



## The Action Toolkit: Building your Ocean Acidification Action Plan

The International Alliance to Combat Ocean Acidification ([OA Alliance](#)) is an international network of governments and organizations (affiliate members) that together will address ocean acidification (OA) and other threats from changing ocean conditions. Members work collaboratively and individually to take actions that address the causes of ocean acidification and changing ocean conditions, as well as commit to actions that reduce future impacts to our coastal communities, economies and the health of our oceans.

By joining the OA Alliance and endorsing the Call to Action, governments commit to creating a customized OA Action Plan that addresses one or more of the five goals within the OA Alliance's Call to Action. Member governments are encouraged to work with affiliates and others to leverage jurisdictional capacity and build support for actions that successfully address OA and other changing ocean conditions.

Affiliates should support the development and implementation of government OA Action Plans and are encouraged to create their own organizational OA Action Plan. Affiliate involvement, in either capacity, brings vital expertise and perspectives and increases the venues where OA is discussed and addressed.

To facilitate the development of OA Action Plans, the OA Alliance has created this **Action Toolkit** as a reference aid. The OA Action Toolkit contains both regulatory and non-regulatory actions and is meant to be a source of inspiration, and a listing of suggested actions that members might consider when crafting their own OA Action Plan. Though the content in the Action Toolkit has been collected and adapted from several sources, the Action Toolkit is not a fully comprehensive nor exclusive list. New ideas will certainly emerge as members work to build a locally-relevant OA Action Plan. Indeed, the Action Toolkit will benefit from the sharing of new suggestions by OA Alliance members.

The Action Toolkit outlines examples of actions that pertain to the five goals of the OA Alliance's Call to Action:

- 1) ***Advance Scientific Understanding***: Improve the understanding of OA globally and within the members' regions, including support for research and OA observations within their region.
- 2) ***Reduce Causes of OA***: Implement actions that will prevent or slow OA through reducing atmospheric emissions of CO<sub>2</sub>, reducing inputs of land-based pollutants, and other measures.
- 3) ***Build Adaptation and Resiliency***: Implement actions to assist ocean-dependent communities and industries, and marine ecosystems to adapt to increasing acidity in marine waters.
- 4) ***Expand Public Awareness***: Engage policy makers, scientists and the public on the growing threat posed by OA, as well as local actions that may be taken to address OA.
- 5) ***Build Sustained International Support***: Secure sustained funding, nationally and regionally, for ongoing, enhanced, and coordinated research and OA observation systems, to continue to inform governments and others about the increasing impacts of OA.

It is important to consider the following suggested actions within a local context by creating OA Action Plans that are appropriate to that context and address local vulnerability to OA, at-risk resources, funding capacity and other considerations. This process of creating OA Action Plans, when done collectively and with purpose, will begin to shape a larger roadmap for combatting OA locally, regionally and globally.

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<b>1. Advance Scientific Understanding</b>			
<b>General Action</b>	<b>Example Specific Actions</b>	<b>Gov't</b>	<b>Affil.</b>
Expand and sustain OA observations, leveraging existing networks	Support convening OA professionals to participate in local, regional and international networks to share OA observations (ex: GOA-ON).	✓	✓
	Organize letters of support for research and observing infrastructure to decision-makers.		✓
	Inventory regional observing efforts and analyze for gaps, efficacy.	✓	✓
	Identify locations where protected areas and areas highly vulnerable to OA overlap to explore opportunities for research and adaption.	✓	✓
	Support development of new technologies for making OA observations.	✓	✓
	Support establishing local and regional programs dedicated to OA research.		✓
	Develop budget mechanisms, funding mechanisms to support research and monitoring.	✓	✓
Conduct research to understand local OA impacts	Support laboratory studies to assess the direct effects of OA, alone or in combination with other stressors, on local species and ecosystems.	✓	✓
	Support field studies to characterize the effects of OA, alone or in combination with other stressors on local species and ecosystems.	✓	✓
	Support research to determine the association between water and sediment chemistry and shellfish production in hatcheries and in the natural environment.	✓	✓
	Support research to quantify the relationship between local air emissions and local marine water acidity.	✓	✓
	Support research to characterize and quantify the sources of pollution (nutrients, organic carbon, other) from small and large on-site sewage systems, to determine local contribution to acidification.	✓	✓
	Quantify key natural and human influenced processes contributing to acidification based on estimates of sources, sinks, and transfer rates for carbon and nitrogen, differentiating between local and global sources.	✓	✓
Develop predictive models to inform management	Invest and support the development models for short-term forecasting of corrosive conditions (predictive relationships for indicators of OA, such as pH and aragonite saturation state).	✓	✓
	Invest and support the development of models to project ecological responses, biological responses to predicted OA conditions.	✓	✓
	Invest and support the development of long-term predictive models for the future status of carbon chemistry and pH in local waters, including biogeochemical processes relevant to OA trends.	✓	✓

