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Feature Story:

Crayfish in Kenya: A new aquaculture opportunity?

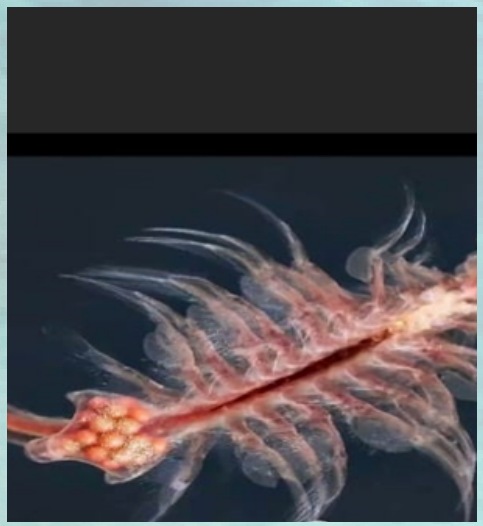
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By: Eugene Praise | *Edits: Jane Kiguta* | Layout: Maliki Fumbwe

From research to partnerships. ARBEC III shapes Africa's blue economy conversation

Africa's Blue Economy conversation is moving beyond the question of what the continent's aquatic resources can offer to how science, innovation, investment and partnerships can work together to turn this potential into sustainable opportunities for people, ecosystems and economies. It is within this changing landscape that the Kenya Marine and Fisheries Research Institute will convene the third edition of the Aquatic Resources and Blue Economy Conference (ARBEC III) from 23rd to 27th November 2026 in Nairobi. Held under the theme **"Science, Innovation and Partnerships for Resilient Blue Economies,"** the conference will bring together scientists, academics, policymakers, industry players, development partners and other stakeholders to examine the opportunities and challenges shaping Africa's aquatic future.

ARBEC III builds on two previous editions held in Kisumu in 2022 and 2024. According to Dr. Crispin Nyamweya, Chief Research Scientist at KMFRI and Center Director at the Kisumu Station, the conference has itself evolved with the changing Blue Economy conversation. The inaugural ARBEC in 2022 brought together more than 300 delegates from 20 countries, with research at the heart of the discussions. By the second edition in 2024, the conversation had expanded to include industry and policymakers, placing partnerships more firmly at the center of efforts to advance the Blue Economy. For ARBEC III, that progression continues, with a stronger emphasis on connecting knowledge, innovation and partnerships to opportunities for Blue Economy growth across Africa.

"It's a platform where we can share lessons learned from elsewhere that we can apply in our region, and we will also showcase what we can offer for the other countries to learn from," Dr. Nyamweya.



KMFRI Chief Research Scientist Dr. Chrispine Sangara Nyamweya

This two-way exchange of knowledge is particularly important at a time when aquatic ecosystems and the communities that depend on them are facing increasingly complex pressures. Climate change, ecosystem degradation, changing fisheries dynamics, food security concerns and the need for sustainable livelihoods are creating challenges that cannot be addressed by one sector or discipline alone.

For Dr. James Maluma, Chief Research Scientist and Director of Oceans and Coastal Systems, Blue Economy at KMFRI, the value of ARBEC III lies in bringing these different perspectives into one conversation. The conference is expected to explore issues ranging from fisheries and ecosystem management to climate change, aquaculture, blue carbon and investment in the Blue Economy. Discussions will span both marine and

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freshwater systems, reflecting the interconnected nature of Africa's aquatic resources.

"We expect to see a lot of discussions centered around blue carbon, investments in the blue economy, issues related to climate change and aquaculture, both dealing with freshwater systems and marine systems," Dr. Mwaluma



KMFRI Chief Research Scientist Dr. James Mwaluma

The breadth of the program reflects a Blue Economy that extends far beyond fisheries alone. Across its seven interconnected thematic areas, ARBEC III will explore sustainable fisheries and aquatic food systems; climate-smart aquaculture; blue tourism and nature-based enterprises; governance, policy and blue finance; technology, data and digital innovation; climate resilience and ecosystem health; and community engagement, equity and capacity building. The presentations will provide an opportunity to bring research findings into conversation with the realities facing aquatic sectors. From aquaculture productivity and aquatic food systems to ecosystem health, fisheries management, climate resilience and emerging technologies, the conference will showcase research and innovations with potential to inform decisions and strengthen livelihoods, but the conversation will not be limited to researchers.

Dr. Jacqueline Oku, a scientist at KMFRI, sees ARBEC III as an opportunity to bring together perspectives from within and beyond the traditional ocean space. Among the conversations she is looking forward to are those around marine spatial planning, food value addition, aquaculture potential, blue carbon ecosystems and the role of oceans in education. For her, one of the most important aspects of the conference is creating room for people who may not ordinarily work within the aquatic sector to become part of the conversation.

"Come, ask your questions, learn with us, teach us what your doubts are," she says, inviting participants to explore both ocean and freshwater spaces with curiosity and openness.

That invitation speaks to a broader ambition behind ARBEC III, that is to make the Blue Economy conversation more connected, collaborative and inclusive. For researchers, the conference provides a platform to share evidence, exchange ideas and build scientific collaborations. To policymakers and government agencies, it offers an opportunity to engage with research that can inform planning and decision-making. Industry players, investors and innovators can connect with emerging technologies, research findings and potential partnerships, while development partners can identify opportunities to support solutions with potential for wider impact.

The conference will also create space for Africa to learn from experiences beyond the region while showcasing knowledge and innovations emerging from African institutions and communities. This exchange is central to building a Blue Economy that is responsive to local realities while remaining connected to global knowledge and opportunities.

With its mandate spanning marine and freshwater fisheries, aquaculture, aquatic ecosystems and related research, KMFRI is strategically positioned to convene this conversation. The Institute brings together expertise across many of the sectors represented at ARBEC III and

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its work places it at an important intersection between science, policy, communities and the wider Blue Economy. As host, KMFRI is therefore not just simply providing a venue for scientific presentations but also helping create a space where different forms of knowledge can meet, where research can connect with policy and practice, and where partnerships can develop around shared challenges and opportunities.

