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KMFRI partners with TUM and global scientists in first ever Kenyan ocean carbon removal study

By: Caleb Korir | Photos: Caleb Korir | Layout: Kasuku Eugene
Edits: Jane Kiguta

The Kenya Marine and Fisheries Research Institute (KMFRI), in collaboration with scientists from the GEOMAR Helmholtz Centre for Ocean Research, the Ocean Climate Innovation Hub Kenya, and the Technical University of Mombasa (TUM), conducted a two-week laboratory study in Mombasa to evaluate the safety of Ocean Alkalinity Enhancement (OAE) for marine life.

The carbon removal study - the first of its kind in Kenya – was conducted from 17th February to 3rd March, 2026, at KMFRI laboratories, seeks to determine whether OAE can be applied without causing harm to marine ecosystems. Further tests are currently underway in Germany.

What is Ocean Alkalinity Enhancement?

OAE is an emerging climate research approach designed to increase the ocean's natural capacity to absorb carbon dioxide from the atmosphere. While the ocean already absorbs about a quarter of global carbon dioxide emissions, excessive absorption leads to ocean acidification; a process that can negatively affect coral reefs, shellfish, fish, and other marine organisms, with implications for fisheries and coastal livelihoods.

Unlike tree planting, which stores carbon on land, OAE works directly within the ocean system. Scientists introduce small, carefully measured amounts of alkaline (non-acidic) materials into seawater to reduce acidity and enhance the ocean's ability to capture and store carbon dioxide.



KMFRI's Anthony Kenga currently undertaking chemistry studies in TUM during the lab experiment

According to Dr Leila Kittu, a marine biogeochemist at GEOMAR, the Kenyan experiment is one of 17 studies being conducted globally under the *Ocean Alkalinity Enhancement Pelagic Impact Intercomparison Project*; a coordinated international research initiative.



Dr Leila Kittu conducts water tests

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“We will be collecting water samples regularly from tanks filled with seawater and monitoring how marine communities respond to changes in alkalinity,” Kittu explained. “The project aims to understand the environmental impacts of OAE across different geographical locations.” KMFRI’s Assistant Director for Oceanography and Hydrography, Dr. Joseph Kamau, emphasized the urgency of carbon removal efforts.



Research team getting ready

“There is already excess carbon dioxide in the atmosphere contributing to global warming. Even if emissions stopped today, the accumulated carbon dioxide would remain a challenge. This research explores potential solutions to remove carbon dioxide from the atmosphere and mitigate climate change impacts,” he said.

Ali Shee, a chemist at TUM’s School of Pure and Applied Sciences, noted that carbon dioxide remains the primary driver of global warming, underscoring the importance of evaluating scientifically sound mitigation approaches.



Research team involved in the study

“As you know the ocean is more than 75 per cent of our earth and we can use this vast resource both for economic activities as well as for fighting climate change,” Shee said.

The project involves participation from 17 countries across all continents, with Kenya hosting the only experiment of its kind in Africa.

OAE remains in the research phase. Scientists are closely monitoring its effects on marine plants and animals, water quality, and potential long-term environmental impacts. No large-scale deployment will occur without rigorous scientific validation and regulatory oversight.

Healthy oceans are vital for food security, fisheries, tourism, coastal protection, and biodiversity. Public awareness and community engagement are essential as climate innovation research progresses.

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KMFRI embarks on development of coastal microplastic monitoring dashboard

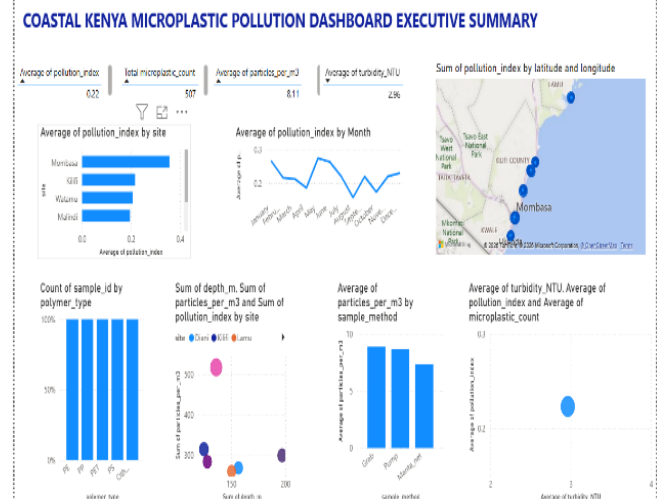
By: Justin Rutto, Kasuku Eugene | Layout: Kasuku Eugene
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The Kenya Marine and Fisheries Research Institute (KMFRI) is advancing Kenya's marine research capacity through the development of an interactive Coastal Microplastic Pollution Dashboard designed to transform how pollution data are analyzed, interpreted, and applied. Microplastic pollution has emerged as a growing concern for marine ecosystems worldwide. Along Kenya's coastline, these microplastic particles pose potential risks to fisheries, biodiversity, food safety, and coastal livelihoods.

