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Feature Story:

KMFRI-WorldFish partnership shows strong promise for sustainable Coastal livelihoods

Highlights



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KMFRI alongside state agencies strengthen collaboration with WorldFish to advance blue economy and fisheries sector



Untapped aquaculture in ASALs holds great promise - KMFRI study



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By: Caleb Korir | Edits: Jane Kiguta | Layout: Faith Mboka

KMFRI-WorldFish partnership shows strong promise for sustainable Coastal livelihoods

WorldFish, in partnership with the Kenya Marine and Fisheries Research Institute (KMFRI) and other stakeholders, held the Asia-Africa BlueTech Superhighway (AABS) dissemination workshop in Mombasa. The initiative is an effort to transform coastal livelihoods through innovative and sustainable aquaculture practices.

KMFRI Director General Dr. Paul Orina, who was joined by KMFRI's Director of Aquaculture, Dr. Jonathan Munguti, officially opened the meeting. The project, implemented over the past three years in Kilifi and Kwale counties, focuses on improving the livelihoods of coastal communities not only in Kenya but also across Asia and Africa.

In his remarks, Dr. Orina emphasized the need to connect science with everyday life, especially for communities that depend on marine ecosystems. His message was that innovation must work for both the people and the environment.

Led by WorldFish in partnership with KMFRI and other stakeholders, AABS focuses on improving livelihoods, especially for women and youth, while also restoring marine ecosystems. The idea is that healthy oceans can support healthy communities, but only if they are managed in a sustainable way. The collaborative project is delivered through four synergistic work

packages that assess, adapt, and scale evidence-based innovations for nature-positive impact.



KMFRI Director General Dr. Paul Orina, delivers his keynote remarks during the official opening of the Asia-Africa BlueTech Superhighway (AABS) dissemination workshop.

During the workshop, Work Package 2 was highlighted as one of the project's key approaches. It promotes Integrated Multi-Trophic Aquaculture (IMTA), led by the WorldFish Scientist and Work Package 2 lead of the IMTA under the Asia- Africa Blue Tech Superhighway(AABS) project, Dr. Esther Wairimu. IMTA involves farming different aquatic species together in a way that benefits both productivity and the environment. For instance, waste from one species can support the growth of another, creating a balanced system.

In his remarks, KMFRI Aquaculture Director Dr. Jonathan Munguti hailed IMTA as a revolutionary approach that can play a key role in boosting aquaculture in Kenya. He added that it allows for

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greater efficiency, competitiveness, and profitability while guaranteeing environmental balance.



KMFR I Director of Aquaculture Dr. Jonathan Munguti delivers his remarks during the Asia-Africa BlueTech Superhighway (AABS) dissemination workshop

Participants were taken through early findings from projects in Kilifi and Kwale counties, where IMTA practices are already showing promising results. The real voices from the ground, including fish farmers and seaweed farmers, brought the story to life. Seaweed farmers spoke about improved yields, while fish farmers shared how the system has helped reduce costs.

These stories highlight a growing realization that solutions work best when communities are actively involved in designing, testing, and scaling them

Progress like this does not happen in a vacuum, but through collaboration among different stakeholders. The workshop brought together key partners, including the Kenya Fisheries Service (KeFS), the county governments of Kwale and Kilifi, Pwani University, and private sector players such as UMITRON. Each partner plays a role in research, policy, training, and technology. Together, they form a network that ensures ideas are implemented beyond words and translated into visible results.



Participants pose for a group photo during the IMTA dissemination workshop.

The results sparked lively discussions on how successful ideas can be expanded to reach more communities. Stakeholders explored ways to scale up the model so that it can benefit even more people. There was a shared understanding that collaboration is key to ensuring the initiative succeeds and meets its targets.

As the workshop came to an end, one key message stood out clearly: meaningful change happens when there is strong collaboration between science and local communities. Through the AABS initiative spearheaded by WorldFish, there is growing hope that coastal communities can improve their livelihoods while keeping the ocean healthy for future generations.

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By: Justine Rutto & Faith Mboka | Edits: Jane Kiguta | Layout: Faith Mboka

From city floods to ocean pollution: Tracing urban plastic waste to Kenya's Coast

Hheavy rains in Nairobi often bring familiar disruptions—flooded streets, stalled traffic, and pressure on infrastructure. Less visible, however, is a far-reaching environmental consequence: the movement of plastic waste from urban areas to the ocean. What begins as improperly discarded waste in city drainage systems can ultimately end up polluting Kenya's coastline.



