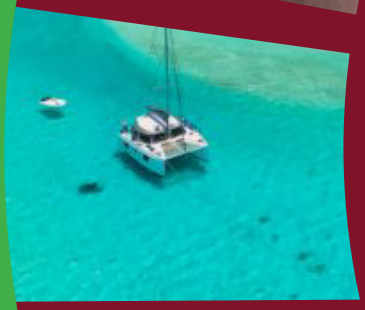










COUNCIL OF GOVERNORS

48 Governments 1 Nation

COMPENDIUM OF COUNTY INNOVATIONS AND BEST PRACTICES ON SERVICE DELIVERY

11TH EDITION

JANUARY-JUNE 2026

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Maarifa Centre
Sharing Kenya's Devolution solutions

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OF COUNTY INNOVATIONS AND BEST PRACTICES ON SERVICE DELIVERY

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Maarifa Centre

Maarifa Centre is the premier subnational knowledge hub established to serve as Kenya's knowledge sharing and learning platform to support effective governance and service delivery at the County level, The vision of the Centre is "To be Kenya's Premier knowledge sharing and learning platform for effective Governance and service delivery for sustainable development".

CoG Vision

Prosperous Counties that are drivers of socio-economic growth and development and quality service delivery

CoG Mission

To deepen devolution through coordination, consultation, information sharing, capacity building, performance management and dispute resolution.

CoG Values

Collaboration and Partnership; Integrity; Diversity, Equity and Inclusion; Innovation; Professionalism.

CoG Motto

48 Governments, 1 Nation

Maarifa Centre Motto

Sharing Kenya's Devolution Solutions

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ACRONYMS

A&E	Accident and Emergency
ABDP	Aquaculture Business Development Programme
ACK	Anglican Church of Kenya
AIEs	Authority to Incur Expenditure
ANC	Antenatal Care
BBAs	Babies Born Before Arrival
TTBSF	Black Soldier Fly
CCAK	Clean Cooking Association of Kenya
CEmONC	Comprehensive Emergency Obstetric and Newborn Care
CFMTC	County Multiplication and Training Centre
CHAs	Community Health Assistants
CHC	Community Health Committee
CHCs	Community Health Committees
CHMT	County Health Management Team
CHPs	Community Health Promoters
CHPs	Community Health Promoters
CHUs	Community Health Units
CLTS	Community-Led TotalSanitation
CoG	Council of County Governors
CP	Protein Content
CQI	Continuous QualitImprovement
EBRIMS	Embu Boda Boda Rider Information Management System
ECDE	Early Childhood Development and Education
EPRA	Energy and Petroleum Regulatory Authority
FIC	Fully Immunized Child
FIGO	Federation of Gynaecology and Obstetrics
FP	Family Planning
FSBs	Fresh Stillbirths
HFMC	Health Facility Management Committee
HSC	Heat Stable Carbetocin
IDPs	Internally Displaced Persons
IFAD	International Fund for Agricultural Development
IGRA	Intergovernmental Relations Act, Cap 265F
KHIS	Kenya Health Information System
KMFRI	Kenya Marine and Fisheries Research Institute
LPG	Liquefied Petroleum Gas
MCH	Maternal and Child Health
MPDSR	Maternal and Perinatal Death Surveillance and Response
MSBs	Macerated Stillbirths
MSME	Micro, Small, and Medium Enterprises
ODF	Open Defecation Free
PDSA	Plan-Do-Study-Act
PHC	Primary Health Care
PPH	Postpartum Haemorrhage
R&D	Research and Development
RAS	Recirculatory Aquaculture System
RMNCAH	Reproductive, Maternal, Newborn, Child, and Adolescent Health
SACCOs	Savings and Credit Cooperative Society
SBCC	Social Behaviour Change Communication
SDGs	Sustainable Development Goals
SHA	Social Health Authority
TBAs	Traditional Birth Attendants
UHC	Universal Health Coverage
WHO	World Health Organization
WUPC	Water Users Peace Committee
WWF	Worldwide Fund for Nature
YISA	Youth in Sustainabl Aquaculture

FOREWORD



Over the past decade, County Governments have demonstrated that when decision-making is brought closer to the people, innovation flourishes and public service becomes more responsive. Faced with a demand for quality, accessible and available services, Counties are investing in practical, locally driven solutions aimed at transforming lives, strengthening governance and entrenching sustainable development.

The stories featured in this edition highlight innovations and best practices that are strengthening health systems, improving food and nutrition security, advancing climate resilience, expanding access to clean water and renewable energy, advancing sustainable urban development, fostering social inclusion and creating economic opportunities. They demonstrate that lasting development is driven by visionary leadership, strategic partnerships, evidence-informed decision-making and active citizen participation.

The initiatives documented in this Compendium remind us that innovative service delivery is not always about creating something entirely new. Often, it is about learning from peers, and thereafter upscaling, replicating and applying newly acquired knowledge to local problems.

In remaining committed to its mandate under section 20(b) of the IGRA, the CoG continues to foster a culture of inter-County learning and exchange of ideas. Through the Maarifa Centre, best practices and innovations emerging from service delivery are regularly identified, documented and disseminated.

This Compendium therefore serves as a useful knowledge resource whose goal is to spur learning amongst Counties and promote evidence- based decision making. e It reinforces our belief that every County has valuable experiences worth sharing.

With devolution being in its 13th year of implementation, it is imperative that CoG continues to document the success stories, the lessons and the challenges experienced so that relevant and critical knowledge is secured for future County administrations. The editions of this Compendium are expected to inspire Counties to robustly learn from one another, scale up proven innovations and eventually improve service delivery.

H.E. FCPA Ahmed Abdullahi, EGH

Chairperson, Council of Governors

ACKNOWLEDGEMENT



The successful production of this 11th Compendium of County Innovations and Best Practices on Service Delivery is the result of the collective efforts of County Governments, Maarifa Centre, development partners and technical experts who continue to champion learning, innovation and excellence in Kenya's devolved system of governance.

The CoG extends its sincere appreciation to all the County officials who were part of this edition's production and also to Counties themselves whose inspiring innovations and experiences are documented in this publication. We acknowledge both the Executive and Assembly arms, technical officers, frontline service providers and community members whose commitment to improving service delivery continues transform the lives of citizens across the country.

We express our heartfelt gratitude to the County Knowledge Management Champions and County resource persons who worked tirelessly to identify, document and validate the success stories presented in this Compendium. Their commitment to capturing knowledge and sharing practical experiences has created a valuable resource for peer learning, policy development and the replication of proven solutions across Counties.

The successful production of this 11th Compendium of County Innovations and Best Practices on Service Delivery is the result of the collective efforts of County Governments, Maarifa Centre, development partners and technical experts who continue to champion learning, innovation and excellence in Kenya's devolved system of governance.

We acknowledge the invaluable technical and financial support of the DANIDA Primary Health Care (PHC) Support Programme, the Financing Locally-Led Climate Action (FLLoCA) Programme, and EED Advisory, whose partnership made the documentation of many of these stories possible.

Special appreciation goes to the Maarifa Centre team for coordinating the identification, documentation and development of this Compendium. We also acknowledge the technical teams whose expertise and dedication contributed to the quality of this publication.

Finally, we thank all stakeholders who continue to contribute to a culture of learning, collaboration and innovation within County Governments. My hope is that continous and active inter-County learning will accelerate transformative service delivery for the benefit of all Kenyans.

CHRP. Mary Mwiti, EBS

Chief Executive Officer

INTRODUCTION

The 11th Compendium of County Innovations and Best Practices on Service Delivery showcases how County Governments are addressing development challenges through innovation, strategic leadership, partnerships, technology and community participation. The stories cover diverse sectors including blue economy, renewable energy, water security, maternal and newborn health, public health, urban development, environmental conservation, social inclusion, refugee-host integration and local economic development. Together, they demonstrate the resilience, creativity and transformative potential of Kenya's devolved system of governance.

A recurring theme across this edition is the growing focus on sustainability. Counties are integrating successfully innovative interventions into policies, annual work plans and budgets, ensuring that impactful initiatives continue beyond project cycles. Others are improving service delivery by leveraging technology, promoting citizen participation, strengthening partnerships and investing in local capacity. These experiences demonstrate that lasting development is achieved through collaborative governance and evidence-informed decision-making.

County need to focus on strengthening existing systems, adopting proven approaches to local contexts and working together to solve persistent challenges. From improving maternal healthcare and expanding access to safe water through renewable energy, to strengthening livelihoods, restoring ecosystems and revitalising urban spaces, Counties continue to demonstrate that locally driven solutions deliver meaningful and lasting impact.

Beyond celebrating these achievements, this Compendium serves as a practical resource for policymakers, practitioners, researchers and County Governments seeking proven approaches to improving public service delivery. The lessons and experiences documented here provide valuable insights for policy development, programme design and replication while reinforcing the principle that every County has knowledge worth sharing.

As Counties continue to respond to emerging opportunities and challenges, the Council of Governors remains committed to strengthening knowledge management as a driver of learning and innovation.

CHAPTER 1: BLUE ECONOMY SECTOR

Propelling Climate-Smart Aquaculture in Homa Bay County through Innovative Fish Farming

Introduction

Homa Bay County, located along the expansive shores of Lake Victoria, is one of Kenya's leading blue economy Counties. With over 200 kilometres of shoreline, the county has long depended on capture fisheries for food and income. However, decades of overfishing, environmental degradation, and the growing impacts of climate change, such as warming lake waters, erratic rainfall, and fluctuating water levels, have severely depleted fish stocks and disrupted livelihoods, exposing communities to poverty, food insecurity, and economic vulnerability.

In response, the County Government, supported by development partners and national programs, has championed aquaculture as a climate-resilient, inclusive, and economically viable alternative. Recognizing that aquaculture offers a more controlled and adaptive environment for fish production, key initiatives such as the Aquaculture Business Development Programme (ABDP), Youth in Sustainable Aquaculture (YISA), and donor-backed interventions from Echo Network Africa and Farm Africa have driven a shift from reliance on wild capture to pond and cage-based systems.

Between 2018 and 2025, over KES 1.5 billion has been invested in fisheries development, leading to the establishment of more than 1,800 fishponds and over 250 cage units across the County. These efforts are backed by innovations such as solar-powered aquaculture systems, decentralized hatcheries, Black Soldier Fly (BSF) production for sustainable feed, and aquaponics, which together build resilience by lowering input costs, reducing environmental impacts, and ensuring year-round production.

These climate-smart practices are enabling a diverse range of community members, including youth, women, and smallholder farmers, to thrive in aquaculture despite growing climate pressures. The following examples from Rusinga Island and Muga Fish Farm illustrate how inclusive, locally driven innovations are transforming aquaculture into a climate adaptation strategy and economic growth engine in Homa Bay County.

Implementation of the Practice:

1. Muga Fish Farm

Muga Fish Farm demonstrates how small and medium-scale producers can integrate low-cost, environmentally sustainable technologies into aquaculture operations to improve productivity while strengthening climate resilience.

- Hatchery development using recycled materials: By repurposing plastic drums, basins, and bottles for incubation, Muga reduces reliance on expensive inputs and lowers its environmental footprint. This approach also reduces waste and improves access to fingerlings in a cost-effective and climate-conscious manner, ensuring a steady supply even during climate-induced disruptions to fish breeding.



Figure 1: Solar-powered aquaculture for clean energy, driving reliable fish production and sustainable farming.

- Solar-powered aquaculture systems: Solar energy powers aerators, pumps, and lighting, enabling uninterrupted fish production even in off-grid areas. This reduces dependency on fossil fuels, cuts greenhouse gas emissions, and ensures consistent pond conditions, especially during power outages or dry seasons when stable water quality is critical for fish survival
- Black Soldier Fly (BSF) production for feed: Conventional fishmeal is expensive, unsustainable, and relies on overharvested marine resources. Muga addresses this by farming BSF using biodegradable waste. This low-input system:
    - Diverts organic waste from the environment,
    - Produces high-protein feed at minimal cost,
    - Reduces pressure on wild fish stocks, and
    - Supports circular economies that buffer farmers against external shocks such as feed price volatility or climate-induced feed shortages.
- Aquaponics integration: By linking fish production with hydroponic vegetable farming, Muga creates a closed-loop system where fish waste nourishes crops, and plants filter water for the fish. This water-efficient model reduces dependence on rain-fed agriculture, enables year-round food production, and is particularly suited for areas facing water stress or erratic weather patterns.

Training and technical support: Muga operates as a demonstration site, offering training in hatchery management, climate adaptation, and sustainable aquaculture practices. This empowers other farmers with tools to adopt climate-resilient systems in their own contexts.



Figure 2 Rusinga Nile Perch Youth Group's floating fish cage at Rusinga Island, supported by YISA to advance sustainable aquaculture

2. Rusinga Nile Perch Youth Group

Established in 2022 as a self-help group (chama), the Rusinga Nile Perch Youth Group began with just ten women in Mbita Sub- County, Rusinga Island Ward. Initially functioning as a merry-go-round to build financial resilience, the group formalized and registered as a cooperative in 2024. This enabled them to access support and financing for commercial fish farming. Membership has now grown to 22 active women, with the youngest being 18 years old.

With support from Echo Network Africa through the Youth in Sustainable Aquaculture (YISA) Programme, implemented with partnership with the County Government of Homa Bay, the group transitioned into commercial cage fish farming, a high-yield and technology-driven aquaculture method. This support included provision of a complete cage system, fingerlings, fish feed, life jackets, a fishing boat, and climate change training. Cage fish farming involves rearing fish in floating net enclosures placed in open water bodies such as lakes. This method allows fish to grow in their natural environment while ensuring controlled feeding and monitoring, leading to higher yields and efficient use of space. By reducing pressure on overfished wild stocks, cage farming contributes to sustainable fisheries management. Unlike traditional pond farming that may dry up during prolonged droughts, cages in open water ensure a continuous supply of fish.

The programme provided infrastructure and equipment, including fish cages, weighing scales, solar lamps, life jackets, and a fishing boat, which amounted to KES 4.2 million. Additionally, each member contributes a minimum of KES 100 in monthly savings, fostering financial discipline and internal capital growth within the cooperative.

Results of the Practice

- Women in Rusinga Island have transitioned from vulnerable traders to empowered producers with consistent income and group savings.
- Membership growth and rising community interest signal strong potential for scale.
- Muga's use of recycled materials, solar systems, and BSF has cut costs, lowered

emissions, and enhanced food production efficiency.

- Both initiatives offer replicable models for inclusive aquaculture, bridging gender gaps and attracting youth into the sector.
- The adoption of clean energy, alternative feeds, and closed-loop systems supports climate resilience and ecosystem protection.

Lessons Learnt

- Empowering communities through knowledge transfer and mentorship is critical to sustaining innovation and improving livelihoods.
- Access to finance remains a barrier, particularly for women and smallholder farmers; revolving funds and soft loans are key enablers.
- Gender-responsive interventions must go beyond production support and tackle social norms and market access to ensure lasting impact.
- Integrated farming systems like aquaponics and BSF production offer climate-smart pathways for food and income diversification.

Recommendations (Conclusion)

- The County should expand access to aquaculture for women and youth by prioritizing targeted grants, essential inputs, and continuous technical support.
- There is need to integrate solar energy systems, Black Soldier Fly (BSF) production, and aquaponics into County aquaculture strategies and extension services to promote climate smart innovations.
- There is need to establish community-based training and demonstration sites to enhance peer to-peer learning and build local technical capacity.
- The County should consider supporting traders by facilitate aggregation, cold chain development, and direct-to-market strategies to improve profitability and reduce post-harvest losses.



Figure 3 Rusinga Nile Perch Youth Group's floating fish cages at Rusinga Island, supported by YISA to advance sustainable aquaculture



Figure 4 Protective nets placed over fish cages to safeguard stock from predators



Figure 5Muga's farm showcases aquaponics system, linking fish farming with vegetable production

From Matoke to Fishponds: Kisii County's Path to Sustainable Aquaculture

Introduction

Kisii County, located in the fertile highlands of western Kenya, is renowned for its perennial rainfall, lush greenery, and thriving small holder agricultural base. Traditionally known as the land of matoke (bananas), Kisii's economy is driven by smallholder farmers cultivating crops like bananas, tea, and maize while also engaging in livestock production. However, these agricultural systems are increasingly under pressure from climate variability, soil degradation, and shrinking land resources, challenges worsened by climate change.

The County has embraced aquaculture not only as a strategic pillar for livelihood diversification but also as a pathway to enhanced climate resilience and sustainable food systems. Fish farming offers an efficient way to utilize land and water resources, but high costs of commercial protein-rich feeds, aggravated by inflation and unreliable supply chains, have emerged as a major bottleneck.

To address this, Kisii County has embraced Azolla, a fast-growing aquatic fern rich in protein, as a low-cost, eco-friendly feed alternative for fish, poultry, and dairy production. Azolla's climate-smart attributes, rapid growth, nitrogen fixation, water surface shading, and compatibility with circular farm systems, make it particularly well-suited for smallholder farmers facing both economic and environmental vulnerability. This intervention directly responds to the need for climate adaptation strategies that promote ecological balance, reduce external input dependency, and sustain livelihoods under shifting climatic conditions.

Implementation of the practice

To strengthen local capacity and build resilience in aquaculture and livestock systems, Kisii County Government, in partnership with the Aquaculture Business Development Programme (ABDP) and IFAD, under the Memorandum of Understanding between the Ministry of Agriculture, Livestock, Fisheries, State Department for Fisheries, Aquaculture and the Blue Economy and the County Government of Kisii, rolled out an integrated Azolla promotion strategy. This solution emphasized climate-smart accessibility, integration, and farmer empowerment. Beyond lowering feed costs, Azolla's integration into smallholder systems enhances climate resilience.

1. Farmer training and demonstration sites

Recognizing low awareness and skills gaps, the County established Azolla demonstration ponds in 7 out of 9 sub-counties. These sites served as hands-on learning hubs, where farmers were trained on climate-smart Azolla farming practices, including lined pond construction, starter culture inoculation, water management, and routine harvesting. Demonstrations were tailored to local conditions, using materials accessible to smallholders.

During the Kisii ASK Show 2024, over 100 farmers from Kisii and neighbouring Counties were reached. A total of 144 farmers has since received direct training, and 20 farmers have already established their own Azolla production units.



Figure 1Azolla propagation tanks at a demonstration site, supporting clean stock production for farmer uptake and scaling.

2. Provision of starter stock and input

To kick-start on-farm production, Kisii County Multiplication and Training Centre (CFMTC) propagates high-quality Azolla starter stock. This stock is distributed to trained farmers along with lined polythene sheets for pond construction, technical guidance on site selection, pond construction, and management, and water management tips, including pH balance and shade management.

Each trained farmer receives enough starter culture to establish a mother pond, which is then used to multiply Azolla for personal use or distribution to other farmers. The initial starter package ensures cost savings, since farmers don't have to purchase commercial feed, sustainability, as Azolla regenerates quickly under proper conditions and

local ownership, empowering farmers to become Azolla trainers and suppliers themselves.

This decentralized approach reduces dependency on central nurseries and promotes self-reliance at the grassroots level.

At the Kisii County Multiplication and Training Centre (CFMTC), Azolla is propagated using simple but effective techniques suited for small-scale and scalable replication. The goal is to produce a consistent supply of healthy, fast-growing Azolla starter stock for distribution to farmers across the County.

County-based propagation of Azolla through the CFMTC offers several significant benefits.



Figure 2 Lined ground-based pond under partial shade, designed for optimal Azolla propagation by retaining water and shielding

Firstly, the CFMTC maintains high-quality, disease-free stock, ensuring that farmers receive healthy and fast-growing Azolla. By centralizing the propagation process, the center reduces the burden on individual farmers who might otherwise face challenges in sourcing clean starter cultures. Once farmers receive the initial stock, they can multiply it at home by establishing mother ponds, which not only meet their own needs but can also support neighbouring farms. Additionally, regular harvesting at the center guarantees a consistent, year-round supply of Azolla for both new farmers and those looking to expand their production.

3. Integration with aquaculture and livestock systems

Integration into aquaculture and livestock systems models are being developed to integrate Azolla into fish farming systems to reduce reliance on costly commercial feeds. This integration promotes resource cycling, improves nutrient use efficiency, and aligns with climate-smart agriculture principles. Pilot feeding trials have been conducted for poultry and dairy livestock, demonstrating improved nutrition. Farmers are trained in harvesting, drying, and mixing Azolla with conventional feeds, promoting its incorporation into broader farm operations.

4. Market development and policy engagement

Recognizing the need for sustainability, the County is actively developing market systems to support Azolla commercialization. Key actions include:

- Engaging feed manufacturers, such as Aquarech, to explore bulk sourcing and

formulation of Azolla-based feeds

- Collaborating with fish farmer cooperatives and self-help groups to promote bulk production, aggregation, and market access
- Facilitating public-private partnerships to attract investment in Azolla processing, packaging, and distribution
- Advocating for policy domestication to include Azolla in local feed standards and County agricultural strategies
- Azolla nutrient and sensitization of feed manufacturers of its high crude protein (CP) content.

At the same time, the County Directorate of Fisheries is spearheading policy domestication efforts to formally recognize Azolla as an approved and certified ingredient for livestock and aquaculture feeds. This policy push is important for encouraging uptake by commercial feed processors, attracting institutional buyers (e.g., schools, cooperatives) and unlocking investment and donor support for infrastructure and R&D.

So far, efforts have been concentrated on 22 priority wards, selected for their high poverty levels and suitability for aquaculture development.

Results of the Practice

- Farmers observed notable improvements in fish growth rates and pond performance, particularly in non-ABDP areas where access to commercial feeds is limited. The high protein content of Azolla contributed to accelerated fish development, while its nitrogen-fixing properties improved pond water quality, creating a healthier aquatic environment. Most importantly, adopting farmers achieved a 40–60% reduction in feed costs, leading to higher profit margins and greater economic viability for small-scale fish farming operations.
- The widespread adoption of Azolla has increased the availability and affordability of fish at the household level, enabling families to incorporate protein-rich diets into their daily meals. This shift has had a direct impact on community nutrition, particularly for women and children, by enhancing dietary diversity and reducing malnutrition risks.
- Azolla cultivation has introduced multiple ecological benefits, including reduced eutrophication risks through improved pond water quality and minimized reliance on resource-intensive feed crops. As a floating fern, Azolla naturally shades pond surfaces, suppressing excessive algae growth and maintaining balanced aquatic ecosystems. These attributes make Azolla a cornerstone of climate-smart agriculture, aligning with global sustainability goals.
- The initiative has fostered strong peer-to-peer learning networks, with trained farmers establishing local Azolla demonstration ponds to distribute starter cultures and share best practices.

Lessons learnt

- Despite the benefits of Azolla, more structured farmer field schools and refresher training sessions are needed to equip farmers with deeper knowledge in areas such as Azolla value addition, feed formulation, and commercialization.
- Practical, hands-on training through demonstrations and extension support proved most effective in building farmer confidence and accelerating adoption compared to theoretical approaches.
- Integrating Azolla into existing fish farming systems as both feed and water conditioner provided immediate tangible benefits that increased smallholder adoption rates.
- Developing market linkages and policy recognition emerged as critical requirements for scaling, prompting engagement with feed manufacturers and advocacy for official classification as feed ingredient.
- Individualized entrepreneurship models, particularly among youth and women, outperformed group approaches by offering greater flexibility, innovation, and ownership.
- Water availability challenges during dry seasons reinforce the need for climate-resilient infrastructure such as lined ponds and rainwater harvesting.
- Farmer groups and peer-to-peer learning networks became powerful drivers of knowledge transfer and community ownership of technology.