For KMFRI Director General Dr. Paul Orina, the conference represents an opportunity to look ahead. ***"Shaping the future of aquatic research and the Blue Economy in Africa"*** is at the heart of his invitation to participants, as he welcomes scientists, practitioners, policymakers, industry players and other stakeholders to Nairobi.



KMFRI Director General Dr. Paul S. Orina

With participants expected from across Africa and beyond, ARBEC III offers an opportunity to consider where the region's aquatic sectors stand today, and where they could go next. The challenge is too complex for science, policy, investment or innovation to work in isolation. Building resilient blue economies will require these elements to come together, alongside the communities whose lives and livelihoods are closely tied to aquatic resources. ARBEC III provides a space for that convergence by bringing knowledge to the table, connecting people and institutions, and opening conversations that can move beyond ideas towards practical action.

In November, Nairobi will become a meeting point for those shaping Africa's aquatic future. Come to share, come to learn, come to question, and come ready to build partnerships that can turn knowledge and innovation into a more resilient and sustainable Blue Economy.

Karibu Kenya. Karibu ARBEC III.



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By: Eugine Praise | *Edits: Jane Kiguta* | *Layout*: Maliki Fumbwe

From knowledge to Action. ARBEC III sets the stage for Africa's blue economy conversation

Africa's blue economy is no longer a conversation about potential alone. Across the continent, aquatic resources are supporting food systems, livelihoods, trade, tourism, innovation and economic development. Yet, as pressure on these resources intensifies, the question is shifting from how much the blue economy can offer to how sustainably and inclusively that potential can be realized. It is against this backdrop that the Kenya Marine and Fisheries Research Institute is convening the third Aquatic Resources and Blue Economy Conference (ARBEC III), scheduled for 23rd to 27th November 2026 in Nairobi under the theme ***"Science, Innovation and Partnerships for Resilient Blue Economies."***

ARBEC III comes at a time when the blue economy is being shaped by multiple, interconnected pressures. Climate change is altering aquatic ecosystems and production systems. Fisheries face increasing demands for sustainable management. Aquaculture is expanding but continues to encounter challenges around productivity, disease, feeds, seed supply and environmental sustainability. At the same time, pollution, ecosystem degradation, changing livelihoods and gaps between research, policy and practice continue to complicate efforts to secure healthy aquatic systems and the communities that depend on them.

The challenge, therefore, is a shortage of resources and a need for better knowledge, stronger evidence, appropriate technologies and meaningful collaboration to translate knowledge into solutions.



Showcasing marine and fisheries innovation at ARBECII

Why ARBEC III, and why now?

The blue economy sits at the intersection of environment, food security, livelihoods and economic development. Decisions made today about fisheries, aquaculture, aquatic ecosystems, coastal development and blue finance will influence the resilience of communities and economies for years to come. ARBEC III seeks to create a platform where these different dimensions can be considered together.

The conference is organized around seven interconnected thematic areas: sustainable fisheries and aquatic food systems; climate-smart aquaculture; blue tourism and nature-based enterprises; governance, policy and blue finance; technology, data and digital innovation; climate resilience and ecosystem health; and community engagement, equity and capacity building. The breadth of these themes reflects the challenges facing aquatic resources which cannot be solved from within one discipline or institution.

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A fishery management decision, for example, can have consequences for food security and livelihoods. A new aquaculture technology may offer increased production, but its success may depend on access to finance, markets, quality seed, farmer training and environmental safeguards. Similarly, ecosystem restoration requires not only ecological knowledge, but also the participation of communities whose lives and livelihoods are tied to those ecosystems.

ARBEC III is designed to move the conversation towards connections between science and policy, research and industry, innovation and investment, and institutions and communities.

An African conversation with a Western Indian Ocean perspective

For Africa, these conversations carry particular significance. The continent's aquatic resources support millions of livelihoods, while its inland waters, coastlines and oceans are increasingly exposed to climate and environmental pressures. Within the Western Indian Ocean region, countries also share marine ecosystems, fisheries resources, environmental challenges and economic opportunities that do not stop at national borders. This makes regional knowledge exchange particularly important.



KMFRI delegates listen attentively to a presentation during ARBEC II.

ARBEC III provides an opportunity for researchers and practitioners to place local evidence within a broader African context and, in turn, learn from experiences across the continent and beyond. The program brings together work ranging from fisheries and aquaculture to water quality, aquatic health, climate resilience, technology, communities and governance.

The diversity of research already reflected in the program illustrates the breadth of the conversation. Presentations under sustainable fisheries and governance, for instance, will examine issues including shark and ray populations, small-scale fisheries, swordfish dynamics, reef-associated fish stocks and prawn stocks. In aquaculture and aquatic food systems, researchers will explore subjects ranging from farmer-centered biosecurity and aquaculture productivity to Kenya's seaweed sector, marine prawn hatchery and grow-out trials, and innovations in fish health. The environmental and ecosystem health discussions will similarly bring together studies on Lake Turkana, cage aquaculture and water quality, harmful algal blooms, elasmobranch monitoring and riverine carbon and nutrient dynamics. Other presentations will bring the human dimension into sharper focus, examining gendered vulnerabilities, participation in the blue economy, inequalities in small-scale fisheries and aquaculture, citizen science, and the role of small-scale actors in shaping aquatic food-system policies.

Together, these studies demonstrate that the blue economy is not just one sector but an interconnected system in which environmental health, economic opportunity and human wellbeing are closely linked.

From research findings to real-world solutions

For participants, ARBEC III offers more than an opportunity to present research. Researchers will have a platform to share evidence, test ideas, build collaborations and identify areas where knowledge gaps remain. Policymakers can engage directly with emerging evidence that can inform planning and decision-making.