Addressing such complex environmental challenges requires not only rigorous field research, but also modern digital tools capable of organizing and interpreting large volumes of environmental data.

The Coastal Microplastic Pollution Dashboard is being developed as a scalable, data-driven platform that will integrate multi-year and multi-site monitoring datasets into a dynamic and interactive interface. Rather than relying on isolated spreadsheets or static technical reports, the dashboard will allow researchers and decision makers to explore pollution patterns in real time.

Through integrated visualization tools, the platform



will enable users to identify spatial pollution

Prototype of the Coastal Microplastic Pollution Dashboard under development at KMFRI, designed to strengthen long-term marine pollution monitoring, multi-agency collaboration, and data-driven Blue Economy governance in Kenya.

hotspots along the Kenyan coastline, track temporal trends across sampling periods and compare microplastic concentration between counties such as Mombasa, Kilifi, and Kwale. It will also allow examination of dominant polymer types and exploration of potential relationships between microplastics and selected water quality parameters including turbidity, salinity, dissolved oxygen, and nutrient levels.

Beyond visualization, the dashboard represents a strategic research enabler. It will provide baseline datasets for future grant proposals, support advanced research such as ecological risk modeling, and facilitate interdisciplinary collaboration among chemists, oceanographers, ecologists, GIS analysts, and policy researchers.

By improving data organization and accessibility, the platform strengthens KMFRI'S institutional capacity for long-term marine environmental

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surveillance. The initiative aligns closely with Kenya's Vision 2030 and the country's expanding Blue Economy agenda, both of which emphasize sustainable ocean resource management and evidence-informed governance.

"Robust environmental monitoring systems are essential to ensuring that marine resources continue to support fisheries, aquaculture, tourism, shipping, and coastal communities".

Reflecting on the strategic importance of the initiative, Research Lead Rutto Justine noted.

"Developing this dashboard is an investment in future research capacity. By creating an interactive platform for marine pollution data, we are laying groundwork for stronger collaborations, improved grant competitiveness, and more responsive policy support in Kenya's coastal management sector."

Currently under active development, the dashboard will continue to evolve as additional datasets, analytical layers, and geospatial features are integrated. Future enhancements may include predictive pollution modeling, automated research functions, and expanded regional data-sharing capabilities. As the platform matures, it is expected to serve as a model for digital marine environmental monitoring systems across Eastern Africa, reinforcing KMFRI's leadership in technology-driven marine research and sustainable ocean governance.

KMFRI plays key role in flag-off of first ever Lake Turkana fishers survey

By: Brian Isoe | Photos: Brian Isoe | Layout: Kasuku Eugene | Edits: Jane Kiguta

The Kenya Marine and Fisheries Research Institute (KMFRI) team, led by Limnology Assistant Director Dr. Chrisphine Nyamweya, alongside Turkana Centre Director Mr. Maurice Obiero, and Project Coordinator Dr. Kevin Obiero, participated in the flag-off of the first-ever Lake Turkana Frame Survey on 19th February 2026 at Impressa (Daraja) Landing Site in Kalokol, Turkana County.

The survey is a critical initiative aimed at generating comprehensive data on the fisheries sector within Lake Turkana. It seeks to estimate the number of fishers operating on the lake; document fishing vessels and gear, including boats, nets, and hooks; identify fish landing sites and fishing villages; and assess fishing effort and capacity.

Ultimately, the survey will provide essential data to inform fisheries management and support evidence-based policy decisions.

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The Lake Turkana Frame Survey 2026 was conducted from the 19th to the 25th of February 2026, across all landing sites in Turkana and Marsabit Counties.



Flagging off of the survey

This comprehensive and historic Frame Survey targeting the fisheries sector is being undertaken by KMFR I together with the State Department for Blue Economy and Fisheries (SDBE&F) and the counties of Turkana and Marsabit.

The flag-off ceremony was presided over by Mr. Peter Ekaru, Chief Officer for Fisheries and Aquaculture in the Turkana County Government, alongside Mr. Charles Onduh, Assistant Director and Lake Turkana Alternate Focal Point, who represented the Principal Secretary, State Department for Blue Economy and Fisheries (SDBE&F). The event brought together national and county leaders, technical experts, and community representatives, demonstrating strong collaboration and a shared commitment to advancing the sector.

