

Mtafiti Monthly

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Indigenous knowledge: local communities at the forefront in conservation of wetland areas

Wetlands are often described as the “lungs of the planet” because of their remarkable ability to filter water, store carbon, regulate floods, and support diverse plant and animal life. Yet for the communities who live alongside them, wetlands are far more than ecological assets, they are homes, sacred spaces, natural pharmacies, sources of food and income, and foundations of cultural identity, deeply woven into the social and economic fabric of society. Recognizing this immense ecological and human value, the world commemorates World Wetlands Day every 2nd February, marking the adoption of the Ramsar Convention on Wetlands in Ramsar, Iran, in 1971. The day serves as a global call to action, reminding governments, conservation organizations, and communities of the urgent need to protect wetlands and promote their wise use.



AI Generated Image Illustrating wetlands and how they operate

Guided by this global spirit of awareness and responsibility, stakeholders gathered at Mnarani Beach Club in Kilifi County on 2nd February 2026 to mark this year's celebration. The dialogue brought together local communities, conservation experts, government agencies, and civil society organisations, all united by a shared commitment to sustainable wetland management. The Kenya Marine and Fisheries Research Institute (KMFRI) joined fellow stakeholders in reaffirming its dedication to wetland conservation. The event was graced by the Director General, Dr. Paul Orina, who served as Chief Guest and emphasised the importance of placing communities at the centre of conservation efforts. He noted that when local people are meaningfully involved, they develop a sense of ownership and become the strongest champions for protecting and preserving wetlands.

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KMFR I Director General giving his remarks at the World Wetlands Day event

The commemoration brought together partners from Nema Kenya, KEFRI, WWF-Kenya, Wetlands International, Kenya Fisheries Service, Kenya Forest Service, Kenya Wildlife Service, IUCN, and others, showcasing the power of collaboration in safeguarding Kenya's wetlands. Discussions throughout the event focused on promoting sustainable management practices while raising awareness of the ecological, social, and economic significance of wetlands. A key highlight of the panel dialogue was the critical role of indigenous knowledge and community participation in conservation efforts. Participants acknowledged that local communities possess deep ecological wisdom passed down through generations through oral tradition, knowledge that remains invaluable in safeguarding fragile ecosystems. An elder representing the Kaya community illustrated this by sharing how traditional practices, including taboos and the protection of sacred sites, have long regulated access to sensitive wetland areas, ensuring their preservation for generations to come.



Stakeholders engaging in discussions on conserving our wetlands

The elder from the Kaya community highlighted that some places have been reserved as sacred sites and ritual, and certain areas are traditionally reserved as fish breeding grounds. This indigenous knowledge is not found in books but has been passed through generations as stories and daily practices. For example, the local knowledge on tides informs the communities on when to plant mangrove, as one speaker put it, *"traditional knowledge is like a living library of wisdom."* This indigenous knowledge improves the rate of restoration.



Stakeholders posing for a group photo during the World Wetlands Day celebrations

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Beyond Kilifi, the experience of the Tana Delta offers a compelling example of how traditional systems can successfully support conservation. In this ecologically rich landscape, wetland areas such as Lake Lemu and Lake Shakababu, in Tana River County are safeguarded through community-led management approaches rooted in local knowledge, customary norms, and collective responsibility. These efforts demonstrate that when communities are empowered, conservation becomes both practical and sustainable.

At the same time, wetlands across the region continue to face serious threats. The case of Lake Kenyatta (Mpeketoni) illustrates how deforestation, pollution of water channels, illegal sand harvesting, and settlement encroachment can severely degrade fragile ecosystems, in some instances leading to the drying up of vital water bodies. Yet, even in the face of such challenges, there is hope. Through coordinated efforts by local communities working in partnership with Civil Society Organizations and non-governmental organisations, significant progress has been made toward restoring the lake.

These experiences reinforce a consistent message echoed throughout the World Wetlands Day dialogue: sustainable wetland conservation depends on inclusive, community-driven approaches that blend scientific knowledge with indigenous wisdom. When local stewardship is recognized and strengthened, wetlands stand a far greater chance of thriving for generations to come. The CSO's such as World Wide Fund for Nature (WWF) highlighted the importance of working the local communities in conservation of wetland areas. WWF works with community forest association along the coastal areas. Holy Forest project was developed to protect sacred natural sites.