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Industry and entrepreneurs can discover technologies, innovations and research partnerships with potential for application and investment. Development partners and financial institutions, meanwhile, can engage with researchers and practitioners working on challenges that require investment beyond the laboratory or field site. The conference will also create space for exhibitions, side events and innovation-focused engagements, providing opportunities for organizations to showcase technologies, programs and approaches while connecting with potential collaborators. This emphasis on interaction is important because research creates its greatest value when knowledge can move.

A finding published in a scientific journal may advance understanding. A finding discussed with a policymaker may influence a decision. The same finding shared with an entrepreneur may inspire a product, while collaboration with communities may help translate it into a solution that works on the ground and ARBEC III will bring these possibilities into the same conversation.

KMFRI role: convening science for impact

For KMFRI, hosting ARBEC III is also an extension of its role within Kenya's aquatic research and blue economy landscape. As a national institution mandated to undertake research in marine and freshwater fisheries, aquaculture and related aquatic resources, KMFRI occupies a unique position at the interface of science, policy and society. Its research work cuts across ecosystems and disciplines, generating evidence on fisheries, aquaculture, biodiversity, environmental health, climate change and the communities whose livelihoods depend on aquatic resources. This gives the Institute a strong foundation from which to convene a conversation that is broader than any single research project.

ARBEC III provides KMFRI with an opportunity to bring together knowledge generated within the Institute with expertise from universities, government agencies, research organizations, industry, development partners and communities. More importantly, it creates space for those different actors to identify where their work intersects, and where collaboration can produce outcomes that individual institutions may struggle to achieve alone.

Looking beyond the conference room

Ultimately, the value of ARBEC III will not be measured only by the number of presentations delivered or participants attending but its greater value will lie in what happens when the conference ends. Will new research partnerships emerge? Will evidence find its way into policy? Will innovators identify opportunities to take research closer to the market? Will researchers discover new questions through engagement with communities and industry? Will development partners identify investments capable of supporting resilient aquatic food systems and livelihoods? These are the possibilities that make the conference timely.

With more than 300 presentations expected across seven thematic tracks, ARBEC III will provide a broad snapshot of where aquatic research, innovation and practice are heading. But beyond presenting what is already known, the gathering presents an opportunity to ask what needs to be known next and, importantly, who needs to be part of finding those answers.

Africa's blue economy will not be built by science alone, nor by investment, policy or innovation in isolation. It will require these forces to work together. The conversation that KMFRI will bring to ARBEC III is one in which research informs action, innovation responds to real challenges, partnerships bridge sectors and borders, and knowledge becomes a foundation for blue economies that are not only productive, but resilient, inclusive and sustainable. Advancing Africa's blue economy begins with understanding its waters, but its future will depend on what we do with that knowledge.

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By: Brian Isoe | *Edits: Phionalorna Nzikwa* | Layout: Maliki Fumbwe

Strengthening blue food safety and sustainable food systems in Coastal Kenya

The Kenya Marine and Fisheries Research Institute (KMFRI), in partnership with the Institute of Marine Research (IMR), Norway, is advancing efforts to strengthen **blue food safety, sustainable aquaculture and coastal livelihoods** through the Strengthening Sustainable Blue Food Systems in Coastal Kenya to Enhance Livelihoods, Food Security and Nutrition (SBFS-Kenya) Project.



KMFRI Chief Research Scientist Dr. Jacqueline Uku during the inception workshop

The project recently convened an inception workshop for its Aquaculture and Blue Food Safety components at the Kenya School of Government, Matuga, Kwale County. The meeting brought together KMFRI, government representatives, development partners, community members, and actors across the aquaculture, capture fisheries, and seaweed value chains to establish a shared understanding of the project's objectives, implementation approach, and expected outcomes.

Funded by **NORAD under the Ocean for Development Programme**, the project focuses on the **Shimoni-Vanga Joint Co-management Area (JCMA)**, where coastal communities depend heavily on fisheries, aquaculture and other ocean-based activities for food and livelihoods.

Building safer and more sustainable blue food systems

Blue foods including fish, shellfish, seaweed and other aquatic productsplay an important role in supporting **food security, nutrition, diet, sources of employment and livelihood enhancement** in coastal communities. However, ensuring that these foods are safe for consumption requires attention across the entire fisheries value chain, from production and harvesting to handling, processing, transportation, and markets (sea to plate).

The workshop, officially opened by the KMFRI Director General, provided an opportunity for stakeholders to identify challenges and opportunities affecting blue food production and safety along the coastal stretch. Discussions also focused on strengthening collaboration, improving aquaculture practices, enhancing food safety standards, and developing sustainable approaches to ocean resource use.

KMFRI Director General Dr. Paul Orina, speaking during the opening, emphasized the need to look beyond research outputs and examine whether interventions are actually improving people's lives as they are supposed to. The project, he noted, provides an opportunity to examine the links between **food, nutrition, health and livelihoods**, while addressing gaps that have existed along the blue food value chain.

Dr. Orina stressed the importance of interrogating whether communities are benefiting from the interventions and whether their lives are being transformed. KMFRI, he said, looks forward to

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accelerating implementation and ensuring that the project delivers meaningful benefits across the value chain that not only provides credible data but data that can be used to alleviate the livelihoods of the people who depend on the entire value chain to sustain their lives.

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KMFRI Director General Dr. Paul S. Orina during the inception workshop.

Stakeholders emphasised the importance of identifying **existing and potential aquaculture sites** to increase production and complement ongoing initiatives. Mapping these sites will help identify suitable areas for aquaculture development while providing a basis for addressing some of the challenges limiting production.

The **Shimoni Senior Warden** noted that the project presents an opportunity to develop a clear roadmap for strengthening sustainable blue food systems in the area: “Map active and potential aquaculture sites to increase production, to complement the project. This will be key in addressing the challenges.”He noted.