Key participants in the survey, including enumerators and supervisors, underwent comprehensive training covering various aspects of the exercise. This included the use of tools to ensure accurate, consistent, and

reliable data collection, as well as effective stakeholder engagement. The training equipped them with the requisite skills to work efficiently with different actors across the fisheries sector. The training was conducted at the Kenya Forestry Research Institute (KEFRI), where participants also gained a clear understanding of the survey objectives and standard operating procedures to ensure consistency of results throughout the exercise.

The survey is being carried out through a coordinated multi-agency effort involving SDBE&F, the county governments of Turkana and Marsabit, the Kenya Fisheries Service (KeFS), and the BMU Network Leadership, with KMFR I providing technical leadership and scientific oversight.

It is conducted under the project “*Sustainably Unlocking the Economic Potential of Lake Turkana*,” funded by the Embassy of the Netherlands in Kenya. The training and flag-off ceremony also brought together the Ag. Ward Administrator, the Area Chief, representatives from the SDBE&F, KeFS, County fisheries teams from Turkana and Marsabit, the Beach Management Networks Water Body President, Mr. Charles Nabwel, and KMFR I’s technical team.



Participant at the flagging off event

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This strong partnership demonstrates a shared commitment to advancing evidence-based fisheries management and supporting sustainable livelihoods for Lake Turkana's fishing communities. As the survey moves forward across the lake's landing sites, it is more than just data collection; it signifies an important step in protecting the lake's resources while unlocking its economic potential for current and future generations.

Fishing with eyes of experience: Integrating indigenous knowledge in Lamu fisheries

By: Stephen Makupe, Edward Waiyaki, Hellen Moyoni, Nicholas Karani, Faith Kimanga, Pendo Kazungu, Erick Nyambariga, Brenda Sibote and Mitch Mujibi | Layout: Kasuku Eugene | Edits: Faith Mboka

Along the shores of Lamu County, fishing is far more than an economic pursuit; it is a cultural heritage and a livelihood system shaped by generations of intimate engagement with the ocean. For elders, artisanal fishers, and fish traders, the sea is read through signs that are seldom documented but deeply understood.

The movement of seabirds, subtle shifts in water color and temperature, the behavior of marine organisms, and even the ocean's perceived healing properties form part of a sophisticated body of lived experience known as Indigenous Knowledge (IK). This knowledge has long underpinned sustainable fishing practices that support food security and local economies.



Hovering seabirds: a trusted Indigenous Knowledge sign of an abundant presence of fish

In recognition of its importance, the Kenya Marine and Fisheries Research Institute (KMFRI), through its Socioeconomics Directorate, undertook an initiative to document the application of Indigenous Knowledge in Blue Economy resource management. The study specifically focused on small-scale fisheries in Lamu County and explored the feasibility of integrating Indigenous Knowledge into formal fisheries management regulations.

Reading the ocean: Practical knowledge from the shore

For artisanal fishers in Lamu, Indigenous Knowledge is practical, observational, and deeply contextual. During focus group discussions in Kiwayuu led by the KMFRI Socioeconomics Team, retired fishers described how hovering and diving seabirds signal the presence of

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small pelagic fish. Such cues guide decisions on when and where to set nets. Changes in bird behavior along the shoreline are interpreted as indicators of shifting ocean conditions and potential variations in fish availability.

Beyond fishing grounds, Indigenous Knowledge extends to traditional healing practices. Washing wounds with seawater, for example, is widely believed to promote healing due to the saline water's disinfectant properties. While these practices may appear simple, they reflect a nuanced understanding of marine ecology developed through long-term observation, experimentation, and intergenerational knowledge transfer.

Research at both regional and global levels demonstrates that Indigenous Knowledge systems often align closely with ecological realities. They provide valuable insights into fish behavior, breeding cycles, migratory patterns, and ecosystem changes, particularly in contexts where scientific monitoring data may be limited. Evidence from coastal Kenya indicates that such knowledge has historically informed sustainable marine resource use through locally enforced norms, seasonal restrictions, and community-based management practices.

Why documentation matters

From KMFRRI's institutional perspective, documenting Indigenous Knowledge serves multiple strategic functions.

First, it strengthens evidence-based research by grounding scientific inquiry in the lived realities of fishing communities. Indigenous observations can complement biological and oceanographic data, enriching ecosystem assessments and improving the relevance of research outputs.

