Volume 9, Issue No. 02

KENYA Aquatica

HOME OF KMFRI THE KENYA AQUATICA JOURNAL

A Scientific Journal of Kenya Marine and Fisheries Research Institute

KMFRI

SPECIAL ISSUE

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A Scientific Journal of
Kenya Marine and Fisheries Research Institute

Editorial

The present Special Edition of the Kenya Aquatica Journal has been meticulously compiled to highlight the robust capacity of the Kenya Marine and Fisheries Research Institute (KMFRI) to conduct research on the coastal and marine environment of Kenya. As a premier research institution, KMFRI has continually played a strategic role in advancing scientific knowledge, policy development, and sustainable management of coastal and marine resources and understanding processes related to their existence.

Established with a vision to foster excellence in aquatic research, KMFRI has developed into a centre of scientific distinction. The Institute's infrastructure and facilities underscore its commitment to high-quality research. A key asset in KMFRI's research arsenal is the *RV Mtafiti*, a state-of-the-art scientific research vessel that enables extensive marine explorations. Furthermore, the Mombasa Centre boasts of hosting 13 specialized laboratory units, equipped to conduct a wide array of experiments and analyses across diverse disciplines.

This Special Edition demonstrates that beyond infrastructure, KMFRI's human resource capacity is a testament to its scientific prowess. The Institution has a dedicated workforce of 57 research scientists specializing in the coastal and marine science. Notably, over half of these scientists hold Doctoral qualifications, while nearly all others possess Master's degrees. With research specialization spanning over 70 disciplines, KMFRI's intellectual resource is complemented by 35 technologists and 105 support staff in the coastal and marine stations. This results in an exceptional researcher-to-support staff ratio of 1:4—an enviable metric not only in the region but also on a continental and global scale.

Based on researchers' profiles presented in this Edition, KMFRI's research output in coastal and marine environment is equally remarkable. Between 2022 and 2024, researchers from the Mombasa Centre, and stations at Gazi and Shimoni have collectively published nearly 700 peer-reviewed scientific articles, book chapters, pamphlets, and policy papers. This impressive body of work underscores the Institute's commitment to generating knowledge that informs sustainable marine and coastal resource management.

Financial sustainability is a key determinant of research effectiveness, and KMFRI has demonstrated in this Edition commendable success by securing funding for coastal and marine research. In addition to financial allocations from the Government of Kenya, KMFRI's scientists actively seek competitive grants. Since 2018, small research grants secured through collaborations have amounted to nearly KES 1.15 billion (USD 8.9 million). These funds reinforce the Institute's ability to conduct research that is not only innovative but also sustainable and impactful.

The capacity and capability of KMFRI to conduct coastal and marine research are further enhanced through strategic partnerships. The Western Indian Ocean Marine Science Association (WIOMSA) has been instrumental in supporting the publication of past editions of the Kenya Aquatica Journal. Through the Marine and Coastal Science for Management (MASMA) programme, WIOMSA has generously extended its support to the current Volume 9 (2). This partnership underscores the significance of regional collaboration in advancing marine and coastal ecosystems research.

The Chief Editor, members of the Editorial Board, and the management of KMFRI—proud custodians of the Kenya Aquatica Journal—express sincere appreciation for the unwavering support and collaboration from WIOMSA. As KMFRI continues to strengthen its research capacity, its contributions to coastal and marine science remain invaluable in fostering sustainable use and management of Kenya's aquatic resources.

About
Kenya Aquatica

Kenya Aquatica is the Scientific Journal of the Kenya Marine and Fisheries Research Institute (KMFRI). The aim of the Journal is to provide an avenue for KMFRI researchers and partners to disseminate knowledge generated from research conducted in the aquatic environment of Kenya and resources therein and adjacent to it. This is in line with KMFRI's mandate to undertake research in marine and freshwater fisheries, aquaculture, environmental and ecological studies, and marine research including chemical and physical oceanography.

Manuscripts may be submitted to the Chief Editor through

aquatica@kmfri.go.ke

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Featured front cover picture: Chair of KMFRI Board of Management Amb. Dr. Wenwa Akinyi Odinga Oranga (seated middle), on her right, Ag. KMFRI CEO Dr. James Mwaluma, flanked by KMFRI Heads of Sections: Front (L-R) Dr. Victoria Tarus, Ms Caroline Mukiira, Dr. Jacob Ochiewo, Dr. Irene Githaiga, Mr. Abraham Kagwima. Back (L—R) Mr. Paul Waluba, Ms Jane Kiguta, Dr. Gladys Okemwa, Dr. Eric Okuku, Dr. Joseph Kamau, Mr. Isaac Kojo, Ms Joan Karanja, Mr. Milton Apollo. (Photo credit KMFRI)

Research Vessel *MV Mtafiti* in the background

Featured back cover picture: Community members participating in mangrove planting at Gazi, Kwale County (Photo Credits: Dr. Amina Hamza, KMFRI).

Kenya Aquatica Journal - Volume 9, Issue No. 02

SPECIAL ISSUE

KMFRI: Capacity to Conduct Coastal and Marine Research

An aerial view of Mombasa Station of KMFRI located on the shore of Tudor Creek, Mombasa

KMFRI
Kenya Marine and Fisheries Research Institute

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Headquarters of the Kenya Marine and Fisheries Research Institute (KMFRI), Located at Mkomani, Mombasa

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FOREWORD

Amb. Dr. Wenwa Akinyi Odinga Oranga

It is with great pride and enthusiasm that I introduce this special edition of the Kenya Aquatica Scientific Journal of the Kenya Marine and Fisheries Research Institute (KMFRI), titled "KMFRI: Capacity to Conduct Coastal and Marine Research." This publication provides valuable insights into the Institution's human and infrastructural capabilities, as well as its unwavering commitment to scientific excellence, innovation, and the sustainable management of Kenya's coastal and marine environment, and its resources.

Since its establishment, KMFRI has played a pivotal role in shaping Kenya's coastal and marine research landscape. Guided by a clear mission and vision, the Institute has strategically positioned itself as a leader in aquatic research, providing critical scientific knowledge to inform policy and drive sustainable development. With an extensive geographic reach, KMFRI operates three directorates based at its Mombasa Centre, along with field stations equipped with research facilities along the Kenya coast, ensuring comprehensive coverage in ocean and coastal systems, the Blue Economy, mariculture and socioeconomics research.

A key strength of KMFRI lies in its state-of-the-art research infrastructure. The institute's flagship research vessel, *RV Mtafiti*, has been instrumental in advancing marine science through numerous expedition cruises, leading to groundbreaking discoveries and enhanced regional capacity building. Complementing this are specialized laboratories, well-equipped field stations, and teams of highly trained researchers, technical experts, and support staff dedicated to scientific inquiry and innovation.

KMFRI's commitment to research excellence is evident in its participation in flagship initiatives funded by the Kenya Government and in collaboration with local and global donor agencies. These initiatives not only contribute to the sustainable use and conservation of Kenya's coastal and marine environments and their resources but also foster community engagement and socio-economic development through innovative approaches such as carbon credit certification and marine spatial planning. The *RV Mtafiti* research cruises have further cemented the Institute's reputation by facilitating international collaborations and producing valuable scientific insights into ocean floor mapping, productivity, fisheries, biodiversity, mineral potential and various other deep-sea resources.

The impact of KMFRI's coastal and marine research extends beyond the scientific community. Through peer-reviewed publications, policy briefs, technical reports, and direct engagement with indigenous communities, the Institute has significantly influenced local, national, and regional policies on coastal and marine resource management. Furthermore, its contributions to international conventions and regional policy frameworks underscore KMFRI's role as a key player in global marine science initiatives. This significance was recognized and appreciated during the first Sustainable Blue Economy Conference (SBEC) held in Nairobi in 2018.

