preamble).

The Ad Hoc Open-ended Informal Working Group, which was established by the General Assembly to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction (see resolution 59/24, paragraph 73), has also expressed concerns over the impact of climate change on the oceans. In 2008, the Working Group recognized that the oceans faced numerous and diverse pressures from human activities and that there was growing evidence of the degradation of the ocean ecosystems and their biodiversity, including as a result of climate change (see outcome of the second meeting of the Working Group). The Working Group identified a number of anthropogenic impacts on marine biodiversity beyond areas of national jurisdiction requiring particular attention, including impacts of

According to recent studies, the past decade has been the warmest on record and the warmer climate has contributed to rising sea levels and sea-surface temperature. Ice cover in the Arctic Ocean has continued to decrease and 2009 marked the third smallest area of sea-ice extent. Arctic sea ice has become thinner and more prone to rapid melting, with growing proportions of one- and two-year old ice. Ocean acidification has also progressed at rates that far exceed models and projections, with impacts on shellfish and corals in the surface layer of the oceans.

The General Assembly has recognized the importance of improving understanding of the impact of climate change on the oceans. It has thus encouraged States to enhance their scientific activity to better understand the effects of climate change on the marine environment and marine biodiversity, and develop ways and means of adaptation (see resolution 64/71, paragraphs 114 and 119). In particular, it has encouraged States and competent international organizations and other relevant institutions to urgently pursue further research on ocean acidification, especially programmes of observation and measurement (see resolution 64/71, paragraph 113). The General Assembly has also stressed the importance of increasing the scientific understanding of the oceans-atmosphere interface, including through participation in ocean observing programmes and geographic information systems, such as the Global Ocean Observing System (see resolution 64/71, paragraph 169). Ocean observation systems, comprised of satellite measurements of the ocean surface and in situ surface and sub-surface observations, play a critical role in building the knowledge-base on climate change.

The Ad Hoc Open-ended Informal Working Group has also stressed the need for further study of the connections between climate change, the increased vulnerability of marine species and ecosystems and the need for urgent action. It has recognized, however, that such studies require additional resources, both financial and technological, and entail the development of involvement by States, in particular small island developing States (see outcome of the first meeting of the Working Group, paragraphs 19, 35 and 42).

In 2009, the World Ocean Conference recognized the importance of improving understanding of the impact of climate change on the ocean and the need to consider ocean dimensions to inform adaptation and mitigation strategies. It emphasized: (a) the need for improved understanding of the role of oceans in climate change and the effects of climate change on marine and coastal ecosystems, marine biodiversity and coastal communities, especially in developing countries and small island States; (b) the need for gathering and exchange of information related to the impact of climate change on marine ecosystems, communities and fisheries and other industries; emergency preparedness; monitoring and forecasting of climate change and ocean

variability; and measures to improve public awareness of early warning system capacity; and (c) the need to promote affordable, environmentally sound and renewable ocean technologies and know-how, particularly in developing countries (see the Manado Ocean Declaration).

For further information on the impacts of climate change on the oceans, see the following recent reports of the Secretary-General: A/64/66/Add.2, paragraphs 44-47, 85-91 and 98-101, A/64/66/Add.1, paragraphs 341-348, A/63/63/Add.1, paragraphs 259-263, A/63/63, paragraphs 354-359, A/62/66/Add.2, paragraphs 57-60, A/62/66/Add.1, paragraphs 225-235, and A/62/66, paragraphs 326-330.

III. Climate change and sustainable development

Climate change will have direct impacts on coastal communities that rely on the oceans for a range of goods and services, including food, income, security, cultural identity and recreation. Significant and immediate examples of such impacts include coastal erosion and loss of land and property, flooding, saltwater intrusion, shifts in the distribution and abundance of marine habitats, species and biodiversity, and the accelerated spread of invasive species. Additional consequences include coral bleaching and increased coral mortality, loss of coastal wetland ecosystems and fishing grounds, and growth in the spread of marine dead zones (see Adapting to Coastal Climate Change).

Climate change will thus likely slow progress towards sustainable development, and impede achievement of the Millennium Development Goals, as well as the oceans-related goals of the World Summit on Sustainable Development. In this regard, coastal communities that rely on marine and coastal ecosystems to provide essential goods and services are likely to suffer economic and development losses due to the diminished productivity of these ecosystems. These impacts will affect the livelihoods of local fisheries and food supplies for coastal communities, which will also impair the contribution of fisheries to food security and poverty alleviation.

Densely populated and low-lying coastal areas where adaptive capacity is relatively low are especially at risk, particularly in areas that already face other challenges and human-induced pressures. Small island developing States are particularly vulnerable and the existing adaptive capacity of some communities will be insufficient to respond. Some small island communities have already been displaced due to rising sea levels, and forced displacement of these populations will present significant challenges and could promote wider instability (see Impacts of Sea Level Rise on Developing Countries).

Climate change will also compound the effects of other stressors on coastal communities, including increased coastal development, pollution, overfishing and unsustainable fishing practices (see UNEP report, In Dead

and seagrasses, which are responsible for storing up to 70 per cent of the carbon in the marine environment, will help to mitigate the impact of climate change. Adaptation strategies to enhance the resilience of these ecosystems will help generate economic revenue and improve food security and livelihoods in coastal communities (see UNEP report, Blue Carbon).

In this context, the General Assembly has urged States, either directly or through appropriate subregional, regional or global organizations or arrangements, to intensify efforts to assess and address the impacts of global climate change on the sustainability of fish stocks and the habitats that support them (see resolution 64/72, paragraph 3). It has also encouraged States and relevant international institutions to improve efforts to address coral bleaching by, inter alia, improving monitoring to predict and identify bleaching events, supporting and strengthening action taken during such events and improving strategies to manage reefs to support their natural resilience and enhance their ability to withstand other pressures, including ocean acidification (see resolution 64/71, paragraph 159). In addition, the General Assembly has encouraged States and competent international organizations and other relevant institutions to increase national, regional and international efforts to address levels of ocean acidity and the negative impact of such acidity on vulnerable marine ecosystems, particularly coral reefs (see resolution 64/71, paragraph 113).

Coastal communities are now taking a wide range of measures to adapt to the impacts of climate change on the oceans. In this regard, the adoption of integrated conservation and management measures can help to prevent or reduce the decline or extinction of marine species. Addressing other stressors, such as overfishing and land-based pollution, will enhance the ability of marine ecosystems to adapt to climate impacts and provide lasting benefits for human welfare (for additional information, see Adapting to Coastal Climate Change).

In this context, the World Ocean Conference highlighted the need to increase the resilience of coastal and marine ecosystems and vulnerable communities. In particular, the Manado Ocean Declaration recognized the need to: achieve long-term conservation, management, and sustainable use of marine

events. At the international level, the topic of climate change will need to be more firmly positioned in the broader sustainable development agenda and action on climate change will need to be integrated into broader development efforts and scientific research.