- Azolla's multiple uses (feed, pond conditioner, soil enhancer) significantly increased its appeal and adoption potential among diversified smallholder farmers.
- Successful scaling of the initiative requires an integrated strategy that combines capacity building, system integration, market development, and climate adaptation measures.

Recommendations/Conclusion

1. Comprehensive training programs should be scaled across all Sub-counties, emphasizing practical Azolla cultivation, integration with aquaculture and livestock systems, and value addition. This should be complemented by improved extension services, including mobility support such as motorcycles and pickup trucks for effective farmer outreach.
2. Establishing local Azolla nurseries at ward level and distributing key inputs, such as pond liners, predator nets, and starter stock will support localized propagation. These efforts should go hand-in-hand with technical guidance on water harvesting and pond construction.
3. Documenting and disseminating proven outcomes from Azolla feeding trials in aquaculture, poultry, and dairy farming can build farmer confidence and encourage broader uptake.
4. Supporting the formation of farmer groups and cooperatives can facilitate peer learning, bulk production, and improved market access for Azolla-based products.
5. Partnerships with feed processors and connections with institutional buyers should be developed to create structured market pathways and sustainable demand for Azolla products.
6. Encouraging the use of Azolla within broader climate-smart practices, such as water harvesting, conservation, composting, soil management and replacement of water-intensive vegetation will enhance system resilience and sustainability.



Figure 3. Bamboo near fishponds, a natural solution for flood control and soil stabilization.



Figure 4. Thriving Azolla mat on pond surface, displaying successful propagation for sustainable livestock and fish feed.



Figure 5. Fish–vegetable farming which maximizes land, boosting growth



Figure 6: A farmer demonstrating Azolla harvesting from a lined pond

Transforming Aquaculture through Black Soldier Fly Innovation: A Youth Success Story from Machakos County

Introduction

In the heart of Machakos County, fish farmers are grappling with a persistent challenge that threatens the growth of aquaculture: the high cost and limited availability of quality fish feeds. Despite the region's growing interest in fish farming as a source of nutrition and income, many small-scale producers find themselves priced out of commercial feeds, which often account for over 60% of production costs. The reliance on imported ingredients and centralized manufacturing has created a supply chain that is both expensive and inaccessible for rural farmers. As a result, feed related constraints continue to stifle productivity, profitability, and the promise of aquaculture as a pathway to food security and economic empowerment.

The adoption of Black Soldier Fly (BSF) technology is transforming aquaculture by offering a sustainable and cost-effective alternative for fish feed production. Recent studies have highlighted the remarkable potential of BSF (Hermetia illucens) as an eco-friendly high-protein source sustainable alternative to conventional azolla fish feed, particularly suited for aquaculture systems. Renowned for their efficiency in decomposing organic waste, BSF larvae, commonly known as maggots can convert a wide array of biodegradable materials into high-quality protein.

This innovative approach is gaining momentum among both small- and large-scale fish farmers, driven by its affordability, environmental benefits, and capacity to reduce reliance on conventional feed inputs. By integrating BSF into aquaculture value chains, farmers are not only lowering production costs but also contributing to circular economy practices that enhance sustainability across the sector.

Machakos County Government has emerged at the forefront in insect-based protein farming. With the growing demand for sustainable animal feed, the County Government through the Department of Agriculture and Fisheries Development in partnership the Aquaculture Business Development Program (ABDP), has promoted BSF farming as an innovative solution for waste management, fish feed production, and youth employment. This initiative has not only improved fish farming & livestock nutrition but also contributed to environmental sustainability by recycling organic waste.

Implementation of the practice

Machakos County Government Department of Agriculture and Fisheries through the ABDP and its partners supported beneficiaries by providing training on obtaining alternative feeds from BSF, which has positively impacted their livelihoods in aquaculture. BSF is not only cheap to obtain and rear but also derived from waste materials, making it a viable solution.

The training provided by the Agricultural Business Development Programme (ABDP) has significantly empowered aquaculture beneficiaries, equipping them with practical skills and innovative approaches to fish farming. One standout example is Titus Muema, a youth fish farmer from Machakos County, who transformed his livelihood by applying the knowledge gained through the programme and conducting further research on Black Soldier Fly (BSF) technology as a sustainable feed alternative.

BSF larvae (Hermetia illucens) are known for their ability to convert organic waste into protein-rich biomass, making them an ideal substitute for conventional fish feed. Titus collects organic waste from kitchen scraps & hotels, agricultural byproducts or market waste from Machakos town and its' environs. He feeds it to the larvae which rapidly converts it to biomass. The larvae grow quickly, reaching harvestable size in about 14 days where they are separated from the waste and cleaned.

The harvested larvae are either fed directly to fish (especially catfish and tilapia), dried and ground into protein-rich fish feeds or pressed for oil which is also used in aquafeeds. BSF feeds are ideal for fish farming due to their high protein content (38-50% dry weight), a fat content of up to 35%, including omega-3 and omega-6 fatty acids as well as amino acids that are ideal for fish growth and immunity. BSF feeds sustainable and impactful in that they reduce reliance on fishmeal while closing nutrition gaps by recycling waste into feed and cutting feed costs for farmers.

Before joining the programme, Titus struggled financially, particularly to purchase commercial

feed. However, the training he received introduced him to alternative feed options and connected him with a network of fellow beneficiaries some of whom had become trainers themselves.

Inspired by a session organized by ABDP, Titus took initiative and began experimenting with BSF production. His efforts paid off. The impact of BSF



Picture 1: a farmer tending to a BSF farm in a farm in Machakos County

on his fish growth has been remarkable, and his entrepreneurial spirit has led him to supply BSF larvae and feed to other farmers in the region.

Titus currently produces an average of 150 kilograms of BSF larvae, selling them from KES 140 to KES 170 per kilogram. Titus Muemas' journey exemplifies how targeted training, innovation, and youth engagement can drive sustainable transformation in rural aquaculture.

Results of the practice

- Through this initiative, farmers such as Titus Muema have seen an increase in fish productivity: Farmers have reported improved growth rates and health in poultry, fish, and pigs fed with BSF-based feed.
- Waste Reduction: being a peri-urban set-up, Machakos generates a lot of organic waste. BSF rearing has promoted organic waste recycling consequently reducing environmental pollution and promoting cleaner communities especially in the sub-urban setups in Machakos County.
- Economic Benefits: Farmers saved costs on expensive commercial feeds such as Azolla and generated income by selling surplus BSF products.
- Scalability: The model has been replicated in neighbouring counties, demonstrating its potential for wider adoption. Titus Muema has mentored other youths in Machakos County on this venture and have adopted the initiative.

Machakos County Government through the Department of Agriculture and Fisheries has proven that Black Soldier Fly farming is not just an experimental idea but a profitable, eco-friendly agribusiness. By turning waste into wealth, the County has created jobs, reduced feed costs for fish farmers, and promoted a circular economy. With continued investment, Machakos County could become East Africa's hub for sustainable insect protein production.

Lessons learnt

- Youth are highly responsive to practical, low-cost innovations when supported with mentorship
- BSF technology is scalable and adaptable to local contexts with minimal investment
- Peer-to-peer learning enhances adoption and builds community resilience
- Organic waste is an underutilized resource with high economic potential in aquaculture

Recommendations

- Expanding training programs on BSF farming to reach more farmers and youth groups is highly recommended to ensure large scale production and an amplified impact.
- The integration of BSF production into County agricultural policies and waste management strategies is also recommended to ensure better planning and budgetary allocation.
- Establishing local BSF nurseries at ward level and distributing key inputs, such as pond liners, predator nets, and starter stock will is necessary support towards localized propagation. These efforts should go together with technical guidance on water harvesting and pond construction



Picture 2: Titus Muema's BSF production warehouse in Machakos County

Greening the Cold Chain: Solar and Ice Technologies Boost Fish Trade in Nakuru County

Introduction

Nakuru County, situated in Kenya's Rift Valley region, is a leading agricultural and economic hub renowned for its vibrant urban centers, scenic landscapes, and rich biodiversity. While agriculture remains the County's primary economic driver, the fisheries and aquaculture sectors have gained momentum in recent years as part of broader efforts to diversify livelihoods and enhance food security.

The aquaculture sub-sector has experienced increased investment in fish farming, value addition, and market development, fuelled by the growing demand for affordable and nutritious protein sources. Small-scale fish farmers and traders, particularly women, play a critical role in the local fish value chain, operating across both rural and peri-urban markets.

In 2024 alone, the fisheries sector in Nakuru generated approximately KES 248 million in revenue, with over 2 million kilograms of fish harvested, predominantly tilapia. Despite this progress, the sector continues to face challenges, including post-harvest losses, limited access to cold storage, high electricity costs, and increasing vulnerability to climate-related impacts such as temperature fluctuations and unreliable power supply, all of which threaten the sustainability and profitability of small-scale fish enterprises.

In particular, small-scale fish traders play a critical role in the County's fish value chain, engaging in procurement, processing, preservation, and retail, often under challenging conditions. These actors are not just selling fish, they are adding value at different stages, from gutting and filleting to managing cold chains and aggregating supply. However, their efforts are frequently constrained by high post-harvest losses, limited access to cold storage, unreliable electricity, and rising climate related risks.

To address these challenges and improve fish quality, safety, and profitability, Nakuru County, in partnership with the Agricultural Sector Development Support Programme II (ASDSP II), supported the County through the provision of climate-smart technologies to preserve unsold fish, extend shelf life, reduce losses, and improve market competitiveness.

Implementation of the practice

The Nakuru County Government, through the Department of Livestock, Fisheries, and Veterinary Services, played a key role in identifying and selecting suitable beneficiaries for the cold chain intervention. Following the selection process, the Department deployed fisheries extension officers to provide hands-on training to traders. These sessions focused on the proper use and maintenance of the equipment, hygienic fish handling, and sustainable post-harvest management practices. The training was tailored to align with the traders' schedules and needs, ensuring relevance and practical application.

The following were the interventions deployed to the traders:

1. Deployment of a Solar-Powered Freezer

The County supported Ponda Mali Fish Mongers Self-Help Group with a solar-powered freezer to address fish spoilage during periods of excess supply and reduce reliance on unreliable and costly electricity. The Ponda Mali Self-Help group started in 2013 with some few fish mongers who traded and fried fish on small scale at the Ponda Mali open market, while the Rech Self-Help group started in 2009 with some few women as fish traders who traded and fried fish at a small scale on the ukulima fresh market.

Based at Ponda Mali Market, the group comprises 157 fish traders (138 adult females, 17 adult males, 1 male youth, and 3 female youth) who came together to strengthen their operations and improve economic resilience. The solar-powered freezer operates by drawing energy from solar panels installed on-site, which convert sunlight into electricity that powers the freezer unit. This makes it reliable even in areas with frequent power outages or high electricity costs. For the traders, this means they can store fish at consistently low temperatures without worrying about spoilage or interruptions, especially during periods when fish supply is high, but market demand is low. In addition, using solar energy reduces operational expenses, as they do not have to depend on costly grid electricity or fuel-powered generators, while also contributing to environmental sustainability.



Figure 1: A solar-powered freezer used to keep fish fresh, cutting costs, and powering resilience in the fish value chain.

The group primarily engages in two core activities: table banking, where members meet every Tuesday to contribute and lend money among themselves, and the collective purchase of fish, previously sourced from Kisumu and Naivasha. However, more recently, many members have transitioned to individual ordering based on market demand.

Most members are also involved in small-scale fish processing, including cleaning and frying, and the solar-powered freezer has proven to be a valuable innovation. It helps preserve fish during peak supply periods, allowing the traders to store unsold stock safely while they seek out markets, and significantly reduces their dependency on grid electricity. The cost of the solar-power freezers was KES 1 million.

2. Use of an Ice Flake Machine

At the Ukulima Market, the County supported the Nakuru Fish (RECH) Self-Help Group, a 28-member women's association, to install an ice flake machine. The ice flake machine works by producing thin, soft flakes of ice that are ideal for preserving fish because they cover the fish uniformly and cool it quickly. The machine freezes water on the inner surface of a cooled drum, then scrapes off the thin layer of ice as flakes, which are collected and stored for use. When fish are packed with these flakes, the ice maintains a consistent low temperature around the entire surface of the fish, slowing down bacterial growth, reducing spoilage, and extending freshness. Because flake ice melts gradually, it keeps the fish moist without causing damage to the flesh, making it highly effective for storage and transportation.

The RECH Self-Help Group was formed to strengthen their operations in the fish trade and engages in activities such as table banking and welfare support. They meet every Tuesday to collect and lend money among members, and also coordinate the bulk purchase of fish, primarily sourced from Lake Victoria and delivered by transporters. The members are involved in small-scale fish processing, including filleting, gutting, and scaling. One of the key challenges they faced was frequent fish spoilage, especially when large volumes were delivered and could not be sold within a single day. To address this, the group was supported with an ice flake machine as an innovative solution to preserve unsold fish, extend shelf life, and allow the traders to seek better market prices.

The purchase of the ice flake machine cost KES. 800,000.

After the installation of the technologies, the beneficiary groups were empowered to take full responsibility for the maintenance and operation of the equipment. The County Government ensured access to essential utilities such as water and electricity at the installation sites. This model was deliberately chosen to promote ownership, reduce dependency, and build the traders' capacity to manage their own enterprises sustainably.

The beneficiaries expressed satisfaction with this arrangement, noting that while the County Government and ASDSP II had covered the major costs, their role in day to-day maintenance gave them a sense of control, accountability, and pride in the project's success.

The beneficiary groups continue to receive ongoing and diversified training on the operation and management of the cold chain technologies to enhance their technical capacity and ensure proper use. As part of the project's design, the beneficiaries contributed land and space for the installation of the equipment, along with in-kind support, a strategy that has fostered a strong sense of ownership, accountability, and long-term commitment. Furthermore, the County Government ensured that the groups were actively involved during the public participation processes for both the identification and implementation of the interventions.

Results of the practice

Ponda Mali Self-Help Group

- Members are now able to procure and store an additional 500 kg of fish per week, valued at approximately KES 150,000, due to the availability of the solar-powered freezer which keeps the fish fresh.
- Previously, members spent about KES 3,000 per month on hiring freezer space (KES. 100 per basin). With the new freezer, storage costs have been eliminated, and the increase in fish sales has boosted their table banking savings and individual incomes.
- On average, each member previously lost about 5 kg of fish per week (worth approximately KES 1,500) due to spoilage. This loss has now been eliminated thanks to improved preservation.
- The group can now store unsold fish during periods of high supply, avoiding spoilage and enabling them to wait for better market prices.
- The use of solar energy has cut electricity expenses by 40%, from KES 4,000 to KES 2,400 per billing cycle.

Rech Self Help Group

- The group increased daily fish stock from 1,000 kg to 1,200 kg, raising their potential daily sales value from KES 300,000 to KES 360,000.
- The group now avoids spoilage of approximately 50 kg of fish per day, previously valued at KES 15,000.
- The group earns around KES 1,200 per day from selling ice flakes to members and other traders.
- Ice flakes preserve the fish's freshness and natural taste, minimizing spoilage. Even during glut periods, traders retain product quality, allowing them to sell fish at better prices and maintain customer trust.

Lessons learnt

- Adoption of green energy technologies such as solar-powered freezers and ice flake machines is a practical, cost-effective solution for improving fish preservation, reducing post-harvest losses, and enhancing climate resilience in small-scale fisheries.
- Community ownership and participation are critical to the success and sustainability of development interventions. Involving beneficiaries from the planning to implementation stage fosters accountability, relevance, and long-term commitment.
- Youth engagement in the management of storage and processing facilities can promote job creation, enhance local capacity, and support innovation in the fish value chain.
- Accessibility to shared infrastructure, such as centralized cold storage, increases operational efficiency, reduces individual burdens, and enhances profitability for informal traders.
- Proper scheduling and coordination of training activities are essential to ensure participation, especially for informal traders who operate on tight and unpredictable schedules.
- Gender inclusivity in value chain development remains a challenge and requires targeted efforts to encourage balanced participation and equitable benefits.
- Operating in informal market settings exposes traders to risks such as displacement and delayed service delivery, underscoring the need for formalized market infrastructure.
- Inter-departmental collaboration and timely approvals are key to smooth implementation of projects. Delays in administrative processes can stall progress and reduce impact.

Recommendations (Conclusion)

- Align training schedules with traders' regular meeting times to improve participation and ensure effective knowledge transfer without disrupting daily business activities.
- Allocate formal, designated spaces for fish traders within County markets to enhance tenure security, improve hygiene conditions, and support sustainable business operations.
- Promote the use of green energy technologies, such as solar-powered freezers and ice flake machines, to lower energy costs, reduce post-harvest losses, and strengthen climate resilience.
- Encourage inclusive participation in the fish value chain by sensitizing and building the capacity of men to engage in what is often a female-dominated sector, promoting gender

balance and shared economic gains.

- Support the formalization of informal markets by partnering with county governments to develop appropriate infrastructure and policy frameworks that protect traders from sudden displacement or disruption.
- Streamline approval processes by ensuring that all necessary permits and authorizations are secured in advance to avoid delays and ensure timely project implementation.
- Ring-fence funding for critical infrastructure, such as cold chain facilities, to safeguard against budget reallocations or disruptions, ensuring that key interventions are fully implemented and impactful.



Figure 3: Solar Panel at Ponda Mali Market



Figure 4: Solar Inverters at Ponda Mali Market



Figure 5: Solar Inverter and Controllers at Ponda Mali Market



Figure 6: Ice Flake Machine at Ukulima Market

Revolutionary Collaborations in Fish Farming: The Case of Nyeri County

Introduction

Nyeri County, perched in the lush Central Highlands of Kenya, is renowned for its temperate climate, fertile soils, and abundant freshwater resources sourced from rivers and springs cascading off the Aberdare Range. For decades, its' economy has thrived on coffee, tea, and dairy farming—sectors that shaped its identity and sustained its rural communities.

However, the landscape is shifting. Climate variability has disrupted traditional farming cycles, rainfall patterns have become erratic, and arable land is increasingly fragmented due to population pressure and urban expansion. At the same time, youth unemployment continues to rise, and smallholder farmers face diminishing returns from conventional agriculture. These converging challenges have prompted a strategic pivot—toward aquaculture.

Fish farming is emerging as a viable and transformative alternative. It requires less land, adapts well to changing weather conditions, and offers high nutritional value and market potential. Recognizing this, the County Government of Nyeri, in collaboration with development partners such as the Aquaculture Business Development Programme (ABDP), has rolled out a multi-pronged strategy to promote aquaculture as a tool for economic empowerment and food security.

This success story highlights how Nyeri County through a collaborative approach is harnessing fish farming to empower smallholders, diversify livelihoods, and build a more food-secure future by spotlighting the story of 2 farmers; Peter Mwangi and Christopher Mureithi whose exemplary stories are transforming aquaculture in Nyeri County.

Implementation of the practice

1. Peter Mwangi: Youth practising climate-smart Recirculatory Aquaculture System (RAS)

Peter is among the 398 small-scale fish farmers who have benefitted from the Aquaculture Business Development Program being implemented collaboratively with Nyeri County Government Department of Fisheries Development, receiving about 400,000 fingerlings. He started with a small pond during the economic stimulus program in 2013 and encountered a myriad of challenges including poor water quality, poor quality feeds and low quality of fingerlings. In 2019, the County Government through the department of fisheries and aquaculture development in partnership with the Dutch Embassy, Wageningen University, and FOSPA-Africa, identified Peter as among the passionate youth and women farmers who were taken for a training on fish farming in Netherlands where he acquired the skills to use the modern technologies for fish farming.



Figure 1 water hyacinth that is used for biofiltration in RAS

To address the problem of fish mortality caused by poor water quality in traditional ponds, Peter, converted his traditional pond into a Recirculatory Aquaculture System (RAS) which continuously purifies and reuses the water. The RAS has water recycling features whereby water from the fishpond is filtered and cleaned and recycled back to the ponds. It is comparable to a closed circuit, where waste products like solid waste, ammonium, and CO2 are either removed or converted into non-toxic substances. The clean water is then replenished with oxygen and sent back to the fish tanks. The system used biofilters such assuch as water hyacinth to remove harmful waste products like ammonia, ensuring healthy water conditions for the fish. The farmer has also embraced clean energy solutions where he uses a solar-powered pump to pump the cleaned water back into the fishponds.

As compared to the open pond system, RAS offers the following benefits as compared to the traditional fish farming system:

- Better water quality since the purification through addition of oxygen and removal of ammonia gives the water better quality and therefore faster growth of the fish and healthy water conditions for the fish
- Lower water quantity: The system significantly reduces the amount of water used as compared to the traditional pond system therefore ensuring water conservation
- Climate smart and has reduced environmental impact as it re- uses water usage and minimizes pollution making the system more environmentally sustainable
- RAS allows for the farmer to produce fish throughout the year since the system is done in green houses, enabling all year-round fish farming. The system also ensures faster maturity of fish where fish get to maturity in 5-6 months compared to 8 months in the traditional ponds



Figure 1 Circular raise ponds that hold more than 1,000 fish

- The system also ensures increased production since the climate/temperature in the greenhouse is controlled and the raised ponds with one circular raised pond holding 1000 fingerlings
- The challenge of fish predation by birds such as kingfishers is reduced. Escapees are also limited as well as external transmission of diseases and parasites.

This innovative aquaculture farmer has mastered the art of sustainable farming by integrating a Recirculating Aquaculture System (RAS) with crop cultivation. After harvesting the fish, ammonia nutrient-rich pond waste is channelled to irrigate the maize fields. The water transforms farmland into a thriving oasis.

2. Christopher Mureithi: Pioneering Hatchery-Based Fish Farming in Nyeri County

In Nyeri County, one of the persistent challenges facing fish farmers has been access to high-quality fingerlings. Recognizing this gap, the Nyeri County Government, through its Department of Agriculture and Fisheries, in partnership with the Aquaculture Business Development Program (ABDP)—launched a targeted initiative in 2022 to build farmer capacity. Beneficiaries received training in aquaculture practices, pond liners, and improved tilapia F9 fingerlings, a cold-tolerant breed well-suited to Nyeri's climate.

Among the standout beneficiaries is Christopher Mureithi, a visionary farmer who has established a hatchery with the capacity to host up to 18,000 fingerlings. His model ensures a consistent supply of healthy stock for his own ponds and for other farmers in the region. Mature fish are housed in separate breeding ponds, providing eggs for the hatchery and sustaining the production cycle. To boost survival rates and optimize water use, Christopher has adopted the Recirculating Aquaculture System (RAS), a modern, water-efficient technology that filters and reuses water, maintaining ideal conditions for fingerling growth. In a bid to diversify income and sustain operations, he has also ventured into ornamental fish farming, selling each at KES 200 to help cover feed costs. Christopher sells fingerlings that are between 1.5 months to 2 months old at between 15 to 25 KES.



