Increasing Ambition to Reduce Carbon Dioxide Emissions and Implementing Strategies to Assess and Prepare for Impacts of Ocean Acidification

Submission to the Ocean** Dialogue **at the 52nd Session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) June 2020

Submitted on behalf of the International Alliance to Combat Ocean Acidification

By the Secretariat for the International Alliance to Combat Ocean Acidification

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In accordance with "COP25 Decision 1 Chile Madrid Time for Action," the Secretariat of the International Alliance to Combat Ocean Acidification submits the following input to the Ocean Dialogue to be held at SBSTA 52 in June 2020.

This submission : 1) calls for increasing urgency to drastically reduce carbon dioxide emissions; 2) provides an overview of ways in which ocean acidification impacts and actions can be accounted within Party Nationally Determined Contributions (NDCs) and through other climate mitigation and adaptation strategies; 3) supports the Platform for Science-Based Ocean Solutions (PSBOS) as launched by the COP25 Presidency and calls for an annual Expert Ocean Dialogue or Ocean Work Programme at COP26.

This submission reflects views of the secretariat of the International Alliance to Combat Ocean Acidification and does not necessarily represent the views of all government or non-government members that have joined the OA Alliance and are creating OA Action Plans.

__Context and Rationale:__

The ocean plays a central role in regulating our climate and absorbing human-caused greenhouse gas emissions. Healthy ocean and coastal ecosystems help safeguard global populations from intensifying impacts caused by climate change; are critical for ensuring food security in highly vulnerable regions; and support thriving coastal communities and cultures, traditions and economies.

The ocean has already absorbed 93% of the excess heat resulting from increased greenhouse gas emissions since the 1970s and absorbed 28% of carbon dioxide generated by human activities since the 1750s. Carbon dioxide (CO_2) combines with seawater to produce carbonic acid, acidifying the seawater and depleting it of carbonate that many forms of sea life need to build their shells. Increasing CO_2 levels have already altered the basic chemical composition of our oceans causing them to become 30% more acidified than pre-industrial levels (IPCC, 2013).

Ocean acidification (OA) is a direct result of human-caused carbon dioxide emissions and is altering the chemical balance of seawater that marine life depends upon for survival.

Increasing acidification combined with other climate change-driven changes in ocean conditions, including warmer temperatures and reduced oxygen levels, is already having significant, adverse impacts on fisheries, aquaculture, and marine ecosystems and these impacts will worsen in the future without urgent action (Gattuso et al., 2015). Scientific research demonstrates that acidification can reduce growth rates in some species, can impact plankton which in turn effects entire marine food webs and can even have negative impacts on behavior of fish (Munday et al., 2009).

Ocean acidification threatens biodiversity and adversely impacts commercial, recreational, subsistence, and ceremonial shellfish harvest and other species around the world like crab, lobsters, shrimp, clams, mussels, sea urchins, corals, squid and some species of plankton (Johnson, 2016; Kroeker, 2013). These species are essential for sustaining jobs, supporting coastal economies, and feeding billions of people around the world.

Coral reefs are threatened by combined impacts of warming, acidification, and rising sea levels. Some models project that 92% of global coral cover will be lost by 2100. This will lead to declines in fish populations that rely on reefs for habitat and have devastating impacts to coastal communities where reefs account for entire tourism and recreation-based economies.

195 countries signed the Paris Agreement committing to meaningful and timely action to reduce greenhouse gas emissions to limit global average temperature rise to 1.5 degrees Celsius. While reducing overall emissions of greenhouse gasses can help curb temperature rise, reducing CO_2 is particularly important to curbing ocean acidification.

Only by reducing net CO_2 emissions can we directly mitigate ocean acidification.

Only by accounting for impacts of increasing acidification can governments, communities and economies accurately assess the full suite of changes and vulnerability directly caused by CO_2 emissions.

Future changes to our ocean due to acidification will largely depend on how much CO_2 the global population continues to release. Projections for the end of this century indicate that our oceans' surface waters could be 150 times more acidified than pre-industrial revolution. This would result in an ocean that is more acidified than at any time over the last 20 million years (Orr et al., 2005).

