



## Analytical Brief on Climate Ambition and Sustainability Action

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# The Perils of Sea Level Rise and Ocean Pollution

Are current responses sufficient to address this local, transboundary and global problem?

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### Key Questions >>>

- What measures are needed to upscale nature-based solutions as well as technological solutions for preserving marine areas and for climate change mitigation?
- What adaptation measures are required in the wake of sea level rise and rising vulnerability to coastal regions?
- Given that marine pollution is a trans-boundary, complex, social, economic and environmental problem, what pathways are needed to address the issue?
- How can countries cooperate for addressing the issue of marine pollution?

### Introduction

Goal 14 of the sustainable development goals focuses on 'Life Below Water'. The oceans of the world are facing a serious threat not only from sea level rise due to melting of ice on land and the Arctic ice cover, thermal expansion of the ocean and the rapid increase in ocean pollution from human activities, including plastic waste. The session will focus on the nature of the problem and solutions by which human society has to implement rapid changes.

### Sea level rise

The floods that afflicted the city of Venice in 2019 highlight the risks that sea level rise would impose on low lying areas across the world, of which Venice as a city ranks among the most vulnerable. The

country of Bangladesh which has a high population density living on a very low lying area of land, for instance, will face not only the problem of sea level rise but also coastal area related extreme events. The Fifth Assessment Report (AR5) of the IPCC clearly stated "Global mean sea level rise will continue during the 21st century, very likely at a faster rate than observed from 1971 to 2010. For the period 2081–2100 relative to 1986–2005, the rise will likely be in the ranges of 0.26 to 0.55 m for RCP2.6, and of 0.45 to 0.82 m for RCP8.5. Sea level rise will not be uniform across regions. By the end of the 21st century, it is very likely that sea level will rise in more than about 95 per cent of the ocean area" (IPCC 2014). Also, it clearly highlighted the projection that global mean sea level rise will continue for many centuries beyond 2100. From available evidence, AR5 concluded that "sustained global warming

greater than a certain threshold above pre-industrial levels would lead to the near-complete loss of the Greenland ice sheet over a millennium or more, causing a global mean sea level rise of about 7 metres” (IPCC 2014). We, therefore, cannot possibly allow global average temperature to go beyond 1.5°C by the end of this century, if the risks of sea level rise of several metres are to be avoided (Pachauri 2019). Even in the Fourth Assessment Report (AR4) of the IPCC, it had been estimated that a range of concentration of GHGs which would correspond approximately to a 2 degrees rise in temperature by 2100, would lead to sea level rise from thermal expansion alone in the range of 0.4 to 1.4 metres (IPCC 2007).

### **Increase in vulnerability**

A major study published in Nature Communications, highlights global vulnerability to sea level rise and coastal flooding. Scott Kulp and Benjamin Strauss use a new digital elevation model which projects that under a low carbon emissions scenario (where greenhouse gas emissions peak by 2020), about 190 million people will be occupying land that will be below projected sea levels for 2100. The study estimates that under a high emissions scenario (where greenhouse gas emissions continue to rise through the 21<sup>st</sup> century), about 630 million people across the world would live on land that will be below projected annual flood levels for the end of the century.

### **Ocean acidification**

Ocean acidification is caused by absorption of atmospheric CO<sub>2</sub> by oceans, resulting in changes of the chemical composition of seawater. Long-term observations of ocean acidification over the past thirty years have shown an average increase of acidity of 26 per cent since pre-industrial times, and at this rate, an increase of 100 to 150 per cent is predicted by the end of the century, with serious consequences for marine life (UNSG 2019).

### **Fisheries and Protected Areas**

According to UNSG (2019), the fraction of world marine fish stocks that are within biologically sustainable levels declined from 90 per cent in 1974 to 66.9 per cent in 2015. In terms of an encouraging response, as of December 2018, over 24 million km<sup>2</sup> (17.2 per cent) of waters under national jurisdiction (0–200 nautical miles from a national border) were covered by protected areas, a significant increase from 12 per cent in 2015 and more than double the extent covered in 2010 (*ibid*).

### **Coral bleaching**

Coral bleaching is caused by global heating and leads corals to expel vital algae that live in its tissues, resulting ultimately in the death of these animals. According to scientists, there is an even more deadly threat—marine heatwaves—which destroy corals much more rapidly than previously thought (Leggat et al 2019). Marine heatwaves provides further compelling evidence for the need to mitigate climate change and instigate actions to reduce marine heatwaves.

### **Nature-based solutions**

Nature-based solutions such as ‘mangroves’ and other ‘blue carbon’ ecosystems like sea grasses and salt marshes can be crucial for storing carbon. These ecosystems can absorb and store as much as 10 times as much carbon as terrestrial ecosystems (UNEP 2019). But despite their value, globally mangroves are being lost at an alarming rate, which is three to five times faster than other forests, and over one third of the world’s mangroves have been lost over the last 100 years (*ibid*). Conservation of mangroves is essential for mitigation as well as adaptation responses to climate change. According to a recent study by the International Monetary Fund, marine biologists have discovered that whales capture tonnes of carbon from the atmosphere and provide a service with an economic value of USD 1 trillion for all the great whales (IMF 2019). According to the study, each great whale sequesters around 33 tonnes of carbon dioxide on average which is more than ten times that absorbed by a tree for the same period (*ibid*).