Collaboration remains a cornerstone of KMFRI's success. Strong partnerships with Government agencies, national and international universities, NGOs, and community organizations have fostered interdisciplinary research and practical solutions to marine conservation challenges. International collaborations with research institutions, funding partners and technical networks have further strengthened KMFRI's research capacity and impact.

Looking ahead, KMFRI remains committed to addressing emerging coastal and marine science priorities, including climate change adaptation, Blue Economy initiatives and sustainable fisheries management. Strategic research investments, capacity development and infrastructure expansion will be key to ensuring the institute remains at the forefront of aquatic research.

This special edition serves as both a testament to KMFRI's achievements and a call to action for continued investment in coastal and marine research capacity, infrastructure and international cooperation. I extend my sincere appreciation to all scientists, partners and stakeholders who have contributed to KMFRI's success. May this publication inspire further advancements in coastal and marine research for the sustainable development of Kenya's aquatic environment and resources.

Amb. Dr. Wenwa Akinyi Oranga, PhD
Chair, Board of Management,
Kenya Marine and Fisheries Research Institute

PREFACE

Dr. James M. Mwaluma, PhD

The Kenya Marine and Fisheries Research Institute (KMFRI) stands as a pillar of scientific excellence in coastal and marine research, playing a pivotal role in the sustainable management of Kenya's aquatic ecosystems. For over forty-five years, KMFRI has consistently demonstrated its capacity for conducting innovative, high-impact research that informs policy, advances scientific knowledge, and supports economic growth through sustainable resource management.

This special edition of the Kenya Aquatica Journal highlights KMFRI's extensive capabilities in coastal and marine research, underscoring its commitment to pioneering studies in oceanography, fisheries, aquaculture, the Blue Economy, climate change adaptation, and more. Equipped with state-of-the-art research vessels—led by R/V Mtafiti—specialized laboratories, and strategically located field stations along Kenya's coastline, KMFRI has established itself as a regional leader in marine science. The Institute's robust infrastructure, complemented by a skilled team of scientists, technical experts, and research support staff, has facilitated groundbreaking discoveries and technological advancements.

KMFRI has also played a fundamental role in capacity development, fostering a new generation of coastal and marine scientists through training programs, international collaborations, and knowledge transfer initiatives. By working closely with government agencies, universities, local communities, and international partners, the Institute has extended its influence beyond Kenya, contributing to regional and global efforts in sustainable ocean management.

Among its flagship research initiatives are pioneering projects such as the Kenya-Belgium Project (KBP, 1980s), the Netherlands Indian Ocean Programme (NIOP, early 1990s), and Ecological Marine Management (ECOMAMA, mid-1990s). More recent projects include the South West Indian Ocean Fisheries Project (SWIOFP, late 1990s), the Kenya Coastal Development Project (KCDP, early 2010s), and the Kenya Marine Fisheries Socioeconomic Development (KEMFSED, 2020s). These collaborative efforts have significantly enhanced scientific understanding of critical marine ecosystems, marine spatial planning, fisheries management, and blue carbon ecosystems, underscoring KMFRI's dedication to integrating science, conservation, and socio-economic development.

As Kenya embraces the Blue Economy to drive national development, KMFRI continues to provide crucial scientific insights that guide the sustainable utilization of coastal and marine resources. The future research directions outlined in this edition reflect the Institute's ambition to remain at the forefront of addressing emerging challenges such as climate change, biodiversity conservation, marine pollution, and resource prospecting within Kenya's Exclusive Economic Zone.

This special edition stands as a testament to KMFRI's enduring contributions to coastal and marine science. We hope it will inspire further research, strengthen partnerships, and inform policy to ensure the continued protection and sustainable use of Kenya's rich coastal and marine resources.

Additionally, this edition pays tribute to KMFRI researchers who made invaluable contributions to coastal and marine research but did not live to witness the full achievements of their dedication and hard work.

Dr. James M. Mwaluma, PhD
Acting Director General/Chief Executive Officer,
Kenya Marine and Fisheries Research Institute

EXECUTIVE OVERVIEW

Brief history of KMFRI

The Kenya Marine and Fisheries Research Institute (KMFRI) was established in 1979 following the dissolution of the East African Marine Fisheries Research Organization (EAMFRO) after the collapse of the East African Community (EAC). Mandated to conduct research and provide management recommendations for the sustainable exploitation of Kenya's aquatic resources, KMFRI has grown into a premier institution in marine and freshwater research.

The Science and Technology Act, Cap 250 of the Laws of Kenya that established KMFRI in 1979 has since been repealed by the Science, Technology and Innovation Act No. 28 of 2013, which recognizes the Institute as a national research body under section 56, fourth schedule. KMFRI's mandate is to undertake research in marine and freshwater fisheries, aquaculture, environmental and ecological studies, and marine research including chemical and physical oceanography, in order to provide scientific data and information for sustainable development of the Blue Economy.

Mission and Vision

The Mission and Vision of KMFRI guide its research, policy advisory role, and engagement with stakeholders in marine and fisheries science, ensuring that Kenya's aquatic resources are managed sustainably for economic growth and environmental conservation. The Mission and Vision state as follows:

Vision: A world class centre of excellence in innovative research for sustainable blue economy and fisheries development.

Mission: To generate and disseminate scientific information for sustainable development of the blue economy and fisheries.

Strategic role of KMFRI in Kenya's coastal and marine research landscape

KMFRI plays a pivotal role in the country's coastal and marine research landscape by providing scientific data, policy guidance, and technological innovations aimed at ensuring the sustainable management of Kenya's aquatic resources. Since its establishment in 1979, KMFRI has progressively expanded its research capacity, focusing on various aspects of marine, freshwater, aquaculture, and socio-economic research.

The Institute's Oceanography and Hydrography (OH) department is at the forefront of research on marine biodiversity, productivity, oceanography, and coastal ecosystems. Through studies on coral reefs, mangrove forests, seagrass beds, and ocean floor morphology, the institute provides critical information for marine conservation efforts. The institution has also been involved in climate change studies, analyzing the impacts of rising sea levels, ocean acidification, and temperature fluctuations on marine life.

The Fisheries counterparts conducts stock assessments and provides data to support the sustainable harvesting of marine and freshwater fish species. Through tagging, monitoring, and breeding studies, the Institute ensures that Kenya's fisheries remain productive while conserving endangered species. The research also supports government policy-making regarding fishing quotas, licensing, and community-based fisheries management.

The Aquaculture Directorate of KMFRI plays a crucial role in promoting an alternative to overfishing. With the increasing demand for fish as a source of protein, the Institute has developed innovative fish farming techniques, including cage culture, pond farming, and hatchery production of tilapia, catfish, prawns, and other marine species like seaweed and crabs. These advancements have boosted food security and created employment opportunities in the coastal counties of Kenya.

The Socioeconomics Department of KMFRI integrates research into its programs, studying how marine and fisheries activities impact local communities. By working with fisherfolk, traders, processors, and policymakers, the Institute ensures that economic benefits from aquatic resources are equitably distributed. It also provides capacity-building programs to empower coastal communities in sustainable fishing, conservation, and alternative livelihoods.

Geographic scope of operations

Figure 1 shows the location of coastal counties, main towns, marine protected areas, bathymetry, direction of the monsoon winds and main rivers flowing into the ocean; where coastal and oceanic-based scientific research is undertaken.

Apart from the Mombasa centre, which is also the Headquarters, and coastal field stations located at Gazi and Shimoni, KMFRI has seven more stations and

centres all over the country. Over the years, KMFRI has invested in modern laboratories across these stations and centres located in Kisumu, Naivasha, Turkana, Sagana, Sangoro, Baringo and Mutonga.

The expansion of postgraduate training programs has enabled researchers at MSc and PhD levels to contribute to cutting-edge marine science. KMFRI has also fostered partnerships with local and international universities, organizations and donor agencies to enhance research funding and technological transfer.