The initiative is also expected to complement county development priorities. The Warden highlighted that the work is in line with the **Kwale County Integrated Development Plan**, particularly its focus on increasing food production through sectors such as aquaculture, where progress has already been made through collaboration with different organisations.

For blue food systems to deliver greater benefits to communities, stakeholders noted that challenges affecting individual value chains must also be addressed.

In the seaweed sector, for example, certification requirements remain a challenge for producers and other value-chain actors. The Director of Fisheries in Kwale County highlighted challenges in obtaining KEBS certification, which can limit access to broader markets.
The discussions therefore encouraged stakeholders to examine the findings and recommendations emerging from the project and use them to guide implementation and address bottlenecks across the value chains.

Putting communities at the centre

For KMFRI, the success of the project will ultimately be measured by its impact on communities. Speaking on the broader objective of the initiative, **Dr. Uku,** the project lead, emphasised the need to increase the benefits derived from ocean resources while maintaining sustainability. **Better outputs from the ocean in a sustainable manner.”**

The statement captures the central ambition of the initiative: to unlock the potential of Kenya's blue food systems while ensuring that marine and coastal resources remain healthy and productive for future generations.
Through collaboration with government agencies, communities, research institutions, development partners and value-chain actors, the **SBFS-Kenya Project** seeks to strengthen sustainable aquaculture, improve blue food safety, enhance food and nutrition security and support resilient coastal livelihoods.

For communities in the **Shimoni-Vanga JCMA**, the project provides an opportunity to connect research, food safety, sustainable production and local knowledge in building blue food systems that are not only productive, but also **safe, inclusive and environmentally sustainable**.

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By: Morine | *Edits: Ruth Ommala* | Layout: Maliki Fumbwe

Growing fish starts with the right feed: KMFRI explores a local solution

For fish farmers, raising healthy fish begins with giving them the right food from the earliest stages of life. Young fish need suitable nutrition to grow and survive, but the feed required at this stage can be expensive or difficult to obtain. Researchers at the Kenya Marine and Fisheries Research Institute (KMFRI) are exploring whether a locally produced feed could help address this challenge.

The research focuses on Artemia, a tiny aquatic organism widely used as live food for young fish. Artemia provides important nutrients during the early stages of development, when fish are particularly dependent on suitable feed for healthy growth and survival.

The study examined African catfish (*Clarias gariepinus*), an important, farmed fish in Kenya. Successful fish farming depends partly on hatcheries being able to produce healthy young fish for farmers to raise to market size. Finding reliable and accessible feed for these young fish is therefore an important step towards improving fish production.

Titled *Comparative Performance of Kenyan and Imported Artemia in Early Larval Rearing of Clarias gariepinus*, the study compared locally produced Artemia from KMFRI with two imported products: Great Salt Lake Artemia and Shell-Free Artemia. The 21-day experiment was conducted at the National Aquaculture Research Development and Training Centre (NARDTC) in Sagana, Kirinyaga County.

The findings showed that the type of Artemia used influenced the growth and survival of the young fish. Shell-Free Artemia recorded better growth in body weight at Day 7 and significantly higher survival than the other two products. However, there was no significant difference in the average length of the fish across the three treatments during the study. Despite having lower crude protein content, the locally produced KMFRI Artemia supported growth comparable to that achieved with imported Great Salt Lake Artemia.

These results offer encouraging prospects for Kenya's aquaculture sector. Many hatcheries rely on imported Artemia, which can be expensive and subject to supply limitations. A reliable local source could provide another option for hatcheries and potentially reduce dependence on imports. However, the study did not establish that the local product is cheaper or that it can already replace imported products commercially.



Shell-Free Artemia

The research also highlighted the importance of feeding young fish at the right stage of development. During the trial, the larvae received Artemia during their early feeding period, followed by a gradual introduction of commercial starter feed. They were fed Artemia alone from Day 3 to Day 8 after hatching, received a

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combination of Artemia and dry starter feed from Day 9 to Day 11, and then received dry starter feed alone until Day 21. The results suggest that seven days of live feeding can support early larval rearing under the conditions tested.

For fish farmers and coastal and inland communities, improvements in hatchery production could have benefits beyond the farm. A reliable supply of healthy young fish can support fish farming, contribute to food availability and create opportunities for income and employment. However, these wider benefits depend on further improvements in feed quality, availability and affordability.

Before the locally produced KMFRI Artemia can be recommended for widespread commercial use, more research is needed. This includes improving its nutritional quality, assessing the quality and hatching performance of its eggs, and evaluating the costs of producing it under commercial conditions.

The study demonstrates how research can help address practical challenges in aquaculture. By investigating locally available resources, KMFRI is exploring ways to strengthen fish production and support fish farmers in Kenya.



Artemia cysts

With further research and improvements in quality and production, locally produced Artemia could become a useful additional source of live feed for African catfish hatcheries. This would offer a promising opportunity to strengthen Kenya's aquaculture sector while helping farmers access the resources they need to raise healthy fish.

The story has been extracted from a research paper titled ***Comparative Performance of Kenyan and Imported Artemia in Early Larval Rearing of Clarias gariepinus*** **by** Morine M. Ngarari, Mary A. Opiyo, Hinzano S. Mdzomba, Miriam W. Wainaina, Anthony M. Nzioka, Betty M. Nyonje, James M. Mwaluma, Derrick G. Rugendo, Charles C. Ngugi, Charles W. Gatune

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By: Elijah Kembenya | *Edits: Eugene Praise* | Layout: Maliki Fumbwe

KMFRI explores the aquaculture potential of freshwater eels

From the flowing waters of River Kathita to controlled tanks at the Kenya Marine and Fisheries Research Institute Mutonga Centre in Tharaka Nithi County, wild freshwater eels are entering a new phase of scientific exploration. KMFRI is undertaking domestication trials to understand how these naturally occurring fish respond to life in captivity and whether they can adapt to conditions that could eventually support their use in aquaculture. The work is generating preliminary knowledge on their survival, feeding behavior, growth, health and adaptation to controlled environments, all of which are key information needed before their wider aquaculture potential can be considered.