What stood out throughout the conversations during the dialogue was that communities are the true custodians of indigenous knowledge, and effective wetland conservation requires partners to act as collaborators rather than owners. Integrating traditional ecological knowledge with policy, funding, and science is essential to protect wetlands, safeguard livelihoods, and preserve the environment for future generations. Inclusive, community-driven approaches are key to ensuring sustainable conservation outcomes.



Dr Judy Okello, the Chair, National Mangroves Committee giving her remarks as participants follow through the deliberations

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Unlocking the potential of Kenya's longline pelagic fisheries

Pelagic fisheries are a strategic component of Kenya's Blue Economy, contributing approximately 35% of total marine landings and valued at an estimated KES 2.5 billion. They play an important role in national food security, employment, and export earnings. High-value species such as tuna, swordfish, and other large migratory fish support both domestic markets and international trade, positioning Kenya within the broader Western Indian Ocean fisheries landscape.

Despite this contribution, offshore pelagic resources within Kenya's Exclusive Economic Zone (EEZ) remain underexploited by local fishers. Industrial longline vessels operating in deeper waters account for much of the offshore catch, while domestic capacity for large-scale pelagic fishing is still developing. This situation presents both a challenge and an opportunity, thus the need to ensure sustainable management of shared stocks while strengthening national participation and value capture.



High value fish species, Tuna and Swordfish ready for domestic markets and international trade

Recent research by the Kenya Marine and Fisheries Research Institute (KMFRI) on the status of longline pelagic fisheries in Kenya's EEZ provides important evidence to guide this process. The study examines catch trends, species composition, fishing effort, and stock sustainability of key commercial species targeted by industrial longline vessels by analyzing available fisheries data. The research offers a clearer understanding of how offshore pelagic resources are being utilized and the implications for long-term management.

The findings contribute to evidence-based decision-making at a time when Kenya is advancing its Blue Economy agenda. Strengthening monitoring,

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improving data systems, enhancing domestic capacity, and aligning policy with scientific assessments will be critical to ensuring that pelagic fisheries continue to generate economic benefits while maintaining ecological sustainability.



A Domestic longline vessel within Kenya's Exclusive Economic Zone (EEZ)

What the Data Tells Us

Between 2016 and 2024, industrial longline vessels deployed an estimated 17.3 million hooks, landing over 3,400 metric tonnes of fish. Fishing effort and catches fluctuated over the years, with notable declines during the COVID-19 pandemic and a steady recovery observed from 2022 onwards. On average, a single industrial longline vessel lands over 300 metric tonnes annually, generating a positive net profit, an indicator of the sector's strong economic potential.

The fishery is dominated by Swordfish (*Xiphias gladius*), which accounts for nearly 60% of total landings, followed by Yellowfin tuna (*Thunnus*

albacares), Bigeye tuna (*T. obesus*), and Blue shark (*Prionace glauca*). Catch-per-unit-effort (CPUE) trends for these species remained relatively stable, suggesting that stocks have not yet shown dramatic declines. However, changes in species dominance, particularly the increasing prevalence of Swordfish, may signal shifts in targeting practices or ecosystem dynamics.



Swordfish catches during the high monsoon season

Sustainability Concerns

While the economic outlook is promising, biological indicators raise important sustainability concerns. A large proportion of the dominant species landed, particularly Swordfish and Yellowfin tuna, were found to be immature at the time of capture. This trend, combined with declining average sizes for some

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species, points to the risk of growth overfishing if current practices persist.



Longline vessel lands over 300 metric tons annually

Seasonal patterns were also evident, with higher Swordfish catches recorded during the southeast monsoon season. These findings highlight the need for season-specific management measures, such as temporal fishing controls or protection of known spawning areas, to reduce juvenile catches and safeguard stock productivity.