- **Mombasa Station:** As the headquarters, it has coordinated national research programs, facilitated international collaborations, and hosted numerous workshops and conferences. Research conducted at the station includes studies on bathymetry, Monsoon regime and its effects, tidal fluctuations, ocean productivity, marine protected areas, resources such as corals, mangroves etc.
- **Gazi Station:** Known for its pioneering work in mangrove restoration, the station has implemented successful community-based conservation projects, serving as a model for similar initiatives globally.
- **Shimoni Station:** The station's research on coral reef ecosystems has contributed to the development of conservation strategies, ensuring the protection of these vital habitats. This centre also hosts the National Mariculture Resource and Training Centre (NAMARET) and Hatchery which is aimed at improving access to high quality seed to improve mariculture productivity for enhanced livelihoods and food security.

Since inception of KMFRI in 1979, the Mombasa Station, Gazi and Shimoni that were established later to address coastal and marine science have enabled the Institute to evolve into a premier research institution not only in Kenya but also regionally in Western Indian Ocean and globally. These coastal and marine research hubs have made a significant contribution to sustainable fisheries, oceanography, aquaculture development and marine conservation. The Centre and Stations continue to expand their research capacity, influence policy decisions and contribute to regional and global coastal and marine science.

Among the recent key achievements include improvement of the Research Vessel Mtafiti, enhanced aquaculture technological innovation, involvement of the local communities through knowledge transfer and stakeholder engagement for the sustainable management of Kenya's coastal and marine resources.

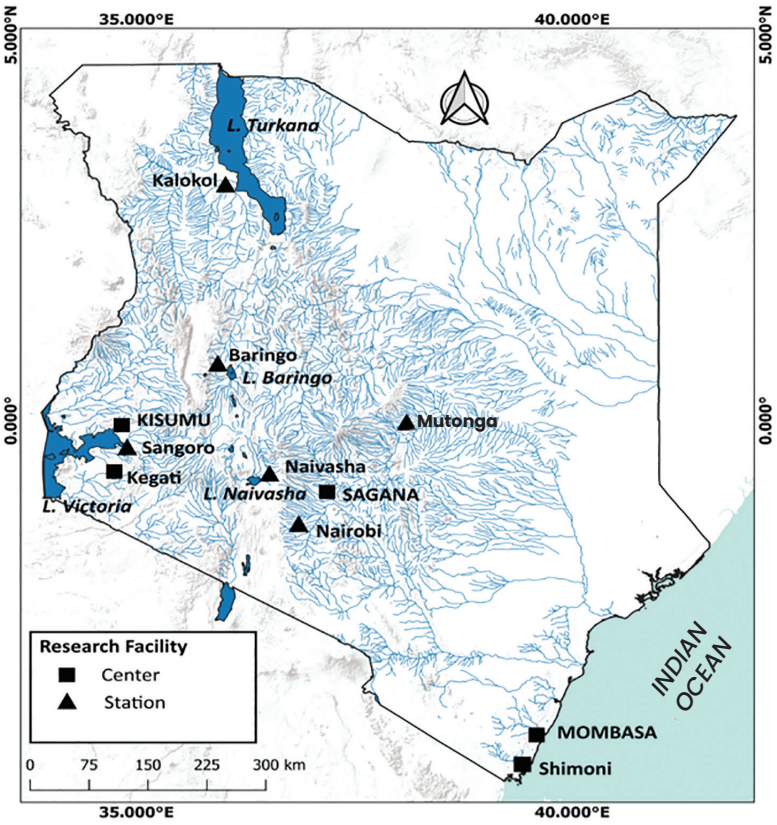


Figure 1: Map of Kenya showing the main aquatic systems and location of KMFRI Centres and stations country wide.

RESEARCH INFRASTRUCTURE AND FACILITIES

Research Vessel

Historical Context

The Research Vessel (RV) Mtafiti was formerly designated as RV Zeeleeuw, an oceanographic research vessel operated by the Flemish Government of Belgium. The vessel was officially transferred to the Government of Kenya on May 3, 2013, following the establishment of a formal Memorandum of Understanding (MoU) between the Flanders Marine Institute (VLIZ) and the Kenya Marine and Fisheries Research Institute (KMFRI) signed on October 19, 2012, which initiated bilateral collaboration in marine sciences.

The vessel's transit from Oostend, Belgium to Mombasa, Kenya was conducted under Kenyan sovereign flag with navigation by Kenya Navy personnel through the Suez Canal, completing the 33-day maritime journey in October 2013. The formal commissioning ceremony was conducted on January 27, 2014, at Kilindini Harbour, Mombasa, with His Excellency President Uhuru Kenyatta officiating. Distinguished attendees included representatives from VLIZ and the governor of West-Flanders Province. This commissioning established *RV Mtafiti* as the inaugural permanent oceanographic research vessel dedicated to offshore investigation in the East African region.

Currently, *RV Mtafiti* continues its scientific operations under the administrative management of the Kenya Kenya Navy in collaborative partnership with KMFRI.

Technical Specifications and Operational Capabilities

The *RV Mtafiti* measures 56 meters in length, constituting the largest dedicated research platform of its classification in the East African region. The vessel's substantial dimensional parameters and specialized scientific instrumentation facilitate extensive offshore oceanographic investigations beyond the limitations of coastal research platforms previously available.

The vessel's scientific capabilities encompass multiple oceanographic disciplines:

- **Physical Oceanography:** Instrumentation for measuring hydrodynamic parameters, water column characteristics, temperature gradients, salinity profiles, and oceanic current patterns
- **Chemical Oceanography:** Analytical equipment for seawater composition assessment and biogeochemical process investigation
- **Geological Oceanography:** Bathymetric mapping systems and sediment sampling apparatus for benthic substrate analysis
- **Biological Oceanography:** Specialized equipment for marine biodiversity assessment and ecosystem function analysis
- **Fisheries Research:** Stock assessment capabilities using hydroacoustic technology within Kenya's marine waters

The vessel serves as a critical platform for monitoring, control, and surveillance activities to address illegal, unreported, and unregulated fishing practices that compromise national marine resource integrity. *RV Mtafiti* directly addresses the previously identified methodological constraints in marine stock assessment and oceanographic research that had limited comprehensive understanding of Kenya's marine resources.

Through institutional collaboration between KMFRI and the Western Indian Ocean Marine Science Association (WIOMSA), the vessel facilitates coordinated regional research initiatives addressing priority themes identified by African Member States of the Intergovernmental Oceanographic Commission of UNESCO, including coastal geomorphological dynamics, anthropogenic contamination assessment, sustainable resource utilization, critical habitat conservation, and marine tourism development.

Professional Development and Capacity Building

The *RV Mtafiti* has facilitated three key training programs to enhance regional expertise in marine research:

- **Scientific Cruise Planning and Data Management Training (April 18-27, 2016):** Conducted in collaboration with Flanders Marine Institute (VLIZ) and sponsored by VLIR-UOS, KMFRI, and IOC Africa, this program developed personnel capable of leading oceanographic research cruises, optimized ship time utilization, and promoted *RV Mtafiti*'s availability for regional collaborative research.
- **Hydroacoustics (EK60) System Training (September 7-12, 2016):** Delivered by Kongsberg Simrad specialists to sixteen scientists and technologists, this training covered EK60 system initialization, calibration of multiple frequencies (38, 120, and 333 KHz), standardized data collection methodologies, and data extraction techniques.
- **Acoustic Doppler Current Profiler Training (October 2017):** Conducted by UNIK Ltd at Kenya Navy docks for two scientists and one technician, this program included ADCP transducer initialization, frequency testing (150KHz), and data collection protocols during a test cruise.

These structured initiatives have significantly enhanced KMFRI's technical capabilities for utilizing *RV Mtafiti*'s advanced instrumentation while promoting regional collaboration throughout the Western Indian Ocean.