Monitoring Freshwater eels

Freshwater eels, belonging to the family Anguillidae, move between freshwater and marine environments during their life cycles and are considered potentially valuable aquaculture species. However, their domestication remains constrained by limited knowledge on how wild individuals acclimate to captivity, accept feed, grow and maintain good condition under managed conditions. At Mutonga, the trials are providing an opportunity to begin addressing some of these knowledge gaps. Wild eels are collected from selected sections of River Kathita before being carefully transported to the KMFRI hatchery in temperature-controlled, oxygenated containers designed to minimize stress. Once at the facility, healthy individuals are introduced into holding tanks and observed during acclimation.



Freshwater eels

The process goes beyond simply keeping the eels alive to observing how the fish respond to their new surroundings, including their swimming activity, hiding behavior, response to feeding and handling, as well as their general physical condition. As the eels become accustomed to captivity, the trials examine how factors such as shelter, stocking conditions and routine tank management influence their adaptation. Shelters such as PVC pipes are provided to give the eels refuge within the tanks and create conditions that reflect aspects of their natural habitat. The fish are also gradually introduced to routine captive management, including feeding, water exchange, tank cleaning and periodic handling. Their responses provide important indicators

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of how well they are adapting to the controlled environment.

Feeding is another important part of the trials. Researchers are examining whether the eels accept feed in captivity and how their feeding behavior changes as they are gradually introduced to formulated diets. Feed acceptance, consumption and uneaten feed are monitored, with feeding frequency and ration adjusted according to the observed response, eel size and environmental conditions. Alongside feeding observations, the eels are periodically monitored for changes in body weight and length, survival, body condition, activity and general health. These observations are intended to help identify the conditions and husbandry practices that can support successful adaptation and growth in captivity.

For KMFRI, the trials represent an early step in exploring how locally available aquatic resources could contribute to a more diversified aquaculture sector. The knowledge generated could support future optimization of eel culture trials, broodstock development and, ultimately, the development of culture protocols if the species demonstrates sufficient potential under captive conditions.

The work also highlights the broader role of research in finding new ways of utilizing indigenous aquatic resources. Rather than moving immediately towards production, the current trials are focused on building the evidence needed to understand what it takes to bring a wild species into captivity successfully. The journey from River Kathita to a potential future in aquaculture is still at an early stage. But through each observation and trial, KMFRI is building the scientific knowledge needed to determine whether Kenya's freshwater eels can become part of the country's evolving aquaculture story.



Researchers harvesting Freshwater eels

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By: Morara G | *Edits: Eugene Praise* | Layout: Maliki Fumbwe

Crayfish in Kenya: A new aquaculture opportunity?

From a long-established freshwater species to a possible new aquaculture enterprise: *A species with a long history in Kenya*

Aquaculture in Kenya has traditionally been dominated by a relatively small number of species, particularly Nile tilapia and African catfish. As the sector seeks to diversify production, improve farm profitability and respond to changing consumer preferences, attention is increasingly turning to alternative aquatic species. Among these is crayfish, particularly the red swamp crayfish (*Procambarus clarkii*), a freshwater crustacean with a long and complex history in Kenya.

A growing global aquatic food economy

The global aquatic food sector provides an important context for considering new aquaculture opportunities. According to the Food and Agriculture Organization – (FAO)'s *State of World Fisheries and Aquaculture 2026*, global fisheries and aquaculture production reached a record 235 million tonnes in 2024, including 195 million tonnes of aquatic animals. Aquaculture alone produced about 103 million tonnes of aquatic animals, surpassing 100 million tonnes for the first time and accounting for more than half of global aquatic animal production. The same report indicates that aquatic foods supplied at least one-fifth of animal protein consumed by approximately 3.1 billion people worldwide.

This expansion reflects a broader transition in the global aquatic food system. Capture fisheries have largely stabilized, while aquaculture continues to expand to meet rising demand. FAO projections show continued growth in aquatic food consumption, driven by the global population growth, urbanization, rising incomes, improved distribution and changing dietary preferences.



An image of a Crayfish.

Crustaceans occupy an important space within this expanding market. Crayfish are widely consumed in North America, Europe and Asia and have become a significant aquaculture commodity. The FAO identifies red swamp crayfish (*Procambarus clarkii*) as a major cultured crustacean species and documents its importance in the global aquaculture statistics. The scale of the industry is illustrated by *P. clarkii* production record which indicate approximately 3.2 **million tonnes** of the species were reported **in 2023,** with **China alone producing about 3.16 million tonnes**

This makes *P. clarkii* one of the world's most important freshwater crustacean aquaculture commodities. The red swamp crayfish is particularly adaptable and can be produced in ponds and integrated farming systems. In China and the southern United States, crayfish

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production has historically been integrated with rice farming, an indication of the potential for crayfish to function as a complementary aquaculture enterprise opportunity.

Crayfish are not new in Kenya. Their history stretches back several decades, from deliberate introductions and the development of a fishery in Lake Naivasha to their subsequent occurrence in rivers, dams and other freshwater systems. What is new is the growing interest in understanding whether this species can be responsibly cultured and developed as an alternative aquaculture enterprise. This emerging interest must, however, be considered alongside the ecological risks associated with an introduced and highly adaptable (invasive) species.

For many Kenyans, aquaculture is closely associated with Nile tilapia and African catfish. However, another aquatic species has been present in the country for decades: the red swamp crayfish (*Procambarus clarkii*). Its history in Kenya dates back to the 1960s, when it was introduced from Uganda into dams in the Rift Valley, including Solai and Subukia. It was later introduced into other dams, waterways and river systems.