Second, it enhances KMFRRI's advisory role to government. By generating locally grounded data, the Institute can provide more context-sensitive recommendations on fisheries policies, co-management frameworks, and ecosystem-based management approaches.

Third, documentation promotes inclusivity in governance. Fishing communities, particularly small-scale operators are often underrepresented in formal policy processes. Recognizing and recording their knowledge affirms their role not merely as resource users, but as custodians of marine ecosystems.

Toward inclusive fisheries management

For small-scale fishers, this initiative represents recognition and empowerment. Formal documentation validates their experiential knowledge and opens space for more participatory fisheries management. Regulations such as closed seasons, gear restrictions, and spatial zoning can be strengthened when they reflect both scientific assessments and local ecological understanding.



FGD session with artisanal fishers in Kiwayuu, Lamu County, led by the KMFRRI Socioeconomics Team

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International case studies show that when fishers' knowledge is meaningfully integrated into policy frameworks, compliance improves, conflicts decline, and conservation outcomes are enhanced. Co-management arrangements grounded in mutual respect between scientists, policymakers, and communities tend to foster greater legitimacy and long-term sustainability.

National relevance and the Blue Economy

The implications of this initiative extend beyond Lamu County. Integrating Indigenous Knowledge into fisheries research and governance supports Kenya's broader Blue Economy agenda by promoting sustainability, social equity, and resilience.

It aligns with national fisheries and ocean governance frameworks, devolved county development planning, and global commitments such as the Sustainable Development Goals, particularly SDG 2 (Zero Hunger) and SDG 14 (Life Below Water). Furthermore, it responds to growing international calls for recognition of epistemic diversity: the understanding that Indigenous Knowledge constitutes a distinct and valuable knowledge system, not merely an adjunct to Western scientific traditions.

Listening for the future

At its core, this initiative is about listening; listening to elders, fishers, and coastal communities who have long understood that the health of the ocean and the wellbeing of those who depend on it are inseparable.

By documenting Indigenous Knowledge, KMFRI is not only preserving cultural heritage but also strengthening the scientific and policy foundations for sustainable fisheries management. In doing so, it advances food security, reinforces community resilience, and contributes to a more inclusive and sustainable Blue Economy for Kenya.

KMFRI leverages film to empower science communicators in seagrass conservation efforts

By: Kevin Otieno, Phionalorna Nzikwa, Dr Jacqueline Uku, | Layout: Kasuku Eugene | Edits: Jane Kiguta

The Kenya Marine and Fisheries Research Institute (KMFRI) recently hosted an inspiring Aquavox intergenerational filmmaking workshop in Mombasa, bringing together scientists, storytellers, and creatives in a dynamic learning environment designed to bridge the gap between science and society. While KMFRI is widely recognized for its leadership in marine and fisheries research, the Institute continues to expand its role beyond technical and scientific training by equipping researchers and partners with the skills to communicate science effectively, creatively, and meaningfully to diverse audiences.

The workshop, led by KMFRI Principal Research Scientist, Dr. Jacqueline Uku, and Ms. Stephanie Smith, founder of Aquavox, provided participants with hands-on training in storytelling and filmmaking. It created a platform where scientific knowledge and creative expression intersected, reinforcing KMFRI's commitment not only to generating scientific evidence but also to ensuring that research findings are accessible, relatable, and impactful to policymakers, coastal communities, and the general public.

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The Vision Behind Aquavox



Ms. Stephanie Smith, the founder of Aquavox

Ms. Stephanie Smith, an educator, communicator, and strategist from Chicago, founded Aquavox on the powerful principle that water has a voice, and storytelling can amplify it. Derived from the words “Aqua,” meaning water, and “Vox,” meaning voice, Aquavox uses film as a medium to help scientists and communities communicate environmental issues in compelling ways that inspire awareness, action, and change.

During her visit to East Africa to facilitate engagements focused on aquatic ecosystems, Stephanie partnered with KMFRI to deliver this specialized training workshop. The collaboration reflects KMFRI’s growing

recognition that impactful science extends beyond data collection and analysis, it must also be communicated



Group photo for the seagrass workshop participants at KMFRI

in ways that resonate with communities, decision-makers, and future generations. By hosting this workshop, KMFRI reaffirmed its leadership as a hub for scientific excellence and capacity building, fostering interdisciplinary skills that enable researchers to translate complex scientific concepts into engaging visual narratives.

Why seagrass?