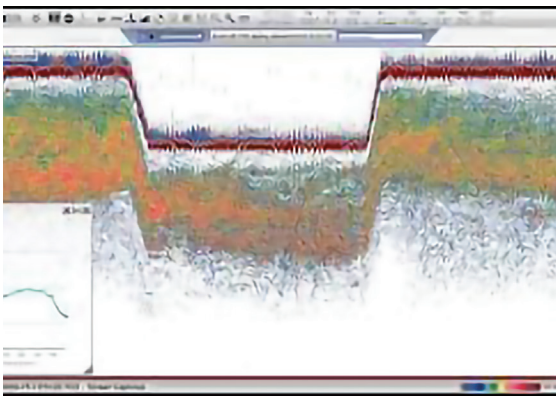
Laboratory Facilities

The Kenya Marine and Fisheries Research Institute (KMFRI) has established itself as a cornerstone institution for marine and coastal research in East Africa, supported by comprehensive specialized equipment and laboratory facilities. The institute's research capacity spans both field and laboratory operations, with two major categories of instrumentation: deep-sea research vessel equipment and laboratory instrumentation. The vessel is equipped with advanced tools including the EK80 echo sounder system for seafloor mapping, Conductivity-Temperature-Depth (CTD) devices for water column analysis, and Remotely Operated Underwater Vehicles (ROVs) for subsea observation and sampling.

KMFRI's laboratories house over fifty specialized scientific instruments across multiple research domains including analytical chemistry, molecular biology, environmental science, and materials analysis. The institute maintains dedicated facilities for spectroscopy, microscopy, elemental analysis, biochemistry, microbiology, and food science research. These laboratories feature sophisticated systems including HPLC-MS, FTIR, ICP-OES, flow cytometers, gamma germanium detectors, and various spectrophotometers. This robust infrastructure has positioned KMFRI as a regional hub for marine and fisheries research, serving numerous academic institutions, government agencies, and private sector organizations throughout Kenya and the WIO region.

Major KMFRI deep sea research vessel equipment

1. ECHO Sounder EK 80



EK80 is a high-precision scientific echo sounder and ADCP system designed to quantify and monitor underwater ecosystems. The EK80 is a modular system capable of operating several different transceiver and transducer combinations, all through the same operator station.

Applications

The Lecho sounder EK80 has several applications including:-

a) **Seafloor classification:** The EK80 provides information about the composition of the seafloor.

b) **Sediment concentration:** The EK80 can measure sediment concentration in the water column, which is important for understanding how dredging and mining impact local ecosystems.

c) **Target identification:** The EK80 can identify and quantify a variety of targets, including fish, plankton, bubbles, and oil droplets.

d) **Oceanographic features:** The EK80 can identify physical oceanographic features, such as turbulence.

e) **Fisheries research:** The EK80 can be used to study fish populations.

f) **Biological oceanography:** The EK80 can be used to study marine life.

g) **Chemical oceanography:** The EK80 can be used to study chemical processes in the ocean.

h) **Environmental monitoring**: The EK80 can be used to monitor the ocean for environmental issues

2. Conductivity, Temperature and Depth (CTD)

A CTD device's primary function is to detect how the conductivity and temperature of the water column changes relative to depth. Conductivity is a measure of how well a solution conducts electricity and it is directly related to salinity. By measuring the conductivity of seawater, the salinity can be derived from the temperature and pressure of the same water. The depth is then derived from the pressure measurement by calculating the density of water from the temperature and the salinity.

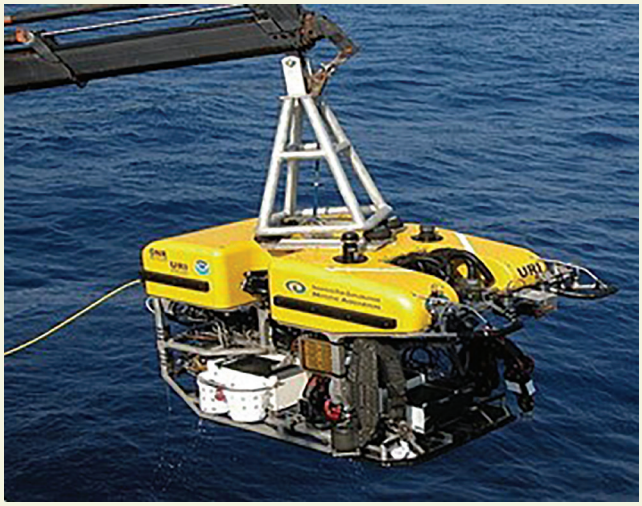
Applications

a. **Ocean research:** CTDs are used to study how the ocean mixes and stores heat, carbon, and oxygen. They can also be used to detect hydrothermal vents, volcanoes, and other deep-sea features.

b. **Climate studies:** CTDs are used to monitor changes in ocean temperature and salinity, which are indicators of climate change.

c. **Water quality monitoring:** CTDs are used to monitor the performance of water purification systems such as temperature, conductivity and dissolved oxygen

3. Remotely Underwater Operated Vehicle (ROV)



A remotely operated underwater vehicle (ROUV)or remotely operated vehicle (ROV) is a free-swimming submersible craft used to perform underwater observation, inspection and physical tasks such as valve operations, hydraulic functions and other general tasks within the subsea oil and gas industry, military, scientific and other applications.

Applications

a) **Oil and gas:** ROVs are used for pipeline inspection, valve operations, and other tasks in the subsea oil and gas industry.

b) **Marine research:** ROVs are used for oceanography, biology-guided missions, and deep ocean research.

c) **Search and rescue:** ROVs are used to investigate submerged hazards and perform search and rescue operations.

d) **Underwater construction:** ROVs are used for underwater construction tasks.

e) **Environmental monitoring:** ROVs are used to monitor water quality and other environmental aspects.

f) **Seabed surveys:** ROVs are used to map the seafloor and characterize its physical, chemical, and biological properties.

Major KMFRI instrumentation and laboratory equipment

4. Calibration bench

Calibration Test Benches are workstations for the maintenance and calibration of process instruments. Masibus Test Bench configurations are developed with intelligence of versatile & modular design, keeping in mind the instrument testing & calibration procedures. The bench is ideal for periodic calibration of temperature & pressure sensors, Transmitters, switches & recorder thermocouple & RTDs.

Applications

Calibration benches are applicable in industries such as oil and gas, petrochemical, power and utilities, mining, manufacturing, food and beverages, aviation, automobile and education for:-

a) **Periodic calibration:** Calibrate pressure sensors, switches, transmitters, gauges, indicators, controllers, and recorders

b) **Fault diagnostics:** Use a frequency counter to measure frequency and diagnose faults

c) **Repair work:** Use a calibration bench to repair instruments and devices

d) **Compliance:** Use a calibration bench to achieve compliance with quality standards

5. Dry block calibrator

A dry block calibrator is a temperature calibration instrument used to verify and calibrate temperature sensors and thermometers. It consists of a temperature-controlled block that provides a stable and uniform temperature environment.