Picture: 4 Christopher Mureithi attending to his hatchery

The County Government continues to support farmers like Christopher by providing quality feeds, technical training, pond liners, and extension services, ensuring that aquaculture remains a viable, scalable, and climate-resilient livelihood option across Nyeri.

Through such climate-sustainable ventures by Christopher, farmers have formed farmer cooperative groups which offer financial solutions as well as provide a platform for peer learning amongst farmers. For example, Christopher is the chairperson of Muthe-Gathehu fish farmers cooperative through which the members have been able to benchmark on fish farming from other counties such as Kirinyaga, Machakos and Tharaka Nithi Counties.

Results of the practice

Individual-Level Impact

Peter:

By Adopted Recirculating Aquaculture System (RAS) with controlled temperatures (26–28°C) Peter houses over 4,500 fingerlings and produces 1,800 kg of table fish per cycle, each retailing at between 350 – 600 KES. He is also able to achieves year-round harvests, effectively doubling his income while eliminating wastewater discharge through rainwater harvesting and solar-powered recirculation

Christopher:

He has established a hatchery that produces high-quality, fast-maturing tilapia F9 fingerlings that grow from 40g to 400g in 4 months which has ensured a steady supply of quality and affordable fingerlings improving access for other farmers. The diversification into ornamental fish farming, generating additional income for feed sustainability.

Community & Systemic Outcomes

- On community and systematic outcomes, over 3,000 farmers in Nyeri County have benefitted from aquaculture interventions with most of the transitioning from subsistence to semicommercial fish farming, which has improved productivity and income.
- With the formation of farmer cooperatives (e.g., Muthe-Gathehu), financial inclusion has been fostered as well as providing a platform for peer learning
- Enhanced food security, nutrition, and poverty reduction in rural communities
- Strong alignment with SDGs: Clean Water (SDG 6), Decent Work (SDG 8), and Climate Action (SDG 13) Picture: 4 Christopher Mureithi attending to his hatchery
- Nyeri County now serves as a benchmark for aquaculture governance, with the model being scaled to other counties including Kirinyaga, Machakos, and Tharaka Nithi

Lessons learnt

Some of the key learnings form these 2 initiatives include:

- Productivity gains are real: Farmers like Peter Mwangi achieved 4x higher yields and reduced fish maturation time from 9 months to 4–6 months. Controlled environments lead to better fish quality and more predictable harvest cycles.
- Adopting water and resource efficiency such as A-RAS recycles water, reducing consumption by up to 90%. These and other climate-smart practices such as the use of solar-powered systems and rainwater harvesting promote environmental sustainability and attract development partners while also minimising operational costs and environmental impact.
- There is need to be innovative and embrace modern fish farming technologies in hatcheries such as adoption of RAS to ensure efficient use of water, embracing raised fishponds in greenhouses as this helps with temperature control and ensure proper utilization of space while also controlling predators.
- Adopting cooperative models fosters knowledge exchange, financial access, and collective growth among farmer groups. Formation of Muthe-Gathehu Fish Farmers Cooperative, chaired by Christopher, facilitating peer learning and benchmarking with counties like Kirinyaga, Machakos, and Tharaka Nithi Counties

Recommendations

1. Investing in training and extension services by partnering with technical institutions and NGOs to train farmers on system design, maintenance, and fish health is an important component in ensuring skills development and support to young farmers
2. Leveraging on public-private partnerships through collaborating with development partners (e.g., Netherlands Embassy, FOSPA-Africa) to co-finance infrastructure and scale adoption is highly recommended.
3. Incentivizing youth participation for example through provision grants or subsidized kits to youth groups to build and manage A-RAS units is necessary in motivating them to engage in fish farming.
4. It is important for fish farmers to form groups and cooperatives to help them learn from each other and share ideas, pool resources and be able to secure loans as well as earn support from the County Governments and partners
5. Considering the fish cost of commercial fish feeds (a 50 kg bag goes for 4500 shillings) fish farmers need to find alternative feeds on rear other species of fish such as the ornamental fish that fetch better prices and farmers are therefore able to buy fish feed.



Ornamental fish reared by Christopher Mureithi in Nyeri County



1 week old tilapia F9 fingerlings in Chistopher Mureithis hatchery in Nyeri County

Strengthening Fish Marketing Through a Thriving Fish Eatery in Tharaka Nithi County

Introduction

The fish market in Kenya is inherently competitive, volatile, and frequently marked by supply shortages (KMFRI, 2021). Tharaka Nithi County, like many other Counties, faces significant challenges due to underdeveloped fish market infrastructure. Historically, the County has not been a traditional consumer of fish, resulting in low initial demand for fish and fish products. However, targeted interventions such as fish fairs and social behavior change communication (SBCC) campaigns have gradually stimulated local interest and increased consumption.

Despite this progress, many fish farmers have delayed harvesting, citing unstructured market systems and exploitative practices. These conditions have discouraged timely sales, leading farmers to retain fish in ponds beyond optimal harvest periods. Consequently, maintenance costs have risen, eroding potential profits and undermining the sustainability of fish farming enterprises in the region.



A section of the fish eatery set up by the ABDP program where value added fish is sold.

A baseline survey carried out by the Aquaculture Business Development Program (ABDP) in Tharaka Nithi County noted the challenges of prolonged droughts, porous soils, predators, unavailable and costly feeds, scarcity of quality fingerlings and an unstructured fish market as the major hindrances to fish farming in the County.

Implementation of the practice

Tharaka Nithi County, under the second cohort of Aquaculture Business Development Program (ABDP) that begun in the FY 2020-21 benefitted 1,195 fish farmers. 795 males, 420 females, 154 youths, and 9 PWDs. ABDP provided 1,109 pond liners to reduce seepage of water, 25 predator control kits (nets), 839,000 quality f9 tilapia fingerlings with each beneficiary receiving 1000 fingerlings, and 172,300 kg of quality fish feeds. Capacity building of farmers by County technical staff with mobility support from the program is a key implementation practice with 8 motorcycles having been issued to extension staff to support extension outreach to farmers.

Like most other Counties, many beneficiaries from the County faced marketing obstacles as well as post-harvest losses. To address the challenge of farmers continuing to feed table-sized fish due to limited market access, Tharaka Nithi County Government Department of Agriculture and Fisheries with support from ABDP County Office established a fresh fish market at Chuka Town.



A section of the fresh fish market set up by Tharaka Nithi County Government with the help of ABDP program

The initiative offers ready market for fish produced by farmers at around the County. Fresh catfish and tilapia fish is value added at the facility and served with kachumbari and ugali, offering a ready market for the local fish producers. Marketing of the eatery is done through social media and through strategically placed posters across government offices and key locations in Chuka town. Since its launch, the initiative has significantly boosted demand for both fresh and cooked fish, often exceeding daily supply capacity. In response, the County Government now schedules two farmers

per week to harvest and supply fish to the eatery.

Beneficiary testimonials indicate that this model has enabled farmers to earn higher profits compared to selling through brokers or without value addition, thereby enhancing the viability of fish farming in the County. Scheduled farmers deliver the fish to the facility packed in iced cool boxes that were supplied to all Smallholder Aquaculture Groups across the County by the County Government of Tharaka Nithi.

The County also supported establishment of fish eateries in every sub county. ABDP has also supported 5 other fish eateries mainly operated by Aquaculture Support Enterprise (ASE) youth groups across the County through the matching grants window which has greatly eased the pressure on the main fresh fish market in Chuka Town.

Farmers who cannot sell their fish at farm gate or the sub county level fish eateries are taken care of by being scheduled to value add and sell their fish at the fresh fish market. The market has offered great opportunity to farmers to maximize profits as the price of a kg of fresh fish at the market is KES. 600 while that of value-added fish is KES.700 per kg. This is much higher than the price offered by majority of brokers at KES. 350 per kg. The facility boasts of 3 half tone capacity freezers supported by the ABDP program that fully operates on solar energy cutting the running costs of power.

Results of the practice

- Increased demand and more production of fish in the County: The eatery quickly gained popularity, with demand for fresh and cooked fish surpassing daily supply capacity. The County experienced an increase in the number of farmers practising fish farming from the previous 616 active farmers to a whooping over 2,500 farmers from ABDP program support and replications by farmers encouraged to venture into the ruclative fish farming venture. farmers. The consistent growth of the sector has seen the County placed as one of the best performing among the ABDP implementing Counties scooping awards every year during the National stakeholders' workshops organized by the program. At end of May 2025, the County had registered over 100 tons of harvested fish and a cumulative total of over 500 tons over the last 5 years of the implementation of the program.

- Improved Farmer Incomes: Farmers reported higher profits compared to selling through brokers, thanks to value addition and direct sales. The fresh fish market has offered great opportunity to farmers to maximize profits as the price of a kg of fresh fish at the market is KES 600 while that of value-added fish is KES.700 per kg. This is much higher than the price offered by majority of brokers at KES. 350 per kg.

- Market Confidence: The initiative restored confidence among fish farmers, encouraging them to expand production.

- Planned Expansion: With demand at the temporary eatery now surpassing supply, plans are underway to establish a fully operational eatery that will run throughout the weekdays. This expansion is expected to significantly increase the number of farmers able to market their fish weekly. The fresh fish market is currently operated by smallholder Aquaculture Groups in the County with the support of assigned technical staff from the County Fisheries department. Plans are underway to lease the facility to a private vendor through an organized PPP model to ensure sustainability and further profitability for fish farmers in the County.

Tharaka Nithi County Government has effectively addressed key marketing barriers for fish farmers by guaranteeing a consistent outlet for two producers each week. Moreover, the integration of value addition through preparation and direct sale of cooked fish has enhanced profitability for participating farmers. This success has not only sustained current producers but also inspired others to scale up their operations, confident in the County's continued support for structured and reliable market access.

Lessons learnt

- Creating a localized, structured market can significantly boost demand and profitability for small holder farmers.

- Value addition is a powerful incentive for farmers to remain engaged in production.
- Strategic communication and visibility are essential in shifting consumer behavior in non traditional markets.

Recommendations

✓ A scale up the eatery model to other Sub-Counties to replicate success and broaden market access is highly recommended.

✓ The integration of cold chain and storage facilities to support increased supply and reduce post harvest losses is vital.

✓ It is important to strengthen farmer cooperatives to coordinate supply of fish and negotiate better terms collectively.



Weighing scales and coolers at the eatery provided by Tharaka Nithi County government



Mary Munene, a fish farmer shows freshly harvested catfish from her farm



Catfish ready for serving at the eatery

Driving Sustainable Fish Farming in Uasin Gishu County: A Model for Resilient Blue Economy

Introduction

Uasin Gishu County is endowed with fertile clay and loamy soils, abundant water resources, and high annual rainfall, making it highly suitable for aquaculture. These favourable agro-ecological conditions have created a strong foundation for fish farming, offering opportunities to diversify agricultural production, improve food and nutrition security, and enhance household incomes.

Recognizing the potential of aquaculture as a viable economic activity, the County Government has prioritized the fisheries sector as part of its broader agricultural transformation agenda. In line with national and County priorities such as the Sustainable Development Goals (SDGs) and Kenya Vision 2030, as well as localized policy frameworks like the Bottom-Up Economic Transformation Agenda (BETA) and the Nguzo Kumi blueprint spearheaded by Governor Jonathan Bii, the County has placed agriculture, particularly agribusiness, livestock, and fisheries, at the center of its economic transformation agenda. The fisheries sector contributes to multiple development goals by enhancing access to affordable protein-rich food, creating jobs along the aquaculture value chain, improving household nutrition through omega-3-rich fish consumption, and generating sustainable income for rural households.

Fish farming in Uasin Gishu is primarily conducted through pond systems and dam-based aquaculture, with over 2,000 farmers currently engaged in the practice, an impressive growth from fewer than 870 just two years ago. This increase is a result of deliberate County-led campaigns aimed at encouraging farmers to diversify beyond grain farming, a shift that is particularly timely given the rising need for climate-resilient and nutritionally balanced food systems.

To support this transition, the County Government has rolled out a number of aquaculture initiatives. These include restocking public dams with fingerlings, providing pond liners, starter and finisher fish feeds, training programs, and encouraging the formation of farmer cooperatives. Strategic partnerships, such as with the University of Eldoret, have further boosted these efforts through technical support and the establishment of hatcheries to ensure availability of quality fingerlings.

Despite the positive momentum, several constraints continue to impede the sector's full potential. These include the high cost of fish feed, accounting for up to 65% of production costs, limited access to certified fingerlings, water scarcity and pollution, insufficient extension services, lack of structured markets, minimal value addition, financial barriers, and increasing vulnerability to climate change. Unpredictable rainfall patterns, floods, and droughts frequently disrupt pond water levels, affecting fish survival and productivity.

Implementation of the practice

Faced with worsening climate variability, water stress, soil degradation, and a dependency on rainfed agriculture, Uasin Gishu County identified aquaculture as a viable solution to diversify food systems and strengthen household resilience. However, barriers such as unsuitable soils, high input costs, and poor extension support, post-harvest losses, and limited market access hindered rapid uptake of fish farming.

To address these challenges, the County Government, through its Department of Livestock and Fisheries, developed and implemented a multi-pronged solution pathway grounded in climate-smart technologies, farmer-led innovations, public-private partnerships, and targeted capacity building. This approach was designed to not only expand fish production but to make the sector more climate resilient, accessible, and profitable, particularly for youth and women.

1. Promotion of raised pond systems

Many parts of Uasin Gishu have soils that are either too rocky, poorly drained, or susceptible to flooding, making traditional in-ground fishponds risky or unviable. Raised ponds constructed using treated timber and lined with UV-resistant plastic liners were introduced to make fish farming possible in such environments.

These systems protect pond water from contamination, prevent flood damage, and are easy to maintain.



An above-ground raised pond at Dr. Nyale's farm in Kapsoya Ward, Ainabkoi Sub-County.

Sites for raised ponds are selected based on accessibility, topography, and proximity to reliable water sources. Once identified, farmers, guided by extension officers, construct wooden or block frames, which are then lined with a soft base layer such as sand or geotextile fabric to prevent damage to the pond liner. UV-resistant liners are fitted securely into the frame, and inlet and outlet pipes are installed to manage water flow efficiently. In some setups, solar-powered aerators are introduced to maintain optimal oxygen levels for fish health. Throughout the process, extension officers provide technical support on pond setup, stocking, water quality monitoring, and disease management.



A lined earthen pond at Sila Bore's farm in Sergoit Ward, Moiben Sub-County, designed to retain water and enhance fish production in drought-prone areas.

Benefits

- Raised ponds are protected from flood runoff and soil contamination.
- They are easy to clean and maintain, encouraging youth and women participation.
- These systems are ideal for homesteads or peri-urban settings where space is limited.
- Fish farming is made possible even in rocky, poorly drained, or densely populated areas.

2. Adoption of liner pond systems

Increased drought spells and sandy soils were causing high water losses through seepage, leading to poor fish growth and farm abandonment. The County promoted the use of lined ponds to retain water and stabilize pond conditions throughout production cycles. This technology is now widely adopted in the County, especially in areas with loose soils. Farmers receive training in selecting suitable sites with well drained soils and on accurately marking pond dimensions, typically around 10m by 5m by 1.5m should be at most 1,2 m deep. Excavation follows, with the removal of sharp objects and levelling of the pond floor to ensure liner protection. A cushioning layer is laid at the base before installing a UV-resistant pond liner, which is carefully secured using soil and stones around the edges. Once the pond is gradually filled with clean water, water quality is tested and allowed to stabilize. Fish are only introduced once the water conditions are confirmed to be safe for aquaculture.

3. Introduction of Aquaponics

Frequent water shortages, shrinking land sizes, and high input costs have made it increasingly difficult for many households to sustain both fish farming and crop production independently. Traditional methods also expose farms to risks such as runoff pollution, inefficient nutrient use, and weatherrelated disruptions.



Chebisaas High School's integrated aquaponics system in Moiben Sub-County, Kimumu Ward

To overcome these constraints, the County introduced aquaponics, an innovative, closed-loop system that integrates aquaculture (fish farming) with hydroponics (soilless crop production). In this model, fish waste provides natural nutrients for vegetables, while the plants filter and purify the water, which is recirculated back to the fish tanks.

This innovation not only maximizes resource efficiency but also transforms fish and crop production into a single, symbiotic system that thrives in small spaces, uses minimal water, and eliminates the need for synthetic fertilizers.

Aquaponics systems were piloted in institutions such as Chebisaas High School and Lelmolok High School among youth groups, with technical support from partners such as the Sagana Aquaculture Research Centre. System components, including fish tanks, pumps, gravel-filled grow beds, and filtration units, were installed based on site-specific needs. The systems were stocked with tilapia or catfish, and beneficial bacteria were introduced to establish a functional nitrogen cycle. The system works by crops benefiting from nutrients from fish waste and no bacteria is introduced.

Farmers and students received training on system balance, crop selection, and routine maintenance. Extension officers provided continuous mentorship to ensure optimal performance and longevity. In schools like Chebisaas, aquaponics has evolved into both a productive farming unit and a practical agricultural education platform.

4. Launch of the "Fish for Health and Wealth" Campaign

Even with improved production, farmers were struggling to find reliable markets and suffered postharvest losses due to lack of value addition and consumer awareness. The "Fish for Health and Wealth" campaign was developed in 2015 as a County-led market activation initiative. It linked farmers to buyers, taught value addition skills, and boosted local fish consumption. Every Friday, the County's Department of Fisheries, in collaboration with local farmers, organizes live exhibitions at designated farms and the County fisheries office. These sessions include hands-on demonstrations on fish harvesting, cleaning, degutting, dip frying, and packaging. Farmers contribute fish, oil, and cooking equipment, fostering a cooperative, participatory environment.

The events draw in local buyers, including households, schools, and institutions, who purchase the freshly prepared fish on-site. In addition to marketing skills, the campaign integrates nutrition education, raising awareness on the health benefits of fish consumption and promoting dietary diversification in local communities.

Cross-cutting climate resilience outcomes across all interventions:

- ♂ Water conservation through liner ponds and aquaponics
- ♂ Year-round food and income supply despite droughts or floods
- ♂ Reduced input costs through integrated systems and value addition
- ♂ Improved biodiversity through ecosystem-friendly farming practices

Results of the Practice



Local farmer during the "Fish for Health and Wealth" campaign, promoting on-site fish harvesting

- The adoption of modern pond technologies, especially raised ponds with reinforced liners, has led to better water retention and year-round fish production, even in areas previously unsuitable for aquaculture.

- The "Fish for Health and Wealth Campaign" has created new marketing channels through community-based fish processing and direct sales. Farmers now earn higher incomes due to value addition and reduced post-harvest losses.
- Aquaponics systems have generated interest among youth and educational institutions. Several schools have incorporated these systems into their agricultural programs, with Chebisaas High School emerging as an eminent demonstration and training site. This integration has stimulated greater student participation in agricultural studies while providing practical income-generating opportunities.
- Household consumption patterns show clear positive shifts, with many families incorporating fish into their diets more frequently. The increased availability and affordability of fish protein has contributed to improved dietary diversity in participating communities.
- The climate-smart approaches demonstrate measurable ecological advantages, particularly in water conservation and sustainable integration with crop production. These systems show potential for reducing agricultural runoff while maintaining productivity.

Lessons learnt

- Selecting appropriate fish farming methods tailored to local conditions and farmer needs significantly enhances productivity and sustainability.
- Regular capacity building, on-site demonstrations, and extension support are essential in promoting uptake of aquaculture innovations.
- In aquaponics systems, vegetables perform better under shade nets than when grown inside the same greenhouse as fish tanks, highlighting the importance of optimizing growing conditions.
- Fish farming can be both economically rewarding and environmentally sustainable when best practices are applied.
- Involving schools and integrating fish farming into learning programs boosts youth participation and builds long-term interest in agriculture.

Recommendations/Conclusion

1. Aquaponics system optimization: Greenhouse vegetable components should be transitioned to shade net structures, as this modification offers superior temperature regulation and reduces crop wilting while maintaining productivity levels.
2. Targeted youth programs and school-based aquaculture training should be established to maintain young farmers' interest and active participation in the sector.



Figure 5 Fish tanks of an aquaponic system where integrated fish and vegetable farming supports nutrition, learning, and sustainable agriculture



Figure 7 Vegetables thriving in a greenhouse integrated with an aquaponics system



Figure 6 Aquaponics tanks used to rear fish while supporting vegetable growth through nutrient recycling

Enhancing Climate Resilience through Integrated Aquaculture Innovations in Vihiga County

Introduction

Vihiga County, situated in Kenya's Western Highlands, receives substantial rainfall, between 1,800 and 2,000 mm annually, supporting fertile soils and year-round agriculture. However, the region is increasingly experiencing climate-related stressors such as erratic rainfall patterns, seasonal flooding, seasonal false starts and prolonged dry spells. high population pressure and uneconomical land fragmentation have further limited viable farming land, pushing smallholder farmers to seek alternative, space-efficient, and climate-resilient livelihood options.

In this context, aquaculture has emerged as a promising solution. It is water-efficient, landconserving, and integrates well with other value chains such as poultry, dairy, and vegetable production. Unlike traditional farming, fish farming can thrive in harvested or stagnant water and is particularly suited to flood-prone and waterlogged zones like Luanda, Emuhaya, and parts of Hamisi Sub-Counties, turning climate vulnerability into a production advantage.

As rising temperatures and unreliable rainfall make rain-fed agriculture increasingly unsustainable, small-scale farmers are adopting pond aquaculture as a buffer against climate shocks. Coupled with water harvesting, renewable energy, and integrated farming, these systems offer year-round productivity, economic resilience, and ecosystem benefits, including reduced runoff, improved soil stability, and increased biodiversity around ponds.

Despite its growing promise, Vihiga remains a net importer of fish, sourcing heavily from Kisumu and Busia Counties. The expansion of local aquaculture is therefore not only a livelihood strategy but also a critical component of the County's food security and climate adaptation agenda. This story highlights three exemplary farmers, Meriline Awuor David Omuruli, and Zinath Deen, whose production practices showcase how aquaculture can build both resilience and prosperity in the face of climate change.

Implementation of the practice

1. Meriline Awuor: Youth championing climate-smart aquaculture

Mariline, representing the youth category, practices aquaculture by harvesting water from nearby rivers and using pond liners to ensure efficient water use. To prevent flood-related damage, she has constructed dykes and surface runoff control systems. Her ponds are secured with predator nets, ensuring fish survival and minimizing losses.

Her integrated approach extends to diversified ventures including poultry, dairy, rabbit rearing, beekeeping, and the cultivation of African leafy vegetables. This diversification not only ensures multiple income and food sources throughout the year but also spreads climate-related risks, enhances nutrient recycling on the farm, and strengthens her household's ability to cope with droughts, floods, or market disruptions. She uses compost from farm waste for pond fertilization; Phyto planktons grown in the ponds serve as organic feed.