<b>2. Reduce Causes of OA</b>			
<b>General Action</b>	<b>Example Specific Actions</b>	<b>Gov't</b>	<b>Affil.</b>
Reduce global and local CO2 emissions	Support legislative consideration of climate impacts and other environmental threats, broadly.	✓	✓
	Implement and advocate for initiatives creating climate smart communities (support greener power, waste reduction, recycling, etc.).	✓	✓
	Engage key leaders and policy makers to act as ambassadors advocating for carbon dioxide emission reductions and protection of local marine resources from acidification.	✓	✓
	Reduce local carbon dioxide emissions.	✓	✓
	Work with international, national, regional and local partners to advocate for a comprehensive strategy to reduce carbon dioxide emissions (e.g. UNFCCC, Global Ocean Forum, others).	✓	✓
Reduce local OA contributions by using existing regulations	Implement and reinforce planning efforts and programs that address the impacts of nutrients and organic carbon on OA.	✓	✓
	Determine whether existing water quality criteria are appropriate for tracking OA.	✓	✓
	Reduce nutrients entering marine waters from rural areas by supporting development of sewer connections.	✓	✓
	Support scrupulous enforcement of existing WQ regulations.	✓	✓
	Utilize and expand existing environmental quality laws and policies to promote best practices, permanent improvements (i.e. support participation in programs that leverage national or regional infrastructure and collaborations).	✓	✓
	Support implementation of effective nutrient and solid waste reduction programs in locations where these pollutants are determined to contribute to water quality impacts.	✓	✓
Reduce local OA contributions by developing new regulations	Support use of advanced treatment technologies on sewage treatment systems to mitigate local water quality impacts.	✓	✓
	Include OA as a point of concern and review in local water quality policies and permitting decisions.	✓	
	Reduce identifiable pollution sources, amend allowed water uses, update wastewater and storm water treatment requirements, and other actions to prevent and reduce water quality issues exacerbating coastal acidification.	✓	✓

<b>3. Build Adaptation and Resiliency</b>			
<b>General Action</b>	<b>Example Specific Actions</b>	<b>Gov't</b>	<b>Affil.</b>
Mitigate OA	Support local remediation of OA impacts, such as adding shell to marine waters or expanding bivalve aquaculture.	✓	✓
	Develop vegetation-based remediation systems, for use in upland habitats and in vulnerable areas.	✓	✓
	Preserve, protect, and restore submerged aquatic vegetation.	✓	✓
Increase adaptation capacity	Manage resources and human activities to reduce co-occurring stressors that exacerbate the impacts of OA (i.e., precautionary fisheries policies, support marine protected areas, climate-smart human development, etc.).	✓	✓
	Support development of commercial-scale technologies that mitigate the impact of OA on vulnerable industries (e.g. water quality technologies for hatcheries, aquaculture operations, etc.).	✓	✓
	Support fishery stock assessment designed to alert managers of changing OA conditions and resulting impacts.	✓	✓
	Support development and incorporation of acidification indicators and thresholds to guide adaptive management action for species and places at varying scales.	✓	✓
Enhance biological/economic resilience	Identify OA impacts to key economic and culturally important species and associated activities.	✓	✓
	Support pilot projects for coastal environment management and restoration in partnership with NGOs, agencies, researchers, others.	✓	✓
	Enhance 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.)	✓	✓
	Incorporate resilience planning initiatives (e.g., insurance, cooperation, relocation) in uncertain environments to support coastal businesses.	✓	✓
	Encourage or require climate-conscious growth and land use planning, resilience planning, and OA monitoring.	✓	✓
	Promote coordinated funding strategies for resilience planning and implementation via grants, loans, tax credits, workshops, broader use of less impactful fishing gear, or diversely funded cooperatives to respond to stakeholder needs.	✓	✓
	Support inclusion of climate change and OA in fisheries management planning and harvest decisions.	✓	✓
	Identify and protect refuges for OA-vulnerable organisms.	✓	✓
	Use existing laws and conservation measures to designate waters threatened by OA exacerbating pollution "Vulnerable" or "Protected" statuses to enhance restoration, remediation, and abatement efforts.	✓	
Provide direct support for affected industries (e.g., through subsidies, monetary offsets, transitional opportunities, etc).	✓		

