

Leading the Coordination of a Regional OA Monitoring Network to Inform Implementation of Marine, Climate and Sustainable Development Goals

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i. Introduction: What are the policy limitations or science gaps that hinder the attainment of the global targets?

Africa's marine resources hold the potential for achieving socio-economic development goals and bolstering health and resilience of marine ecosystems and coastal communities. The Continent's marine resources and ecosystem services play a role in alleviating poverty and promoting development in the face of transformative changes, including post-COVID economic recoveryⁱ and rapid demographic shifts.ⁱⁱ

However, achieving regional developmental goals, delivering a sustainable blue economy, and feeding a growing population will require ever more increasing reliance on WIO's marine resources that are threatened by climate change and ocean acidification (OA).

OA represents a unique and pressing challenge for the WIO region. It involves a series of chemical reactions occurring in the ocean, primarily driven by the increased absorption of CO₂, resulting in more acidic seawater.ⁱⁱⁱ These chemical changes, such as reduced pH and diminished concentrations of carbonate minerals used by some marine species (e.g., coral reefs and shellfish) to create shells and skeletons, combine with other climate-related ocean impacts like ocean warming and declining oxygen levels to heighten the overall stress faced by marine species and ecosystems, diminishing their resilience against these and other stressors.^{iv}

These changes are likely to intensify as this century progresses and have the potential to significantly alter marine ecosystems and associated ecosystem services for decades to come. The cumulative effects of OA and other associated stressors, WIO marine ecosystems and resources are vulnerable to the cumulative impacts of OA and climate change. This has impacts on the region's development goals, sustainable blue economy, and food security.

Landmark policy initiatives, such as the UN Decade of Ocean Science for Sustainable Development (Ocean Decade), the Kunming-Montreal Global Biodiversity Framework (GBF), and the Biodiversity Beyond National Jurisdiction (BBNJ) Agreement, reflect the growing recognition of the importance of these issues.^v

International and regional governance frameworks call for—or would benefit from—an enhanced focus on OA monitoring and research (**Table 1**). Across policy frameworks, there are several localized management actions that can be employed to combat OA and support vulnerable marine ecosystems and resources. However, the effectiveness of management strategies depends on knowledge of local factors and conditions, alongside an awareness around the costs or benefits of certain activities.

Table 1. Example of relevant governance arrangements that call for—or would benefit from-- OA monitoring and research in WIO.

	Global	Regional
Marine Management Goals & Targets	<p>United Nations Law of the Sea (UNCLOS)</p> <p>Boundaries Beyond National Jurisdiction Agreement (BBNJ Treaty)</p> <p>Kunming-Montreal Global Biodiversity Framework</p>	<p>Nairobi Convention & Decision CP 10/7 to Establish Regional Action Plan to address Ocean Acidification</p> <p>Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities</p> <p>Convention for the Protection, Management, and Development of the Marine and Coastal Development in the East African Region</p>
Climate Adaptation Goals & Targets	<p>United Nations Framework Convention on Climate Change</p> <p>Paris Agreement</p>	<p>African Union Climate Change and Resilient Development Strategy and Action Plan</p> <p>East African Community Climate Change Policy</p> <p>East African Community Climate Change Master Plan 2011-2031</p> <p>Southern African Development Cooperation Climate Strategy</p>
Sustainable Development Goals & Targets	<p>UN – SDG Goals including goal 14.3 “to minimize and address OA”</p> <p>SDG 1 – No Poverty</p> <p>SDG 2 – Zero Hunger</p> <p>SDG 13 – Climate Action</p> <p>SDG 17 – Partnership for the Goals</p>	<p>Africa Agenda 2063</p> <p>Africa Blue Economy Strategy</p> <p>East African Community (EAC) Development Strategy 2050</p> <p>Southern African Development Community (SADC) Vision 2050</p>

II. Do we understand or are we prepared for the implementation of these instruments at the national, or regional level?

To gain a better understanding of, prepare for, and address the dual ecological and developmental challenge posed by climate-ocean change and OA, it is imperative to enhance regional capabilities and coordination of scientific monitoring, research, and impact assessments. This information should serve as a foundational element of existing and emerging policy responses to the challenge.

While the Intergovernmental Panel on Climate Change (IPCC) can offer insights into global trends, there remains significant gaps in information concerning national or local trends as well as the localized impacts of OA. This information gap creates impediments to achieving equitable and holistic responses to OA at the domestic level. In addition, regional information gaps also obscure valuable insights, perspectives, and knowledge from the region that could inform effective response.

The Western Indian Ocean Marine Science Association (WIOMSA) are critical players in increasing regional scientific knowledge, prioritizing discrete projects at local scales, and are well aligned to provide decision makers and communities with research and monitoring information on current and emerging marine socio-ecological threats and potential responses.

In 2018, the Western Indian Ocean Acidification (WIO) OA Monitoring project was established by WIOMSA in conjunction with regional institutions and experts. The monitoring project resulted in the WIO OA report in 2022, which examines the state of OA and makes recommendations for future research and information priorities across 6 countries: Kenya, Tanzania, Mozambique, South Africa, Mauritius, and Seychelles.

This research initiative provides a baseline that can foster the development of a more comprehensive and integrated strategy for ocean acidification monitoring, research, and impact assessment across the WIO region. The research also identifies priority knowledge gaps that must be addressed to enhance management response to rising acidity.