The IPCC Special Report on Ocean and Cryosphere in a Changing Climate tells us that increasing ocean acidification is "virtually certain" and includes significant scientific evidence about the hastening rate of ocean acidification and potential impacts (IPCC, 2019: Summary for Policymakers).

We must direct more global attention to these trends and dramatically increase collective ambition to reduce CO_2 emissions.

In addition to reducing carbon emissions, there are actions that governments can and should be taking now that will allow for increased adaptation and resilience of vulnerable ecosystems and bolster some species' ability to cope with future changes. These actions could also be considered and included in Parties Nationally Determined Contributions (NDCs), pursuant to the Paris Climate Agreement.

Members of the OA Alliance are helping to promote and drive implementation of actions, including nature-based solutions, that address the causes of ocean acidification and increase adaptation and resiliency of coastal communities to reduce current and future impacts.

We must advance actions that are innovative, scalable and replicable, address social and economic issues, are cross-sectoral and multi-stakeholder, create co-benefits for sustainable development, and have measurable impacts.

COP25, the "Blue Ocean COP," was a critical milestone for ensuring that findings of the IPCC Special Report on Ocean and Cryosphere in a Changing Climate are understood across the United Nations Framework Convention on Climate Change (UNFCCC) and that initiatives like the OA Alliance are continuing to support and encourage government led actions to respond and address impacts from a changing ocean.

An Overview of Ocean Acidification Action Plans:

The International Alliance to Combat Ocean Acidification (OA Alliance) was launched by the four North American West Coast governments of California, Oregon, Washington and British Columbia, Canada in direct response to the observed impacts of ocean acidification on oyster hatchery production across the North American West Coast during the mid-2000s.

Today, the OA Alliance is comprised of over 100 members, including 13 national governments, 9 states, 2 provinces, 6 tribal and sovereign nations, and 4 cities, along with local research institutions, monitoring networks, businesses, affected industry partners and NGO (Appendix A).

Under the leadership of its diverse members, the OA Alliance is harnessing growing scientific knowledge about impacts of ocean acidification and transforming it into increased urgency for climate change mitigation and for outlining tangible and innovative actions that will help communities and industries adapt.

National, subnational, regional and tribal governments are proactively responding to the impacts of ocean acidification as they create OA Action Plans (OA Alliance Action Plan Toolkit, 2016).

OA Action Plans help governments identify key species and ecosystems within their region (economically, culturally, or otherwise), assess potential vulnerabilities and develop strategies to protect them. The development of OA Action Plans also engages policymakers and heads of state (ministers, governors, premiers, agency directors, mayors and tribal chairs) in leadership roles, helping to elevate climate-related impacts to our ocean and the forecasted catastrophic impacts if we do not act quickly.

Importantly, OA Action Plans help governments establish an authorizing environment in which reducing human-caused carbon dioxide emissions and protecting coastal and marine resources, communities and cultures are inextricably linked.

Drawing from examples of OA Action Plans across our membership, the OA Alliance makes recommendations to the Ocean Dialogue under the following categories:

1) Increase Mitigation Through Nature Based Solutions and by Reducing Land-Based Contributions
2) Increase Knowledge About the Impacts of Ocean Acidification at the Local and Regional Level
3) Improve Adaptation and Resiliency

Recommendations:

(1) Increase Mitigation Through Nature Based Solutions and by Reducing Land-Based Contributions

Nature-based solutions for sequestering carbon in our ocean are called “Blue Carbon” solutions. Blue Carbon sequestration can be achieved through some types of submerged aquatic vegetation ecosystems like mangroves, salt marshes and some seagrasses.

However, even actions such as protecting and restoring kelp and eelgrass —ecosystems with root systems that may not be ideal for long-term carbon sequestration — can still improve water quality locally and provide refuge for marine species from acidified and other stressful conditions elsewhere.

In some cases, these habitats have been shown to remediate or buffer against impacts of acidification in nearshore coastal waters—raising the pH level within the submerged ecosystems—and potentially improving the growth and survival of species that are sensitive to ocean acidification (Unsworth et al., 2012; Chan et al., 2016).

