

## **Professor Steve Widdicombe's 5-minute introduction – substantive remarks**

Dear Excellencies, distinguished participants, ladies and gentlemen, it is an honour for me to moderate this dialogue today and I would like to thank the honorable Co-Chairs for their kind introduction. Before handing the floor over to our distinguished panelists and lead discussants I will take this opportunity to provide a few of my own perspectives.

Today over three billion people depend on marine and coastal biodiversity for their livelihoods and, when you think of it, every single one of us, depend on the additional benefits and services the ocean and its ecosystems provide us with.

Crucially, and particularly relevant to the dialogue today, is that the ocean has greatly slowed the rate of climate change. But at a cost as the ocean has also warmed, acidified and lost oxygen, whilst circulation patterns are changing, and sea levels are rising. The continuation of these changes not only threatens marine ecosystems, but also the future ability of the ocean to indirectly support all life on Earth.

In support of this dialogue, a concept paper has been published on “Minimizing and addressing ocean acidification, deoxygenation and ocean warming” which eloquently summarizes the status, trends, challenges and opportunities for the achievement of the relevant targets of Sustainable Development Goal 14. I would like to thank all of those involved in developing this excellent resource.

The concept paper reminds us that the ocean, its ecosystems and the numerous economic, ecological, aesthetic and cultural resources it provides, is under heightened threat from a multitude of human induced pressures.

Together with my fellow scientists at the Plymouth Marine Laboratory, and many collaborators from across the world, I have been personally involved in observing and quantifying the impacts of these climate change stressors for over 20 years. During this time, we have used our findings to provide a better understanding of these stressors and to create future projections of their impacts, impacts which we are now sadly starting to see manifesting across the planet.

By increasing the amount of carbon dioxide in our atmosphere, we have created a blanket around the planet trapping in the heat, driving the warming of the planet's surface, energizing more powerful weather systems, and changing weather patterns.

But, as we know, all that heat, nor all of that carbon dioxide itself, stays in the atmosphere. To date the ocean has absorbed at least 25% of the carbon dioxide we have emitted and at least 90% of the extra heat generated. Whilst this transport of carbon dioxide and energy into the ocean serves to mitigate the impacts of climate change on land, we are all paying a heavy price for this service.

Carbon dioxide dissolves on entering the ocean and interacts with the seawater's carbonate chemistry, driving ocean acidification. In addition, the extra heat absorbed by the ocean results in ocean warming and this in turn results in its thermal expansion that drives sea-level rise along with melting ice on land. This warming also contributes to the formation of low oxygen zones.

It is a mistake to consider that these major climate change stressors of ocean warming, acidification, deoxygenation and sea level rise, are operating solely at a global scale, or are slow onset events, and it is wrong to assume that the first effects of these will be felt decades into the future.

We are already seeing the occurrence of climate driven events, such as heat waves, severe storms, oxygen deplete dead zones, seasonal upwelling of more acidic waters, and sea level rise at local and regional scales and from the poles to the tropics, causing significant impacts on marine ecosystems and the health and well-being of human communities.

We also know that the consequences of these events become even more drastic when multiple stressors combine to impact on biological systems. For example, corals are suffering from bleaching in warming waters whilst also finding it challenging to build calcium carbonate reefs in the face of increasing ocean acidity. Not to mention all the additional non-climate stressors they are exposed to, such as over exploitation, pollution and habitat degradation.

It is clear that scaling up ocean action is now urgently needed. We must reduce the fundamental cause of climate induced stress, namely by stabilizing, and then dramatically reducing, the amount of carbon dioxide in our atmosphere and our ocean. This must be supplemented by additional actions that will increase the resilience of both marine ecosystems and those human communities that depend on them, and actions that will reduce the vulnerability of marine systems and provide space for them to adapt to a changing global climate.

The concept paper clearly sets out a number of concrete measures that can be taken forward and I hope that we can explore and build on these as part of this dialogue and through the commitments and contributions we will hear about today.

I am pleased to say that we have an excellent panel of distinguished experts in the room to provide additional insight and perspective that will help frame the context of this dialogue and I would like to give the floor to our first speaker .....