Applications

a) Pharmaceuticals

Dry block calibrators are used to ensure that medications are stored and produced at precise temperatures to prevent spoilage.

b) Food and beverage

Dry block calibrators are used to ensure that products are safe and have the desired quality by maintaining precise temperatures.

c) Manufacturing

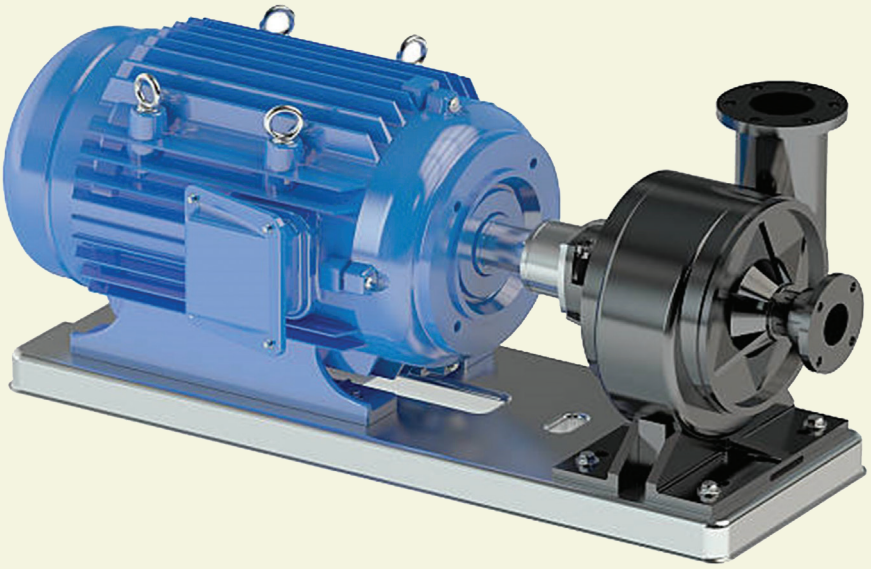
Dry block calibrators are used to ensure that machinery and equipment function properly by maintaining precise temperatures.

d) Industrial and marine

Dry block calibrators are used to calibrate temperature devices like RTDs, thermometers, and temperature switches.

6. Vacuum pump

A vacuum pump is a device that removes gas particles from a sealed area to create a partial vacuum. Vacuum pumps are used in many industries, including food processing, pharmaceuticals, and aviation.



Applications

i.Food and beverage

a. **Degassing:** Removes gas bubbles from liquids to maintain flavor and aroma

b. **Packaging:** Vacuum-sealed bags prevent bacteria growth and extend shelf life

ii. Electronics

a) **Semiconductor processing:** Creates clean environments for thin-film deposition, etching, and lithography

b) **Vacuum tubes and electric lamps:** Produces vacuum tubes and electric lamps

iii.Medicine

a. **Medical procedures:** Small vacuum pumps are used in routine interventions and complex surgeries

b. **Suction:** Used for medical applications that require suction

iv.Scientific and research

a) **Laboratory research:** Used with instruments that require low-pressure environments

b) **Climate research:** Used to sample and analyze air and other environmental samples

v.Other applications

a. **Flight instruments:** Used to create gyroscopes for flight instrumentation

b. **Automotive engines:** Used to boost braking and increase fuel efficiency

c. **Robotic material handling:** Used to make picking and placing objects easier, faster, and safer

7. Standard masses

Standard masses, also known as calibration weights, are used in many industries to ensure accurate measurements. They are used to calibrate weighing devices and scales, and to verify the accuracy of measurements.

Applications

a) **Scientific research:** Used to maintain precision in experiments

b) **Pharmaceuticals:** Used to ensure accurate dosing and formulation

c) **Manufacturing:** Used to verify the weights of raw materials and finished products

d) **Retail:** Used to ensure accurate pricing based on weight

e) **Logistics:** Used to verify the weights of shipments and cargo for transport

8. Thermocouple sensors

Thermocouples are temperature sensors used in many applications

Applications

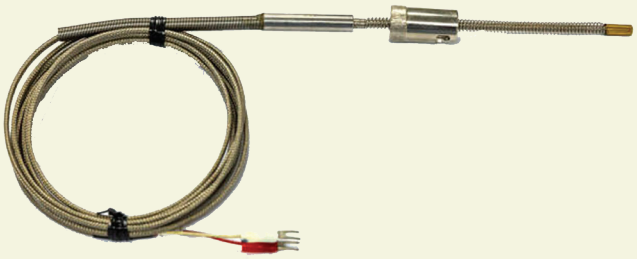
a. **Home appliances:** Thermocouples are used in ovens, toasters, grills, and fryers to ensure food is cooked safely

b. **Industrial processes:** Thermocouples are used in manufacturing processes, such as in kilns, autoclaves, presses, and molds

c. **Power generation:** Thermocouples are used in electric power generation

d. **Food and beverage processing:** Thermocouples are used in pasteurization, refrigeration, fermentation, brewing, and bottling

e. **Vehicle sensors:** Thermocouples are used in onboard diagnostics systems



f. **Aircraft engines:** Thermocouples are used to monitor temperatures in aircraft

g. **Rockets, satellites, and spacecraft:** Thermocouples are used to monitor temperatures in rockets, satellites, and spacecraft

h. **Medical applications:** Thermocouples are used in medical machinery and processes, such as in implants, external sensors, and catheter probes

9. Intelligent digital pressure module

Intelligent Digital Pressure Module (IDPM) provides an accurate, reliable, and economic solution for wide range of pressure applications.

Applications

a. It can be used for pressure measurement with HSIN series process calibrators,

b. Calibrate pressure transmitters, pressure switches, precision pressure gauges, and general pressure

c. Pressure instruments such as watches, sphygmomanometers, pressure sensors, etc.

10. Refrigerated bath circulator

Refrigerated bath circulators are used to maintain a specific temperature for samples or products in a variety of industries. They are used in research, industrial production, food and beverage, and medical applications.

Applications

a) **Laboratory research:** Maintain the temperature of samples for experiments like photometry, refractometry, and viscometry

b) **Industrial production:** Maintain the temperature of products during production

c) **Food and beverage:** Maintain the temperature of products during processing

d) **Medical:** Maintain the temperature of medical equipment and solutions

e) **Temperature probe calibration:** Calibrate temperature probes in industrial laboratories

f) **Product testing:** Test products for quality control in industrial laboratories

g) **Hydrometer testing:** Maintain a uniform temperature for soil samples during hydrometer testing

11. Assorted microscopes

Instrument that makes an enlarged image of a small object, thus revealing details too small to be seen by the unaided eye.

Types of microscopes fitted with cameras available at KMFRI are Florescent microscopes, compound microscopes, inverted microscopes and dissecting microscopes

Applications

i. Biology

a) Blood cells

Microscopes are used to examine blood cells, such as red blood cells, white blood cells, and platelets. This helps diagnose diseases like anemia, leukemia, and infections.

b) Tissue samples

Microscopes are used to examine tissue samples, such as biopsies, to diagnose cancer and other diseases.

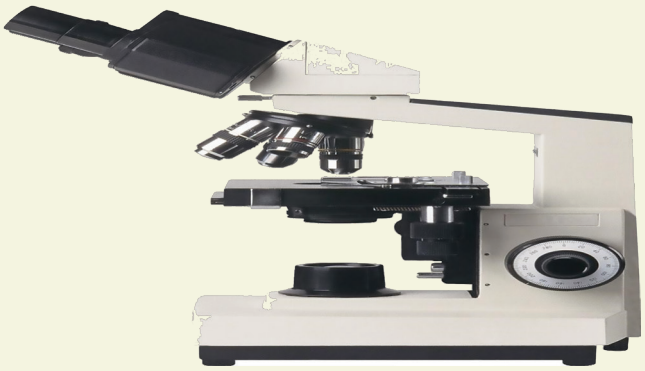
c) Plant cells

Microscopes are used to observe plant cells and the bacteria that live on them.

ii. Forensics

a. **Organ and bone examination:** Microscopes are used to examine organs, bones, and other parts of the body to determine the cause of death.

b. **Crime investigation:** Microscopes are used to examine evidence in a crime lab.



iii. Industry

a) **Quality control:** Microscopes are used to inspect parts and components, and to ensure quality.

b) **Failure analysis:** Microscopes are used to analyze failures and determine their causes.

c) **Research and development:** Microscopes are used to study and develop new materials and products.

iv Other applications

a. Studying microorganisms, crystalline structures, and molecular structures

b. Creating electronic devices and circuits

c. Analyzing fossils

d. Studying soil particles

e. Studying skin diseases

f. Studying algae and fungi

g. Magnifying fine parts of jewelry

12. Freeze dryers

A drying machine for an already frozen product in a vacuum below the triple point. The vacuum allows for a sublimation process facilitating the direct conversion of ice into vapor without any intermediate liquid stage. This results in an extremely gentle drying process preserving the product's shape, color, taste, and nutrients.