Meriline also plays a role in ecosystem restoration by planting Napier grass and bamboo. These species enhance biodiversity, prevent soil erosion, and support sustainable farming. She also utilizes rabbit urine as a bio-pesticide, replacing synthetic alternatives in vegetable farming. Her fresh fish outlet ensures reduced post-harvest losses, further contributing to climate-smart value chain management.

2. David Omuruli: Innovating for quality and conservation

David, an adult male farmer, shares many of Meriline's techniques, such as water harvesting from the river, pond liners, dyke construction, and the use of green energy. However, his standout innovation is the use of specialized harvesting nets that enable fish collection without draining the pond, conserving water and maintaining pond ecosystems. His diversified practices include dairy, poultry, rabbit keeping, and vegetable farming. He emphasizes natural fertilization using compost and encourages natural feed production through Phyto planktons. His climate resilience efforts are further exemplified through tree nursery establishment before rainy seasons, helping to restore degraded landscapes.

David's agroforestry system includes Napier grass, which supports his dairy enterprise as animal feed; arrowroots, valued for both household consumption and fish feed; and bamboo, which contributes to clean air through carbon sequestrations soil stabilization, improves water retention in the soil, and provides timber and raw materials for local crafts. He also champions the removal of invasive eucalyptus trees, which pose a threat to local water tables.



Figure 1 A poultry shed strategically positioned above a fish pond that provides a natural, cost-effective source of nutrients for the fish.

3. Zinath Deen: Women-led aquaculture with a training touch

Zinath's aquaculture enterprise is comprehensive, combining water sourced from rivers, shallow wells, and roof catchment systems. She uses both predator and shade nets to safeguard fish and regulate pond temperatures, improving fish survival under changing climate conditions. Her efforts go beyond aquaculture. She engages in dairy goat rearing, banana farming, poultry, and vegetable production, all interconnected in a circular farming system where waste from one activity is reused as input for another, minimizing external inputs and promoting resource efficiency. Her ponds are fertilized using compost, and fish feed is enhanced using Phyto planktons. She also produces Azola as alternative fish and poultry feed, and this reduces cost of production. Azola grows naturally in well fertilized ponds



igure 2 Nets installed around fishponds to act as predator arriers, protecting fish from birds

Zinath adds value to her harvest by processing fish and milk products, reducing waste and increasing profitability. She breeds selective Nile Tilapia and African Catfish for high productivity and raises and sells goldfish as ornamental fish. As a certified trainer of trainers, Zinath runs a training centre that hosts students from Masinde Muliro University and other institutions. Her expertise has been recognized through awards and international workshop participation.

While each farmer has a unique journey, a set of common, affordable practices emerges across all their enterprises, pointing to what works best in climate-resilient aquaculture in Vihiga County.

These shared innovations are outlined below:

- **Use of Phyto Planktons as natural fish feed:** Farmers cultivate phyto planktons within their ponds as an organic, low-cost alternative to commercial fish feed. These microscopic plants thrive in nutrient-rich water, helping to sustain fish growth while cutting feed costs. Their use reduces dependency on industrial feeds, supports pond ecology, and minimizes the carbon footprint of aquaculture.

- **Composting for pond fertilization and crop production:** All three farmers use compost from animal and plant waste to fertilize their ponds and farms. This promotes nutrient cycling, eliminates the need for synthetic fertilizers, and improves soil and water quality. Composting is both affordable and scalable, making it a key pillar of circular farming systems.
- **Predator and shade nets for climate adaptation:** Predator nets prevent fish losses from birds and other predators, while shade nets help control pond temperatures during hot seasons. These simple yet effective tools improve survival rates and reduce stress-related fish mortality, crucial in an era of erratic weather and rising temperatures.
- **Efficient water management through pond liners and water harvesting:** By lining ponds with polythene liners, farmers prevent seepage and optimize water use, especially during dry periods. Water is harvested from rivers, shallow wells, or rain catchments, stored, and reused, helping farmers remain productive year-round even as rainfall patterns change.
- **Green energy for reduced emissions**: The use of solar-powered pumps and lighting reduces reliance on fossil fuels and lowers greenhouse gas emissions. Green energy also cuts operational costs, allowing farmers to invest more in improving productivity and value addition.
- **Value chain diversification and integration:** The integration of dairy, poultry, rabbits, beekeeping, and crop farming spreads risk, creates multiple income streams, and ensures that waste from one enterprise supports another. For example, manure from livestock enriches compost, which in turn fertilizes vegetables or fishponds. This reduces vulnerability to climate-induced shocks while enhancing food and income security.
- **Ecosystem restoration with indigenous plants**: The strategic planting of Napier grass, arrowroots, and bamboo not only supports farm productivity but also restores degraded landscapes. These plants prevent soil erosion, purify water, and sequester carbon, contributing to broader environmental resilience.

Results of the Practice

- The construction of well-lined ponds and adoption of water harvesting methods have enabled farmers to maintain fish production year-round, even during prolonged dry spells. Structured production cycles allow for harvesting mature fish every 6 to 8 months, ensuring a reliable supply to local markets and enhancing household access to nutritious, protein-rich fish.
- Integrated aquaculture models have unlocked multiple income streams, boosting household earnings and financial stability. In addition to consistent revenue from fish sales, value-added products, such as fillets, smoked fish, and attractively packaged offerings, higher yield market returns. Complementary ventures like poultry, vegetable farming, and honey production provide regular cash flow, transforming livelihoods, particularly for youth and women who previously relied on informal or precarious employment.
- These farms serve as practical training grounds for students, interns, and aspiring farmers. Women and youth actively mentor others in areas such as fish breeding, value addition, pond construction, and agro ecological practices.
- Beyond skill-building, farms are generating part-time jobs and entrepreneurial opportunities. Youth manage community fish outlets, offer farm support services, and lead processing initiatives, contributing to stronger aquaculture value chains and a growing skilled workforce.
- With consistent access to fresh fish, vegetables, eggs, and milk, farming households now enjoy better dietary diversity and food self-sufficiency reducing dependency on external food sources, particularly during periods of economic stress or drought.
- Farmers have adopted climate-smart practices such as the use of solar energy, organic composting, and locally sourced feed ingredients. Agroforestry elements, including Napier grass, bamboo, and arrowroots, are planted around ponds to reduce erosion, stabilize banks, enhance biodiversity, and improve soil quality. Collectively, these practices

reduce pollution, promote sustainability, and contribute to long-term ecological balance.

- Diversified farming systems have strengthened farmers' ability to cope with erratic rainfall, floods, and dry spells. With multiple income streams, resource-efficient technologies, and homegrown inputs, livelihoods have become more adaptive, self-reliant, and resilient to changing climate conditions.

Lessons learnt

- Farmer-led innovation thrives when supported by extension services and academic institutions.
- Integrating aquaculture with crops, livestock, and composting boosts productivity and resource efficiency.
- Scaling gradually, starting small and reinvesting, ensures sustainability, especially when backed by technical or financial support.
- Empowering women and youth with tools, training, and mentorship enables them to lead transformative change.
- Climate-smart practices such as agroforestry, solar energy, and circular water systems promote environmental sustainability and attract development partners.
- Diversified products and direct-to-consumer marketing reduce post-harvest losses, improve shelf life, and enhance profitability.

Recommendations/Conclusion

For County Governments & Development Partners

- Scale up access to pond liners and water harvesting infrastructure.
- Provide grants or low-interest loans for inputs, targeting women and youth.
- Incentivize green practices like solar adoption, pond liners, and indigenous tree planting through subsidies or tax breaks.
- Invest in hatcheries, feed mills, and cold storage infrastructure in Vihiga.
- Establish model farms and innovation hubs in each sub-county.
- Host aquaculture expos for showcasing best practices and attracting investment.

For Extension Services & Institutions

- Expand farmer-led training and mentorship programs.
- Promote climate-smart certification schemes to boost marketability.
- Facilitate inter-county knowledge exchange and learning visits.

For Farmers & Farmer Groups

- Keep accurate records and reinvest profits incrementally.
- Form or join cooperatives to benefit from collective bargaining and bulk purchases.
- Explore new markets, including schools, hospitals, and value-added fish product lines.



Figure 3: A farmer uses nets to protect fish from predator attacks



Figure 4: Dykes constructed to regulate water levels and protect fish ponds from flooding



Figure 5: Zinath received the Fish for Trade Award in 2016— recognizing excellence in aquaculture and market-driven fish farming



Figure 6: Honored as the 2nd Best Woman in Agriculture, Tigoi Farm, Vihiga County, 2015—celebrating Zinath's dedication to sustainable farming

CHAPTER 2: ENERGY SECTOR

How Kiambu County Is Harnessing Solar Energy to Reduce Expenses for Water Utilities

Introduction

Kiambu County has in recent years experienced steadily rising electricity bills, largely attributed to the growing number of grid-powered streetlights and boreholes across its 60 wards. As urban centres expanded and rural electrification increased, the cost burden of powering public infrastructure through the national grid became increasingly unsustainable

A significant portion of the County's revenue has consequently been allocated to electricity payments to support essential services in sectors such as health, water supply, and street lighting. This growing financial burden has constrained resources that could otherwise be invested in critical development priorities, including water expansion, road networks, health facilities, and other community infrastructure.



igure 1 Solar mini grid in Ondiri Water Scheme that will hold a total apacity of 338kWp

In addition, reliance on grid power exposed service delivery systems to frequent outages. When power interruptions occurred, boreholes became non-operational, disrupting water supply to households, institutions, and businesses.

Beyond cost and reliability challenges, climate change considerations further reinforced the need for a transition to cleaner energy solutions. Grid electricity in Kenya is partly generated from fossil fuels, contributing to greenhouse gas emissions. According to the EPRA Statistical Report 2024, thermal power plants accounted for 8.42% of total electricity consumed in 2024, with an installed capacity of 627.1 MW.

Against this background, it became clear that a more reliable, cost-effective, and sustainable energy solution was necessary to safeguard service delivery and strengthen the County's resilience.

Implementation of the practice

To address these challenges, Kiambu County initiated a comprehensive solarization programme of County facility including boreholes, hospitals and public buildings. A notable project under this initiative is the solarization of Ondiri Water Scheme in Kikuyu Sub-County, Kiambu County. The scheme is located within the Ondiri Wetland which is the primary headland for the Nairobi River and has over 40 springs (Mwangi et al., 2018). It has 6 boreholes (five are hybrids and one is fully powered by solar) and produces 1500 M3 of water per day. The scheme is managed by Kikuyu Water Company, an agency mandated to deliver and manage water services on behalf of the County Government. The scheme is a key water source for over 200,000 residents in Kikuyu and Kabete Sub-County (Kikuyu Water Company, 2025).



igure 2: Solarized Borehole at Ondiri in Kikuyu that pumps 50m3/hr

The County Government of Kiambu, working through Kikuyu Water Company, implemented the solarization of the scheme through a phased approach to improve sustainability, reduce operational costs, and strengthen energy resilience in water service delivery.

Phase I, implemented in 2022, involved the installation of a 240 kWp (Kilowatt-Peak-Peak) solar mini grid system by Kikuyu Water Company to power five boreholes that were previously fully reliant on the national grid. Following this intervention, the boreholes now operate primarily on solar energy during daylight hours and automatically switch to grid power only at night when solar generation is not available.

Phase II, implemented in 2024, was financially supported by the County Government through the installation of a 58 kWp solar system at a cost of KES 6 million to power a newly drilled borehole within the Ondiri Water Scheme. This borehole operates fully on solar energy, significantly reducing dependence on grid electricity. Since its commissioning, it has supplied over 70,600 m^3 of water with zero electricity costs incurred.

Phase III is expected to deliver an additional capacity of 80kWp to power the remaining two boreholes in the scheme. Overall, the solarization of the scheme has enhanced operational efficiency of the water service providers by significantly reducing overhead costs associated with water service provision. Notably, electricity bills account for up to 40% (United States Environmental Protection Agency, 2025) of operating costs for drinking water systems. By transitioning to solar energy, the County is not only cutting costs but also strengthening energy resilience and advancing sustainable service delivery.

Key Implementers and collaborators for the project included:

- **Office of the Governor:** Policy direction and strategic leadership.
- **County Departments of Water, Environment, Natural Resources, Energy and Climate Change:** Overall coordination, procurement, and technical oversight.
- **Water Service Providers:** Implementation of solarization in water infrastructure.
- **Technical Contractors and Engineers:** Installation, testing, and commissioning of solar systems.

Results of the practice

The solarization of boreholes initiative has yielded measurable financial and service delivery benefits. Key outcomes of the initiative include:

1. **Cost savings:** Water Service Providers have reported over 35% (Kihanya, 2025) cost savings in boreholes that operate continuously (day and night) after transitioning to solar power. Solar panels have a service life exceeding 25 years, and solar streetlights require minimal maintenance compared to grid-powered systems, which incur recurring electricity and repair costs. By eliminating monthly electricity bills for solarized installations, the County is progressively reducing recurrent expenditure. These savings have been redirected to improve water supply systems and expand service coverage.
2. **Improved reliability: Solar-powered boreholes are not affected by grid outages.** This has ensured uninterrupted water supply.
3. **Environmental benefits:** The County has reduced its dependence on grid electricity, part of which is generated from fossil fuels (EPRA, 2025). This contributes to climate change mitigation and aligns with green energy and resilience goals.

While the programme is ongoing, preliminary assessments indicate positive returns both financially and socially. The reduced operational costs strengthen the service provider's fiscal sustainability.

Lessons Learnt

What Worked Well for Kiambu County included:

- **Strong political leadership:** Clear direction from the Governor accelerated decision-making and implementation.
- **Phased approach:** Implementing the project in stages made it financially manageable and allowed lessons from early phases to inform later rollouts.

- **Targeting high-impact areas First:** Prioritizing high yielding facilities generated quick wins and visible results.

Challenges Encountered

- The high initial capital investment required careful budgeting and planning. The programme required significant initial capital investment for procurement and installation of solar panels, inverters, and mounting structures. However, this upfront cost was justified by long-term operational savings.
- Technical standardization was necessary to ensure uniform quality across installations.

What Could Be Done Differently

- Earlier integration of solar in all infrastructure planning would have reduced cumulative electricity costs sooner.
- More structured data collection at the start would have strengthened baseline comparisons.

Overall, the initiative demonstrates that transitioning to renewable energy is not only environmentally responsible but also fiscally prudent.

Recommendations

The Kiambu County experience shows that solarization is a practical and replicable solution for Counties facing rising electricity costs and unreliable grid supply. Key recommendations include:

1. **Start with quick wins:** Solarize new boreholes immediately to prevent additional grid-based liabilities.
2. **Adopt a phased transition:** Gradually convert high-consumption infrastructure such as boreholes to solar power.
3. **Secure political and administrative buy-in:** Strong leadership commitment is critical to overcoming initial cost concerns.
4. **Invest in quality installations:** Use certified equipment and qualified technicians to avoid long-term maintenance issues.
5. **Track and document savings:** Establish clear baselines to quantify impact and strengthen accountability.
6. **Conduct regular energy audits:** Systematic audits will identify inefficiencies, optimize performance, and strengthen accountability.

What to Avoid

1. Delaying transition due to fear of upfront costs without evaluating long-term savings.
2. Installing substandard systems that compromise durability and public confidence.

Kilifi County Government Leads the Way with Kenya's First County Clean Cooking Policy

Introduction

Over 80% of households in Kilifi County, representing more than 250,000 households, depend on biomass fuels such as firewood and charcoal for cooking (Kenya National Bureau of Statistics, 2019). This heavy reliance on traditional fuels contributes to household air pollution, environmental degradation through deforestation, and rising energy costs for families (Clean Cooking Association of Kenya, 2025). Despite national and global efforts to promote clean cooking technologies, adoption in the County has remained slow due to limited awareness, affordability challenges, and the absence of a coordinated policy framework to guide investment, coordination, and large-scale uptake of clean cooking solutions.

The lack of a structured policy framework has particularly constrained innovation, private sector participation, and sustained investment in alternative energy solutions, resulting in fragmented and uncoordinated interventions across the County.

The problem particularly affects women and children, who are disproportionately exposed to smoke from traditional cooking methods and often spend considerable time collecting firewood. Prolonged exposure to indoor air pollution increases the risk of respiratory diseases and other health complications, while the time spent gathering fuel reduces opportunities for education and income generating activities (World Health Organization; The Star, 2025).

Public institutions are also affected, as many schools and Early Childhood Development Education (ECDE) centres rely heavily on firewood and traditional three-stone fires to prepare meals for learners. This has resulted in inefficient fuel use, excessive smoke emissions, and increased operational costs. These cooking methods also contribute to environmental pressure due to increased demand for wood fuel.

The lack of a clean cooking policy has limited structured transition pathways toward clean and sustainable cooking technologies, leaving households and institutions dependent on unsustainable and unhealthy cooking practices. This highlighted the urgent need for a comprehensive County-level clean cooking policy to guide planning, investment, and implementation.

Implementation of the practice

The solution was initiated through the development of the Kilifi County Clean Cooking Energy Policy in November 2024. The policy provides a structured framework to promote clean cooking solutions such as LPG and energy-saving stoves, reduce reliance on firewood, improve health by lowering exposure to harmful smoke, and protect the environment by reducing deforestation.

The policy development process was led by the County Government through the Directorate of Energy, with technical and financial support from the Clean Cooking Association of Kenya (CCAK) and the Worldwide Fund for Nature (WWF)–Kenya under the Voices for Just Climate Action programme. The process involved broad stakeholder engagement, including public participation forums to ensure that community needs and priorities were incorporated.



Launch of the Kilifi County Energy Plan during the 6th edition of the Clean Cooking Week held at Karisa Maitha Grounds in Kilifi County

A key feature of the process was the early engagement of the County Assembly's Energy Committee prior to formal submission, which enhanced ownership and facilitated smooth review and approval. The policy was subsequently validated and approved by the County Executive Committee and the County Assembly by June 2025.

The Policy was officially launched during the Clean Cooking Week in September 2025, positioning

Kilifi County as a national leader in the clean energy transition and the first County in Kenya to develop a Clean Cooking Energy Policy. To operationalize the policy, the County Government piloted the implementation of clean cooking technologies in selected institutions. Seven schools, i.e., Katana Ngala, Ndugumnani, Migodomani, Kawala, Jila, ACK Bishop Kalu, and Silala were each provided with two 100-litre institutional energy-saving stoves. This intervention improved cooking efficiency, reduced firewood consumption, and minimized smoke emissions, demonstrating the practical application of the policy at institutional level.



Improved cookstoves installed at Katana Ngala Secondary School

Building on these initial results, the County is scaling up the transition through a broader mix of clean cooking solutions tailored to different contexts. These include improved biomass stoves, liquefied petroleum gas, biogas systems for institutions, and emerging electric cooking technologies where electricity is available. Alongside these efforts, briquette production has been decentralized through youth polytechnics across all seven Sub-Counties, converting agricultural waste into alternative fuel while creating local economic opportunities.

Sustainability

To strengthen coordination and ensure effective implementation at the grassroots level, Kilifi County established a specialized Energy Directorate with technical officers deployed across all seven Sub-Counties. This decentralized structure ensures that clean cooking interventions are not only managed at the County headquarters but are continuously supported at the local level, enhancing monitoring, community engagement, and sustained uptake of the policy.

Results of the practice

The initiative represents the first County-level Clean Cooking Energy Policy in Kenya, integrating clean cooking with climate action, public health, and sustainable energy planning, while demonstrating institutional adoption through pilot school transitions.

Early results include the establishment of a county policy framework, adoption of energy-saving cooking technologies in schools, strengthened stakeholder coordination, and reduced reliance on biomass fuels in pilot institutions.

At Katana Ngala Secondary School, for instance, the two 100-litre energy-saving cookers donated through a tripartite collaboration between the County Energy Directorate, the Clean Cooking Association of Kenya (CCAK), and WWF Kenya have significantly improved institutional cooking efficiency. The new equipment complements four existing cookers, enabling the school to better serve its growing population of over 1,340 students.

The transition to clean cooking has also generated cost savings, with the school now spending approximately KES 185,000 annually on cooking energy, down from KES 252,000 previously spent on firewood, a saving of about KES 67,000 per year. The additional cookers have reduced meal preparation time and improved kitchen workflow, allowing seamless service across the school's 20 streams.

The installation of a chimney and provision of protective gear for kitchen staff have further enhanced safety, improved health conditions, and increased dignity in the working environment.

Lessons learnt

1. The County has realized that policy coordination is key in scaling clean cooking interventions across sectors. Through the policy, the County was able to identify learning institutions that needed urgent interventions and was able to do so through collaboration with the private sector.

2. There is greater value in a multi-stakeholder partnership approach to support the adoption of institutional clean cooking technologies. The policy development and the pilot project implementation critical key support from partners such as WWF-Kenya and CCAK amidst limited budget allocation from the exchequer.
3. Financing barriers still limit access to clean cooking technologies, particularly at the household and institutional levels.
4. Public awareness and behavioural change education on clean cooking technologies need to be implemented across all learning institutions. 5. Monitoring and evaluation should be incorporated into the planning of institutional clean cooking programs to track progress and ensure effectiveness.

Recommendations

1. Institutionalize clean cooking within county energy, climate change, health, and environment planning frameworks to ensure coordinated implementation across County Departments.
2. Close collaboration between the Department of Energy and the County Assembly Committee responsible for Energy is critical to support development of policies at the County level.
3. Strengthen public–private partnerships and stakeholder collaboration to support clean cooking market development and scaling.
4. Expand institutional clean cooking programmes in schools, health facilities, and other public institutions to demonstrate viable solutions.
5. Promote innovative financing mechanisms, subsidies, and investment partnerships to improve the affordability of clean cooking technologies.
6. Enhance community awareness, training, and behaviour-change initiatives to increase adoption and sustained use of clean cooking solutions.
7. Establish strong monitoring, evaluation, and learning systems to document progress, capture lessons, and inform future policy decisions.

Lamu County Department of Water and Energy Harnesses Solar Power to Beat Persistent Blackouts

Lamu County has faced persistent and unpredictable electricity outages that have disrupted livelihoods, essential services, and overall socio-economic development.



Solar panels installed by Lamu County Government

In response, Lamu County Department of Water and Energy has turned to solar energy as a practical and sustainable solution to keep critical systems running. For many years, Lamu residents have struggled with prolonged blackouts lasting several hours or even days. These outages severely affected:

- Small businesses, which could not refrigerate perishable goods. Traders reported ongoing losses and unaffordable electricity bills when power was restored.
- Fishermen, who depend on cold storage to preserve their catch. Without electricity, fresh fish spoiled within hours, leading to substantial income losses
- Households and schoolchildren, who were forced to rely on kerosene lamps for lighting, resulting in health risks and increased costs raising concerns about the children's ability to study at night.

- Essential services, particularly water supply and public safety, which struggled without steady power.

The severity of the blackouts had escalated to a point where Lamu County could no longer rely on the national grid as its primary power source. This underscored the need for alternative energy to ensure continuity of critical services.