Charting the Way Forward

The study underscores the strong potential of Kenya's longline pelagic fisheries to contribute more substantially to national development, if managed responsibly. Strengthening scientific monitoring and data systems will be essential to guide adaptive, evidence-based management of key stocks. Enhancing Monitoring, Control and Surveillance (MCS) mechanisms will help safeguard offshore resources and ensure compliance within Kenya's EEZ. At the same time, building local capacity to participate more actively in offshore fisheries, through investment,

skills development, and value addition, will increase the benefits retained within the country.

As Kenya advances its Blue Economy agenda, a balanced approach that integrates profitability with sustainability will be critical to ensuring pelagic fisheries continue to support livelihoods, food security, and long-term economic growth.

By: Faith Mboka, Phionalorna Nzikwa | Photos: Faith Mboka & Kevin Owino | Layout: Faith Mboka & Jacqueline Wamta

Diving into expertise as KMFRI hosts Mombasa fisheries team for practical learning and knowledge exchange

Kenya's coastline is not just a scenic stretch of beaches and mangroves; it is a living laboratory where the health of marine ecosystems, fisheries, and local communities are intricately linked. Ensuring the sustainability of these resources requires both scientific knowledge and practical, on-the-ground solutions. Recognizing this, the Kenya Marine and Fisheries Research Institute (KMFRI), a leading Centre for aquatic research and technical expertise in fisheries

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and the blue economy, recently opened its doors to the Mombasa County Fisheries Department team for a week-long learning programme.



KMFRI Research scientists and Mombasa County Fisheries Team pose for a group photo

The initiative offered county officers a unique opportunity to engage directly with KMFRI researchers, gaining hands-on experience and practical insights into sustainable fisheries management, marine science, and the blue economy. The programme blended technical presentations and interactive discussions in laboratories and conference rooms with field visits to seaweed farms, mangrove forests, fish-drying sites, and a constructed wetland, vividly demonstrating how scientific knowledge can be applied to support both ecosystems and the livelihoods that depend on them.

By bringing together county officers, KMFRI researchers, and development partners, the sessions fostered a collaborative approach to learning, showing how science, technology, and community knowledge can work hand in hand to strengthen coastal fisheries management. Discussions began with an overview of

Mombasa County's fisheries and the broader opportunities within Kenya's Exclusive Economic Zone. Participants explored Mariculture technologies and innovations along the coast, while sessions on nutrition security and post-harvest solutions highlighted ways to reduce losses and improve fish quality for small-scale fishers and traders. Other sessions examined the health of marine ecosystems, focusing on the impacts of climate change, marine pollution, and nature-based solutions for wastewater management. Participants also explored the role of digital technologies in fisheries, the links between fisheries and livelihoods, and the importance of art, culture, and ocean literacy in fostering community awareness and engagement.



Mombasa County Fisheries Team during the Technical Capacity Building training

The learning journey then moved from the meeting rooms into coastal communities, where participants witnessed many of these concepts in action, observing firsthand how sustainable practices and innovative

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solutions are shaping the future of Kenya's fisheries and coastal ecosystems. In Kibuyuni, the team visited seaweed farms, observing cultivation, harvesting, and marketing practices. The visit highlighted how seaweed farming contributes to household incomes and strengthens local value chains.

between scientific knowledge and everyday livelihoods, empowering communities while safeguarding valuable coastal resources.



Mombasa County Fisheries Team at Seaweed farms witnessing cultivation and harvesting