Applications

i.Food preservation

a) **Fruits and vegetables:** Freeze drying can preserve fruits and vegetables without changing their taste or appearance.

b) **Dairy:** Freeze drying can preserve dairy products like milk, yogurt, and ice cream. Freeze-dried dairy is lightweight and easy to transport.

c) **Pet food:** Freeze drying can preserve pet food like chicken breast and beef.

d) **Instant coffee:** Freeze drying is a common method for making instant coffee.

ii. Pharmaceuticals

a. Vaccines and antibiotics

Freeze drying can improve the storage stability of vaccines, antibiotics, and other pharmaceuticals.

b. Drug delivery systems

Freeze drying can prepare drug delivery systems that contain complex active ingredients.

iii.Scientific research

a) **Laboratory samples:** Freeze drying can preserve lab samples, such as microorganisms, tissues, and blood.

b) **Chemical synthesis:** Freeze drying can help produce high-quality chemical substances.

c) **Biotechnological processes:** Freeze drying can help maintain the activity of enzymes and cultures.

iv.Other applications

a. **Taxidermy:** Freeze drying can preserve animals for taxidermy.

b. **Space travel:** Freeze-dried meals are lightweight and have a long shelf life, making them ideal for space travel.

13. Miniature spectrometer

A compact, low-cost instrument that can be used for a variety of applications, including color measurement, environmental measurement, and quality control.

Applications

i. Medical applications

a) **Bio-fluidics control:** Miniature spectrophotometers are used in point-of-care diagnostic instruments for blood gas analysis and pathogen detection

b) **Dental imaging:** Miniature spectrophotometers can be used for dental imaging

ii.Manufacturing applications

a. Semiconductor manufacturing

Miniature spectrophotometers are used to monitor fabrication processes in semiconductor manufacturing

b. Battery and control board inspection

Miniature spectrophotometers can be used to inspect battery and control boards

iii.Environmental monitoring applications

a) Environmental monitoring: Miniature spectrophotometers can be used for environmental monitoring

b) Food safety: Miniature spectrophotometers can be used for food safety

iv.Other applications

a. **Color measurement:** Miniature spectrophotometers can be used for color measurement

b. **Astronomy:** Miniature spectrophotometers can be used for astronomy

c. **Radiation detection:** Miniature spectrophotometers can be used for radiation detection

d. **Quantum technologies:** Miniature spectrophotometers can be used for quantum technologies

14. Laminar flow cabinet

An enclosed workstation that is used to create a contamination-free work environment through filters to capture all the particles entering the cabinet. It prevents contamination of biological samples, semiconductor wafers, and other particle-sensitive materials.

Applications

a) **Medical laboratories:** Prevent airborne contamination of samples and experiments

b) **Pharmaceutical production:** Ensure sterile conditions for drug preparation and packaging

c) **Tissue cultures:** Provide a clean environment for culturing cells and tissues

d) **Electronics assembly:** Prevent contamination during the assembly of sensitive electronic components

e) **Food industry:** Used for microbiological testing to ensure food safety

f) **Lens assembly:** Prevent dust and particles from attaching to lenses during assembly

g) **Data recovery:** Assist in file recovery from digital devices

15. Digital shaking dry bath

A digital shaking dry bath is a laboratory instrument that can be used for heating, shaking, or both, and can be used for a variety of purposes, including incubating, heating, thawing and boiling samples as well as cell culture.

Applications

a. **DNA amplification:** Digital shaking dry baths can be used to amplify DNA

b. **Enzyme reactions:** Digital shaking dry baths can be used to perform enzymatic reactions

c. **Incubating cultures:** Digital shaking dry baths can be used to incubate cultures

d. **Sample preparation:** Digital shaking dry baths can be used to prepare samples for chemical reactions

e. **Warming reagents:** Digital shaking dry baths can be used to warm reagents

f. **Heating tubes:** Digital shaking dry baths can be used to heat tubes

16. Rotary evaporator

A piece of equipment primarily used to remove solvent from a sample through "evaporation under reduced pressure". The presence of reduced pressure in the apparatus causes the solvent (in the round bottom flask) to boil at a lower temperature than normal.

Applications

a) Separating and purifying compounds
Rotary evaporators can separate and purify compounds like acids, inorganic salts, and solvents.

b) Concentrating samples
Rotary evaporators can remove solvents and other unwanted substances from samples.

c) Extracting essential oils
Rotary evaporators can extract essential oils from plants and other natural sources.

d) Preparing samples for analysis
Rotary evaporators can prepare samples for further analysis, such as for developing new drugs or chemicals.

e) Environmental testing
Rotary evaporators can test for environmental drugs, pesticides, dioxins, and other harmful substances.

f) Food safety testing
Rotary evaporators can test for animal drugs, pesticide residues, additives, and contraband.

g) Molecular gastronomy
Rotary evaporators can prepare distillates and extracts, and concentrate non-volatile components in a mixture.

h) Biofuel extractions
Rotary evaporators can isolate and purify biomass components for energy generation.

i)Alcohol industry
Rotary evaporators can create and distill flavors for infusing in alcoholic drinks.

17. Spectrophotometer

An instrument that measures the amount of light absorbed by a sample. It is mostly used to measure the concentration of solutes in solution by measuring the amount of the light that is absorbed by the solution in a cuvette placed in the spectrophotometer.

Applications

a. Detection of concentration of substances
b. Detection of impurities
c. Structure elucidation of organic compounds
d. Monitoring dissolved oxygen content in freshwater and marine ecosystems
e. Characterization of proteins
f. Detection of functional groups
g. Respiratory gas analysis in hospitals
h. Molecular weight determination of compounds
i. The visible and UV spectrophotometer may be used to identify classes of compounds in both the pure state and in biological preparations.

18. Aquaculture photometer

A multiparameter instrument that measures vital parameters such as alkalinity, calcium, nitrite, and phosphate being critical at monitoring and maintaining a healthy aquatic ecosystem.

Applications

a) **Ammonia toxicity control:** Photometers can measure ammonia levels, which can be toxic to fish.

b) **Disease prevention and management:** Photometers can help maintain water quality, which can help prevent and manage fish diseases.

c) **Alkalinity management:** Photometers can measure alkalinity levels, which can help maintain pH levels and store extra carbon dioxide for photosynthesis.

d) **Calcium management:** Photometers can measure calcium levels, which are important for fish growth and development.

e) **Nitrite management:** Photometers can measure nitrite levels, which can be toxic to fish.

f) **Phosphate management:** Photometers can measure phosphate levels, which are important for plant growth.

19. Gamma germanium detector

Gamma germanium detectors are semiconductor diodes that detect gamma rays and other ionizing radiation. They are used in a variety of applications, including nuclear forensics, environmental monitoring, and nuclear defense.

Applications

i.Nuclear security

a. **Nuclear forensics:** Identify and quantify radioactive materials at nuclear sites
b. **Border detection:** Detect radioactive materials at borders
c. **Material verification:** Verify the isotopic composition of uranium and plutonium
d. **Non-proliferation:** Identify and assay materials, and monitor air for treaty verification

ii.Space exploration

a) **Astrophysics:** Measure gamma-ray energies to study astrophysical topics

b) **Planetary science:** Measure gamma-ray energies to study planetary topics

iii.Scientific experiments

a. **High-resolution gamma and x-ray spectroscopy:** Identify closely spaced radionuclides
b. **Neutrino-less double beta decay search:** Search for neutrino-less double beta decay
c. **Dark matter search:** Search for dark matter

20. Texture analyzer

A scientific instrument that measures a sample's texture by compressing or stretching it and recording the sample's response: Texture analyzers are used to test mechanical properties of foods, cosmetics, pharmaceuticals and other products. They capture force, distance and time data during tests.