Pathway of plastic pollution from urban flooding in Nairobi to coastal deposition through the Sabaki River, illustrating how inland waste management challenges contribute to marine pollution in the Indian Ocean.

From drainage systems to the ocean

During periods of intense rainfall, plastic waste that has accumulated in drains, streets, and open spaces is rapidly mobilized through stormwater drainage systems into urban waterways. These flows feed into larger river systems, most notably the Sabaki River, which drains a vast catchment area from the central highlands to the coast. As Kenya's second-longest river, the Sabaki acts as a major transport pathway, carrying plastic waste downstream to the Sabaki Estuary, where it enters the Indian Ocean.

Along this pathway, plastic waste—including single-use packaging, plastic bags, and bottles—is transported over long distances before settling in coastal habitats. Beaches, mangrove forests, and nearshore ecosystems often become accumulation zones, where currents and tides concentrate debris. These environments are ecologically sensitive, serving as breeding grounds, nurseries, and feeding areas for diverse marine species.

Impacts on Coastal ecosystems

One of the areas increasingly impacted by this influx is Malindi Marine National Park. Known for its coral reefs, rich biodiversity, and economic importance through tourism, the park is a cornerstone of Kenya's marine conservation efforts. However, plastic pollution poses growing risks: marine organisms can become entangled in debris, coral habitats may be damaged or smothered, and over time, plastics break down into micro plastics that enter the marine food chain. These impacts extend beyond ecological damage, affecting fisheries, tourism, and ultimately human health.

Interestingly, recent rainfall along the coast has been relatively mild. Counties such as Mombasa, Kilifi, Kwale, and Lamu recorded minimal flooding. As a result, locally generated flood-driven plastic inputs into the ocean have likely remained low during this period. However, marine pollution persists—largely due to riverine inputs from upstream regions. This contrast highlights the critical role of river systems in transporting pollution from inland areas to coastal

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environments, even when local conditions at the coast appear relatively stable.



Justine conducting automated titration in the KMFRI laboratory to measure turbidity and other key marine pollution parameters that support research on coastal water quality.

Towards integrated solutions

The situation underscores a fundamental reality: environmental systems are deeply interconnected. Rivers link human activities in urban centers to distant marine ecosystems, effectively transferring the consequences of inadequate waste management across landscapes. Addressing marine plastic pollution, therefore, cannot be confined to coastal interventions alone.

A more integrated approach is required—one that prioritizes upstream solutions. Improving urban waste management systems, strengthening recycling infrastructure, promoting responsible consumption, and enhancing public awareness are all essential steps. By reducing the volume of plastic entering drainage networks in cities, the flow of waste into rivers—and ultimately the ocean—can be significantly curtailed.

Protecting Kenya's marine ecosystems begins far upstream. Without addressing urban waste management challenges, efforts at the coast will remain limited. Cleaner cities lead to cleaner rivers—and ultimately, more resilient marine ecosystems.

By: Dr Jonathan Munguti, Dr Domitila Kyule & Dr Paul Orina | Edits: Faith Mboka & Jane Kiguta | Layout: Faith Mboka

KMFRI harnessing Lake Chala tilapia for sustainable aquaculture

The Kenya Marine and Fisheries Research Institute (KMFRI) has been at the forefront of championing the conservation and utilization of Lake Chala's endemic tilapia as a pathway to sustainable aquaculture development.

Research studies led by KMFRI's Aquaculture Director Dr. Jonathan Munguti highlight the significant potential of the critically endangered *Oreochromis hunteri* for Kenya's aquaculture sector. Its unique adaptive traits position it as a promising candidate for enhancing productivity, supporting climate-resilient aquaculture

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practices, and contributing to the conservation of genetic resources while meeting the growing demand for fish.



Lake Chala Tilapia

In the face of climate variability, resource constraints, and increasing demand for fish, highly adaptable fish species play a critical role in strengthening aquaculture systems. Their ability to tolerate a wide range of environmental conditions, efficiently utilize available feed resources, and demonstrate resilience to disease and stress makes them particularly suitable for diverse production systems, including low-input and smallholder operations.

About Lake Chala Tilapia

Deep within the volcanic crater of Lake Chala lives one of East Africa's most unique freshwater species. This tilapia is found nowhere else in the world, making it both ecologically irreplaceable and scientifically significant. As the type species of the *Oreochromis* genus, it is closely related to globally farmed species such as *Oreochromis niloticus*, yet it remains largely absent from aquaculture systems.