Lamu County Department of Water and Energy adopted a comprehensive renewable energy strategy centred on solar power. Lamu County Department of Water and Energy implemented several targeted solar projects to mitigate service disruptions:

a. Solar-Powered Water Infrastructure: Water wells connected to the Shela freshwater springs were fitted with solar-powered pumps. This ensured uninterrupted delivery of clean water to households—even during extended blackouts.

b. Solar-Powered Desalination Plant in Mkokoni: A seawater desalination plant in Mkokoni now operates entirely on solar energy. This has strengthened the reliability of drinking water supply for coastal communities.

c. Solar Street Lighting: Towns and villages across Lamu have seen widespread installation of solar streetlights. This has improved safety, mobility at night, and energy efficiency. As a result, residents of Lamu County are enjoying a myriad of benefits amongst them:

d Improved Access to Basic Services: The shift to solar power has ensured continuous operation of water systems and improved access to drinking water. The desalination plant in Mkokoni, for instance, provides reliable water supply even during grid outages.

- ✓ Enhanced Safety and Social Wellbeing: Solar-powered street lighting has made it easier for residents to move safely at night, supporting local businesses and enhancing security in previously dark areas.
- ✓ Economic Stabilization for Local Traders: Reduced dependency on unreliable grid power has helped stabilize incomes for small-scale traders and fishermen who were previously at high risk of losing perishable goods during outages.
- ✓ Financial Savings for Households: Families no longer spend heavily on kerosene or generator fuel, lowering the overall cost of daily living while also reducing exposure to toxic fumes.

Lamu County Department of Water and Energy bold shift to solar energy demonstrates how devolved governments can creatively respond to infrastructural challenges to protect livelihoods and sustain essential services. While not a complete replacement for a dependable national grid, solar initiatives have significantly improved the quality of life for residents, stabilized key economic activities, and strengthened community resilience. As Kenya continues to advance towards cleaner and more reliable energy systems, Lamu's model stands out as a practical and replicable success story for counties striving to enhance service delivery through innovation.

Turning Saline Groundwater into Safe Drinking Water: Lamu County's Solar Desalination Solution

Introduction

Kiunga is a remote coastal settlement located along Kenya's border with Somalia in Lamu County. The area has historically experienced severe water scarcity due to prolonged drought, limited freshwater sources, and the presence of naturally saline groundwater. Although underground water exists within the area, high salt concentration makes it unsafe for human consumption and unsuitable for domestic use. Conventional boreholes therefore failed to provide a sustainable solution to the area's water challenges.

The town has an estimated population of approximately 3,500 people, including host communities, internally displaced persons (IDPs) from the Boni Forest area, refugees, cross-border communities from Ras Kamboni in Somalia, students, traders, and security agencies stationed in the region. The lack of reliable clean water significantly affected households, schools, health facilities, and local economic activities. Women and children were often forced to walk for up to six hours daily in search of brackish and sometimes contaminated water, exposing them to safety risks and disrupting education and livelihoods.

Conventional water supply interventions such as shallow wells and water trucking proved unreliable, expensive, and unsustainable for the remote settlement. At the same time, increasing pressure on the few available water points contributed to tensions among different user groups competing for access to water.

Faced with persistent water insecurity and the limitations of traditional approaches, Lamu County explored the use of solar-powered desalination technology to convert saline groundwater into safe drinking water. The initiative aimed to provide a sustainable, climate-resilient, and off-grid water supply solution suitable for remote coastal communities facing saline groundwater challenges.

Implementation of the practice

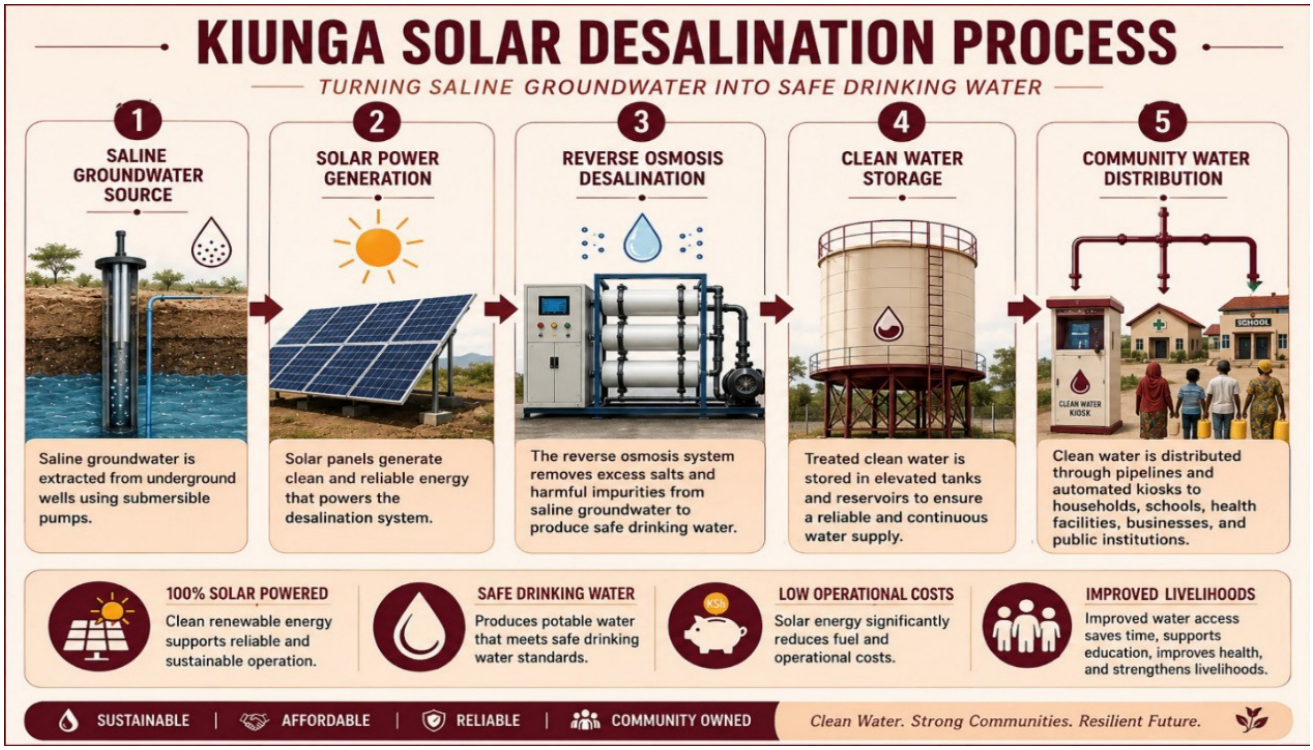


Figure 1 The Kiunga Solar Desalination and Community Water Governance Initiative in Lamu County, featuring the solar panels that power the water supply system.

The implementation of the Kiunga Solar Desalination initiative began after the County Government of Lamu identified persistent water scarcity as one of the major challenges affecting communities living in Kiunga and surrounding settlements. Assessments undertaken by the County established that although groundwater existed within the area, most of it was highly saline and therefore unsafe for human consumption. Existing water sources could not meet the growing demand from households, schools, health facilities, security agencies, and cross-border populations, while water trucking remained expensive, unreliable, and unsustainable for such a remote settlement.

At the same time, the County recognized that Kiunga had strong solar potential, making renewable energy a viable option for powering a long-term water solution. These findings informed the County's decision to explore solar-powered desalination technology as a sustainable intervention capable of converting saline groundwater into safe drinking water.

Implementation of the initiative commenced in January 2022 under the County programme titled "Breaking the Wall of Peace Fragility in Disaster Zones" in collaboration with the Water Sector Trust Fund at an estimated cost of approximately KES 48.9 million. The County coordinated the initiative through the Department of Public Service Management and the Directorate of Peace Building, working closely with technical partners, local leadership, and community representatives during the planning and implementation phases.



Following the assessment phase, the County adopted a solar-powered desalination model using advanced brackish water reverse osmosis technology. The system was selected because reverse osmosis effectively removes high salt concentration, impurities, and contaminants from saline groundwater, making the water safe for human consumption. Unlike seawater desalination, the system utilizes locally available saline groundwater from underground wells, making the model more cost-effective and practical for remote inland coastal settlements.

The desalination system is powered by a 50kW off-grid solar photovoltaic system, eliminating dependence on fossil fuels, diesel generators, and unreliable electricity infrastructure. The use of solar energy significantly lowered operational costs while ensuring continuous water production within the remote settlement.

The infrastructure development phase involved installation of several interconnected components designed to support water abstraction, purification, storage, and distribution. Saline groundwater was abstracted from underground wells and directed into the reverse osmosis desalination system for treatment. Solar

photovoltaic panels were installed to generate renewable energy required to operate pumps and the desalination equipment.

The plant currently produces approximately 5,000 litres of potable water per hour, translating to up to 120,000 litres of clean drinking water per day at full production capacity. The desalination process successfully reduces Total Dissolved Solids (TDS) from hazardous and undrinkable levels to safe potable water standards suitable for domestic and institutional use. The system effectively transformed previously unusable brackish groundwater into "sweet water" for the local population.



Figure 2 A concrete sump tank at the Kiunga Solar Desalination Plant used to support storage and regulated distribution of treated water to households and institutions

To support water storage and distribution, the County established a 15.093 km pipeline network, a 50m^3 concrete sump tank, a 15-metre elevated steel storage tank for gravity-fed distribution, and localized community water kiosks. Water produced through the desalination plant is distributed through connected supply lines serving households, institutions, and public facilities within Kiunga and surrounding settlements.

As part of expanding water access, the County extended the pipeline network to Ishakani village, the last settlement along the Kenya-Somalia border, significantly improving water availability in one of the most remote frontier areas of Lamu County.

Following installation, the desalination plant was commissioned to provide reliable clean water to households, schools, health facilities, businesses, security installations, and public institutions. Institutions currently benefiting from the project include Kiunga Primary School, Kiunga Secondary School, Ishakani Primary School, Kiunga Health Centre, Ishakani Dispensary, the Ward Administrator's Office, Fisheries Office, police and GSU camps, and local businesses operating within the settlement.

To support sustainable management of the system, day-to-day operations are managed through the Water Users Peace Committee (WUPC), a community-based management structure comprising representatives from host communities, refugee populations, youth leaders, elders, and women representatives, with women constituting approximately 30% of the committee membership.

The project operates through a social enterprise model under the Community Water Trust Fund. Water is sold at a nominal community-agreed rate, with revenues retained locally to support operations, operator payments, repairs, and maintenance of the system. Part of the revenue is also used to support local women's economic empowerment initiatives through small community-based financing mechanisms.



A group of women collecting water in containers during the designated hours at the community water point.

To ensure equitable access and accountability, the County facilitated community engagement forums involving host communities, internally displaced persons (IDPs), refugee representatives, youth groups, women groups, institutions, and security agencies. Through these consultations, stakeholders developed community-agreed water management arrangements to regulate usage and

improve accountability around water distribution.

The County Government, through the Directorate of Peace Building under the Department of Public Service Management, continues to provide oversight and coordination for the initiative. The project is also integrated within the County Peace Policy and Disaster Risk Management frameworks established in 2022, strengthening sustainability and institutional support for the initiative.

Results of the practice

The Kiunga Solar Desalination and Community Water Governance Initiative has significantly improved access to clean water and strengthened social cohesion in Kiunga and surrounding settlements.

- **Improved access to safe drinking water:** The Kiunga Solar Desalination initiative improved access to clean and reliable drinking water for approximately 3,500 residents in Kiunga and surrounding settlements, including host communities, internally displaced persons (IDPs), refugees, cross-border communities, students, traders, and security agencies. The project converted previously unusable saline groundwater into safe drinking water for domestic and institutional use.
- **Expansion of water supply coverage:** The County extended the water pipeline to Ishakani village, the last Kenyan settlement along the Somalia border, improving water access in one of the most remote areas of Lamu County.
- **Improved service delivery in institutions:** The desalination system currently supports water access in key institutions including: Kiunga Primary School, Kiunga Secondary School, Ishakani Primary School, Kiunga Health Centre, Ishakani Dispensary, Ward Administrator's Office, Fisheries Office, Police and GSU security camps and local businesses and households. Reliable water supply improved sanitation, hygiene, healthcare delivery, and learning conditions within these institutions.
- **Reduced burden on women and children:** Improved access to water reduced the time and distance previously spent by women and children searching for water, allowing more time for education, household activities, and livelihoods.
- **Climate-resilient and sustainable water solution:** The initiative demonstrated the viability of solar-powered desalination as a sustainable and cost-effective solution for coastal and arid areas with saline groundwater. The off-grid solar-powered system reduced dependence on diesel-powered systems and emergency water trucking.
- **Elimination of emergency water trucking:** The establishment of a permanent desalination and pipeline distribution system eliminated the County's reliance on expensive emergency water trucking during drought periods, generating significant savings in public emergency response expenditure.



Sador Mary M. Mutuku receiving the 2026 Water Transversality Global Award on behalf of Lamu County

- **Strengthened community cooperation:** The community agreed water management system improved equitable access to water and strengthened cooperation among host communities, refugees, internally displaced persons, and security agencies. This

contributed to reduced tensions related to water scarcity.

- **International recognition:** The initiative received international recognition under the Water Transversality Global Awards 2026, where it was selected as the Best Community Impact Project Award winner for its contribution to water security, climate resilience, and community impact.

Lessons Learned

- Solar-powered micro-grids reduce operational costs: The Kiunga desalination plant demonstrated that integrating desalination systems with solar-powered micro-grids significantly lowers operational costs in remote and off-grid settlements. The 50kW solar photovoltaic system eliminated dependence on diesel-powered generators and supported affordable water production.
- **Built-in technical redundancy improves reliability:** The use of parallel pumping systems ensured continuous water production even during maintenance or equipment failure, reducing the risk of complete system shutdowns in the remote settlement.
- **Long-term sustainability requires local ownership:** The project demonstrated that community-managed operational models are critical for sustainability of remote water infrastructure. Through the Water Users Peace Committee (WUPC) and the Community Water Trust Fund, locally generated revenues support operations, maintenance, and repairs while strengthening local ownership and accountability.
- **Equitable water governance strengthens social stability:** Community-agreed water management arrangements improved accountability, regulated access to water, and reduced tensions associated with water scarcity among host communities, refugees, institutions, and security agencies.
- **Modular clean technology enables scalable solutions:** The initiative demonstrated that modular solar-powered desalination systems can be deployed in remote coastal and arid areas without extensive conventional infrastructure, providing a practical and replicable solution for saline groundwater regions.

Recommendations

Coastal and arid Counties facing persistent water scarcity should consider solar-powered desalination as a sustainable and climate-resilient solution for converting saline groundwater into safe drinking water.

- **Groundwater assessments should guide water investments:** It is important to undertake groundwater quality and salinity assessments before investing in conventional boreholes and water supply systems.
- **Water projects should integrate storage and distribution systems:** Desalination projects should include adequate storage facilities, pipeline networks, elevated tanks, and community distribution points to ensure reliable water access.
- **Renewable energy should be integrated into remote water systems:** Solar-powered systems reduce operational costs, fuel dependency, and carbon emissions while improving reliability in remote and off-grid settlements.
- **Strengthen local technical capacity for operation and maintenance:** Sustainability of desalination systems depends on local operational capacity. Counties implementing desalination projects should invest in training local operators and technicians on operation, maintenance, troubleshooting, and management of reverse osmosis systems to reduce dependence on external technical support.
- **Community-managed operational models should be prioritized:** Community-managed governance structures and locally retained revenue systems strengthen accountability, ownership, and sustainability of water infrastructure projects. Counties should establish community-based management systems to support operation, maintenance, and equitable access to water resources.
- **Water projects in fragile areas should integrate inclusive governance approaches:** There is need to promote community

participation and locally agreed water management arrangements to improve accountability and reduce tensions associated with water scarcity.



Figure 5 Residents at the water collection point during its commissioning



Figure 6 Community members collecting water at the point



Figure 7 Interior of the solar desalination system, including batteries and operational components



Figure 8 Interior of the solar desalination system, including operational components



Figure 9 Interior of the solar desalination system, including batteries and operational components



Figure 10 Cross-border forum to discuss the growing tensions around water scarcity and jointly explore



Figure 11 A photo of Kiunga Solar desalination plant



Figure 12 One of the tanks used for water storage

CHAPTER 3:
HEALTH SECTOR



Fully equipped neonatal incubator station at Kiambu Level Five Hospital providing specialized care for premature and critically ill newborns

The Battle Against the Leading Killer of Mothers: Kiambu Level 5 Hospital's Life-Saving Journey

Excessive bleeding during pregnancy, childbirth or after delivery, medically referred to as obstetric hemorrhage, remains the leading cause of maternal deaths in Kenya. For many years, Kiambu Level 5 Hospital struggled with this challenge, recording poor maternal outcomes and drawing public concern before 2019. Today, the situation has changed significantly. In 2025, the hospital recorded zero maternal deaths in the first seven months. It also achieved eleven consecutive months without losing a mother due to excessive bleeding during or after childbirth. By the end of November 2025, a total of 5,841 mothers had delivered safely at the facility, including women referred in with severe bleeding, some in critical condition. All survived.

This turnaround has largely been driven by the strong implementation of the Maternal and Perinatal Death Surveillance and Response system at both County and hospital levels. Regular death reviews, timely follow up of recommendations and strict adherence to rapid response protocols have strengthened accountability and improved decision-making during emergencies.

Kiambu County has supported these efforts through targeted investments aimed at improving maternal outcomes. These include dedicated ambulances for maternal and newborn referrals, early adoption of Heat Stable Carbetocin in line with national guidelines, procurement of non-pneumatic anti shock garments, improved access to blood and blood products, adequate specialist staffing at higher level facilities, and community initiatives that promote early identification and referral of high-risk mothers.



Figure 2 Kiambu ambulances that were rehabilitated and fully equipped by the Kiambu County Government

Within the hospital, care has been standardized to ensure that all severe bleeding cases are immediately escalated to senior clinicians. Continuous mentorship of midwives and medical officers, open communication within the maternity unit and access to a critical care unit with a dedicated obstetric bed have further strengthened emergency response. In 2025, the hospital recorded zero ICU deaths related to postpartum hemorrhage.

Kiambu Level 5 Hospital's experience shows that consistent leadership, teamwork and use of data can turn one of the leading causes of maternal death into a story of survival and renewed confidence in public health care.

Kilifi County Strengthens Maternal and Referral Care with Modern Maternity Wing at Malindi Sub-County Hospital



Figure 1 A section of the 40-bed maternity wing at Malindi Sub-County Hospital

Kilifi County has strengthened maternal and newborn healthcare services through the commissioning of a 40-bed maternity wing at Malindi Sub-County Hospital, complete with two fully equipped theatres and a dedicated maternity ambulance.

The investment is part of the County's broader health system strengthening strategy under H.E. Gideon Maitha Mung'aro's Afya Mashinani initiative, which focuses on improving the availability, accessibility, affordability, and quality of healthcare services. Implemented through a partnership between the County Government of Kilifi and the Government of Italy, the project demonstrates how strategic collaboration can accelerate delivery of critical health infrastructure at the County level.



Figure 2 A section of the 40-bed maternity wing at Malindi Sub-County Hospital, featuring patient monitoring stations

The Challenge

Malindi Sub-County Hospital serves a large and growing population along the coastal region, resulting in increased demand for skilled delivery services, emergency obstetric care, and referral support.

Previously, limited maternity space and critical care capacity contributed to congestion, delays in emergency response, and avoidable referrals outside the County. This placed financial and emotional strain on families while stretching existing hospital resources.



Figure 3 Inside the dedicated maternity ambulance at Malindi Sub-County Hospital, equipped for emergency maternal and newborn transport

The County's Response

Kilifi adopted County an integrated health systems strengthening approach, combining infrastructure expansion, digital transformation, and emergency referral improvements to address service gaps comprehensively.

The new maternity wing significantly enhances the hospital's ability to provide Comprehensive Emergency Obstetric and Newborn Care (CEmONC), improving patient flow, privacy, and timely access to life-saving interventions.

This development builds on major upgrades undertaken over the past three years, including:

1. Expansion inpatient of capacity to over 160beds
2. Establishment of an 8-bed ICU/HDU unit
3. Renovation and equipping of the main theatre
4. Upgrading of outpatient services
5. Implementation of a paperless hospital system through an integrated health information management system
6. Construction of accessible walkways
7. Establishment of a modern hospital kitchen
8. Ongoing construction of a modern mortuary facility



Figure 4 H.E. Gideon M. Mung'aro, Governor of Kilifi County, with leaders from the Government of Italy during the official opening of the new maternity wing at Malindi Sub-County Hospital

Further investments underway include a modern Accident and Emergency (A&E) unit, the Malindi Private Wing, and expanded ambulance and referral services.

A notable feature of this approach is the deliberate integration of physical infrastructure with digital systems and emergency response strengthening. The transition to a paperless hospital system has improved records management, enhanced efficiency, and strengthened continuity of care across departments, while the dedicated maternity ambulance has reinforced timely referrals within and beyond the sub-county.

Impact

These investments are already contributing to:

- Improved maternal and newborn health outcomes
- Reduced referrals outside Kilifi County
- Strengthened critical care and emergency response capacity
- Improved patient experience and dignity in care
- Greater efficiency in service delivery through digital systems

Malindi Sub-County Hospital is increasingly serving as a key referral facility for Lamu and Tana River Counties, as well as health facilities in Magarini and

Malindi SubCounties.

Through sustained, coordinated investments, Kilifi County is reinforcing its commitment to accessible, quality maternal healthcare and advancing progress toward Universal Health Coverage (UHC).

Integrated Community Outreach Model Boosts Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH) at Tsangatsini Dispensary, Kilifi County



Figure 1 Service Charters of Tsangatsini Dispensary in Kaloleni Sub-County, Kilifi County

Context and Pre-Intervention Reality

Tsangatsini Dispensary is a primary health care facility located in Kaloleni Sub-County, Kilifi County, serving an estimated catchment population of approximately 15,000 people. The facility offers outpatient services, Maternal and Child Health (MCH) services, immunization, laboratory services, and preventive and promotive health services. On average, the facility conducts about 50 deliveries per month based on the health facility reports, although service utilization had historically fluctuated.

The facility is supported by two Community Health Units (CHUs); Tsangatsini A and Nyenzeni, comprising a total of 36 Community Health Promoters (CHPs). Governance and community oversight are provided through the Health Facility Management Committee (HFMC) and Community Health Committees (CHCs).

Despite the presence of these structures, Kaloleni SubCounty faced persistent RMNCAH challenges, including:

- Low antenatal care attendance, particularly completion of the fourth ANC visit
- Incomplete immunization coverage
- High reliance on home deliveries
- Weak follow-up of pregnant women and children
- Limited reach to hard-to-access communities due to distance and transport constraints

Outreach activities were irregular and largely dependent on ad hoc arrangements, limiting continuity of care and weakening community-facility linkages. These constraints undermined RMNCAH outcomes despite the commitment of health workers and community health actors.

Implementation of the Practice

To address low ANC attendance, incomplete immunization coverage, and high reliance on home deliveries, Tsangatsini Dispensary implemented a structured, integrated approach to community health service delivery. Supported by DANIDA PHC operational funding, this approach combined strategic planning, strengthened community-facility linkages, monthly integrated outreaches, and data-driven monitoring. By engaging Community Health Promoters (CHPs), facility staff, and governance structures, the facility ensured that maternal, newborn, child, and adolescent health services were delivered efficiently, equitably, and in a manner responsive to the needs of the catchment population.