Some of these include:

- Expanded coverage on monitoring assets in the region.
- Capacity for robust laboratory equipment.
- Increased funding for research assistants conducting ex-situ and in-situ experiments.
- Expanded research to incorporate multiple stressors of warming, OA and deoxygenation.
- Increased biological research on the impacts of OA to key fisheries, shellfish and coral.
- Monitoring OA conditions in coastal waters to identify hot spots or refugia (worse or better conditions).
- Research to evaluate the potential of mangrove and seagrass to remediate the effects of OA on nearby coral reef or near shellfish.
- Develop regional vulnerability assessments that prioritize OA research of species and ecosystems that have socio-economic significance or dependence.

III. Is there anything that needs to be done at the regional level to enhance attainment of targets at the national and global levels? Leveraging existing obligations to situate and enhance support for OA monitoring and research.

In 2021, the Conference of Parties to the Nairobi Convention requested the secretariat to develop, “A regional action plan to both monitor and enhance national climate change intervention strategies to minimize the impacts of ocean acidification.” (*Decision CP 10/7*) The decision has established an

opportunity for integrating ongoing OA monitoring and research work into the broader governance of the Convention.

With this approach, OA monitoring, research, and impact assessment need not be viewed as isolated, stand-alone activities, but as integral components of larger resource management. There are political and practical opportunities of such a regional OA program established under the Nairobi Convention, including a deeper relationship to policy, management strategies and communications about OA.

A regional OA program should be part of the WIO's approach to integrated ocean management in the context of climate change. This integration is critical for managing climate-ocean change and advancing the development of a sustainable blue economy. Moving forward with a coordinated and well-funded regional OA monitoring network and research agenda in the WIO, would provide a value model for the Continent.

IV. Recommendations: What could be the WIO region's contribution to the global debate on the subject?

Operationalize a Regional OA Program:

Implement a regional OA program, as advocated by the Nairobi Convention, and integrate into the WIO's approach to resource management. The development of a robust regional OA program should integrate monitoring, research, and impact assessment to directly inform mitigation, adaptation, and priorities of national governments across relevant policies. These efforts should focus on enhancing marine socio-ecological adaptation and resilience to OA and other perturbations at local, national, and regional scales.

Integrate OA Information Across Relevant Policy Goals:

There exists a diverse suite of existing policy arrangements whose implementation would benefit from increasing OA information in the WIO. Parties to the Nairobi Convention should include OA within their technical and financial support mechanisms for critical policy priorities, including those related to sustainable blue economy, climate action, and sustainable development. This ensures that OA information becomes an integral component of these broader policy objectives. Existing marine management, climate change, and sustainable development policies provide a crucial foundation for utilizing OA information.

Call For Increased Climate Adaptation Funding to Support OA Knowledge and Response:

Regional proposals should be put forward to funding entities like the Green Climate Fund, Global Environment Facility, or Development Banks, making the case that well-funded and intentionally coordinated regional OA monitoring and research agenda is an imperative and a necessary use of climate-adaptation financing at scale.

Climate financial mechanisms have existing marine and coastal project portfolios that increased OA information could further support and enhance. Examples include projects focused on developing the blue economy, coastal adaptation, sustainable aquaculture, and ecosystem restoration.

Institutionalize and Enhance Science-Governance Collaboration:

Establish and enhance research and advisory frameworks that bridge the gap between scientific knowledge and governance. This facilitates the identification and utilization of the most influential marine, climate and developmental policy frameworks that can benefit from and mainstream the existing and emerging scientific information. This fosters a more profound connection to policy responses aimed at addressing current and emerging socio-ecological challenges in the region.

Endnotes

ⁱ John C. Anyanwu and Adeleke O. Salami, 'The Impact of COVID-19 on African Economies: An Introduction', *African Development Review* 33, no. Suppl 1 (April 2021): S1–16, <https://doi.org/10.1111/1467-8268.12531>.

ⁱⁱ 'By 2050, a Quarter of the World's People Will Be African – This Will Shape Our Future', *The Guardian*, 20 January 2022, sec. Global development, <https://www.theguardian.com/global-development/2022/jan/20/by-2050-a-quarter-of-the-worlds-people-will-be-african-this-will-shape-our-future>.

ⁱⁱⁱ Jean-Pierre Gattuso and Lina Hansson, 'Ocean Acidification: Background and History', in *Ocean Acidification* (New York: Oxford University Press, 2011); Alistair J. Hobday and Richard J. Matear, 'The Impact of Climate Change on Oceans: Physical, Chemical and Biological Responses', in *Research Handbook on Climate Change, Oceans and Coasts* (UK: Edward Elgar Publishing, 2020), <https://www.elgaronline.com/view/edcoll/9781788112222/9781788112222.00007.xml>.

^{iv} O. Hoegh-Guldberg et al., 'Coral Reefs Under Rapid Climate Change and Ocean Acidification', *Science* 318, no. 5857 (14 December 2007): 1737–42, <https://doi.org/10.1126/science.1152509>; Scott C. Doney et al., 'The Impacts of Ocean Acidification on Marine Ecosystems and Reliant Human Communities', *Annual Review of Environment and Resources* 45, no. 1 (October 2020), <https://doi.org/10.1146/annurev-environ-012320-083019>.

^v <https://plus.google.com/+UNESCO>, 'United Nations Decade of Ocean Science for Sustainable Development (2021-2030)', UNESCO, 9 February 2017, <https://en.unesco.org/ocean-decade>; Convention on Biological Diversity, 'Kunming-Montreal Global Biodiversity Framework' (Secretariat of the Convention on Biological Diversity, 4 October 2023), <https://www.cbd.int/gbf/>; United Nations, 'Intergovernmental Conference on Marine Biodiversity of Areas Beyond National Jurisdiction |', 2023, <https://www.un.org/bbnj/>.