Over thousands of years, *O. hunteri* has evolved in complete isolation within Lake Chala, adapting to a deep, clear, and nutrient-limited environment. This long evolutionary history has produced a genetically distinct species with specialized ecological traits, making it an important model for understanding biodiversity and ecosystem dynamics in isolated freshwater systems.



Aerial view of Lake Chala

Rising threats to survival

Despite its resilience over millennia, *O. hunteri* now faces unprecedented threats. The introduction of non-native species, particularly *Coptodon rendalli* and hybrid tilapias, has significantly altered the lake's ecological balance. These invasive species compete directly for food and habitat, forcing *O. hunteri* into deeper, less favorable zones of the lake.

At the same time, environmental pressures are intensifying. Deforestation around the lake's catchment has increased sedimentation, degrading water quality and reducing available food resources. Climate change further threatens the lake's delicate stratification and oxygen balance, potentially shrinking the already limited habitat available to the species.

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As a result of these combined pressures, *Oreochromis hunteri* is now classified as critically endangered, with its entire global population confined to a single, vulnerable ecosystem.



KMFRI Aquaculture Director Dr Jonathan Munguti

Ecology and adaptive traits

Lake Chala's unique environment has shaped the biology and behavior of *O. hunteri*. The species primarily feeds on algae and organic matter scraped from rocks, but it also demonstrates seasonal flexibility by shifting to plankton feeding during periods of high productivity. This adaptability has historically supported its survival in a resource-limited system.

Like other tilapias, *O. hunteri* is a maternal mouthbrooder, with females carrying eggs and young

in their mouths for protection. Its deep-bodied structure and specialized feeding mechanisms further reflect adaptation to a benthic lifestyle within a steep, rocky habitat.

"However, recent observations suggest that competition from invasive species has compressed its ecological niche, limiting its distribution and potentially affecting its long-term viability," says Dr Munguti.

Nutritional value and local relevance

Although not widely commercialized, *O. hunteri* holds clear nutritional value. Like other tilapia species, it is expected to be high in protein and low in fat, making it an important potential contributor to food and nutrition security. Local communities around Lake Chala already recognize its value, often describing it as a uniquely flavorful and desirable fish.

However, its endangered status currently limits exploitation, reinforcing the need for conservation-focused strategies that balance utilization with sustainability

Aquaculture potential and conservation opportunities

The biological characteristics of *O. hunteri* suggest promising potential for aquaculture, particularly within a conservation framework. As a tilapia species, it is likely adaptable to controlled environments and capable of accepting formulated feeds. This opens the possibility for conservation aquaculture, where the species is bred and reared to support both population recovery and local livelihoods.

Such approaches could include cage culture within Lake Chala or ex situ farming in controlled systems. Beyond providing an alternative source of fish, aquaculture could reduce pressure on wild populations and support restocking efforts.

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However, careful management is essential. Maintaining genetic diversity, avoiding domestication effects, and ensuring that aquaculture complements habitat conservation are critical considerations for long-term success.



KMFRI team

Closing knowledge gaps

Significant knowledge gaps continue to limit effective management of *O. hunteri*. Key areas requiring further research include population size, reproductive biology, growth performance, and detailed nutritional composition. Addressing these gaps will be essential for both conservation planning and aquaculture development.

Equally important is the need to integrate local communities into conservation efforts. Understanding their dependence on the lake and involving them in

monitoring and management can strengthen both conservation outcomes and livelihood resilience.

Towards integrated conservation action

Given that Lake Chala is shared by Kenya and Tanzania, effective conservation of *O. hunteri* requires coordinated, transboundary action. Joint management frameworks, habitat restoration initiatives, and strict control of invasive species are essential components of a sustainable strategy.

Community-based approaches, supported by institutions such as KMFRI, offer a strong foundation for conservation success. When combined with policy support and scientific research, these efforts can help safeguard both the species and the ecosystem it depends on.

Oreochromis hunteri represents more than a rare fish—it is a symbol of biodiversity, resilience, and the potential for sustainable blue economy innovation. Its survival depends on immediate and coordinated action that integrates conservation, research, and responsible utilization.