The following interventions were implemented:



1. Needs assessment and strategic planning
   - A comprehensive community mapping exercise was conducted jointly by facility staff and CHPs.
   - All pregnant women and children under five in the catchment area were identified.
   - Service gaps were mapped, and priority outreach sites were selected based on need, distance, and population density.
   - A monthly outreach schedule was developed, integrating ANC, immunization, family planning, nutrition counselling, and health education services.
2. Strengthening Community-Facility Linkages
   - CHPs were assigned households to monitor, early identification of pregnant women, and defaulter tracing for ANC and immunization.
   - CHPs facilitated timely referrals to the facility.
   - The HFMC and CHCs provided oversight, community mobilization, and accountability.
3. Key operational steps
   - Each CHP assigned 20-25 households to follow up weekly.
   - Weekly reporting of pregnant women, newborns, and under-five children.
   - Monthly joint meetings with facility staff to review data, identify gaps, and plan outreach.
4. Integrated Outreach Service Delivery
   - DANIDA-funded transport and logistical support enabled monthly integrated outreaches at permanent outreach sites.
   - Services offered during outreach:
   - ANC services
   - Routine immunization
   - Family planning
   - Nutrition assessment and counselling
   - Health education and promotion
5. Operational details
   - Outreach teams included facility nurses, CHPs, and support staff.
   - Outreach locations were rotated monthly to reach remote communities.
   - CHPs mobilized the community in advance, using household visits and local announcements.
6. Data-Driven Monitoring and Feedback
   - Monthly data review meetings focused on ANC attendance, immunization coverage, and referral completion rates.
   - CHPs and facility staff reviewed performance, identified gaps, and adjusted outreach plans.
   - Data use enhanced targeted interventions and accountability.
7. Financial and Logistical Support
   - DANIDA funds provided:
   - Transport allowances for health workers and CHPs
   - Performance-based incentives especially for RMNCAH indicators
   - Provision of maternity packs (baby shawls, basic supplies) for mothers delivering at the facility
8. Governance and Oversight
   - HFMCs and CHCs ensured transparency, accountability, and community participation throughout implementation.
   - Regular community meetings reviewed performance and addressed concerns.

Contribution and Impact of DANIDA PHC Support Programme

Within Tsangatsini Dispensary's community health model, the DANIDA Primary Health Care (PHC) Support Programme provided crucial operational funding that enabled the facility to implement planned activities effectively. Supported by the Government of Denmark, the Programme strengthens primary health care at both community (Level 1) and facility (Level 2) levels, improving access, quality, and equity of services, particularly maternal and child health, family planning, nutrition, and hygiene (DANIDA PHC Support Programme, n.d.).

During the reporting period (FY 22/23 23/24), Tsangatsini Dispensary received KES 731,334 under the DANIDA PHC Support Programme, managed through the health facility work plan under the Health Facility Management Committee. These funds bridged operational gaps, supporting community mapping, integrated outreaches, household registration, CHPs facilitation, dialogue and action days, and monitoring activities. This support strengthened facility-community linkages, improved early ANC uptake, increased male involvement, enhanced defaulter tracing, and contributed to better maternal and child health outcomes in the catchment area.

DANIDA PHC support was primarily applied to areas that directly affected service continuity, quality, and community access, including:

- Transport facilitation for facility staff and CHPs during outreach activities
- Provision of performance-based incentives for CHPs to encourage household follow-ups and health education
- Organization of monthly integrated outreaches offering ANC, immunization, family planning, nutrition counselling, and health education
- Provision of maternity packs to encourage facility-based deliveries
- Support for data-driven monitoring and monthly feedback meetings to enhance evidence-based planning

Results

- Increased ANC attendance: Completion of the fourth ANC visit improved significantly, with women accessing ANC services earlier and more consistently.
- Improved immunization coverage: Increased Penta 3 and Fully Immunized Child (FIC) immunization coverage.
- Increased skilled deliveries: Strengthened referral systems and community trust contributed to facility-based deliveries.
- Enhanced CHP performance: CHPs became more active and motivated, resulting in improved defaulter tracing, referrals, and health education.
- Improved data use: Routine monitoring and feedback strengthened responsiveness to emerging gaps and service delivery challenges.

Lessons Learned

- ♦ Well-supported, trained, and supervised Community Health Promoters (CHPs) are central to improving RMNCAH service utilization. Their motivation and engagement directly influence timely referrals, follow-ups, and adherence to care schedules.
- ♦ Offering multiple services such as ANC, immunization, family planning, nutrition counselling, and health education during a single outreach session maximizes community participation and strengthens trust in public health services.
- ♦ DANIDA PHC's timely and flexible allocation enabled the facility to respond to real-time needs in the community, such as unexpected transport challenges, outreach logistics, and commodity shortages.
- Monthly data review meetings with CHPs and CHCs helped track ANC attendance, immunization coverage, and defaulter tracing, enabling evidence-based planning and continuous quality improvement.
- Inclusion of fathers in mother-to-mother and father-to-father support groups increased

male involvement, reduced gender-based barriers, and improved uptake of RMNCAH services.

- Strong coordination among the facility, community structures, local administration, partners, and development agencies ensures interventions are community-led, contextually relevant, and sustainable.
- Addressing retrogressive practices such as the "Mwenye" syndrome through dialogue and education promotes behavioural change and strengthens behaviours in seeking health in male-dominated communities.
- Involving local leadership, elders, and community groups in planning and oversight ensures that interventions continue even beyond direct programme support.

Recommendations for Scale and Sustainability

- There is need to scale-up DANIDA supported CHUs to additional villages or locations to reach underserved populations and maximize RMNCAH impact.
- It is critical to broaden the range of activities supported under DANIDA PHC, including household-level nutrition interventions, kitchen garden initiatives, hygiene and sanitation projects, and water supply solutions.
- There is need to ensure predictable and timely release of funds to avoid delays in community-level activities, especially during critical periods for maternal and child health.
- Maintaining routine monthly or quarterly performance review meetings for CHPs and facility staff while incorporating mentorship and recognition systems will sustain engagement.
- Improve planning and management at the facility level to prevent stockouts of vaccines, ANC supplies, and essential commodities during outreach activities.
- Sustain community sensitization to address cultural and social barriers respectively.



Figure 1 Patient Record Books and Files

Integrated Health Financing for Enhanced Service Delivery: Lessons from Kiwandani Dispensary, Kilifi County

Context and Pre-Intervention Reality

Kiwandani Dispensary is a Level 2 primary health care facility serving an estimated catchment population of approximately 30,327 people in a peri-urban setting of Kilifi County. The facility provides outpatient services, maternal and child health (MCH) services, including antenatal care (ANC), family planning (FP), immunisation and nutrition services, laboratory services, and community health programmes. The facility is supported by one Community Health Unit (CHU) comprising 30 active Community Health Promoters (CHPs), who play a critical role in linking households to facility-based services.

Prior to the adoption of an integrated health financing approach, Kiwandani Dispensary operated within a fragmented financing environment. Facility operations were supported through multiple funding streams, including County health allocations, Social Health Authority (SHA) reimbursements, the DANIDA Primary Health Care (PHC) Support Programme, and other development partner contributions. However, these funding sources were often uncoordinated, characterised by delayed disbursements, parallel planning, and limited flexibility in addressing immediate operational needs.

As a result, the facility faced persistent challenges in sustaining uninterrupted RMNCAH service delivery, supporting community engagement activities, and maintaining essential operational standards. Despite strong leadership and committed staff, the absence of harmonised planning and resource utilisation limited the facility's ability to translate available funds into consistent, high quality health services.

Implementation of the Practice

Implementation of the integrated health financing practice began with a shift from fragmented funding utilization to coordinated financial planning and execution. The facility leadership, together with departmental heads and community representatives, conducted annual and quarterly assessments to identify service delivery gaps, operational bottlenecks, and priority RMNCAH interventions.

All available funding streams including County allocations, SHA reimbursements, DANIDA PHC support, and partner contributions were harmonised under a single, integrated facility work plan. This plan was reviewed and endorsed by the Health Facility Management Committee (HFMC) and subsequently submitted through the County system for issuance of Authority to Incur Expenditure (AIEs), ensuring compliance with public finance management requirements.

To strengthen financial accountability and continuity, Kiwandani Dispensary introduced a staff rotation system for financial reporting and budget tracking. This approach ensured that multiple staff members were equipped with financial management skills, reduced dependency on single officers, and enhanced institutional memory.

The facility embedded Continuous Quality Improvement (CQI) principles into financial and service delivery processes using the Plan-Do-Study-Act (PDSA) cycle. Monthly and quarterly reviews of expenditure patterns, service utilisation data, and stock status informed adaptive planning and ensured resources were directed to high-impact interventions.



Figure 2 Patient waiting bay at Tsangatsini Dispensary, constructed with support from the DANIDA PHC Programme to enhance patient care services

Contribution and Impact of DANIDA PHC Support

Within Kiwandani Dispensary's integrated health financing model, the DANIDA Primary Health Care (PHC) Support Programme provided crucial

operational funding that allowed the facility to translate its plans into concrete actions. Supported by the Government of Denmark, the Programme aims to strengthen Kenya's primary health care system by addressing persistent operational and service delivery bottlenecks at both community and primary facility levels (Levels 1, 2 and 3). Its focus is on improving access, quality, continuity, and equity of essential health services, as well as other priority primary health care interventions.

The Programme adopts a health systems strengthening approach rather than a vertical or disease-specific funding model, recognizing that many service delivery challenges at primary care level stem not from a lack of policy or infrastructure, but from gaps in operational financing, outreach capacity, community follow-up, availability of essential commodities, and routine use of data for decision-making.

During the reporting period (FY 23/24), Kiwandani Dispensary received an allocation of KES 117,359.00 through the DANIDA PHC Support Programme. These funds were channelled through County approved plans and implemented under the oversight of the Health Facility Management Committee (HFMC), ensuring transparency, accountability, and full alignment with public finance management requirements. By bridging operational gaps that could not easily be financed through other sources, DANIDA PHC support enabled the facility to strengthen service delivery, engage the community, and sustain impactful health interventions.

DANIDA PHC support was primarily applied to areas that directly affected service continuity, quality, and community access, including:

- Operational continuity: Payment of locum staff and casual workers during peak service periods, ensuring uninterrupted RMNCAH service delivery.
- Community-facility linkage: Facilitation of Community Health Promoters (CHPs) through transport allowances, airtime, and performance incentives to support referrals, defaulter tracing, and follow-up.
- Community engagement: Financing dialogue days, household registration activities, school health programmes, and targeted outreach to address sociocultural barriers to service uptake.
- Facility functionality: Minor infrastructure improvements, sanitation enhancements, waste management, and procurement of small but essential equipment that improved the care environment.
- Quality and accountability: Supporting Continuous Quality Improvement (CQI) processes, routine data reviews, and responsive adjustments to service delivery.

Results of the practice

- The integrated health financing approach resulted in clear and measurable improvements in service delivery, facility functionality, and community health outcomes. Harmonised planning across funding sources reduced duplication and operational delays, enabling timely procurement of essential medicines, vaccines, and RMNCAH commodities and ensuring uninterrupted service delivery.
- Facility functionality improved significantly through targeted infrastructure upgrades, including the construction of patient waiting bays, improvements in sanitation and waste management systems, and the partitioning of service areas to enhance privacy and quality of care for clients.
- Community engagement and linkages were strengthened through regular dialogue days, school health programmes, and household registration activities, which increased community trust in facility services. Active involvement of CHPs enhanced client follow-up, reduced defaulter rates, and contributed to improved continuity of care.
- As a result of the community-level improvements, uptake of antenatal care services increased, both early ANC and 4th ANC attendance, while skilled delivery rates improved as confidence in facility-based services grew. At the same time, the motivation and performance of CHPs improved due to incentives, transport facilitation, and airtime support, enabling them to carry out referrals and defaulter tracing more effectively.
- The integration also strengthened governance and accountability at the facility level by improving financial management capacity, transparency, and oversight, reinforcing confidence among staff, community structures, and partners.

Lessons learnt

- Integrating multiple funding streams under a single planning and accountability framework maximises the impact of limited resources.
- Flexible, facility-level financing such as DANIDA PHC support is critical for addressing day-today operational gaps that undermine service delivery.
- Building financial management capacity across multiple staff members enhances flexibility and accountability.
- Continuous quality improvement processes support adaptive decision-making and sustained performance improvements.
- Strong community-facility linkages, supported through adequately facilitated CHPs, are essential for improving RMNCAH outcomes.

Recommendations

- Counties should institutionalise integrated health financing approaches to harmonise diverse funding sources at facility level.
- Flexible PHC support mechanisms, like DANIDA PHC funding, should be sustained and expanded to enable timely response to local service delivery needs.
- Facilities should continue rotating financial management responsibilities to strengthen institutional capacity and continuity.
- Routine use of service delivery and financial data should be strengthened to guide prioritisation and resource allocation.
- Investment in community engagement and CHP facilitation should be scaled to sustain demand for RMNCAH services and strengthen accountabil



Figure 3 Patient waiting bay equipped with a triage area to streamline patient assessment and care

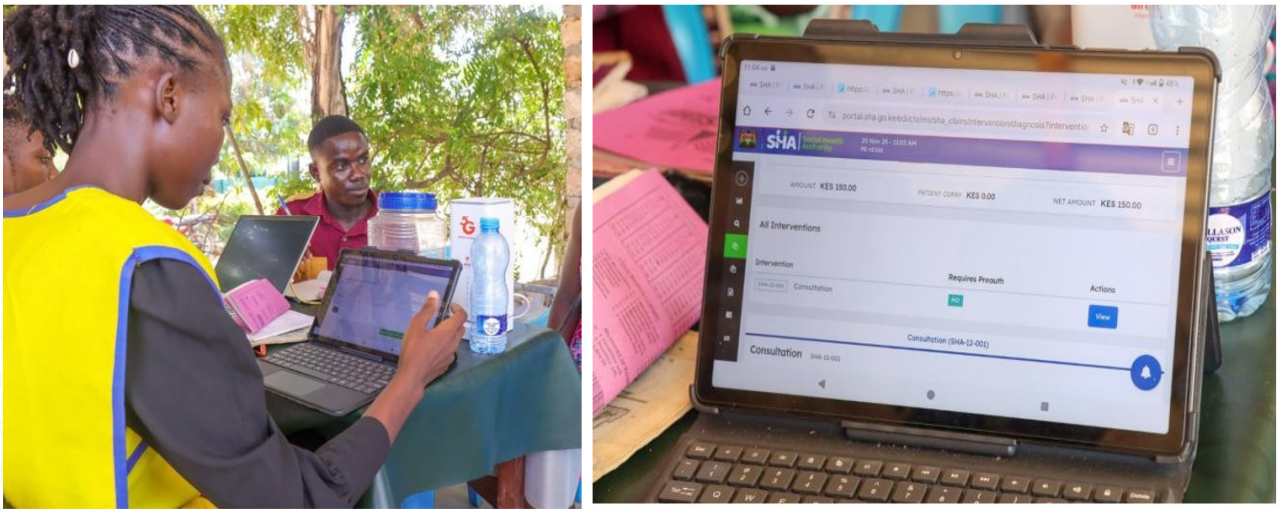


Figure 4 Dedicated desk office for SHA registration, with staff supported through DANIDA PHC Programme funding

Kirinyaga Saves Millions: Kerugoya CountyReferral Hospital Oxygen Plant Guarantees Lifesaving Care

Introduction

Kirinyaga County previously spent millions of shillings annually on outsourced oxygen cylinders for Kerugoya County Referral Hospital, yet frequent stock-outs and supply interruptions were common. This costly and unreliable system not only threatened the quality of emergency, surgical, and neonatal care but also placed sustained pressure on the County health budget, limiting resources for other critical priorities.

Patients requiring oxygen therapy, particularly critically ill adults, neonates, and surgical cases, were most affected, while health workers were constrained in delivering timely and effective care. Amref Health Africa (2025) reports that, nationally, only a small proportion of facilities have on-site oxygen generation, forcing many counties to depend on costly and inconsistently available cylinder deliveries, especially outside major urban centers.

During health crises, cylinder refill prices have historically tripled, rising from KES 2,500 to over KES 6,000 (Breaking Kenya News, 2021). In public referral hospitals, a patient on low-flow oxygen may require 2–3 cylinders per day (KES 5,000–18,000), while highflow cases can cost KES 10,000–30,000 daily. Even one hour of therapy can cost KES 200–500, illustrating the financial burden for both patients and the County health system.

These challenges highlight the urgent need for sustainable, self-reliant oxygen solutions at the County level, underscoring the need for the intervention at Kerugoya County Referral Hospital.

Implementation of the practice:

To address these challenges, in 2023 the County Government of Kirinyaga invested in the installation of a medical oxygen generation plant at Kerugoya County Referral Hospital.

The County provided policy direction, financing, and overall oversight. The intervention aimed to achieve self-sufficiency in medical-grade oxygen while strengthening critical care capacity at the County Referral Hospital and other public health facilities across Kirinyaga County



Figure 1 A biomedical technician shows Governor H.E. Anne Waiguru, EGH, how the oxygen plant operates during its unveiling.

As end users, Kerugoya County Referral Hospital developed the requisition proposal that initiated the procurement process for the oxygen plant.

Key activities undertaken for the oxygen project included:

1. **Feasibility studies for plant installation:** The feasibility studies were contracted to a specialized firm. Respondents included hospital staff, County Health Management Team members, supply chain and procurement officers, County finance officers, and patient and community representatives.
2. **Procurement of oxygen generation equipment:** An open tender was floated, and MedQuip Limited, with a proven track record in oxygen plant installations including participation in the AMREF Oxygen infrastructure project, was awarded the contract.
3. **Installation of compressors, dryers, and molecular sieve systems**
4. **Integration with the hospital's piped medical gas infrastructure**
5. **Capacity building for biomedical and technical staff:** Training covered plant operation, preventive maintenance, and safety protocols.

The contract was awarded in March 2021 and was initially scheduled for completion within one year. However, installation and commissioning were delayed by COVID-19 disruptions and importation challenges, extending the timeline to approximately two years, with the plant completed in April 2023.



A fully operational medical oxygen generation plant at Kerugoya County Referral Hospital

The oxygen plant now serves as the primary source of medical oxygen for the County Referral Hospital and over 70 other public hospitals in Kirinyaga County.

Roles and Responsibilities:

- Kerugoya County Referral Hospital Management: Oversaw day-to-day coordination and integrated the oxygen plant into hospital services.
- Biomedical Engineering Unit: Managed technical installation, operation, preventive maintenance, and troubleshooting.
- Healthcare workers: Acted as end-users, ensuring rational and appropriate clinical use of oxygen across all service delivery points.

The intervention required an upfront capital investment of approximately KES 80 million for equipment procurement and installation. The project cost, spread over three financial years (FY 2020/2021–FY 2022/2023), also included allocation of human resources for technical operation and maintenance. These initial investments were offset by the elimination of recurrent expenditures previously incurred through outsourced oxygen cylinder supply.

To sustain the practice, Kirinyaga County has institutionalized routine preventive maintenance, ongoing capacity building for biomedical staff, and budgetary provision for spare parts and servicing. Additionally, plans are underway to install a 6,000-litre liquid oxygen storage tank to provide backup during maintenance or power interruptions, ensuring round-the-clock availability of oxygen and continuity of services.



Results of the practice

- **Reliable oxygen supply:** Uninterrupted, 24-hour availability of medical-grade oxygen across all critical service points, including operating theatres, inpatient wards, casualty, and neonatal units. The facility produces up to 10,000 litres per day, generating millions of litres of lifesaving oxygen since commissioning.
- **Near-elimination of stock-outs:** The plant has drastically reduced oxygen shortages, ensuring patients receive timely treatment and enhancing overall clinical responsiveness.
- **Enhanced patient safety:** Continuous oxygen supply has improved outcomes for critically ill adults, neonates, and surgical patients.
    - Financial savings: Annual savings of approximately KES 20 million have been achieved, translating to cumulative savings of over KES 80 million over four years. According to the County Budget documents for FY 2021/2022 and preceding financial years, the County previously budgeted approximately KES 15 million annually for medical oxygen under the health budget. Even with this allocation, actual expenditure consistently surpassed the budgeted amount, leading to perennial pending bills. These resources have allowed the County to reinvest in other critical health priorities, including procurement of medicines, recruitment of essential health professionals, and infrastructure improvements.
    - Improved operational efficiency:
    - Integration with piped gas systems has enhanced safety and streamlined oxygen delivery.
    - Capacity building of biomedical and technical staff has reduced equipment downtime and extended the lifespan of the plant.

What Worked Well:

- Strong political and administrative leadership, combined with in-house biomedical expertise, enabled timely decisions, efficient resource allocation, and effective technical guidance throughout the project.
- Clear alignment with critical care priorities ensured the intervention directly addressed urgent patient and health system needs.
- The strategic shift from "buying air" to "making air" strengthened local capacity and reduced reliance on external suppliers, positioning Kirinyaga County as a leader in health system self-reliance.
- Beyond cost savings, the intervention reinforced health system sovereignty by giving the County direct control over a critical lifesaving resource, ensuring continuous access for patients.

Challenges Faced

- Power instability and delays in spare parts procurement initially affected operations, highlighting the importance of robust contingency planning.
- Maintenance gaps required emergency interventions, demonstrating the need for strengthened preventive systems and rapid-response mechanisms.

Scaling Up and Replication

- Integrating high-capacity backup oxygen storage and reliable power solutions from the outset will reduce risks of downtime and service disruption.
- The model of in-house oxygen production, technical capacity building, and phased implementation provides a replicable blueprint for other Counties seeking sustainability, cost savings, and uninterrupted access to lifesaving oxygen.

Recommendations

- Counties should consider investing in local oxygen production as a high-impact, cost-effective measure to strengthen critical care, emergency readiness, and universal health coverage.
- Developing in-house biomedical and technical expertise ensures sustainability, reduces reliance on external suppliers, and enhances operational efficiency.
- Projects should plan for preventive maintenance, power backup, and human resource allocation at inception to prevent service disruptions and extend equipment lifespan.

- Counties should minimize over-reliance on outsourced oxygen or other lifesaving commodities to ensure consistent availability and avoid budgetary strain.
- The Kirinyaga approach of phased implementation, technical capacity building, and self-reliant infrastructure provides a blueprint for other Counties facing similar challenges.

Life-Saving Drug Brings Hope to Delivery Rooms in Makueni County: The Story Of Faith Mumbe

Introduction

Maternal mortality remains a major global health concern, with postpartum hemorrhage (PPH) identified as one of the leading causes of death among mothers during or after childbirth. In Makueni County, like many other regions, maternal health outcomes have historically been affected by delayed response, inadequate treatment options, and the limitations of temperature-sensitive drugs such as oxytocin.

To address this challenge, the County Government of Makueni, through the Department of Health Services, partnered with Jhpiego, in collaboration with the International Federation of Gynecology and Obstetrics (FIGO) and the Kenya Obstetric and Gynecological Society, to introduce Heat Stable Carbetocin (HSC) in January 2024. HSC is a World Health Organization (WHO) recommended uterotonic drug for the prevention and treatment of postpartum hemorrhage. The drug does not require refrigeration and effectively controls bleeding after childbirth by stimulating uterine contractions.