Around 1970, crayfish was introduced into Lake Naivasha, where they quickly established a large population. Historical accounts link the introductions to fisheries development, including their use as food for introduced largemouth bass, while some river introductions were associated with attempts to control freshwater snails linked to schistosomiasis. By the 1970s, crayfish had multiplied extensively in Lake Naivasha and supported the development of a commercial fishery.

The fishery was mainly based on baited traps. Crayfish supplied tourist hotels and restaurants, and some of the catch entered export markets. This history shows that crayfish already have economic value in Kenya.

An opportunity with an environmental challenge

The history of crayfish also carries an important warning. Research has documented their effects on aquatic food webs and shoreline communities. They have been associated with changes in aquatic vegetation and interactions with native freshwater fauna. Their spread into tributary rivers has also raised concerns about competition with native freshwater crabs. Records show their presence beyond Lake Naivasha, including parts of the Malewa and Gilgil rivers and other freshwater systems.

The same qualities that make crayfish attractive for farming—rapid growth, adaptability, prolific reproduction and tolerance of different environmental conditions—can also help them establish and spread outside farms. The key question is therefore not simply whether crayfish can be cultured, but whether they can be produced in a controlled way while reducing environmental risks.

Kenya's aquaculture sector is seeking ways to diversify beyond the traditional species. Globally, aquatic food production continues to grow, with aquaculture now providing more than half of global aquatic animal production. Crustaceans occupy an important place in this expanding seafood market, and red swamp crayfish is one of the major cultured freshwater crustaceans.

Crayfish are widely consumed in North America, Europe and Asia. They can be produced in ponds and integrated farming systems, and their global production shows that there is an established market and production experience from which Kenya can learn. In Kenya, growing urban populations, hotels, restaurants, international communities and changing food preferences may create new demand for alternative seafood products.

KMFRI research puts crayfish to the test: Contemporary interest in crayfish culture

Against this historical background, contemporary research is beginning to ask a different question: Instead

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of relying on wild populations, can crayfish be produced under controlled aquaculture conditions?

Recent culture trials at KMFRI's Kegati Aquaculture Research Centre are contributing to this emerging conversation. The work examined the capacity of *P. clarkii* to survive, grow and reproduce under highland equatorial conditions. Initial trials using crayfish sourced from Kinangop area in Nyandarua County demonstrated successful acclimation, survival, growth and reproduction under controlled pond conditions, including the production of berried females and juveniles.



KMFRI research team with crayfish fishers at Njabini, Kinangop, Nyandarua County.

Further research needs to establish several aspects of crayfish culture including: reliable broodstock management, reproduction and juvenile production, appropriate stocking densities, growth performance, feed and feeding strategies, water-quality requirements, harvesting methods and economic returns. Equally important is determining production systems that minimize the possibility of escape into natural water bodies. The emerging Kenyan research agenda will therefore represent a shift from exploiting pockets of established wild population towards understanding whether crayfish can become a controlled, responsible and economically viable aquaculture commodity.

An emerging market opportunity

There are several reasons why crayfish deserve consideration within Kenya's aquaculture diversification agenda. First, they provide a product that is different from the conventional farmed fish currently dominating the market. Second, crustaceans generally occupy higher-value segments of the seafood market, particularly in hotels, restaurants and specialized food outlets. Historical Kenyan fisheries records already identified strong demand for crayfish in the hospitality sector. Third, changing food cultures are creating new consumer niches. Kenya's expanding urban population, hospitality industry, international communities and growing exposure to global cuisines could support demand for alternative seafood products.

Recent research has documented growing demand for crayfish among Kenya's Chinese community, particularly in Nairobi and around Lake Naivasha. This emerging consumer market illustrates how migration and changing food preferences can create new demand for aquatic products and influence the development of underutilized fisheries and value chains.

The opportunity, however, should not be interpreted simply as a call for widespread crayfish stocking. A viable industry would require a well-developed strategy for the entire value chain - from broodstock and seed production to farming, harvesting, live handling, processing, cold-chain management, marketing and consumption. Therefore, elaborate market research is particularly important for *P. clarkii*, as it may have high biological production potential but lack a sufficiently large or reliable domestic market.

Proceeding with Caution: The Risk Dimension

The environmental history of *P. clarkii* in Kenya makes risk management central to any future aquaculture development. Crayfish are highly adaptable, omnivorous and capable of moving beyond production facilities. International experience shows that introduced crayfish

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can alter food webs, compete with native organisms, disturb aquatic vegetation and modify ecosystem processes.

Consequently, commercial culture in Kenya should be approached through contained production systems, strong biosecurity and appropriate regulatory oversight. Particular attention should be given to pond design, screens and escape barriers, effluent management, movement of live animals, broodstock sourcing, farm registration and monitoring of surrounding water bodies. Therefore, any future development should be guided by environmental risk assessment and the precautionary principle.

A game changer?

With global demand for aquatic foods continuing to grow and aquaculture becoming an increasingly important source of seafood, diversification of Kenya's aquaculture portfolio deserves serious consideration. Crayfish may form part of that future, not as a replacement for established species such as tilapia and catfish, but potentially as a specialized, higher-value complementary enterprise that is supported by science, responsible management and a clearly developed market.

Kenya's long experience with crayfish provides an extra advantage because the country does not have to ask whether the species can establish itself in the local environment. It should focus on determining whether that biological adaptability can translate into a safe, controlled and economically viable aquaculture opportunity.

Recent culture trials at KMFRI's Kegati Aquaculture Research Centre are helping to answer whether crayfish can be responsibly cultured under Kenyan conditions. Researchers examined the ability of crayfish to survive, grow and reproduce under highland equatorial conditions.

Initial trials used crayfish sourced from the Kinangop area of Nyandarua County. The results were encouraging: the crayfish successfully acclimated to controlled pond conditions, survived and grew, and researchers observed reproduction, including berried females and juveniles.