## 4. Expand Public Awareness

General Action	Example Specific Actions	Gov't	Affil.
Increase visibility of OA as an issue	Identify key findings and talking points for use by officials who will act as ambassadors on ocean acidification.	✓	✓
	Support regulatory bodies in publicizing local acidification impacts and responses.	✓	✓
	Communicate OA issues and science developments to stakeholders, regulators, and the general public.	✓	✓
	Facilitate public conversations with key facts and summaries of the OA issue (e.g., convene discussion panel, write articles, etc.).	✓	✓
	Support public-private partnerships with NGOs and industry to participate in data collection.	✓	✓
	Share information with OA vulnerable industries and professions by convening specialists and/or industry representatives across industries and regions.	✓	✓
	Support appointment of positions with dedicated focus on local impacts of OA and local actions to combat OA within government and resource management at every level.	✓	✓
	Collaborate with key stakeholders, audiences, and impacted communities by sharing knowledge on the causes, impacts, and responses to OA by attending conferences, symposiums, workshops, and other events.	✓	✓
Dispel misconceptions and facilitate understanding of the mechanisms and impacts of OA	Help educators develop, adapt, and implement curricula on OA and associated climate issues for primary, secondary, and higher education.	✓	✓
	Aid formal and informal OA education programs and teacher training.	✓	✓
	Leverage existing education and outreach networks to disseminate key information and build support for priority actions.	✓	✓
	Collaborate with educators to inform stakeholders and the public about OA.	✓	✓
	Increase understanding of OA among key stakeholders, targeted audiences, and local communities by sharing knowledge on OA causes, consequences, and responses at state and regional symposiums, conferences, workshops and other events.	✓	✓

<b>5. Build Sustained International Support</b>			
<b>General Action</b>	<b>Example Specific Actions</b>	<b>Gov't</b>	<b>Affil.</b>
Facilitate coordination and collaboration	Regularly and actively participate in OA Alliance events.	✓	✓
	Coordinate integrating OA science into adaptation frameworks and policy by incorporating the most current findings into mitigation and resilience planning.	✓	✓
	Promote scientific collaboration across agencies and organizations to coordinate and implement recommendations with other ocean and coastal actions.	✓	✓
	Support and join existing international science and monitoring activities such as the Global Ocean Acidification Observing Network (GOA-ON) and the Ocean Acidification international Reference User Group (OAI-RUG), or the UN's IOC Sub-Commission for the Western Pacific (WESTPAC).	✓	✓
	Request and support the inclusion of OA, ocean health indicators, and OA work plans by national governments within UN FCCC NDC at COP23.	✓	✓

**Don't see an action that fits your needs!? Don't worry. Your input can help change that!**

Combating OA in your jurisdiction is not limited to the current goals of the OA Alliance or the general to specific actions detailed above. The work of the OA Alliance is intended to be as flexible and fluid as its members' needs to address OA in their jurisdictions.

Creative actions, unique solutions, and additions to the tools provided that are pertinent to advancing the five goals of the OA Alliance are supported and encouraged.

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