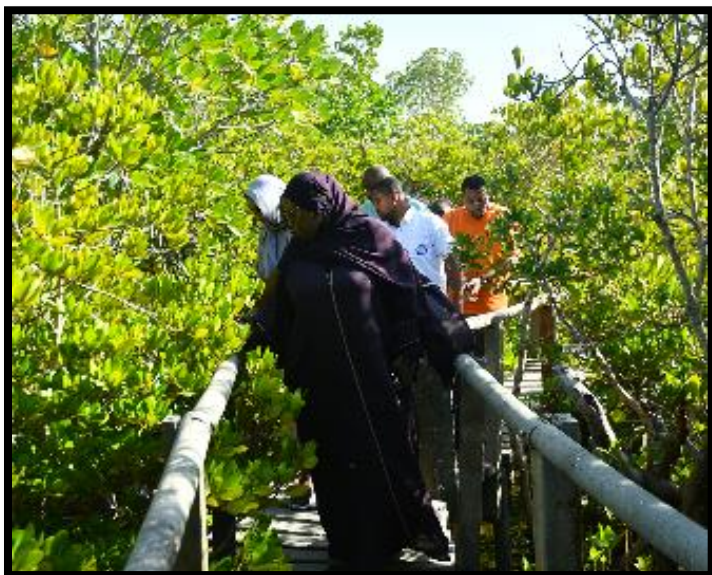
At Mwazaro, participants had the opportunity to see innovative solutions in action, observing the use of Solar Cooling and Drying (SolCoolDry) technology, a simple yet highly effective method for preserving fish and reducing post-harvest losses. The demonstration highlighted how such locally adaptable innovations not only improve the quality and shelf life of fish but also enhance market opportunities for small-scale fishers. By harnessing renewable energy, the technology reduces reliance on ice and fuel, lowers operational costs, and contributes to more sustainable and resilient fisheries practices. Participants saw firsthand how practical, context-specific solutions can bridge the gap



Mwazaro SolCoolDry, learning on effective methods for preserving fish and reducing post-harvest losses

In Gazi, the Mikoko Pamoja project showcased how mangrove conservation can simultaneously address climate change and support local livelihoods through carbon financing. Participants saw firsthand how protecting coastal ecosystems strengthens community resilience, creates sustainable income, and highlights the close link between healthy environments and thriving communities.

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Participants take a walk on Gazi boardwalk led by KMFR I Senior Research Scientist and Mangrove Restoration Expert Dr. Amina Juma

The field tour concluded at Mikindani, where a constructed wetland demonstrated a nature-based approach to wastewater treatment. Participants saw how plants, soil, and microbes naturally filter pollutants, reducing contamination entering coastal waters. The site highlighted how ecological solutions can support healthier marine environments. Beyond environmental benefits, the wetland offered opportunities for community engagement and education. Local stakeholders can participate in maintaining the system while learning practical ecosystem-based solutions. The visit reinforced the value of nature-based approaches in promoting both environmental protection and community resilience.



KMFR I ADOH, Dr. Kamau, giving an illustration on how The Mikindani wastewater treatment wetland works

The workshop ended on a reflective note, with a certificate award ceremony recognizing participants' commitment throughout the training. This was followed by a session where members shared key lessons learned and discussed ways to apply their new knowledge in their work, charting the path forward for sustainable fisheries management in Mombasa County. The week's activities offered a glimpse into the kind of practical guidance, knowledge exchange, and hands-on solutions that continue to shape Kenya's coastal fisheries and the broader blue economy. From classroom discussions to field demonstrations, the programme reflected how institutions like KMFR I can work with stakeholders to address real-world challenges and create lasting impact along the coast.

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KMFRI DOCS, Dr. Mwaluma, presenting a performance certificate to a member of Mombasa Fisheries Team

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Science Café on ocean governance sparks dialogue on sustainable aquatic futures

As oceans and freshwater systems face mounting pressure from climate change, coastal development, and biodiversity loss, the need for informed and inclusive governance has never

been more urgent. These themes took centre stage during a Science Café on Ocean Governance held in Mombasa, where scientists, practitioners, and researchers came together for an evening of thoughtful dialogue and knowledge exchange on the sustainability and resilience of aquatic ecosystems.

Hosted by Alliance Française, Mombasa, in collaboration with the French National Centre for Scientific Research (CNRS), the Kenya Marine and Fisheries Research Institute (KMFRI), the French National Research Institute for Sustainable Development (IRD.fr), and Pwani University, the forum reflected a strong spirit of interdisciplinary and cross-institutional collaboration. Participants shared evidence-based insights and diverse perspectives, examining the complex challenges affecting both marine and freshwater systems and the governance approaches needed to address them.



Ocean Café forum at Alliance Française, Mombasa

KMFRI team was led by the Director General, Dr Paul Orina, underscoring the Institute's commitment to

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science-led dialogue and evidence-based approaches to ocean governance. Representing KMFRI, **Dr Erick Okuku** contributed as a panelist, sharing research-informed perspectives from the field, while **Dr Jacqueline Uku** served as one of the moderators, guiding the conversation and fostering inclusive engagement.