By investing in conservation aquaculture, protecting Lake Chala's ecosystem, and engaging local communities, there is a real opportunity to secure the future of this unique species. In doing so, *O. hunteri* can serve as a flagship for balancing biodiversity conservation with food security and sustainable development in East Africa.

The story has been extracted from *Taxonomy, Distribution and Ecology, Biology, Nutritional Composition, and Conservation Status of Critically Endangered Lake Chala Tilapia Oreochromis hunteri* (Günther, 1889): Implications for Aquaculture Development Paper published by Wiley in *Aquaculture Research Journal*

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By: Ruth Ommala | Edits: Jane Kiguta | Layout: Faith Mboka

KMFRI alongside state agencies strengthen collaboration with WorldFish to advance blue economy and fisheries sector

Kenya has taken a significant step toward transforming its fisheries and aquaculture sector following a three-day Joint Technical Working Group (TWG) workshop held from April 15 to 17, 2026, at Maanzoni Lodge in Machakos County.

The workshop, convened under the Kenya–WorldFish Memorandum of Understanding (MoU), brought together key stakeholders from the Government of Kenya, including the State Department for the Blue Economy and Fisheries, the Kenya Marine and Fisheries Research Institute (KMFRI), and the Kenya Fisheries Service (KeFS), alongside experts from WorldFish. The engagement reflects a growing commitment to harnessing the potential of Kenya's blue economy as a driver of food security, job creation, and sustainable economic growth.

Strengthening partnerships for impact

The MoU, signed in September 2025, provides a framework for collaboration between Kenya and WorldFish to promote innovation and sustainability in fisheries and aquaculture. It emphasizes the adoption of modern technologies, improved fish seed and feed

systems, strengthened hatchery infrastructure, and enhanced data systems.



KMFRI Aquaculture Director Dr. Jonathan Munguti giving a presentation at the WorldFish Workshop.

At the heart of this collaboration is the Technical Working Group, recently established to guide the implementation of the agreement. The Machakos workshop marked a critical milestone in aligning stakeholders on priorities and defining practical pathways for action.

From vision to action

Throughout the workshop, participants engaged in in-depth discussions aimed at translating the MoU into tangible outcomes. Key deliberations focused on developing climate-resilient aquaculture systems to address the impacts of climate change, promoting improved tilapia strains such as the Genetically Improved Farmed Tilapia (GIFT), strengthening fish value chains to enhance productivity and market

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access, and enhancing coordination among government, research, development, and private sector partners.



Participants of the WorldFish Workshop

The workshop also provided a platform to advance flagship initiatives such as the Climate-Resilient Aquaculture Systems for Africa (CASA) project, which seeks to build adaptive capacity and resilience within the sector.

Collaborative planning and coordination

Deliberations emphasized the importance of strong governance structures and clear coordination mechanisms to ensure effective implementation. Participants explored the roles and responsibilities of thematic technical working groups, data-sharing protocols, and strategies for joint planning and resource mobilization. By fostering open dialogue and shared ownership, the workshop enabled stakeholders to co-create actionable plans and agree on immediate next steps.



Participants of the WorldFish Workshop pose for a photo

Looking ahead

The meeting concluded with a renewed sense of purpose and a clear roadmap for advancing Kenya's fisheries and aquaculture agenda. Participants underscored the importance of sustained collaboration, innovation, and inclusive approaches to ensure long-term impact.

The outcomes of the workshop are expected to contribute significantly to Kenya's broader blue economy ambitions, positioning the sector as a key pillar of national development. As momentum builds, stakeholders are also looking ahead to upcoming global engagements, including the Our Ocean Conference scheduled to take place in Mombasa later this year, where Kenya will showcase its progress and leadership in sustainable ocean and fisheries management.

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By: Dr Jonathan Munguti, Mavindu Muthoka, Dr Mercy Chepkirui, Dr Domitila Kyule, Dr Kevin Obiero, Dr Erick Ogello, Dr Nazael Madalla & Dr Gerald Kwikiriza | Edits: Faith Mboka & Jane Kiguta | Layout: Faith Mboka

KMFRI supporting the future of fish feed in East Africa

The Kenya Marine and Fisheries Research Institute continues to play a key role in shaping the future of aquaculture through research, innovation, and strategic partnerships. As aquaculture expands across East Africa, one issue is becoming increasingly clear: fish feed sits at the centre of the sector's success.