A Fresh water crayfish, (*Procambarus clarkii*)

These early results are important, but they do not by themselves establish crayfish as a ready-to-use commercial aquaculture species. Further research is needed on broodstock management, reproduction and juvenile production, stocking densities, growth performance, feed and feeding, water-quality requirements, harvesting methods and economic returns. Researchers must also identify production systems that minimize the possibility of escape into natural water bodies.

Crayfish could offer Kenyan farmers and businesses a product different from conventional farmed fish. Crustaceans often occupy higher-value seafood markets, especially in hotels, restaurants and specialized food outlets. Historical Kenyan fisheries records already showed demand from the hospitality sector.

Changing food preferences may create additional opportunities. Research has documented growing demand for crayfish among Kenya's Chinese community, particularly in Nairobi and around Lake Naivasha. This illustrates how changing consumer tastes and new food markets can create opportunities for underused aquatic products.

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However, production potential does not automatically mean business success. Before an industry expands, Kenya needs reliable market information: who will buy the crayfish, how much they will pay, where demand is strongest, and whether farmers can produce and sell the product profitably.

A successful crayfish industry would require more than stocking ponds. The whole value chain would need attention, from broodstock and seed production to farming, harvesting, live handling, processing, cold-chain management, marketing and consumption.

Market research is especially important because a species may have strong biological production potential while still lacking a sufficiently large or reliable domestic market. The future industry would therefore need to develop alongside clear market opportunities rather than production alone.



Samples of crayfish and berried females being examined in experimental ponds at Kegati Aquaculture Research Centre

Environmental protection must come first

Any future commercial culture of red swamp crayfish in Kenya would require strong environmental safeguards. Because crayfish are adaptable and capable of moving beyond production facilities, farms would need appropriate pond designs, screens and escape barriers, responsible effluent management, careful movement of live animals, controlled broodstock sourcing, farm registration and monitoring of surrounding water bodies.

The development of crayfish culture should therefore follow environmental risk assessment and the precautionary principle. The aim should not be to spread crayfish, but to determine whether they can be safely contained and responsibly farmed.

Kenya's long experience with crayfish gives researchers a useful starting point. The country already knows that the species can establish and survive in local freshwater environments. The next challenge is to determine whether that biological adaptability can be converted into a safe, controlled and economically viable aquaculture opportunity.

Crayfish should not be viewed as a replacement for established species such as tilapia and catfish. Instead, they could potentially become a specialized, higher-value complementary enterprise within a more diversified aquaculture sector.

For KMFRI and Kenya's aquaculture sector, the message is clear: the opportunity is promising, but it must be guided by science, market research and strong environmental management. The question is no longer whether crayfish can live in Kenya. The important question is whether Kenya can responsibly turn that potential into a useful opportunity for farmers, businesses and the wider blue economy.

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By: Dr. Domitila Kyule | Edits: Caleb Korir | Layout: Maliki Fumbwe

Social media opens new opportunities for Kenya's aquaculture sector

Kenya's aquaculture sector is growing, creating opportunities to improve food and nutrition security, livelihoods and incomes. Yet fish farmers continue to face challenges including limited access to technical advice, high feed costs, inconsistent access to quality seed, fish health and water-quality problems, as well as difficulties accessing markets.

A recent review published in Aquaculture, Fish and Fisheries explores how social media and digital communication can help address some of these challenges. The review examined literature and institutional sources published between 2015 and 2025. Out of 388 records identified, 45 sources were included in the final synthesis.

The review shows that platforms such as WhatsApp, Facebook and YouTube can provide farmers with new ways to learn, share experiences, communicate with advisers and connect with other actors in the aquaculture value chain.

Creating stronger market connections

For fish farmers, social media is not only about communication. It can also create opportunities to connect with markets and suppliers.

Farmers can use digital platforms to advertise harvested fish, identify potential buyers, compare suppliers and access information about hatcheries, feeds, transport services and other aquaculture inputs. Online groups can also support networking and farmer-to-farmer learning.

However, digital communication alone cannot solve physical challenges within the aquaculture value chain. Transport, cold storage, aggregation, quality assurance, transparent pricing, reliable payments and dispute resolution remain important for farmers to benefit fully from digital market connections.



Different Social Media Platforms

A phone does not always mean digital access

The review highlights an important gap between owning a mobile phone and using it effectively for agricultural information. One Kenyan smallholder study cited in the review reported mobile phone ownership of about 98%, but only around 25% of respondents used their phones to obtain agricultural information.

This shows that access to technology does not automatically translate into meaningful digital use. Farmers may still face high data costs, poor network coverage, unreliable electricity, limited digital skills and difficulty identifying trustworthy information.

These challenges can particularly affect women, older farmers, lower-income households and farmers in poorly connected rural areas.

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The misinformation challenge

While social media can make information easier to access, not all information shared online is reliable. Incorrect advice on stocking densities, feeding, disease treatment, water quality or chemical use can negatively affect fish production.

The review therefore emphasizes the importance of verified and moderated information. Farmer-generated content can be valuable because it reflects real experiences, but it should not automatically be treated as equivalent to professional technical guidance.

Digital platforms should provide clear links to qualified extension officers, researchers and other technical experts, especially when farmers face complex problems.



A single device can spread false information on social media.

Social media should complement extension services

One of the key recommendations from the review is a hybrid approach to aquaculture extension. Digital communication should complement, rather than replace, field-based extension services.

Simple questions and routine information can often be handled through moderated WhatsApp groups, videos, voice notes, SMS and other digital channels. However, serious problems such as disease outbreaks, unexplained fish mortality, poor water quality or suspected feed and seed failures may require physical inspection, diagnostic testing or direct observation.

Kenya's aquaculture support system can therefore benefit from connecting digital platforms with extension officers, researchers, county fisheries departments, universities, farmer organizations and private-sector actors.

Building an inclusive digital aquaculture future

The review recommends practical measures to make digital aquaculture support more inclusive and useful. These include developing local-language videos, voice notes, posters and short guides on fish feeding, water quality, fish health, seed quality, pond management and biosecurity.