KMFRI Director General, Dr. Paul Orina, giving his remarks

Participants explored the delicate balance between the ocean's immense power and its growing vulnerability, drawing on scientific research, policy frameworks, and practical experiences. Discussions ranged from coastal ecosystems and fisheries management to freshwater marine linkages, highlighting the interconnected nature of aquatic systems and the need for governance models that reflect this complexity.

A central theme of the evening was the persistent gap between science and decision-making. Speakers emphasized the importance of translating research into actionable policy, strengthening cross-sector collaboration, and ensuring governance structures are adaptive, participatory, and grounded in local realities.

Community engagement, regional cooperation, and long-term monitoring emerged as essential pillars for building resilient and sustainable aquatic ecosystems.



Participant engaging directly with experts, sharing experience on Ocean Governance

The set up for the **Science Café** encouraged open exchange, allowing audience members to engage directly with experts, ask critical questions, and share lived experiences. This interactive setting fostered collective learning and reinforced the idea that safeguarding oceans and freshwater systems is not only a scientific or policy challenge, but a shared societal responsibility.

The evening was further enriched by the **CNRS photographic exhibition**, which provided a powerful visual reflection on the ocean's beauty, strength, and fragility, complementing the discussions and deepening the connection between science, art, and public awareness.

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As coastal communities increasingly experience the impacts of climate change and environmental degradation, forums such as the Science Cafés serve as vital platforms for reflection, collaboration, and collective action. This year's first Science Café on Ocean Governance reaffirmed the central role of science-informed dialogue in shaping sustainable futures for oceans, rivers, and the communities that depend on them.



CNRS photographic exhibition: a reflection of ocean beauty

Moving forward, participants called for deeper collaboration between scientists, policymakers, practitioners, and communities to ensure that research translates into inclusive, adaptive, and effective governance frameworks. Continued investment in knowledge exchange, public engagement, and evidence-based decision-making will be essential to safeguarding aquatic ecosystems, today and for generations to come.

By: Dr. Fonda Jane Awuor, Dr. Chrisphine Nyamweya, Venny Mziri, Nathan Lenjo, Sylvia Mosoti, Naftal Obwoni, G. Eng. Emmanuel Nindo | Edits: Faith Mboka | Layout: Faith Mboka & Jacqueline Wamta

KMFRI and ShoShin partner in piloting Early Warning Systems for cage aquaculture in Lake Victoria

The Kenya Marine and Fisheries Research Institute (KMFRI) and ShoShin Innovation Hub have partnered to pilot an Early Warning System for cage aquaculture at Dunga Beach in Lake Victoria. The initiative aims to address the recurring problem of mass fish deaths that have caused huge financial losses to cage farmers and threatened livelihoods along the Lake Victoria blue economy value chain. By combining science and technology, the project introduces real-time environmental monitoring to help farmers respond early to dangerous changes in water quality before fish deaths occur.

The pilot uses ShoShin's digital platform, which integrates Internet of Things (IoT) sensors, artificial intelligence, and mobile and web-based communication systems. The sensors have been installed around cage farming areas to continuously monitor key water quality parameters such as dissolved oxygen, pH, temperature, electrical conductivity, total dissolved solids, and salinity. These

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measurements are transmitted in real time to a cloud-based system where AI tools analyze the data and detect abnormal changes. When water conditions become unsafe, farmers receive alerts on their mobile phones, allowing them to take preventive action early.



KMFRI researchers and ShoShin Innovation Hub team members installing and testing solar-powered early warning technology

The project responds to a serious and recurring crisis affecting Dunga Beach, which is located along the eastern shore of the Winam Gulf in Lake Victoria. For three consecutive years, cage farmers have experienced mass fish death events without an effective early warning system. The most recent incident occurred in September 2025 when thousands of tilapia were found floating dead in the lake. Approximately 12 out of 100 cages were affected, leading to the loss of about 10 tonnes of fish worth nearly KES 10 million within two days. The impact of these losses went beyond farmers. Fish traders recorded low sales because consumers feared contaminated fish, while hotels, restaurants, and transport businesses along the lakeshore experienced reduced income. Environmental degradation, particularly wetland destruction caused by population pressure, pollution, and human activities, has also reduced the natural ability of wetlands to filter and clean water.