Applications

i.Food

a) **Quality control:** Ensure consistent quality of food products
b) **Production:** Determine how changes in temperature, humidity, and cooking time affect a product's structure
c) **Mouthfeel:** Measure how a food feels in the mouth
d) **Flow:** Measure how creams and pastes flow

ii.Pharmaceuticals

iii.Mechanical strength

Measure the mechanical strength, elasticity, and rupture force of pharmaceutical products like stents

iv.Sensory evaluation

Evaluate the texture of pharmaceutical products using the senses of touch, smell, taste, and sound

v.Medical

a. **Image analysis:** Characterize and classify medical image pathologies, such as tumors
b. **Treatment quality:** Assess the quality of a tumor treatment

vi.Other materials

a) **Packaging:** Measure the compressibility and tensile strength of packaging
b) **Adhesives:** Measure the tackiness of adhesives

21. Bomb calorimeter

A device used for measuring the amount of heat produced during the combustion of a solid or liquid substance. It is used to measure the calorific/energy value of any food material

Applications

a. Energy research

Bomb calorimeters are used to measure the heat of combustion of fuels like coal, oil, and natural gas. This information is used to calculate the energy content of the fuel, which helps determine the efficiency of energy production.

b. Food science

Bomb calorimeters are used to measure the caloric content of food products. This information helps determine the nutritional value of the food.

c. Explosives analysis

Oxygen calorimeters can test explosives that can be ignited by heat from the calorimeter's firing circuit.

d. Cement manufacturing

Isothermal calorimeters can test the reaction of cement on hydration.

22. Kjeldahl system

A high degree of precision and universality make the Kjeldahl method the world's dominant standard method for determining the nitrogen content in food ,volatile acidity, alcohol content, sorbic acid,

Applications

a. ***Food analysis*:** The Kjeldahl method is the standard method for estimating protein content in food. It's used in the analysis of dairy products, meat, feed, and grain.

b. ***Soil analysis*:** The Kjeldahl method is used to analyze the nitrogen content of soil.

c. ***Water analysis*:** The Kjeldahl method is used to analyze the nitrogen content of water, including wastewater and sewage sludge.

d. ***Fertilizer analysis*:** The Kjeldahl method is used to analyze the nitrogen content of fertilizers.

e. ***Pharmaceutical analysis*:** The Kjeldahl method is used in the pharmaceutical sector.

f. ***Industrial analysis*:** The Kjeldahl method is used in the industrial sector.

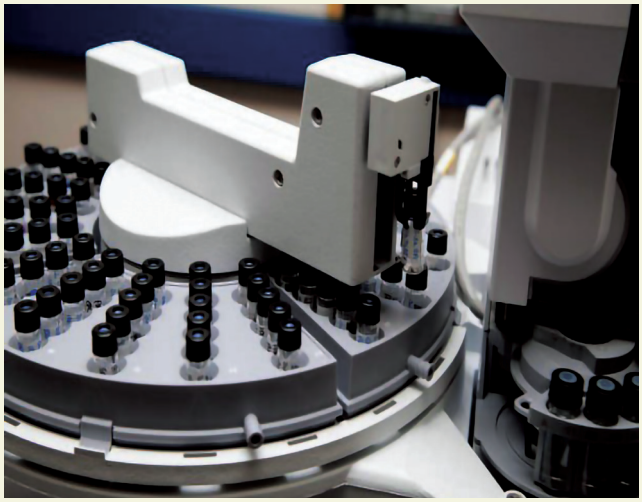
23. Autosampler

An auto sampler can also be understood as a device that collects samples periodically from a large sample source, like the atmosphere or a lake, for example. Auto samplers enable substantial gains in productivity, precision and accuracy in many analytical scenarios, and therefore are widely employed in laboratories.

Applications

i.Medical applications

a. *Blood alcohol analysis*: Auto samplers can analyze blood samples to determine blood alcohol levels



b. *Clinical chemistry*: Auto samplers can analyze bodily fluids like blood and urine to diagnose diseases, measure hormone levels, and assess metabolic disorders

c. *Endocrinology*: Autosamplers can measure hormones

d. *Toxicology*: Auto samplers can detect and quantify drugs of abuse and therapeutic drugs

e. *Nutrition*: Auto samplers can monitor vitamin and mineral levels to diagnose deficiencies or excesses

ii.Forensic applications

a) Volatile compounds: Auto samplers can analyze volatile compounds, such as ethanol, in forensic toxicology

iii.Environmental applications

a. Water purification: Auto samplers can be used to check for contaminants in water

iv.Other applications

a) *Pharmaceutical industry*: Auto samplers can detect impurities in pharmaceutical products and test antibiotics
b) *Food industry*: Auto samplers can analyze flavors and other food components
c) *Semiconductor industry*: Auto samplers can be used in semiconductor applications

Auto samplers can handle a variety of sample containers, including vials, tubes, microtiter plates, and PCR plates.

24. PeCOD analyzer

The PeCOD analyzer is used to measure chemical oxygen demand (COD) in drinking water and wastewater. COD is a measure of how much oxygen is needed to oxidize organic and inorganic materials in water.

Applications

a) **Industrial wastewater:** PeCOD analyzers can be used to treat industrial wastewater.

b) **Municipal wastewater:** PeCOD analyzers can be used to treat municipal wastewater.

c) **Municipal drinking water:** PeCOD analyzers can be used to treat municipal drinking water.

d) **Government and academic:** PeCOD analyzers can be used by government and academic organizations.

25. Submarine electrophoresis system

Submarine Gel Electrophoresis System is a widely used technique in laboratories to analyze DNA based on their size and charge. In this method, the agarose gel is formed on a supporting plate, and then the plate is submerged into a tank containing a suitable electrophoresis buffer.

Applications

a) DNA analysis

Submarine electrophoresis systems can analyze DNA quality, quantity, and restriction patterns. They can also be used to identify polymorphisms and study single strand polymorphisms (SSP).

b) Genetic testing

Submarine electrophoresis systems can be used to perform genetic testing in medical laboratories.

c) Microbiology

Submarine electrophoresis systems can be used to identify microorganisms in microbiology labs.

d) Protein analysis

Submarine electrophoresis systems can be used to analyze proteins and create purified protein samples.

e) Antibiotic analysis

Submarine electrophoresis systems can be used to separate antibodies from impurities in antibiotics. This can help researchers determine the concentration of the antibiotic, which can lead to more accurate dosages.

26. Gel documentation system

A Gel Documentation System, also called Gel Doc, Gel Image System or Gel Imager is used in molecular biology labs for imaging and documentation of protein suspended within polyacrylamide or agarose gels and nucleic acid.

Applications

a. **Western blotting:** A technique that separates proteins by molecular weight. Chemi-luminescence gel doc systems are often used for western blotting because of their sensitivity.

b. **DNA fingerprinting:** Gel electrophoresis is used to separate DNA fragments for DNA fingerprinting, which can be used to investigate crime scenes.

c. **Gene analysis:** Gel electrophoresis can be used to analyze genes associated with specific illnesses.

d. **DNA profiling:** Gel electrophoresis can be used to distinguish different species in DNA profiling for taxonomy studies.

e. **Thin layer chromatography (TLC):** Gel documentation systems can be used to identify mixtures through TLC.

f. **Counting microbial colonies:** Gel documentation systems can be used to count microbial colonies

27. Master cycler

With its intuitive touch screen offering precise fingertip control, the MC X50 PCR thermocycler enables easy PCR optimization in advanced molecular biology research and dependable standardization in routine PCR applications.