It’s important that governments improve their regional and local understanding of the role that mangroves, seagrass, salt marsh and kelp could play in remediating local acidification conditions. Localized plant-based solutions can help improve the survivability of many marine species and the ecosystems they depend on. Actions to achieve this can include:

- Preserve, protect, and restore submerged aquatic vegetation.
- Where possible, co-locate the planting of aquatic ecosystems with potentially vulnerable calcifying organisms like shellfish and coral reef.
- Develop vegetation-based remediation systems, for use in upland habitats and in vulnerable areas.
- Reduce the impact of local land-based inputs and nutrients that can exacerbate OA impacts nearshore and in estuaries. This includes managing stormwater, wastewater and other land-based pollutants that increase nitrogen and cause damage to critical marine habitats and ecosystems.

- Manage resources and human activities to reduce co-occurring stressors that exacerbate the impacts of OA (i.e., precautionary fisheries policies, support and establish Marine Protected areas, climate-smart human development, etc.)

(2) Increase Knowledge About the Impacts of Ocean Acidification at the Local and Regional Level

Ocean acidification is a direct result of human-caused carbon dioxide emissions and is altering the chemical balance of seawater that marine life depends upon for survival.

It is critical countries develop a more comprehensive stocktake of regional vulnerabilities and risks associated with carbon dioxide and ocean acidification-related impacts. This will help governments prioritize studies to examine adaptive capacity of critical species and resources and improve local management of trends and impacts.

A 2017 report found that of the 161 NDCs submitted at that time, 70% mentioned or included a reference to ocean. However, only 14 NDCs submitted—or 9%—included references about the impacts of ocean acidification (Gallo, 2017).

This means that many countries that have large ocean territories are not fully accounting for, and could be undervaluing, the local economic impacts caused by increasing carbon dioxide emissions to ocean industries or marine economies.

National governments must work to increase local and regional knowledge about the potential impacts caused by ocean acidification. Actions could include:

- Establishing local pH monitoring sensors that can measure local variability and establish trends in ocean and coastal chemistry.

- Contributing to, or learning from, global monitoring networks that are supporting the ocean acidification-specific indicator as established by UN Sustainable Development Goal 14.3.1 "Average marine acidity (pH) measured at agreed suite of representative sampling stations."

- Conducting a nationwide or regional vulnerability assessment to identify the risks OA poses to marine resources, communities, and economies. This should include improving knowledge of biological impacts to marine species within the region.

These actions will help governments develop a more comprehensive stock-take of regional vulnerabilities and risks associated with carbon dioxide and ocean acidification-related impacts.

(3) Improve Adaptation and Resiliency

In addition to reducing carbon dioxide emissions, there are actions that governments can and should be taking now that will allow for increased adaptation and resilience of vulnerable ecosystems and bolster some species' ability to cope with future changes. Such actions could include:

- Supporting the development and incorporation of acidification indicators and thresholds to guide adaptive management action for species and places at varying scales.

- Protecting and restoring species such as native shellfish or corals with greater genetic resilience to changing ocean conditions.

- Incorporating OA into existing management practices including habitat restoration projects and the creation of Marine Protected Areas. Supporting inclusion of climate change and OA in fisheries management planning and harvest decisions.

- Collaborating with fishing communities, First Nations, industry and aquaculture partners to experiment with and implement strategies that help to reduce OA impacts on mussel farms and oyster farms through techniques like waste shell dissolution, aeration, buffering local sea water to reduce acidity and identifying resilient families and stocks. This could include innovations in land-based shellfish aquaculture.

- Enhancing restoration and conservation techniques to help ensure the adaptability and resilience of native flora and fauna to OA conditions.

- Maintain and enhance genetic diversity of native flora and fauna (i.e. using conservation hatchery techniques, selective breeding for OA tolerance, etc.)