Fish kill incident linked to poor water quality conditions in Lake Victoria

As one cage farmer, Godfrey Ochieng, explained, *“If the wetlands around Dunga were not interfered with, we might not suffer these losses. But due to population pressure, human activities, and pollution, nature and wetlands have been disrupted.”*

The partnership between KMFRI and ShoShin Innovation Hub was developed after a reconnaissance visit to Dunga Beach in November 2025. During this visit, researchers and technology experts met with cage farmers and Beach Management Unit members to understand the challenges they were facing and design practical solutions. KMFRI provides scientific research expertise, water quality monitoring knowledge, policy guidance, and research validation, while ShoShin contributes technological infrastructure, AI-based analytics, real-time alert systems, and community digital training support.

How the system works

The early warning system works through four main steps. First, IoT-enabled water quality sensors continuously monitor the lake environment around cage farms. Second, sensor data is transmitted through mobile networks to a cloud platform. Third, AI algorithms analyze water quality trends and detect dangerous changes. Finally, when water conditions cross safe limits, automatic alerts are sent to farmers, while KMFRI scientists verify the data and provide

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technical guidance on protective actions such as moving cages or increasing oxygen levels through aeration.



Community engagement and capacity building sessions to support farmer adoption of early warning technology for sustainable aquaculture

Potential benefits

The expected benefits of the project are significant. Early detection of environmental risks could prevent up to 80% of fish deaths caused by poor water conditions. The system also helps protect investments worth about KES 10 million during each fish kill event by safeguarding fish stock, feed, and labour costs. In addition, continuous water quality data collection will support KMFRI's scientific research on Lake Victoria's ecosystem health and help inform future environmental policies. The project is also helping farmers move from reactive farming practices to more proactive, data-driven aquaculture management through digital literacy training.

The pilot is being implemented in three phases. The first phase involved reconnaissance visits,

environmental data collection, and stakeholder consultations to understand farmer needs. The second phase, which is currently ongoing, focuses on installing sensors, configuring the monitoring platform, training farmers, and testing the system. The final phase will focus on continuous monitoring, evaluating system performance, integrating community feedback, and developing recommendations for scaling the model to other cage farming areas across Lake Victoria.



A farmer installing a solar-powered early warning technology device

This initiative is strategically important because it supports Kenya's Blue Economy development goals

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under the State Department for Blue Economy and Fisheries. With more than 40 million people across East Africa depending on Lake Victoria for food, water, and economic activities, protecting the lake's ecosystem is essential.

The KMFRI–ShoShin partnership demonstrates how science, technology, and community participation can work together to build climate-smart and sustainable aquaculture systems that protect both livelihoods and the environment.



KMFRI

Kenya Marine and Fisheries Research Institute

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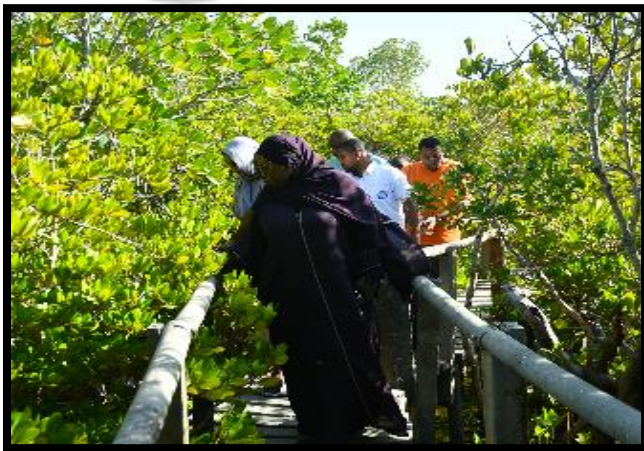
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KMFRI Director General giving his remarks at the World Wetlands Day event



Dr. Judy Okello, the Chair, National Mangroves Committee giving her remarks as participants follow through the deliberations



Participants take a walk on Gazi boardwalk led by KMFRI Senior Research Scientist and Mangrove Restoration Expert Dr. Amina Juma



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