Healthy Ocean, Healthy Climate

Our addiction to fossil fuels is crippling the Ocean as it absorbs 31% of our excess carbon and more than 90% of the extra heat. The result? A warming, oxygen-depleted, 30% more acidic Ocean where shellfish suffer ‘osteoporosis’, 70% of coral reefs are destroyed or endangered, and low-lying coastal and island areas face devastation. A healthy and vibrant Ocean is our greatest ally against climate devastation. We need to act now to implement the Paris Agreement on climate change by dramatically cutting carbon emissions and agree a new global deal for Nature, strengthening Ocean resilience by fully protecting at least 30% of it by 2030 - or await a harsher and more hostile future. The choice is ours. 2016 was the hottest year on record and 2019 the second hottest. We are veering ever closer to the 1.5°C warming threshold. What will we choose to do?

TALKING POINTS

- The Ocean is an integral part of the Earth system and it has suffered greatly because of our escalating use of fossil fuels.

- As a gigantic natural carbon sink, the Ocean has already absorbed about one-third of the additional carbon dioxide we have put into the air. It has also absorbed about 90 per cent of the excess heat put into the atmosphere by carbon emissions. All of this comes at a significant cost to Ocean health and planetary resilience.

- It takes a very long time for the full impacts of greenhouse gas emissions to be realised in the Ocean so even if we stopped using fossil fuels tomorrow, changes will continue percolating down to the deep Ocean for centuries. By the time we see the full range of damage it will be far too late to do anything about it. This is why we must act now.

- Every second breath that we take comes from the Ocean, so keeping Ocean ecosystems healthy is critical to our daily lives. Try to live for an hour missing every other breath and see how well you do.

- In December 2015 at the UN climate change conference in Paris, countries committed to reduce their carbon emissions and to keep global warming ‘significantly below’ 2 degrees Celsius. Somewhat unexpectedly, mainly due to the determination of a number of small island states, the deal also says countries should aim for the even more ambitious target of 1.5 degrees.
• This is particularly important to people living on low-lying islands or coasts as it should limit the sea-level rise that is a result of climate change. It is also of critical importance if we are to save coral reefs.

• The Paris climate Agreement came into force on the 4th November 2016 and as of the 6th March 2020 has been ratified by 189 countries.

Are we heading in the right direction?

• The world has entered what has been called a “new era of climate change reality”, that sees global CO2 concentration levels in the atmosphere above 400 parts per millions (ppm, for every million air particles, 400 are CO2 molecules), exceeding the 350ppm threshold that has been deemed safe by scientists.

• A study looking at the impact on the Ocean of the Paris climate agreement commitments warns that under governments' current pledges the present day risks to the Ocean from climate change would more than double by 2100, resulting in a future that we don’t even want to contemplate.

• Under these current commitments global average temperatures are predicted to rise between 2.7-3.5C, sea surface temperatures by 2-2.6C and pH levels to drop by 0.26-0.34 units by 2100. These changes will significantly increase the risk to Ocean habitats, in particular having dire consequences for warm water corals, as well as negatively impacting valuable ecosystem services such as fisheries, tourism and coastal protection.

• In September 2019, the Intergovernmental Panel on Climate Change released a Special Report on the Ocean and Cryosphere in a changing climate that assesses the latest scientific literature on climate change and the ocean and cryosphere (water in its solid state such as glaciers and ice sheets).

• The report details the huge changes to the ocean and cryosphere which are being caused by human-induced climate change and shows how if these impacts are allowed to continue unabated various tipping points will be reached bringing with them huge costs.

• In monetary terms, declines in ocean health and services are projected to cost the global economy $428bn per year by 2050 and $1.979tn per year by 2100.

• The impacts of extensive changes to marine life and ecosystem services will be immense, driving changes in agriculture, tourism and other key sectors involving millions of people.
• The report underscores the ecological imperative of reducing greenhouse gas emissions in line with the 1.5C limit as well as the huge benefits of ambitious and effective adaptation for sustainable development. **In particular, large-scale MPAs were identified as a priority action by the report to help build ocean resilience to climate change and support the restoration of marine biodiversity.** Even if temperatures were to stay within the 2C commitment, there will still be a huge impact on Ocean habitats and the functioning of ecosystem services (an increase in risk by a factor of 1.4). We will still see a die-off of some 90% of the world’s coral reefs by 2050. **That is the best-case scenario**, which means it is essential to build the Ocean’s resilience to change and help rebuild marine species abundance.

• It is estimated that more than half the Ocean will experience multiple climate stressors by 2030. If we continue another 15 years of current emissions, this will rise to 86% of the Ocean by 2050.

• If all countries cut their emissions, as part of the **Paris Agreement**, this would give the Ocean more time for habitats and creatures to adapt. However, it may be too late for some Arctic or Antarctic species to find refuge from climate change, regardless of how quickly we act to cut emissions.

**WHAT NEEDS TO HAPPEN?**

• The pragmatic response is to cut carbon emissions as far and as fast as possible, and at the same time, to fully protect very large marine areas to help Ocean systems build resilience to the changes happening around them.

• There is more and more evidence that ‘blue carbon’ plays a critical role in maintaining the health of our biosphere. This is the ability of mangroves, seagrass beds, fish and marine mammals to play a huge role in sequestering and storing carbon. By protecting and restoring these crucial habitats and species, the more carbon will be sequestered and stored resulting in a healthier planet, which is better for us all.

• We also need to make sure that any extractive activities, like fishing or mining, are sustainable, precautionary, and take account of their impacts on the entire ecosystem, particularly in a time of change.