Conclusions:

(1) The OA Alliance **reinforces** the need to urgently and drastically reduce atmospheric emissions of carbon dioxide**.** Ocean acidification is a direct result of human-caused carbon dioxide emissions and is altering the chemical balance of seawater that marine life depends upon for survival. Only by reducing CO_2 emissions can we directly mitigate ocean acidification.

(2) The OA Alliance **recommends** incorporating ocean acidification as additional justification for increasing urgency for the need to drastically reduce carbon dioxide emissions.

(3) The OA Alliance **encourages** national governments to incorporate the following actions within Party NDCs and across other climate mitigation and adaptation strategies:

- Increase Mitigation Through Nature Based Solutions and by Reducing Land-Based Contributions
- Increase Knowledge About the Impacts of Ocean Acidification at the Local and Regional Level
- Improve Adaptation and Resiliency

(4) The OA Alliance will **contribute** the "Platform for Science-Based Ocean Solutions (PSBOS)" as launched by the COP25 Presidency. The PSBOS will serve as a dynamic space for bringing together examples and contributions from national and subnational governments along with civil society, providing methodologies, tools, actions and guidance for countries to incorporate ocean into NDCs and other climate policies.

(5) The OA Alliance **supports** an annual Expert Ocean Dialogue or Ocean Work Programme at COP26.

Appendix A

OA Alliance Government Members:

National Governments	State and Provincial Governments	Sovereign, Tribal and First National Governments	City and Municipal	Intergovernmental Organizations
Canada	The Province of British Columbia, Canada	Gullah/Geechee Nation	City of Imperial Beach, California	Secretariat of the Pacific Regional Environment Programme (SPREP)
Cook Islands	The State of California, USA	Makah Tribe	The City of Portland, Oregon	Northwest Indian Fisheries Commission (NWIFC)
Costa Rica	Cross River State, Nigeria	Nisqually Indian Tribe	The City of Seattle, Washington	New York State Ocean Acidification Task Force
The Republic of Chile	The State of Hawaii, USA	Quileute Nation	The City of Vancouver, Canada	
Fiji	The State of Maine, USA	Quinault Indian Nation	Port of Seattle	
The French Republic	The State of Maryland, USA	The Sun'aq Tribe of Kodiak		
Iceland	The State of New York, USA	The Suquamish Tribe		
Netherlands	The State of Oregon, USA	Tsleil-Waututh Nation		
New Zealand	The Province of Quebec, Canada			
Norway	The State of Virginia, USA			
Seychelles	The State of Washington, USA			
Sweden				
Tokelau				
United Arab Emirates				

OA Alliance Affiliate Members

Associations and Initiatives		Business and Industry	Monitoring and Research Networks and Academic Institutions
California Ocean Science Trust	Pacific Community	Edaphic Scientific	Alaska Ocean Acidification Network
Coral Vita	Prince Albert ll of Monaco Foundation	Hog Island Oyster	Asian Marine Conservation Association (AMCA)
Coral Reef Alliance	Puget Sound Restoration Fund	Intake Works LLC	Canadian Ocean Acidification Community of Practice
Center for Ocean Solutions	Sasakawa Peace Foundation	J Hunter Pearls	Hakai Institute
COAST Community of Arran Seabed Trust	Seattle 2030 District	Jewelmer	Latin American Ocean Acidification Network (LAOCA)
Global Ocean Health	Small Scale OA	Mook Sea Farm	New Zealand Ocean Acidification Community (NZOAC)
Joint Ocean Commission Initiative	Wildcoast	Pacific Coast Shellfish Growers Associations and Initiatives (PCSGA)	Scripps Institution of Oceanography
Marine Conservation Institute	World Ocean Council	Taylor Shellfish Farms	Tanzania Fisheries Research and Academic Institutions Institute (TAFIRI)
Monegasque Association on OA (AMAO)		Vigilent	University Cote D'Azur
The Ocean Foundation			University of Hawaii Manoa School of Ocean and Earth Science and Technology (SOEST)
Ocean Networks Canada			University of Otago (OA Research and Academic Institutions Theme)
Ocean Sanctuaries			Washington Ocean Acidification Center (WOAC)
			Western Indian Ocean Marine Science Association (WIOMSA)

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