Across the region, governments and development partners are investing heavily in aquaculture as a way to boost food security, create employment, and support the growing blue economy. However, the success of these efforts depends largely on one critical input. Without reliable access to quality and affordable fish feed, even the most promising aquaculture systems struggle to deliver meaningful results.

Recent research by KMFRI scientists, led by Chief Research Scientist who is also Aquaculture Director Dr. Jonathan Munguti, brings this reality into sharp focus. Fish feed alone can account for up to 70 per cent of production costs, meaning its availability, quality, and affordability directly influence how productive and profitable fish farming can be. At a time when demand for fish is steadily rising, capture fisheries are under increasing pressure, and climate variability continues to affect production systems, strengthening fish feed supply is no longer optional, it is essential.

The role of fish feed in aquaculture growth

Across Kenya, Uganda, Tanzania, and Rwanda, aquaculture is gradually evolving. What was once dominated by small-scale, low-input farming is now shifting towards more intensive and semi-intensive production systems. This transition reflects a broader effort to increase fish production and meet the region's growing demand for affordable protein.



Ornamental fish diet flakes with different colors

With this shift comes a greater need for high-quality, nutritionally balanced feeds that can support faster growth rates, improve survival, and enhance overall productivity. However, the supply of such feeds has not kept pace with demand. Local production remains limited, and many farmers are left with few options.

As a result, farmers often depend on imported feeds, which are costly and sometimes inconsistent in supply. Others attempt to formulate their own feeds using locally available ingredients. While this may reduce immediate costs, it frequently leads to poor growth performance due to imbalanced nutrition and lack of proper formulation knowledge. At the same time, fish consumption across East Africa remains below global averages. This signals a clear opportunity to expand production. Yet, without dependable feed systems, scaling up aquaculture to meet this demand becomes extremely difficult.

Feed ingredients and supply constraints

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Fish feed production in East Africa relies on a combination of plant-based and animal-based ingredients, including maize bran, soybean meal, sunflower cake, and fishmeal. These inputs are essential for providing the protein and energy required for fish growth. However, many of these ingredients are also widely used for human consumption and livestock feed. This creates strong competition, driving up prices and limiting availability for aquaculture. In many cases, feed manufacturers and farmers must compete directly with other sectors for the same raw materials.



A variety of nutritionally formulated fish feeds, highlighting the diversity of pellet sizes, textures, and compositions essential for efficient and sustainable aquaculture production.

Supply is further affected by seasonal changes and climate variability. Agricultural inputs such as maize and soybean are highly dependent on rainfall patterns, while fishmeal production is influenced by fishing seasons and environmental conditions. For example, fishmeal is derived from small pelagic fish that are also consumed by local communities, making it both limited and expensive. These constraints force many farmers to look for cheaper alternatives. Self-formulated feeds become a common solution, but they are often

nutritionally incomplete. Over time, this affects fish growth, reduces yields, and lowers the overall efficiency of production systems.

Quality and knowledge gaps

Even when feed is available, quality remains a major concern. Weak enforcement of standards, combined with limited testing facilities, means that feed quality can vary significantly across the market. In some cases, the nutritional information provided on labels does not accurately reflect the actual composition of the feed. This lack of consistency creates uncertainty for farmers, who may not be sure whether they are using the right feed for their fish. It also undermines trust in the market and makes it harder for farmers to achieve predictable results.

At the same time, many farmers lack adequate training in feed management. Feeding practices are often based on experience rather than technical knowledge. Questions such as how much to feed, when to feed, and how to adjust feeding based on fish size or environmental conditions are not always clearly understood. Poor storage and handling practices further compound the problem. Feeds are often exposed to moisture, pests, and contamination, which reduces their nutritional value and, in some cases, makes them unsafe. These combined challenges ultimately affect fish health, growth rates, and farm profitability.

Infrastructure and investment challenges

The development of the fish feed industry is also constrained by infrastructure gaps. Storage facilities for both raw materials and finished feeds are often inadequate, leading to spoilage and losses. In many rural areas, access to proper storage conditions remains limited. Processing capacity is another challenge. Modern feed production requires specialized equipment and technical expertise, which are not always accessible to local producers. As a result, production remains fragmented and insufficient to meet growing demand.

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In addition, investment in research and development has not kept pace with the needs of the sector. There is still limited work on developing alternative feed ingredients that are both affordable and locally available. Innovations in feed formulation and processing technologies are also not being fully explored. Without sustained investment in these areas, the region will continue to rely heavily on imported feeds, which are vulnerable to global price fluctuations and supply disruptions.