A key focus of the workshop was seagrass ecosystems, an area where KMFRI continues to play a leading role in research and conservation. Dr. Jacqueline Uku introduced participants to KMFRI’s seagrass research team, which is currently undertaking a large-scale seagrass mapping initiative along the Kenyan Coast. Despite their critical ecological importance, seagrasses often receive less attention than coral reefs and mangroves. Yet, these ecosystems play a vital role in supporting marine biodiversity, providing habitat for iconic species such as sea turtles, stabilizing coastlines, improving water quality, and storing significant amounts of carbon, thereby contributing to climate change mitigation. Through this workshop, KMFRI researchers recognized the importance of communicating these

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scientific findings more effectively, ensuring that coastal communities, policymakers, and stakeholders understand the value of seagrass ecosystems and the urgent need to protect them.

Participants and their motivation



Participants in a group discussion during the filmmaking workshop

The workshop brought together a diverse group of participants, including KMFRI scientists, early-career professionals, and digital storytellers, creating a vibrant and collaborative learning environment. Scientists were keen to enhance their ability to visually document their research and communicate their findings more effectively to broader audiences. Digital content creators contributed their expertise in videography and storytelling, eager to apply their skills to environmental conservation narratives. Overall, participants joined the workshop to strengthen their capacity to translate scientific research into compelling and accessible visual stories. This intergenerational and interdisciplinary exchange fostered a rich learning experience, underscoring the value of integrating scientific expertise with creative communication approaches to increase the reach and impact of research.

Understanding storytelling through film

A central component of the training focused on the art and structure of storytelling. Participants learned that effective science communication is not just about presenting facts, but about crafting narratives that engage audiences emotionally and intellectually. They were introduced to the concept of the story arc, which forms the backbone of compelling films. This structure includes a clear beginning that introduces the subject, a middle that presents the challenge or significance of the issue, and an end that offers solutions and inspires action.

Participants also explored key storytelling principles, including identifying the intended audience, defining the central message, and presenting solutions in ways that inspire positive change. Emphasis was placed on using visuals, narration, and music strategically to enhance emotional connection and understanding. This approach reinforced KMFRI's broader institutional goal of strengthening science communication as a critical tool for advancing ocean conservation and sustainable resource management.

Let's talk film: Technical skills

In addition to storytelling techniques, the workshop provided participants with practical training in the technical aspects of filmmaking. They learned how visual composition, lighting, sound, and camera movement influence how stories are perceived and understood. Participants explored the importance of aspect ratio in tailoring content for different platforms, from documentary-style landscape formats to portrait-oriented reels suitable for social media. They also learned how depth of field can be used to focus

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attention on key subjects, and how natural lighting conditions can enhance visual quality.

Sound and voiceovers were highlighted as essential tools for clarifying scientific concepts and making them accessible to non-specialist audiences. Editing techniques were also introduced, demonstrating how raw footage can be transformed into cohesive and impactful narratives using accessible editing tools. Through these technical sessions, KMFRI demonstrated its commitment to empowering researchers with practical skills that enhance the visibility, accessibility, and societal relevance of their work.

From learning to action

By the conclusion of the workshop, participants had begun developing their own short films focused on seagrass conservation. These films aim to raise awareness, influence the public perception and support evidence – based decision making on marine conservation. The workshop underscored the importance of integrating science to ensure that the storyline is factual. Storytelling is a complementary tool for environmental stewardship and this workshop highlighted KMFRI'S evolving role as a center not only for scientific research but also for capacity building science communication.



A participant sharing a story focused on seagrass

Capacity hosting this training forum, KMFRI strengthened its position as a forward-looking institution that recognizes the importance of translating science into meaningful action. The initiative reflects the Institute's commitment to ensuring that scientific knowledge does not remain confined to academic circles but reaches the communities, leaders, and stakeholders who depend on it. Through initiatives such as the Aquavox filmmaking workshop, KMFRI is nurturing a new generation of scientists and communicators who are equipped not only to conduct research but also to tell the stories that inspire conservation, inform policy, and safeguard Kenya's marine ecosystems for future generations.

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Mtafiti Pictorials

By: Kasuku Eugene | Photos: Caleb Korir, Kevin Kevin Owino & Faith Mboka



KMFRRI's Anthony Kenga, also a student at TUM, during a lab experiment



KMFRRI Director General Dr. Paul Orina at the World Fish workshop.



KMFRRI staff at the World Fish workshop



Research team involved in the ocean alkalinity study

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KMFRI staff with community members at a tree planting activity



Group photo for the seagrass workshop participants at KMFRI



KMFRI staff participating in a tree planting activity



Participants during World Fish workshop held in Mombasa

For feedback, inquiries, or further information, please contact the Corporate Communications and Public Relations Department at: **communication@kmfri.go.ke**.