The initiative aimed at improving maternal survival rates by enhancing PPH prevention and treatment in health facilities across the Makueni County. Through the systematic, County-wide adoption and integration of Heat Stable Carbetocin into routine emergency obstetric care, Makueni County Government has eradicated postpartum hemorrhage-related maternal deaths, strengthening maternal health systems and restoring hope for countless mothers.

One such mother is Faith Mumbe, a 28-year-old expectant mother from Mbiuni, Machakos County.

Implementation of the practice

On Saturday, 21st September 2024, Faith Mumbe, a 28-year-old expectant mother from Mbiuni, Machakos County, unexpectedly went into early labor while attending a friend's funeral in Muvau village, Makueni County. As she was being prepared for a cesarean section at the Mother and Child Hospital in Wote, Faith began to bleed heavily — a classic case of postpartum hemorrhage (PPH). "I remember holding my 2.7- kilogram baby girl before everything went dark," Faith recalls. She had lost consciousness due to severe blood loss.



cture 1: the Heat Stable Carbetocin (HSC) being used to impro
aternal survival rates by enhancing PPH prevention and treatment
ealth facilities across the Makueni County Hospital

Previously, the hospital relied on oxytocin, a drug that requires refrigeration to remain effective. With frequent power interruptions and logistical challenges, oxytocin's efficacy could not always be guaranteed, putting mothers at heightened risk.

Faith's life was saved within 15 minutes after healthcare providers administered Heat Stable Carbetocin (HSC), quickly controlling the severe postpartum hemorrhage and preventing further complications.

The County-wide adoption of the drug in Makueni was made possible through a strategic partnership with Jhpiego, which supplied the drug to 36 health facilities including the Mother and Child Hospital, Wote, and other high-volume centers. Through the partnership, healthcare workers were also equipped with calibrated blood collection drapes to accurately measure blood loss replacing the unreliable visual estimation method previously used. The drug has earned the affectionate nickname "Kausha", meaning "dry up" in Swahili, reflecting its efficacy in controlling excessive bleeding and saving lives.

Results of the practice

- Zero maternal deaths related to PPH have been recorded in Makueni County since the introduction of Heat Stable Carbetocin in January 2024.
- Maternal deaths at the Mother and Child Hospital dropped from eight cases in 2022 to two cases in 2023, and zero in 2024.
- 456 healthcare providers have been trained on PPH prevention and treatment.
- Over 13,000 community members have been reached through maternal health awareness programs.
- In the FY 2024/2025, the Makueni County Government department of health services procured 11,000 calibrated blood collection drapes to strengthen emergency obstetric care.

Impact

The introduction of Heat Stable Carbetocin has transformed maternal health care delivery in Makueni County:

- **Enhanced survival outcomes:** Mothers like Faith are now surviving complications that were once fatal.
- **Improved health system readiness:** The drug's heat stability ensures reliable access even in remote facilities without refrigeration.



Picture 2: Faith Mumbe with her baby

- **Capacity building:** Continuous training and mentorship have strengthened healthcare providers' confidence and competence in handling PPH cases.
- **Community trust:** Increased awareness has encouraged more mothers to deliver in health facilities, reducing home deliveries and preventable deaths.

Lessons learnt

- Appropriate technologies should be used to improve maternal outcomes: The use of context appropriate WHO-recommended uterotonics such as Heat Stable Carbetocin drastically reduce maternal mortality.
- System- wide adoption is more impactful that isolated use across multiple facilities: This enhances consistency of care and leads to measurable reductions in maternal mortality.
    - Partnerships amplify impact: Collaboration with development partners such as Jhpiego and FIGO accelerates implementation and capacity building.
    - Accurate measurement is key: Use of calibrated blood drapes has enhanced clinical decision making and improved maternal outcomes.
    - Community sensitization matters: Educating women on the importance of skilled birth attendance increases facility-based deliveries.
    - Sustainability planning is essential: The County's commitment to procure the drug beyond donor support ensures long-term impact.

Recommendations & Conclusion

Faith Mumbe's survival is not just a personal victory — it represents the transformative power of innovation, strategic partnership, and strong leadership in maternal health. Through the adoption of Heat Stable Carbetocin, Makueni County department of health services has set a new standard for maternal care — ensuring that no mother dies while giving life.

Quick facts

Maternal deaths from PPH since 2024

- 36 facilities supplied with Heat Stable Carbetocin
- 456 health workers trained
- 13,000+ community members sensitized
- 11,000 calibrated drapes procured in FY 2024/25



Picture 3: A healthcare worker evacuates a patient from an ambulance into the Mother and Child Hospital in Wote.

Improving Maternal and Newborn Outcomes through Real-Time WhatsApp Monitoring in Nyeri County

Introduction

Effective communication between health facilities is critical for improving maternal and neonatal outcomes, particularly in resource-constrained settings. Traditional referral systems often lack timely feedback and continuity of care, resulting in information gaps that compromise patient management. These gaps especially affected expectant women and newborns referred from primary care facilities through to County and National referral hospitals, leading to delayed interventions, missed case reviews, and reduced quality of care.

Within Kenya's devolved health system, effective implementation of Maternal and Perinatal Death Surveillance and Response (MPDSR) remains central to improving maternal and newborn outcomes. While MPDSR frameworks are well established, Counties continue to face systemic challenges in ensuring timely case notification, coordinated review, and consistent follow-through on response actions across the continuum of care. Delays in information sharing limited two-way feedback between referring and receiving facilities, and inconsistent documentation continue to constrain MPDSR effectiveness.

To address these challenges, the Nyeri County Department of Health established a WhatsApp forum linking maternity nurse-in-charges, Sub-County public health nurses, medical specialists, and community health teams across all County health facilities. The forum enables real-time case discussions, strengthens referral pathways, fosters collaborative learning, and improves continuity of care. Embedded within MPDSR governance structures, it functions as a coordination layer rather than a parallel system, leveraging a low-cost mobile messaging platform to facilitate timely information exchange, accountability, and high-quality data reporting.

Governance and Data Protection

The platform is led by the County Reproductive Health Unit under the oversight of the County Health Management Team (CHMT), linking maternity units, sub-county teams, specialists, and community health structures across public, private, and faith-based facilities. This structure enables coordinated engagement across all levels of service delivery while remaining fully embedded within existing MPDSR governance frameworks.

The CHMT retains full control over group membership and access, with defined protocols guiding participation and information sharing. All case discussions are anonymized, with no patient identifiers, and aligned to role-based engagement and the provisions of the Data Protection Act, 2019. This governance framework ensures that real-time information exchange supports MPDSR processes while maintaining confidentiality, accountability, and trust across participating facilities.

How the Forum Works

Step 1: Daily data posting

Each facility's maternity nurse-in-charge, who also serves as the MPDSR secretary, posts standardized daily data on the WhatsApp forum by 9.00 a.m. Data includes deliveries, macerated and fresh stillbirths (MSBs/FSBs), neonatal and maternal deaths, babies born before arrival (BBAs), referrals, and low birthweight cases.

At the Sub-County level, public health nurses consolidate facility-level data and post summary reports for their respective areas, providing a broader overview of trends and outcomes. Zero reporting is done when there are no cases, ensuring continuous surveillance.

Step 2: Case summaries for adverse outcomes

For adverse events, including MSBs, FSBs, neonatal or maternal deaths, brief summaries are shared outlining how the patient was managed and any gaps identified. For referrals, summaries include patient details, clinical management provided, ambulance response time, and outcomes from the receiving facility. No patient names or identifiers are shared, and abbreviations are used to protect privacy.

Step 3: Critical review and discussion

Forum members review posted data and engage in open discussions to identify gaps, solve problems, and take immediate corrective action. The forum brings together a multidisciplinary team including county leadership, obstetricians, paediatricians, neonatologists, pharmacists, laboratory

technologists, ambulance teams, medical officers, nurses, clinical officers, nutritionists, community health coordinators, and Community Health Assistants from public, private, and faith-based facilities.

Discussions often go beyond the clinical event. For example, one case prompted review of antenatal care attendance, cling film wrapping for thermal care of a newborn, and immunization status of a nine-month-old baby, highlighting missed prevention opportunities and strengthening adherence to maternal and child health protocols.

Step 4: Specialist technical guidance

Medical specialists actively participate by providing technical guidance in their areas of expertise, clarifying clinical decisions, and offering recommendations for improving patient management.

Step 5: Community follow-up

Any issues that require community-level intervention are forwarded to a parallel WhatsApp group of Community Health Assistants (CHAs), who follow up at the household level to ensure continuity of care.

Step 6: System-level analysis and interventions

All discussions and case summaries are analyzed to identify systemic gaps and recurring issues. The Reproductive Health Coordinator compiles monthly summaries and compares them with Kenya Health Information System data, achieving over 95% consistency. Referral confirmations by receiving facilities further strengthen data accuracy.

Insights from the forum have led to targeted actions such as:

- Two-week mentorship and clinical rotations for nurses and clinical officers from Level 3 facilities in Level 4 and Level 5 hospitals.
- Community mapping and ANC follow-up, ensuring pregnant women receive adequate antenatal care

Results

- Real-time monitoring: Daily standardized reporting through the WhatsApp forum enables early identification of adverse outcomes and emerging trends. Health workers and county leadership can quickly detect issues such as maternal or neonatal complications, stillbirths, or referral delays, allowing for timely interventions and improved patient outcomes.
- Accountability and transparency: Case briefs shared on the forum highlight management gaps and prompt immediate discussions among multidisciplinary teams. This transparency fosters a culture of accountability, encourages shared problem-solving, and ensures that corrective actions are taken promptly when gaps in care are identified.
- Improved referral coordination: Structured referral briefs, along with feedback from receiving facilities, have strengthened continuity of care and reduced information loss during patient transfers. As a result, average ambulance response times have improved from 1 hour 50 minutes to 1 hour 30 minutes, ensuring that mothers and newborns receive critical care more rapidly and efficiently.
- Community linkage: Issues identified at the facility are transferred to CHAs for household follow-up. This ensures continuity of care from the facility to the home, supports adherence to postnatal care and immunizations, and strengthens the overall connection between health facilities and the communities they serve.
- Quality improvement and capacity building: Peer discussions on the forum clarify clinical terminology, strengthen case analysis, and foster a culture of collective problem-solving among healthcare providers. Specialists provide mentorship and guidance, helping frontline staff improve their skills, make better clinical decisions, and build confidence in managing complex maternal and neonatal cases.
- Data Quality: Monthly comparisons between WhatsApp forum submissions and the Kenya

Health Information System (KHIS) reports show over 95% consistency, demonstrating that the forum supports reliable, high-quality data. Referral cases are also verified by receiving facilities, further ensuring accuracy and trust in the system.



Empowering Women, Engaging Men: Advancing Maternal and Child Health in Ndura Location, Tana River County

Context and Pre-Intervention Reality

Pumwani Community Health Unit (CHU), linked to Pumwani Dispensary (Level 2 facility) in Lafuma Village, Ndura Location, serves 959 households, with a catchment population of 4,536 people. The CHU operates with 10 Community Health Promoters (CHPs) and 7 Community Health Committee (CHC) members.

Prior to structured community interventions, the area faced critical maternal and child health challenges including:

- Low uptake of ANC, FP, immunization, and CWC services, with women often attending ANC late.
- Inconsistent skilled deliveries, with many women delivering at home under unsafe conditions.
- High malnutrition rates among children.
- Poor hygiene and sanitation at household level.

A significant barrier to maternal and child health in the community was the "Mwenye" syndrome, a deeply rooted cultural belief in male ownership over women's health decisions. Women were often not empowered to seek health services independently, particularly family planning (FP) and reproductive health services. Originating from the Swahili word for "owner," this syndrome limited women's autonomy, granting men control over their wives' health, mobility, and household decision-making.

As a result:

- Women often had to access FP services in secret, taking advantage of market days or other opportunities to avoid scrutiny.
- Discovery of FP use by husbands sometimes led to conflict, with some women being forced to remove contraceptives.
- Overall health-seeking behaviour among women was restricted, contributing to low service uptake and perpetuating risks to maternal and child health.

Tana River County's modern contraceptive prevalence rate is 11%, significantly lower than the national average of 57% among married women (KDHS 2022).

Implementation of the Practice



Figure 1 CHPs in Ndura, Tana River County, lead sensitization sessions with men, women, and local leaders to promote shared decision-making, maternal and child health, and family planning

Step 1: Community sensitization and mobilization

The process began with targeted community sensitization led by the CHPs. They reached out to women, men, household heads, religious leaders, village elders, and traditional birth attendants (TBAs) to create awareness about the benefits of structured support groups. These sessions emphasized the importance of shared decision-making, safe deliveries, maternal and child nutrition, hygiene, and family planning.

CHPs facilitated discussions addressing the "Mwenye" syndrome, helping men understand the health risks of restricting women's access to services. By framing male involvement as a shared responsibility for family wellbeing, the sensitization sessions began to shift entrenched cultural norms.

Step 2: Formation of community support groups

Building on the sensitization, three types of support groups were established:

- Mother-to-mother support groups: Twenty groups of 15 women each were formed, organized by pregnancy or postpartum stage to facilitate mentorship, peer learning, and experience-sharing. Mixed sessions allowed newly expectant women to learn from postpartum mothers about ANC, nutrition, breastfeeding, and early childhood care.
- Father-to-mother support groups: Men were engaged to accompany their spouses to ANC and CWC visits, participate in discussions on family planning and nutrition, and support household-level interventions. This engagement helped

normalize male participation and reduced stigma around reproductive health.

- Father-to-father support groups: These groups created a platform for men to discuss safe maternal practices, shared responsibilities, and nutrition for lactating mothers. Men became active partners in combating child malnutrition and supporting maternal health, challenging the "Mwenye" mindset that previously limited women's autonomy.

Through these groups, women and men were able to openly share experiences, ask questions, and receive mentorship. Over time, this strengthened health-seeking behaviours and fostered a sense of joint responsibility for family health.



Figure 2 One of the groups of TBAs during a session on safe deliveries, maternal and child health, and family planning

Step 3: Traditional Birth Attendant (TBA) engagement

Recognizing that some women preferred home births, the CHU sensitized 52 TBAs on the risks of home deliveries and the importance of early identification and referral of expectant women. TBAs were trained to work alongside CHPs, registering women early in pregnancy for support group participation and encouraging facility-based ANC and skilled deliveries.

By integrating TBAs into the health system, the program ensured that women were guided safely through pregnancy and childbirth, while respecting existing cultural practices.

Step 4: Household nutrition and sanitation interventions

Addressing malnutrition required innovative approaches. Household-level kitchen gardens were established, growing year-round vegetables such as kale, spinach, and coriander, using climatesmart techniques like vertical bags, cone gardens, and Earth Boxes (World Food Programme, 2025). Mothers were trained in Maternal, Infant, and Young Child Nutrition (MIYCN) practices, enhancing dietary diversity and child nutrition outcomes.

Additionally, Community-Led Total Sanitation (CLTS) activities were conducted to promote hygienic practices, including safe latrine construction and elimination of open defecation. The community Figure 2One of the groups of TBAs during a session on safe deliveries, maternal and child health, and family planning eventually achieved Open Defecation Free (ODF) status, reflecting significant improvements in sanitation and hygiene behaviours.

Step 5: Community dialogue and action days

Through the support from DANIDA PHC Support Program, monthly action days and quarterly dialogue days provided structured platforms for community engagement. These events focused on maternal and child health education, nutrition, hygiene, safe deliveries, and family planning. They also served as mechanisms for collective problem-solving, feedback sharing, and experience exchange, strengthening the bond between the community and health facility.



Ndura Community member take part in dialogue and action days to

advance maternal and Child Health

During these events, men and women discussed sensitive topics such as contraception, ANC, and child nutrition in safe, inclusive environments. As a result, the negative influence of the "Mwenye" syndrome began to diminish, replaced by shared decision-making and active male participation.

Step 6: Monitoring and data review

Structured monthly review meetings were held between CHPs, CHC members, and facility staff. These meetings analysed attendance at ANC, FP, CWC, and immunization sessions, as well as follow up on referrals from TBAs and support groups. Data collected from dialogue and action days was integrated into service delivery plans, allowing the facility to respond quickly to emerging challenges. This continuous monitoring improved accountability ensured timely interventions, and reinforced community trust in the health system.

Contribution and Impact of DANIDA PHC Support Programme

Within Pumwani CHU's community health model, the DANIDA Primary Health Care (PHC) Support Programme provided crucial operational funding that enabled the facility to implement planned activities effectively. Supported by the Government of Denmark, the Programme strengthens primary health care at both community (Level 1) and facility (Level 2) levels, improving access, quality, and equity of services, particularly maternal and child health, family planning, nutrition, and hygiene (DANIDA PHC Support Programme, n.d.).

During the reporting period (FY 22/23 23/24), Pumwani CHU received KES 612,094.00 under the DANIDA PHC Support Program, managed through health facility work plan plans under the Health Facility Management Committee. These funds bridged operational gaps, supporting community outreach, dialogue and action days, training, TBA engagement, and monitoring, which together strengthened service delivery, increased male involvement, and enhanced maternal and child health outcomes.

DANIDA PHC support was primarily applied to areas that directly affected service continuity, quality, and community access, including:

- Conducted quarterly dialogue days and monthly action days, providing health education, mentorship, and problem-solving platforms.
- Provided transport, airtime, performance-based incentives, uniforms, and identification materials to strengthen follow-up, coordination, and credibility in the community.



Figure 4 CHPs and CHCs in Ndura undergoing training supported by the DANIDA PHC Support Programme

- Trained CHPs and CHC members on MNCH, family planning, nutrition, and hygiene promotion.
- Sensitized and linked Traditional Birth Attendants with formal health services for early pregnancy identification and safe deliveries.
- Supported ANC, FP, CWC, immunization, and nutrition interventions at community level.
- Strengthened reporting, tracking, and data review processes to inform facility and community planning.

Results of the Practice

1. Improved service uptake: Expectant women began attending ANC early in the first trimester resulting to increasing 4th ANC completion rate, often accompanied by their spouses. Family planning uptake increased, with male partners actively involved in discussions and decision-making. Skilled deliveries at health facilities rose, reducing the risks associated with home births.

2. Nutrition and hygiene: Household-level kitchen gardens and MIYCN education improved maternal and child nutrition. Hygiene practices at household level improved, contributing to the community achieving ODF status.
3. Social and cultural transformation: Male involvement in maternal and child health increased significantly. The negative influence of the "Mwenye" syndrome declined, fostering shared decision-making. Trust and collaboration between the community and the health facility strengthened, promoting long-term engagement.

Data Snapshot as per Pumwani Community Health Unit Health Records (August–October 2025):

- Family Planning visits: 110
- ANC visits: 141
- Gender-Based Violence & injuries: 0 reported cases

Lessons Learned by Pumwani CHU

- The CHU realized that involving men required structured forums like father-to-mother and father-to-father groups, not just one-off sensitizations. Sustained engagement leads to improved decision-making and family health outcomes.
- Addressing cultural barriers showed that consistent dialogue, sensitization, and mentorship can gradually change entrenched beliefs, empowering women while gaining male support.
- Household-level interventions such as kitchen gardens and improved sanitation practices are effective when combined with ongoing education and practical support.
- Occasional delays in disbursement highlighted the importance of adaptive planning, prioritizing activities, and leveraging community volunteers to maintain continuity of services.
- Reliance on external funding revealed that empowering community groups to mobilize local resources and leadership is critical to sustain interventions beyond donor support.

Recommendations

- Scale up support groups to reach more households. These groups proved critical in improving health knowledge, promoting male involvement, and reversing cultural barriers.
- Strengthen support from DANIDA PHC and County allocations to sustain and expand interventions. Expanding the funding base will ensure that similar interventions can continue reliably and reach additional communities.
- Address water supply challenges to enhance household kitchen gardens and improve maternal and child nutrition. While kitchen gardens increased access to fresh vegetables, water scarcity limited their full potential.



Figure 5 Members of Lafiuna Village, Pumwani Community Health Unit (CHU), and the Council of Governors during a documentation exercise to the village



Figure 6 A nutrition guide at Pumwani CHU illustrating recommended meals for breastfeeding mothers



Figure 7 An illustration of a traditional childbirth practice formerly used within the community



Figure 8 Award recognizing Pumwani CHU as the Best Performing Community Health Unit in Tana River County, October 2023.

CHAPTER 4:
INNOVATIONS IN SOCIAL INCLUSION AND COMMUNITY DEVELOPMENT



Figure 1 Modern street lighting infrastructure improving public safety and enabling a vibrant 24-hour urban

Nairobi's Urban Transformation Through Beautification and Tourism Development

Nairobi, Kenya's capital and economic hub, holds a unique position among global cities as the only city in the world with a National Park within its boundaries. This convergence of wildlife, culture, business, and urban life presents both opportunities and challenges as the city navigates rapid urbanization and evolving socio-economic demands. In response, Nairobi City County, in collaboration with partners, has implemented integrated beautification and urban tourism initiatives aimed at revitalizing public spaces, enhancing environmental sustainability, and stimulating local economic activity. These interventions recognize that a well-planned urban environment strengthens tourism appeal while contributing to social well-being, employment creation, and sustainable urban development.

Urban Greening and Public Spaces

The transformation has been most visible through deliberate urban greening and landscaping across major highways, roundabouts, and public spaces. Tree planting and the creation of landscaped green areas have increased urban green cover while improving the city's visual character. Iconic recreational spaces such as Uhuru Park and Central Park have undergone rehabilitation, restoring them as accessible and attractive environments for recreation, leisure, and social interaction. These renewed spaces serve residents, families, and visitors alike, providing safe environments for recreation while reinforcing Nairobi's identity as a green and liveable city.

Infrastructure and Walkability

Complementing environmental improvements, the County has invested in revitalizing public spaces within the Central Business District through pedestrian-friendly walkways, upgraded public squares, and enhanced lighting infrastructure. The installation of smart street lighting has improved safety and extended economic activity beyond traditional working hours, supporting a vibrant 24-hour economy. Safer streets and improved walkability have encouraged increased public use of urban spaces, contributing to a livelier city atmosphere and supporting businesses in the urban core.

Culture Development and Tourism

Recognizing culture as a critical component of urban identity, Nairobi City County has promoted the creative economy through public art, cultural festivals, and support to local enterprises. Murals and artistic installations across public areas Figure 2Artistic murals transforming everyday public spaces into vibrant expressions of Nairobi's culture and heritage have transformed everyday spaces into expressions of creativity and heritage.



Artistic murals transforming everyday public spaces into vibrant expressions of Nairobi's culture and heritage

Markets such as the Maasai Market provide

platforms for artisans to showcase authentic African crafts and generate income. Cultural events have strengthened community pride, attracted domestic tourism, and reinforced Nairobi's image as a vibrant cultural destination. Institutions including the Kenya National Archives and the National Museums of Kenya complement these efforts by preserving and showcasing the country's historical and cultural heritage.