Opportunities for innovation and growth

Despite these challenges, the fish feed sector presents strong opportunities for growth and transformation. Across the region, new partnerships and investments are beginning to strengthen local production capacity. Feed manufacturing initiatives and collaborations are helping to improve availability and reduce dependence on imports.

There is also increasing interest in alternative protein sources, such as insect-based feeds and agricultural by-products. These options offer a promising pathway towards more sustainable and cost-effective feed production. With further research and development, they could significantly reduce production costs while maintaining feed quality.

Equally important is the role of farmer training and extension services. When farmers are equipped with the right knowledge and skills, they are better able to use feed efficiently, reduce waste, and improve productivity. Strengthening extension systems will therefore be critical in supporting the growth of the sector.

Towards a resilient fish feed system

Building a sustainable fish feed industry requires a coordinated and long-term approach. Stronger collaboration among East African countries can help create a more integrated and reliable supply chain,

ensuring that quality feed is accessible across the region.

Improving regulatory frameworks will also be essential for maintaining standards and building confidence in the market. At the same time, investments in infrastructure, research, and capacity building must be prioritized to support continued growth.

KMFRI remains central to this process, providing scientific evidence, technical expertise, and policy guidance. Through its research and partnerships, the Institute continues to support the development of practical solutions that address the real challenges faced by farmers and industry stakeholders.

Fish feed lies at the heart of aquaculture development in East Africa. While challenges related to cost, quality, and supply persist, they also highlight areas where targeted interventions can make a meaningful difference.

By strengthening local production, investing in research and innovation, and equipping farmers with practical knowledge, the region can build a more resilient and sustainable aquaculture sector. Ultimately, improving fish feed systems is about more than increasing production. It is about supporting livelihoods, enhancing food and nutrition security, and advancing the blue economy across East Africa.

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By: Dr Jonathan Munguti, Mavindu Muthoka, Dr Domitila Kyule, Dr Jimmy Mboya, Dr Kevin Obiero, Alice Hamisi, Dr Erick Ogello, Dr Mary Opiyo, Prof Francis Njonge | Edits: Ruth Ommala & Jane Kiguta | Layout: Faith Mboka

Untapped aquaculture in ASALs holds great promise - KMFRI study

Kenya is increasingly turning its attention to an often-overlooked frontier in the quest for food security and economic transformation—its vast arid and semi-arid lands (ASALs). Covering nearly 89 percent of the country and home to millions of Kenyans, these regions have long been associated with drought, food insecurity, and limited agricultural productivity. However, new research led by the Kenya Marine and Fisheries Research Institute (KMFRI) is now shedding light on a promising opportunity hidden in plain sight: aquaculture.

A recent scientific review led by KMFRI's Chief Research Scientist who is also Aquaculture Director Dr. Jonathan Munguti highlights how ASALs could become a game-changer for Kenya's blue economy. The study reveals that despite harsh climatic conditions, these regions possess significant untapped water resources including rivers, lakes, and dam that could support sustainable fish farming.

While ASALs are often perceived as barren, they are intersected by major permanent rivers such as the Tana and Athi, alongside critical water bodies like Lake Turkana, Lake Baringo, and large reservoirs including the Seven Forks Dams. These water systems, combined with warm temperatures favorable for fish growth, create ideal conditions for aquaculture.

According to the study, species such as Nile tilapia and African catfish both widely consumed and

economically viable can thrive in these environments. Yet, despite this potential, aquaculture development in ASALs remains minimal. The researchers emphasize that this is not due to a lack of resources but rather the need to unlock and effectively manage what already exists.

Learning from global leaders

The report draws comparisons with Egypt, Africa's leading aquaculture producer, which has managed to build a thriving fish farming industry despite severe water scarcity. Kenya, with comparable water availability, has yet to reach similar production levels, highlighting a gap that ASAL-based aquaculture could help close.



Aquaculture in arid landscapes: a fish farmer feeds stock in floating cages, demonstrating the untapped potential of water resources in Kenya's ASAL regions.

The researchers note that with the right policies, investment, and capacity building, Kenya could adapt and localize Egypt's success model to strengthen its own aquaculture sector.

Opportunities along rivers and dams

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The Tana River, Kenya's longest river, stands out as one of the most promising opportunities. Flowing through several ASAL counties, it provides a consistent water source that could support both pond-based and cage aquaculture systems. Similarly, the Athi River, despite facing pollution challenges, presents potential for controlled aquaculture if water quality management is improved.