• Studies have shown that coral reefs for example have a much greater chance to recover from the effects of bleaching if other stresses have been minimised or eliminated. For example, areas in no-take marine reserves where fishing is prohibited have been shown to be more resilient.

• While much effort is being put into devising tech fixes to sequester carbon, the most effective solution is letting nature do what it does best by leaving huge areas of Ocean alone to do their thing and allowing animals and habitat to grow and flourish.
• Building the Ocean’s resilience to change and helping to rebuild marine species abundance and diversity are not as fully appreciated as they should be as crucial tools in combatting climate change. Governments should take action from the Arctic to the Antarctic and everywhere in between to reach the target of protecting 30% of the global Ocean by 2030.

• We need to activate impactful voices around this call, unite the Ocean community around it, and create the social media and communications tools to drive this message, so that it becomes the unifying call to regenerate Ocean health that decision makers are compelled to deliver on.

• We need to invest in Nature by financing the protection of key marine areas like mangroves, sea-grass beds, salt marshes and coral reefs that are Nature’s coastal defences protecting coastal communities, towns and cities from storm surges and sea-level rise.

OCEAN HEATING

• In addition to changing chemistry, the Ocean is also warming. A paper in the journal Science Advances (March 2017), outlines that the rate of Ocean warming has quadrupled since the late 20th century, with increasingly more heat finding its way down into the deep Ocean.

• About 93% of all the excess energy trapped in the Earth system by man-made greenhouse gases goes towards heating the Ocean - compared to 1% for the atmosphere.

• If the same amount of heat that went into the top 2 kms of the Ocean between 1955-2010, had gone into the lower 10 kms of the atmosphere, then the Earth would have seen a warming of 36°C. We therefore owe it to the Ocean that life goes on.

• Ocean warming leads to a whole range of impacts on Ocean life, most importantly the forced migration of marine species. The knock-on effects of these changes cannot be underestimated: they threaten food security; the very existence of coastal communities and the informal economies that keep these communities intact. Furthermore, they will play a role in human migrations as these changes impact on some of the most vulnerable peoples around the world.

ACIDIFICATION

• We know that the pH of seawater is changing, becoming less alkaline. This acidification is having a profound effect on marine life.

• Undisputed science shows that increased greenhouse gas emissions have boosted Ocean acidity by 30% since the beginning of the Industrial Revolution so that the rate of acidification now is faster than anything
experienced in the past 250 million years raising the question of how and whether species can adapt to this speed of change.

- Consequently, ocean acidification is sometimes called “climate change’s equally evil twin” with good reason. In particular, organisms that need to form hard parts, such as corals and anything with a shell, are less able to do so.

- In extreme conditions, shells literally corrode to nothing. It’s as if they have osteoporosis.

- The loss of shelled organisms at the bottom of the food chain also has broad cascading effects in existing food webs.

- Although CO2 absorption is by far the greatest driver, coastal zone pollution and large-scale release of methane seafloor deposits (which are projected to occur when water temperatures rise and which have already begun in the Arctic) also contribute to Ocean acidification.

**DEOXYGENATION**

- Warming also leads to hypoxia – lack of oxygen – in parts of the Ocean as it impacts on the microscopic plants that live in the Ocean and are responsible for more than half the oxygen we breathe.

- Oxygen loss from warming has alarming consequences for global oceanic oxygen reserves, which have already been reduced by 2% over a period of just 50-years (from 1960 to 2010).

- Ocean regions with low oxygen concentrations are expanding, with around 700 sites worldwide now affected by low oxygen conditions – up from only 45 in the 1960s.

- The International Union for the Conservation of Nature (IUCN) warns that at a global-scale, warming-induced oxygen loss is driving progressive persistent changes in nutrient cycling and recycling, species distributions, marine ecosystem services and habitat availability.

- This is coupled with fertilizer run-off from industrial agriculture which has led to the expansion of “dead zones” in many parts of the world. Excess nutrients stimulate an overgrowth of algae, which then sinks and decomposes in the water. This decomposition process consumes oxygen and depletes the supply available to marine life causing organisms to either die or move away.

- About a fifth of the world’s marine fishing catch comes from the fishing grounds located along the eastern edges of the world’s ocean basins in areas fed by nutrient rich but oxygen poor currents. These naturally oxygen-poor
areas are particularly vulnerable to even small changes in ocean oxygen. Reduced productivity and catches will ultimately affect hundreds of millions of people.

**CORAL REEFS**

- It is estimated that coral reefs, as they existed half a century ago, will likely disappear from Earth even if the implementation of the Paris climate agreement meets its targets. It is estimated that even if we meet the Paris climate targets, we will still see a die-off of some 90% of the world’s coral reefs by 2050. That is the best-case scenario.

- The fate of the Great Barrier Reef and other coral reefs around the world depends on how effectively we can limit Ocean warming. Their survival depends on “urgent and rapid emissions cuts”.

- An estimated 70 per cent of the world's reefs already threatened or destroyed, according to the US coral reef task force.

- The scientific community is year by year becoming more concerned about the viability of protecting these ecosystems – which support 33 per cent of marine fish species – in the face of threats brought about by global warming.

- Corals that take centuries to form are being wiped out in a matter of weeks, reducing them to ghosts of their former selves.

- While individual corals can survive and recover from a bleaching, repeated or extended bleaching events can kill them off for good.

- The devastating 2014-2017 global coral bleaching event is now considered the longest, most widespread and most damaging coral bleaching event on record. Conditions at the time of writing (March 2020) suggest the Great Barrier Reef – the world’s most iconic reef - is on a knife-edge with a high risk of a widespread outbreak of coral bleaching. This is causing widespread alarm among scientists, who worry the frequency of bleaching events and the impact of water pollution, may mean the Reef loses its resilience to recover.