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Bridging chemical and biological changes to address and mitigate ocean acidification?

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The Global Ocean Acidification Observing Network (GOA-ON) and its associated Ocean Decade programme 'Ocean Acidification Research for Sustainability' (OARS) aim to provide society with the observational and scientific evidence needed to sustainably identify, monitor, mitigate and adapt to ocean acidification; from local to global scales. In line with Target 8 of the Kunming-Montreal Global Biodiversity Framework (GBF), OARS identified the need to increase the understanding of ocean acidification impacts to protect marine life by 2030 as one of the priority areas for OARS action.

The complexity of bridging chemical and biological changes associated with ocean acidification is often underestimated. Today, projections of ocean acidification impacts rely mainly on measuring proxy variables like pH, carbonate saturation state, temperature, and salinity, and coupling these to simplistic thresholds, to speculate about the likely status and trends of biodiversity and ecosystem services. However, the spatio-temporal frequency of the chemical observations are not adapted to infer biological response. Moreover, the impacts of ocean acidification on marine organisms, and the ecosystems they form, are complex and depend on a multitude of other environmental conditions, ecological interactions and biological trade-offs. There is an additional need to consider factors, such as the adaptation of organisms to local chemical variability and evolutionary processes, which can modify ecological responses and interactions, as well as moderating the role of other environmental drivers or stressors.

OARS identified a series of activities to achieve GBF Target 8 and support countries to report towards the respective indicators. As a first step, a comprehensive inventory and gap analysis of coastal, estuarine, and ocean observing programs that conduct co-located and simultaneous carbonate systems and biological observations will be conducted. This assessment combined with a large body of experimental evidence, as well as data collected under the mandate of SDG 14.3.1 (supported by GOA-ON and custodianship with IOC-UNESCO), will be used to guide nations in creating policies to minimize the impact of climate change and ocean acidification on biodiversity as requested in the GBF Target 8 indicator. OARS will provide guidance on how to optimally use these resources to develop effective adaptation and mitigation strategies in support of national

action. The ultimate ambition is to preserve marine biodiversity, ecosystem health and resilience, and human communities who depend upon it.