### **Anthropocentric solutions**

Emissions of greenhouse gases have gone up in 2018, and preliminary estimates in 2019 appear to move in the same direction. A valid question to ask is whether the global community is, for instance, ready to implement a framework for pricing of carbon emitted by different countries, adhering, of course, to the principle of “Common but Differentiated Responsibilities”? A price on carbon is now essential, because that would be the only means by which we provide an economic incentive to move away from a carbon intensive growth path. A recent study by the International Monetary Fund (IMF), shows that unfortunately, fossil fuels still receive a staggering level of subsidies. That study states, “Globally, subsidies remained large at USD 4.7 trillion (6.3 per cent of global GDP) in 2015 and are projected at USD 5.2 trillion (6.5 per cent of GDP) in 2017” (IMF 2019).

## Marine pollution

Land-based anthropogenic activities such as urban waste disposal, industrial effluent discharge, ship-breaking and tourism are the biggest sources of marine pollution. Rains and surface run-offs result in the transportation of this waste into the sea. Sea-based human activities that result in marine pollution include disposal of fishing gear, shipping activities, and legal and illegal dumping. As estimated by the United Nations Environment Programme, an estimated 8 million tons of plastic waste enter the world's oceans each year (UNEP 2020). Marine litter and micro-plastics are one of the fastest growing environmental challenges in terms of ecosystem and human health. Coastal algal blooms are another increasing problem, which are often the result of land-based pollution, commonly associated

with runoff from agricultural activities, or emissions from livestock or human wastewater. Harmful algal blooms grow out of control in response to nutrient inputs and produce toxic effects on people, fish, shellfish, marine mammals and birds. Coastal algal blooms are often the result of land-based pollution, commonly associated with runoff from fertilizer applications on croplands, or emissions from livestock or human wastewater. There is a need for a comprehensive and integrated approach to combat marine litter at local, national and global levels. Tackling marine pollution is simple and complex at the same time. Marine pollution is a trans-boundary, complex, social, economic and environmental problem with few easy solutions. It is not about only banning plastic but also about improvements in terms of a circular economy and waste management along with pathways towards a blue economy.

## Questions

With the above background, the following questions become relevant:

1. What measures are needed to upscale nature-based solutions as well as technological solutions for preserving marine areas and for climate change mitigation?
2. What adaptation measures are required in the wake of sea level rise and rising vulnerability in coastal regions?
3. Given that marine pollution is a trans-boundary, complex, social, economic and environmental problem, what pathways are needed to address the issue?
4. How can countries cooperate for addressing the issue of marine pollution?

## References

IMF (International Monetary Fund) (2019a), *Nature's Solution to Climate Change: A strategy to protect whales can limit greenhouse gases and global warming*, Washington, DC: IMF.

IMF (International Monetary Fund) (2019b), *Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates*, Washington, DC: IMF.

IPCC (Intergovernmental Panel on Climate Change) (2007), *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]*. IPCC, Geneva, Switzerland, 104 pp.

IPCC (Intergovernmental Panel on Climate Change) (2014), *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]*, IPCC, Geneva, Switzerland, 151 pp.

Kulp, S.A. and B.H. Strauss (2019), "New elevation data triple estimates of global vulnerability to sea-level rise and coastal flooding", *Nature Communications*, 10(1): 4844.

Leggat, W et al (2019), "Rapid Coral Decay Is Associated with Marine Heatwave Mortality Events on Reefs", *Current Biology*, 29(16): 2723-2730.

Pachauri, R.K. (2019), “We Need a Billion Noah’s Arks”, Blog, World Sustainable Development Forum, URL: <https://worldsdf.org/blog/we-need-a-billion-noahs-arks/>

UNEP (2019), “Greening the blue: championing coastal climate solutions”, United Nations Environment Programme, URL: <https://www.unenvironment.org/news-and-stories/story/greening-blue-championing-coastal-climate-solutions>

UNEP (United Nations Environment Programme) (2020), Dimensions of Pollution: Marine, URL: <https://web.unep.org/environmentassembly/marine>

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## Analytical Brief on Climate Ambition and Sustainability Action

The brief series, brought out jointly by the World Sustainable Development Forum and the Protect our Planet Movement, seeks to highlight a topical issue relevant to the realization of the sustainable development goals and ambitious climate actions. This brief is to feed into the discussions of the Second World Sustainable Development Forum to be organized in Durango, Mexico (5-7 March, 2020).

### About WSDF

The World Sustainable Development Forum (WSDF) is a not-for-profit organization incorporated separately in Europe, Norway and the U.S. Its North American arm WSDF-NA, headquartered in Washington, DC carries 501c3 tax exempt status. WSDF is a global initiative to promote and mobilize global action for effective implementation of both the Paris agreement on climate change and the Sustainable Development Goals (SDGs) adopted by the UN General Assembly. WSDF’s relevance and role lies in acting as a facilitator for helping with implementation of actions required under these two sets of agreements.

### About POP Movement

Protect our Planet (POP) Movement believes that the impacts of climate change will not affect a single country but the planet, in its entirety. POP believes that the power of the youth of the world will unite and to address this challenge. POP believes that the time to act is now and that knowledge is the true currency of changing the future.



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