Integrated aquaculture systems in a semi-arid landscape, showcasing fish cages and ponds utilizing available water resources for sustainable production.

Dams such as Turkwel and those within the Seven Forks system also offer immense promise. These reservoirs already support fisheries and could be expanded into full-scale aquaculture hubs capable of generating employment and boosting local economies.

In Tana River County, early partnerships with KMFRI are already demonstrating the impact of targeted interventions. Training programs, improved technologies, and extension services are gradually transforming local fish farming practices, offering a glimpse of what could be achieved at scale.

Lakes with untapped potential

Kenya's ASAL lakes further strengthen the case for aquaculture expansion. Lake Turkana, the world's largest desert lake, presents vast opportunities for cage farming, while Lake Naivasha and Lake Baringo provide environments suitable for innovative systems such as pen culture.

However, these opportunities come with challenges. Fluctuating water levels, pollution, and competing land uses remain key constraints that require integrated planning and sustainable management approaches.

Challenges holding back growth

Despite the strong potential, several barriers continue to limit aquaculture development in ASALs. These include inadequate infrastructure and investment, limited access to quality fish feed and fingerlings, water quality concerns, particularly in polluted river systems, climate variability leading to fluctuating water levels, conflicts among resource users, and limited technical knowledge among local communities.

The study stresses that overcoming these challenges will require coordinated efforts among government agencies, research institutions such as KMFRI, development partners, and local stakeholders.

A pathway to food security and jobs

Expanding aquaculture in ASALs could have far-reaching impacts across Kenya. It can improve household nutrition by providing a reliable and affordable source of protein, create employment opportunities, especially for youth, diversify livelihoods in drought-prone regions, reduce dependence on food aid, and strengthen resilience against climate change impacts.

For many communities in ASAL regions, aquaculture represents a shift from vulnerability to opportunity, offering a sustainable pathway toward improved livelihoods and economic stability.

The role of research and innovation

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Institutions like KMFRI continue to play a central role in driving this transformation through research, training, and strategic partnerships. Scientists are working to develop context-specific solutions tailored to Kenya's diverse environments, including identifying suitable fish species, improving farming systems, and addressing water quality challenges.

Dr. Jonathan Munguti and his team emphasize the importance of continued research, particularly in understanding hydrological systems, improving production efficiency, and developing cost-effective aquaculture models suitable for ASAL conditions.

Looking ahead

As Kenya advances its blue economy agenda, aquaculture in ASALS is emerging as a strategic frontier with the potential to transform national food systems and rural economies. The combination of natural resources, scientific expertise, and growing demand for fish presents a strong case for increased investment.

While progress will require sustained commitment, innovation, and collaboration, the potential rewards in terms of food security, economic growth, and improved livelihoods are significant. As the researchers conclude, aquaculture is not merely an option for ASALs but a necessary pathway toward a more resilient and sustainable future for Kenya.

By: Dr Jonathan Munguti, Dr Domitila Kyule & Dr Paul Orina | Edits: Eugene Praise & Jane Kiguta | Layout: Faith Mboka

KMFRI study highlights pathways to stronger aquaculture extension in East Africa

Aquaculture is increasingly recognized as a strategic sector for improving food security, supporting livelihoods, and advancing the blue economy in East Africa. A recent scientific review involving researchers from the Kenya Marine and Fisheries Research Institute (KMFRI) highlights the critical role of strong aquaculture extension systems in transforming fish farming into a more productive, profitable, and sustainable enterprise.

The study, published in *Aquaculture Science and Management*, examines how aquaculture extension services have evolved in Kenya, Uganda, and Tanzania, drawing lessons from Egypt, Africa's leading aquaculture producer. The research emphasizes the importance of strengthening the link between research institutions, extension providers, and fish farmers to accelerate adoption of improved technologies and management practices.

KMFRI played an important role in the study through its National Aquaculture Research Development and Training Center (NARDTC) in Sagana, contributing expertise on aquaculture innovation, farmer training, and knowledge dissemination.

Positioning extension as a driver of the Blue Economy

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According to the study, aquaculture extension services are essential for equipping farmers with practical skills in areas such as fish health management, feeding strategies, water quality control, and business planning. Effective extension systems enable farmers to shift from subsistence production to more commercially viable aquaculture enterprises that can contribute significantly to national food systems and economic growth.