Low-bandwidth options such as SMS and voice communication can help reach farmers with limited internet access. Community digital access points, solar charging options and links with local radio can also support farmers who face connectivity and electricity challenges.

Digital literacy training is equally important. Farmers need skills to verify information, identify misinformation, protect personal data, keep digital records and conduct safer online transactions.

The review also calls for greater attention to gender inclusion, including women-led learning groups, flexible training schedules and deliberate efforts to increase women's participation in digital aquaculture activities.

Looking ahead

The review concludes that social media has the potential to strengthen farmer learning, advisory communication, market coordination and access to information on aquaculture inputs and buyers. However, its impact depends on credible content, effective moderation, affordable and inclusive access, digital literacy and a functioning physical value chain.

The authors caution that the available evidence does not yet establish the size or causal effect of social media on productivity, profitability, income or inclusion. More Kenya-specific research is therefore needed, including studies that track changes in farmer behaviour,

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production outcomes, market returns and extension performance.

For Kenya's aquaculture sector, the message is clear: the future of digital communication is not about replacing extension officers or physical support systems. It is about using technology to connect farmers with reliable knowledge, experts, markets and services—while ensuring that the people and infrastructure behind the technology remain strong.



The power of social media

The story is based on the review paper: "Harnessing Kenyan Aquaculture Through Social Media: Impacts, Challenges and Strategic Directions"



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By: Dr. Mary Opiyo | *Edits:* Jacqueline Wamta | Layout: Maliki Fumbwe

Seaweed on the menu: How Sea lettuce could make Kenyan tilapia healthier to eat

A Kenyan study shows that feeding tilapia a green seaweed from our own coastline boosts the "good fats" people need from fish.

Most of us know that eating fish is good for us. One big reason is that fish contains **omega-3 fats**, the healthy fats that support the heart, the brain, and the healthy growth of children. The two most important ones are known as *Eicosapentaenoic acid* (**EPA) and** *Docosahexaenoic acid* **(DHA)**.

There is a catch, though. Farmed fish only have as much omega-3 as their feed allows. On farms, tilapia are mostly fed plant ingredients such as soybean meal, maize and wheat products, which contain almost none of these valuable fats.

A team of Kenyan and international researchers, led by Dr. Mary A. Opiyo of the Kenya Marine and Fisheries Research Institute (KMFRI), set out to see whether a simple, locally available ingredient could fix this: **sea lettuce**.

Meet Sea Lettuce (*Ulva lactuca*)

Sea lettuce is a bright green seaweed that grows quickly along coastlines around the world, including Kenya's Indian Ocean coast. It looks a bit like thin, wavy lettuce leaves, which is how it got its name.

Although sea lettuce contains very little fat overall, the fat it does contain is special. Unlike crops grown on land, it carries some of the building blocks that fish can use to make their own omega-3s. The researchers wondered: If we add this seaweed to tilapia feed, will the fish become richer in omega-3?



Sea lettuce (Seaweed)

How the study was done

The seaweed was collected from the shore near Mombasa, washed, dried and ground into a fine powder. It was then mixed into five fish feeds containing 0%, 5%, 10%, 15% and 20% seaweed. No fishmeal or fish oil was used, so any omega-3 benefit would have to come from the seaweed.

The trial took place at Mwea Aquafish Farm in Kirinyaga County. Young Nile tilapia weighing about 2 grams each were placed in 15 tanks with a steady flow of fresh water, 25 fish per tank. Each feed was given to three tanks, twice a day, for 12 weeks.

Throughout the trial, the team weighed the fish and checked water quality. At the end, they tested the fish flesh in the laboratory.

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Dr Mary Opiyo monitoring the study at Mweafish farm

What they found

The fish became much richer in omega-3. The more seaweed in the feed, the more EPA and DHA in the fish flesh, the part we eat. Fish on the feed with no seaweed had less than 1% of their fat as EPA plus DHA. Fish on the 20% seaweed feed had almost 10%, roughly a tenfold increase.

The balance of fats improved. Plant-based feeds load fish with omega-6 fats, which can crowd out omega-3. The seaweed feeds shifted this balance strongly towards omega-3, a healthier mix for people who eat the fish.

The fish likely made the omega-3 themselves. The feeds contained almost no EPA or DHA. The seaweed supplied "halfway" building blocks that tilapia can turn into these fats, skipping the slowest step in the process.

Growth: 15% was the sweet spot. Fish on the 5%, 10% and 20% seaweed feeds grew somewhat more slowly than fish on the standard feed. Fish on the **15% seaweed feed** grew just as well as those on the standard feed and had the best survival of all groups.

Why this matters

In many parts of Africa, people have limited access to marine fish, and tilapia is one of the most commonly eaten fish. If farmed tilapia can be made richer in omega-3 using a seaweed that grows on the Kenyan coast, farmers could offer a more nutritious fish without relying on expensive, imported fishmeal and fish oil.

It could also open new opportunities for coastal communities to harvest or farm seaweed for the feed industry.

What's next

This was a 12-week trial with young fish. The next steps are to test the seaweed in commercially made (extruded) feeds and to follow the fish to market size, to confirm the benefits under real farming conditions.



The harvested fish at Mweafish Farm

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Mtafiti Pictorials





KMFRI research team with crayfish fishers at Njabini, Kinangop, Nyandarua County.



Kenya Marine and Fisheries Research Institute is partnering with the Lamu County Government, Kenya Fisheries Service (KeFS), Lamu Bay BMUs, local communities and other stakeholders to advance community-led coral reef restoration within the Lamu Bay Joint Co-Management Area (JCMA)

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The Kenya Seagrass Outlook, a national status report developed under the WIOMSA regional seagrass outlook process, was presented at COP12 by Senior research Scientist Ms. Lillian Daudi,

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