Environmental Sustainability

Environmental sustainability has remained central to the County's approach. The installation of air quality sensors across the city provides real-time data on pollution levels, enabling evidence-based decision-making and targeted interventions to address environmental challenges. This ensures that tourism growth and urban development proceed in responsible an environmentally and resilient manner.

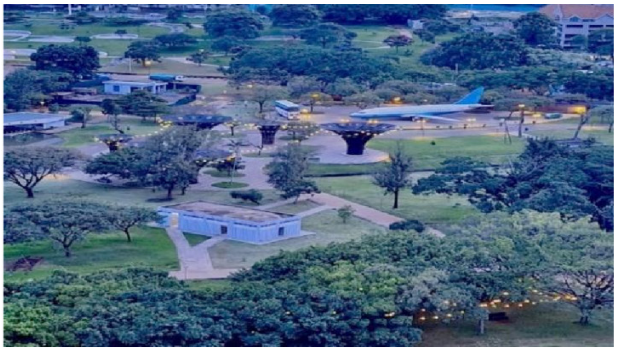


Figure 3 The rehabilitated Uhuru Park showcasing improved landscaping, green spaces, and enhanced

Social and Economic Impact

The cumulative impact of these initiatives has been significant for residents and visitors. Beautified public spaces have become hubs for recreation, community interaction, and youth-driven activities such as photography and digital content creation. Employment opportunities have been generated in landscaping, waste management, tourism, and creative industries, contributing to local livelihoods and supporting small enterprises. Beyond economic gains, the initiatives have fostered civic pride and community ownership of public spaces. Residents benefit from cleaner environments, expanded recreational opportunities, and improved access to shared urban amenities. Increased green cover, improved waste management, and environmental monitoring have also contributed to healthier urban living conditions.

Nairobi's Urban Transformation Through Beautification and Tourism Development









Strengthening Public ECDE in Kirinyaga County Through Integrated Service Delivery



A well equipped classroom with adequate infrastructure and space

In recent years, public Early Childhood Development and Education (ECDE) centres in Kirinyaga County have undergone significant transformation. Faced with challenges such as inadequate classrooms, limited learning materials, teacher insecurity, and declining parental confidence, the County Government implemented a set of interventions aimed at strengthening service delivery.

Today, over 16,000 learners across 201 ECDE centres are benefiting from improvements in infrastructure, teacher capacity, digital learning, and learner support.

The Intervention:

The County adopted a holistic approach targeting the key pillars of early learning.

- **Infrastructure development**

New classrooms were constructed and existing ones renovated to reduce congestion and improve learning conditions. Furniture, play equipment, water tanks, and learning materials were distributed to centres, creating more child friendly environments.

- **Teacher employment and capacity building**

A total of 405 ECDE teachers were employed, with many transitioned to permanent and pensionable terms. This move enhanced job security and motivation. In addition, 401 teachers underwent intensive digital literacy training to strengthen technology-enabled instruction.

- **Digital learning introduction**

A pilot digital learning programme was introduced in selected ECDE centres to integrate foundational digital skills into classroom teaching, with plans for scale-up.

- **Learner support measures**

More than 15,000 learners received free school uniforms, reducing financial barriers and encouraging school attendance.

- **Co-curricular development**

Music and drama festivals were supported up to national level, providing learners with opportunities to develop confidence, creativity, and social skills.

Emerging Results

- The coordinated interventions have contributed to measurable improvements in access and service delivery.
- Enrollment increased from 13,280 learners in 2017 to 16,398 learners in 2025, reflecting growing parental confidence in public ECDE centres. Improved classroom environments have enhanced learner participation and comfort, while better equipped facilities have strengthened the overall learning experience.
- The transition of teachers to permanent and pensionable terms improved morale and stability within ECDE centres. School administrators reported more consistent lesson preparation and stronger classroom management. Digital literacy training has enabled teachers to incorporate technology into teaching, making lessons more interactive and engaging for learners.
- The provision of free uniforms eased the financial burden on families and supported retention, particularly among vulnerable households.
- Co-curricular activities have further contributed to holistic child development, with learners gaining exposure, confidence, and opportunities to showcase talent.

Why the Practice Matters

Kirinyaga County's experience demonstrates that strengthening ECDE requires more than isolated investments. By integrating infrastructure improvement, teacher motivation, digital capacity building, and learner support, the County has enhanced both access and quality in public early learning institutions.

The approach highlights the importance of:

- Investing in teacher security and professional development
- Addressing financial barriers that limit access
- Creating safe, well-equipped learning environments
- Supporting holistic child development beyond academics

With continued commitment and sustained funding, the model provides a practical example for other Counties seeking to improve ECDE service delivery.

Community-Led Refugee–Host Integration and Peacebuilding in Kiunga – Lamu County: From Local Practice to Global Recognition

Introduction

Kiunga is a remote border town in Lamu County along the Kenya–Somalia frontier. The area is geographically isolated and characterized by limited infrastructure, recurrent climate shocks, insecurity, and a historically weak state presence. For decades, Kiunga has served as an entry point for refugees fleeing conflict, instability, and drought in neighboring Somalia.



Picture 1: Cross border meeting between Lamu County Government and Somalia leaders at Raskamboni

Unlike other refugee-hosting contexts in Kenya, Kiunga has never had formal refugee camps or sustained humanitarian funding. Refugees arrived directly into villages already facing poverty, water scarcity, and fragile livelihoods based on fishing and small-scale farming. This created a high risk of tension, competition over scarce resources, insecurity, and social fragmentation among host communities, refugees, the indigenous Boni community, women, youth, and security personnel operating in a fragile border environment.

Implementation of the practice

In response to these challenges, Lamu County Government through the directorate of Disaster Management & Peacebuilding adopted a community-led, equity-based model of refugee–host integration. The approach emphasized coexistence, shared responsibility, and dignity rather than segregation or dependency on external humanitarian systems.

Key interventions included

- Hosting refugees directly within local households and settlements rather than in segregated camps, promoting daily interaction and social bonding
- Equal distribution of County relief food between host and refugee communities to prevent perceptions of exclusion or favoritism
- Fair and transparent rationing of water supply schedules across all communities to reduce competition and conflict
- Provision of subsidized seeds and basic agricultural inputs to both refugees and host households to enhance food security
- Allowing refugees access to farming land and fishing grounds under locally agreed community rules
- Establishment of a sustainable 50/50 resource-sharing model as a guiding principle for humanitarian and development support

The practice was implemented progressively between 2012 and 2025 across Kiunga and surrounding borderland areas. Leadership was exercised through public service roles including Immigration Officers, Sub-County Administrator, and Lamu County Director of Disaster Management & Peacebuilding, working closely with community elders, refugee representatives, and local administrators.



Picture 2: Cross section of refugees during integration forums

Immigration and security agencies conducted standard government screening and vetting of refugees at the border to verify identity and address security concerns. While the initiative did not manage vetting directly, it worked closely with immigration, local administration, and security actors through regular engagement forums. This collaboration strengthened trust, information sharing, and ensured that refugee integration complemented national security processes.

Key collaborators included Lamu County Government administration, community elders, security agencies, humanitarian and development partners, and academic institutions. The model relied primarily on local leadership, social capital, and existing County resources rather than donor-driven humanitarian frameworks.

Results of the practice

The community-led integration model has generated sustained and transformative outcomes, including:

- Significant reduction in conflicts related to water, land, and other shared resources
- Strengthened social cohesion and trust between host communities, refugees, and security agencies
- Improved community-based disaster preparedness and response in a climate- and conflict-prone setting
- Enhanced cross-border collaboration between Kiunga (Kenya) and Raskamboni (Somalia), contributing to regional stability. The Kiunga Model has achieved significant milestones and recognition:
- International Recognition: The model was acknowledged through the UNDRR Sasakawa Award process as a good practice in community resilience and peacebuilding in fragile border contexts. (https://shorturl.at/r9BYt)
- Global Visibility: In 2025, Rotary International featured and published the model in its official magazine, highlighting it as an innovative and replicable approach to refugee–host community integration. (https://shorturl.at/FASun)
- Upcoming Global Platforms: The model will be presented at BAU University in Istanbul in February 2026, showcasing Kenya's leadership in peacebuilding.
- Awards and Evaluations: Lamu County Government has successfully passed the second round of evaluation for the UCLG PRIZE AWARD 2026 and is expected to showcase the model in Morocco this June if it reaches the finalist stage.

These achievements have positioned Lamu County as a pioneer in peacebuilding and resilience in fragile border regions.

Lessons learnt

What worked well:

- Strong community ownership and leadership
- Fairness, transparency, and equity in resource sharing
- Integration of refugees within host communities rather than segregation
- Effective collaboration between civilian authorities and security actors

What was challenging:

- Chronic scarcity of natural and financial resources
- Initial resistance and fear among some host community members during early stages
- Limited early documentation of the practice.

What would be done differently:

- Earlier and more systematic documentation and knowledge sharing
- Proactive engagement with national policy actors to support scaling.

What would remain the same:

- Community-led decision-making
- Equity-based and dignity-centered approaches to refugee–host relations

Recommendations

The Kiunga experience demonstrates that community-led refugee–host integration is viable, sustainable, and scalable, even in fragile and resource-constrained settings. Counties and stakeholders facing similar challenges are encouraged to:

- Promote equity and fairness in resource allocation for refugee-host integration
- Integrate refugees within host communities rather than isolate them in camps
- Strengthen trust between communities, County institutions, and security agencies
- Invest in community-based disaster risk reduction and resilience
- Document and share local innovations through platforms such as the CoG Maarifa Centre
- Segregation, exclusion, and over-reliance on externally driven humanitarian systems should be avoided.





Shee Kupi Shee – Director, Disaster Management & Peacebuilding, Lamu County receiving awards for the initiative from H.E The President and H.E. the Governor

Keeping Girls in School: Kirinyaga County's Sanitary Pads Drive

In Kirinyaga County, period poverty has been a significant challenge affecting school-going girls from economically disadvantaged households. Many girls aged between 10 and 16 years lack access to sanitary towels and other menstrual hygiene products, forcing them to miss school during their menstrual periods. This has resulted in frequent absenteeism, disrupted learning, and reduced confidence due to the stigma and embarrassment often associated with menstruation.



Director Gender, Doreen Nyaguthii Mwangi offloads Sanitary towels at one of the 20 beneficiary schools in Kirinyaga.

To address this challenge, the Kirinyaga County Department of Gender and Youth implemented a Sanitary Pads Drive targeting schools located in poverty pockets across the County. The programme began with a mapping exercise to identify vulnerable communities where girls were most affected by lack of menstrual hygiene products. Based on the findings, the department coordinated the procurement and distribution of sanitary towels directly to the identified schools.

The initiative also included sensitization sessions to promote menstrual hygiene awareness and dignity among students.

The programme was implemented across 20 schools in the County, reaching a total of 3,173 beneficiaries. Department of Gender and Youth spearheaded the initiative, overseeing the planning, procurement, and distribution processes. An allocation of KES 800,000 supported implementation, covering the procurement and distribution of sanitary towels as well as related programme activities

Following implementation, an assessment conducted in participating schools showed that school absenteeism among girls during menstrual periods had reduced significantly. Delivering sanitary towels directly through schools proved highly effective, as it ensured the intended beneficiaries received the products while minimizing stigma and logistical challenges associated with other distribution channels.

To sustain the initiative, the County Government plans to allocate annual budgetary provisions for sanitary pads distribution and introduce dignity packs for boys to promote inclusivity and increase awareness of menstrual health.

Kirinyaga County recommends that Counties seeking to replicate the initiative conduct proper mapping exercises to identify areas experiencing period poverty, as this helps inform accurate budgeting, resource allocation, and planning for sanitary towel distribution

Empowering 10,000 Riders through System Reform in Embu County



Figure 1Seed funding of KES 1million allocated to Manyatta Boda Boda Transport Cooperative Society Ltd as part of supporting the

The boda boda sector is one of the largest sources of employment for young people in Embu County, supporting more than 10,000 registered riders and playing a critical role in transport and local economic activity. However, the sector has long faced challenges including limited access to healthcare, financial insecurity, weak organization, and road safety concerns.

To address these challenges, the County Government of Embu, through the Department of Youth Empowerment and in collaboration with the Boda Boda Association of Kenya (BAK) – Embu Chapter, developed the Embu County Boda Boda Strategic Plan (20242027). The initiative was informed by consultations with riders across the County, who identified healthcare, affordable financing, digital registration, and stronger sector organization as key priorities.

The Strategic Plan was officially launched in February 2025 during the inaugural Embu Boda Boda Summit, which brought together over 10,000 riders from all 20 wards, demonstrating strong sector-wide support for reform. To support implementation of the strategy, the County Government allocated KES 4 million in seed funding towards the establishment and operationalization of rider SACCOs across Sub-Counties, alongside partnerships with national MSME support programmes and other stakeholders.

The initiative is built around five key pillars:



Boda boda riders during the official launch of the Embu County Boda Boda Strategic Plan (2024–2027) held in February 2025 in Embu County

- **Boda Afya na Karinda:** a co-contribution health insurance programme where both the County Government and riders contribute towards affordable healthcare cover for riders and their families, helping reduce vulnerability to medical emergencies and accidents.
- **Rider SACCOs:** to strengthen savings, improve access to affordable credit, and support riders to invest in their businesses through organized cooperative structures.
- **Embu Boda Boda Rider Information Management System (EBRIMS):** a digital rider registration and management platform designed to improve sector organization, enhance security, and support data driven planning and service delivery.
- **Boda Talanta Initiative:** a programme supporting riders' talents in sports and creative arts, while creating alternative income opportunities and promoting positive youth engagement.
- **Green Mobility Initiative:** an environmental sustainability programme promoting electric motorcycles and environmentally friendly infrastructure such as electric powered car wash stations.

Early results from the programme show significant progress in sector organization and awareness creation. Approximately 70% of riders have been registered under the Embu Boda Boda Rider Information Management System (EBRIMS), improving rider identification, sector coordination, and access to targeted services. In addition, 5

rider SACCOs have been operationalized across Sub-Counties to strengthen financial inclusion and collective savings among riders. County monitoring further indicates that nearly 80% of riders report improved awareness of road safety, healthcare services, and ongoing sector modernization initiatives.

The Embu experience demonstrates how Counties can move beyond fragmented interventions toward structured, inclusive, and sustainable reforms that strengthen youth livelihoods, improve service delivery, and formalize the informal transport sector through collaboration, digital systems, and financial empowerment.

APPENDICES

Appendices

Appendix 1: Author Editor and List of Resource Persons

Authors

Mercy Gatabi	Program Officer, Knowledge Management
Grace Kimani	Program Officer, Knowledge Management
Barbara Awuor	Program Officer, Blue Economy
Wendy Mutania	Program Assistant, Tourism, and Natural Resources Management
Dr. Simon Mbirua	Program Officer, Health Systems
Ian Njuguna	Program Assistant, Transport, Infrastructure and Energy

Editor

Rosemary Njaramba – Head of Planning, Monitoring and Knowledge Management

Photographers

Gerald Muka	Council of Governors
Purity Mukuhi	Council of Governors

Resource Persons

RESOURCE PERSON	DESIGNATION	COUNTY/OFFICE
Vincent Odini	Programme Officer- DANIDA PHC	COG
Michael Nyale	Programme Officer- DANIDA PHC	COG
Jane Waroga	CECM, Youth, Sports and Gender	Embu County
Luceta Njeri	Chief Officer, Youth	Embu County
Gilbert Mugo	Director, Governor's Press	Embu County
Kennedy O'Ojala	Chief Officer, Blue Economy and Fisheries	Homa Bay County
Bettina Adhiambo Ocholla	Chairperson, Rusinga Nile Perch Youth Group	Homa Bay County
Joseph Ouma	Chairperson, Beach Management Unit	Homa Bay County
Dr. Patrick N. Nyaga	Chief Officer, Health Services	Kiambu County
Dr. Hillary Kagwa	County Director, Health Services	Kiambu County
Dr. Peter Boro	Director, Medical Services	Kiambu County
Monica Kangethe	Director, Nursing Services	Kiambu County
Grace Kibubu	County Clinical Officer	Kiambu County

Dr. Mary Maina	Head of Department and Chair, County MPDSR Committee	Kiambu County
Dr. Rashida Admani	Obstetrician/Gynaecologist, Level 5 Hospital	Kiambu County
Christine Mumo	County Reproductive Health Coordinator	Kiambu County
Lucy Ng'ang'a	Nurse in Charge, Level 5 Maternity	Kiambu County
Juliet Wanjohi	Maternity Theatre in Charge, Level 5 Hospital	Kiambu County
Dr. Ruth Wamae	Obstetrician/Gynaecologist and Member, County MPDSR Committee	Kiambu County
Dr. Linda Nguu	Anaesthesiologist and Head of ICU, Level 5 Hospital	Kiambu County
Eng. Jamlick Mwenda	Assistant Director, Energy	Kiambu County
Esther Kaguima	Director, Energy	Kiambu County
David Kuria	CECM, Water, Environment, Natural Resources, Energy and Climate Change	Kiambu County
Edmund Njihia	Chief Officer, Water, Environment, Natural Resources, Energy and Climate Change	Kiambu County
Jane Murage	Managing Director	Kiambu County
Samuel Njoroge	Technician	Kiambu County
Steve Konde	Knowledge Management Champion	Kilifi County
Edward Mumbo	DANIDA PHC County Focal Person	Kilifi County
Evelyn Mbeyu	Communication Officer, Energy	Kilifi County
Hon. Jane Kamto	CECM, Lands, Energy, Housing, Physical Planning and Urban Development	Kilifi County
Johnson Nzai	Chief Officer, Energy	Kilifi County
Wilfred Baya	Director, Energy	Kilifi County
Lorraine Omondi	Legal Officer	Kilifi County
Dr. Esbon Gakuo	Director, Medical Services	Kirinyaga County
Annette Evuusa	Hospital Manager, County Referral Hospital	Kirinyaga County
Lisbeth Murimi	Biomedical Engineer, County Referral Hospital	Kirinyaga County
Angela Wangeci	Communication Advisor and Knowledge Management Champion	Kirinyaga County
Millicent Ngari	Acting CECM, Education and Public Service	Kirinyaga County

Rose Wachira, OGW	Acting Chief Officer, Education and Public Service	Kirinyaga County
Lucy Maina	Assistant Director, ECDE	Kirinyaga County
Jackline Njogu	CECM, Finance and Economic Planning	Kirinyaga County
Millicent Ngari	Acting CECM, Education and Public Service	Kirinyaga County
Sheila Nyawira Mwangi	Chief Officer, Gender and Youth	Kirinyaga County
Doreen Nyaguthii Mwangi	Director, Gender and Youth	Kirinyaga County
Edwin Muga	County Director of Fisheries	Kisii County
Job Omweno	Sub-County Fisheries Officer	Kisii County
Winnie Oichoe	Sub-County Fisheries Officer	Kisii County
Zablon Obwoge	Sub-County Fisheries Officer	Kisii County
Jesicah Omete	Sub-County Fisheries Officer	Kisii County
David Motari	Sub-County Fisheries Officer	Kisii County
Zablon Ombata	Sub-County Fisheries Officer	Kisii County
Samson Machera	County Programme Coordinator, ABDP	Kisii County
Gideon Gicheru	Programme Fisheries Officer, ABDP	Kisii County
George Akunga	Programme Fisheries Technician, ABDP	Kisii County
Shee Kupi Shee	Director, Disaster Management and Peace Building, Department of Public Service Management	Lamu County
Khadija Fumo	Chief Officer, Public Service Management	Lamu County
Abdulnasir Mohamed	Chief of Staff, Office of the Governor	Lamu County
Meshack Nzioka	Fisheries Officer	Machakos County
Rachael Ndanu	Fisheries Officer	Machakos County
Patrick Mundia	Designation not provided	Machakos County
Titus Mueme Kamanthi	Fish Farmer	Machakos County
Winfred Wausi Patrick	Knowledge Management Champion	Makueni County
Evelyn Mutanu	Communication Officer	Makueni County
Christine Muteria	Nurse in Charge, Reproductive and Newborn Health, County Referral Hospital	Makueni County
Dr. Harvey Mulei	Chief Officer, Health Services	Makueni County
Dr. Isaack Kimani	Programme Manager	Ministry of Health

Grace Kabura	Assistant Director, Tourism	Nairobi City County
Raymond Mwangata	County Director of Fisheries	Nakuru County
Nelson Mativa	Principal Fisheries Officer	Nakuru County
Rosemary Kimani	Fisheries Officer	Nakuru County
Rosemary Atieno	Chairperson, Ponda Mali Fish Mongers Self-Help Group	Nakuru County
Florence Owuor	Treasurer, Ponda Mali Fish Mongers Self-Help Group	Nakuru County
Milka Odwuo	Chairperson, Rech Self-Help Group	Nakuru County
Agnes Gichogo	County Reproductive Health Coordinator	Nyeri County
Dr. Nelson Muriu	County Director, Medical Services and Public Health	Nyeri County
Dr. Esther Njeri	Paediatrician	Nyeri County
Agnes Kinyua	Fisheries Officer	Nyeri County
Kenneth Ngatia	Knowledge Management Champion	Nyeri County
Peter Nyika Mwangi	Fish Farmer	Nyeri County
Christopher Mureithi	Fish Farmer	Nyeri County
Antony Kiruja	Chief Officer, Fisheries	Tharaka Nithi County
Duncan Bundi	Director of Fisheries	Tharaka Nithi County
Charles Njagi	Fish Farmer	Tharaka Nithi County
Mary A. Munene	Fish Farmer	Tharaka Nithi County
Edina Kemei	Fisheries Sector Representative	Uasin Gishu County
Dr. Betty Mulianga	County Chief Officer, Department of Agriculture, Livestock and Fisheries	Vihiga County
Daniel Okech	County Director of Fisheries	Vihiga County
Wilson Munala	County Project Coordinator, ABDP/ARNSA	Vihiga County

Appendix 2: County Logos



EMBU COUNTY



HOMA BAY COUNTY



KIAMBU COUNTY



KILIFI COUNTY



KIRINYAGA COUNTY



KISII COUNTY



LAMU COUNTY



MACHAKOS COUNTY



MAKUENI COUNTY



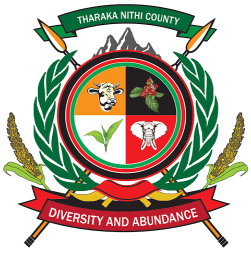
NAIROBI COUNTY



NAKURU COUNTY



NYERI COUNTY



THARAKA NITHI COUNTY



UASIN GISHU COUNTY



VIHIGA COUNTY

Notes

48 Governments 1 Nation

Delta Corner, 2nd Floor, Opp PWC
Chiromo Road, Off Waiyaki Way,
P.O Box 40401-00100, Nairobi, Kenya,
Email: info@cog.go.ke
Phone: +254(020)2403313/4
Cell: +254 718242 203, 0181901667
+254 0181902023
Website: www.cog.go.ke

X: @kenya Governors
Facebook: Council of Governors- Kenya
Instagram: @councilofgovernors
Website: www.maarifa.cog.go.ke
X:@maarifa_centre
LinkedIn: https://www.linkedin.com/in/council-of-governors-kenya-9527b4377



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