However, the review notes that aquaculture extension systems across East Africa remain fragmented, with multiple actors operating independently. In Kenya, institutions including KMFRI, universities, and government agencies all contribute to extension services, but coordination challenges sometimes limit the effectiveness of knowledge transfer to farmers.

KMFRI continues to play a critical role in addressing these challenges by generating scientific knowledge, developing improved aquaculture technologies, and supporting capacity-building initiatives for extension personnel and farmers. Through research programs, training workshops, and collaboration with government and development partners, the institute contributes to strengthening research–extension–farmer linkages that are essential for improving productivity across the aquaculture value chain.

The publication highlights growing opportunities to modernize aquaculture extension through digital advisory tools such as mobile applications, SMS platforms, and online learning systems. These tools can complement traditional face-to-face training approaches by allowing farmers to access timely technical guidance and market information. When combined with on-farm demonstrations and farmer field schools, digital innovations have been shown to improve knowledge retention and increase adoption of improved aquaculture practices.



A picture of summit fish ponds

Partnerships and collaborations: Critical levers for aquaculture extension

Importantly, the study emphasizes the need for stronger partnerships among research institutions like KMFRI, extension agencies, private sector actors, and farmer organizations. Collaborative innovation platforms can help ensure that research outputs are responsive to farmer needs and that scientific innovations are translated into practical solutions that improve farm performance.

As demand for fish continues to rise across Africa, strengthening aquaculture extension systems will be key to unlocking the sector's potential to contribute to food security, employment, and economic development. The findings of this study reinforce KMFRI's ongoing commitment to supporting evidence-based aquaculture development and strengthening the blue economy in Kenya and the wider East African region.

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A pathway to food security and Blue Economy growth in East Africa

Aquaculture has emerged as one of the fastest-growing food production systems globally, now supplying more than half of all fish consumed worldwide. By 2022, global aquaculture production had reached 130.9 million tonnes, valued at over USD 280 billion—underscoring its central role in food systems, nutrition, and livelihoods.



KMFRI CEO Dr. Paul Orina taking part in restocking the pond

Yet, while regions such as Asia continue to dominate production—accounting for nearly 89 per cent of global output—Africa risks falling behind at a time when the need for sustainable fish production has never been greater.

With Africa's population projected to reach 2.5 billion by 2050 and fish demand expected to double, aquaculture presents a critical opportunity to bridge food and nutrition gaps, create jobs, and support rural economies. However, growth across the continent remains constrained, particularly in sub-Saharan Africa where per capita fish consumption is among the lowest globally.

Transforming aquaculture extension systems therefore is no longer optional—it is imperative. A well-coordinated, adequately resourced, and professionally delivered extension framework will be critical in unlocking the full potential of aquaculture in East Africa.

Equally important is the need for governments to establish clear staffing norms, dedicated budget lines, and robust monitoring frameworks that track not just outputs, but outcomes—such as productivity gains, profitability, and inclusion of women and youth.

Announcement!

By Jacque Wanjiru

We are excited to announce the **3rd Aquatic Resources and Blue Economy Conference (ARBEC III, 2026)** organized by Kenya Marine and Fisheries Research Institute (KMFRI).

Theme: Science, Innovation and Partnerships for Resilient Blue Economics.

Conference Date: 23rd to 27th November 2026

Location: Nairobi, Kenya

This premier scientific platform will bring together researchers, policymakers and industry leaders to advance sustainable aquatic resource management in East Africa and beyond.

For this and more **STAY TUNED!!!!**
#ARBEC2026 #KMFRIResearch

Mtafiti Monthly

Mtafiti Pictorials

By: Faith Mboka



A picture of Summit fish ponds



Seawater greenhouse under construction in Kilifi



Fish drying preservation in Turkana



Participants of the AABS dissemination workshop actively engaging in panel discussion

Mtafiti Monthly



DR. Esther Wairimu, WorldFish Scientist and Work Package 2 lead of the IMTA under the Asia- Africa Blue Tech Superhighway(AABS) project, delivering presentation during the dissemination workshop at Cocoa Luxury Beach Club, Mombasa



A picture of Lake Chala



KMFRI, Director General Dr. Paul Orina engages in an insightful discussion with participants during the AABS dissemination workshop in Mombasa



KMFRI Director General Dr. Paul Orina taking part in restocking the Kibokoni pond

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