Applications

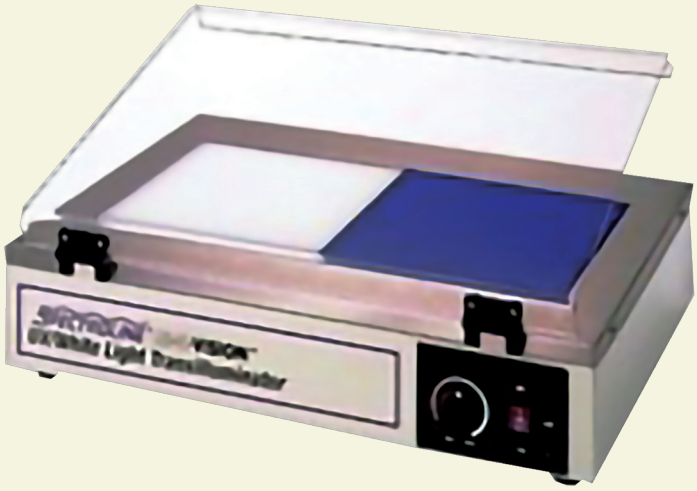
a) **PCR optimization:** Master cyclers can be used to optimize PCR conditions for molecular biology research

b) **Cycle sequencing:** Master cyclers can be used for DNA sequencing

c) **Incubation: Master** cyclers can be used for incubation

d) **NGS:** Master cyclers can be used for next-generation sequencing (NGS)

28.Transilluminator



An ultra-violet (UV) transilluminator is a standard piece of equipment used in life science laboratories for visualization of target DNAs and proteins.

Applications

i.Gel imaging

a) **DNA and protein gels:** Transilluminators are used to visualize DNA and protein in agarose and polyacrylamide gels after electrophoresis.

b) **PCR product sizing:** Transilluminators can be used to size PCR products.

c) **DNA quantification:** Transilluminators can be used to quantify DNA.

d) **Gel comparison:** Transilluminators can be used to compare gels to each other.

ii.Medical imaging

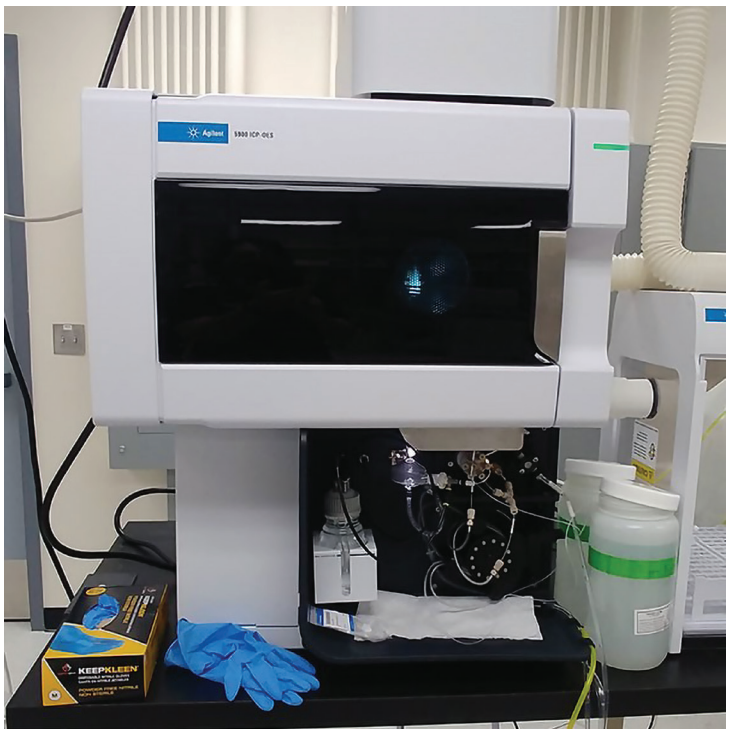
a. **Tumor mass detection:** Transilluminators can be used to detect tumor masses.

b. **Medical inspection:** Transilluminators can be used to facilitate medical inspection.

iii.Other applications

a) Chemiluminescence western blot
b) Multiplex fluorescence
c) Plant imaging
d) Fluorescent dyes
e) Colorimetric imaging
f) Colony counting
g) RNA integrity verification
h) DNA fragment purification

29. ICP-EOS



Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) is a technique that measures the amount of chemical elements in a sample. It's used in many fields, including environmental, geological, pharmaceutical, and materials science.

Applications

a. **Environmental monitoring:** ICP-OES can analyze soil and water samples for trace elements. It can also be used to determine toxic metals in environmental samples.

b. **Food safety:** ICP-OES can analyze food and drink samples for trace metals, such as metals in wine.

c. **Medical diagnostics:** ICP-OES can be used to analyze human tissue and bodily fluids.

d. **Metallurgy:** ICP-OES can be used to analyze metal ores for mass balances and process control.

e. **Geology and mining:** ICP-OES can be used to analyze rare earth elements.

f. **Nuclear power:** ICP-OES can be used to monitor nuclear plants and manage nuclear waste.

g. **Petrochemicals:** ICP-OES can be used to analyze petrochemicals.

h. **Forensic analysis:** ICP-OES can be used for forensic analysis.

30. Micro rotary evaporator

The micro rotary evaporator is a smaller version of the rotary evaporator, and it is used mainly for vacuum distillation. This is widely used in the extraction laboratories, where it is mainly used for different distillation purposes. The distillation process is done by evaporation, which is done by apply low boiling solvents like ethyl or butane alcohol from compounds — acquiring solid substances at constant room pressure and room temperature via the evaporation process.

Applications

a) Concentration

Rotary evaporators can concentrate samples by reducing their volume. This is useful for preparing samples for analysis by chromatography or spectroscopy.

b) Solvent recovery

Rotary evaporators can recover solvents for reuse, which can help reduce waste and operating costs.

c) Extraction

Rotary evaporators can extract active ingredients from plants and other natural sources. This is used in the development of cosmetics, skin care products, and medical marijuana.

d) Environmental testing

Rotary evaporators can test for environmental pollutants like pesticides, dioxins, and total hydrocarbons.

e) Food safety testing

Rotary evaporators can test for food safety issues like pesticide residues, animal drugs, and contraband.

f) Teaching

Rotary evaporators can be used in educational settings to teach students about solvent evaporation and laboratory practices.

31. Flow cytometer

A flow cytometer is a lab instrument that analyzes the physical and chemical properties of cells or particles in a sample. The process involves:

1. Suspending the sample in fluid
2. Injecting the sample into the flow cytometer
3. Analyzing the sample using a laser-based system that generates light signals

Applications

a. Diagnosis

Flow cytometry can identify the type of microorganism causing an infection, and can be used to diagnose hematologic diseases like leukemia and lymphoma

b. Treatment

Flow cytometry can help determine treatment plans and monitor the effectiveness of treatment

c. Prognosis

Flow cytometry can help predict the course of a disease by measuring DNA content and other characteristics

d. Blood banking

Flow cytometry can identify red blood cells and leukocytes in blood products

Other applications

a) Drug discovery

Flow cytometry can help identify potential drug targets and evaluate how drugs interact with cells

b) Immunology

Flow cytometry can identify and count immune cells, and can be used to study the immune response

c) Microbiology

Flow cytometry can detect and identify bacteria and viruses, and can be used to test their sensitivity to antibiotics

d) Genetics

Flow cytometry can be used to analyze chromosomes and diagnose genetic conditions

e) Pharmacology

Flow cytometry can be used to study how cells respond to drugs

32. Biological safety cabinet

A biological safety cabinet (BSC) is a ventilated, enclosed workspace in a laboratory that allows users to safely work with materials that are contaminated with pathogens. BSCs are used to:

- Protect laboratory personnel, the environment, and samples from pathogenic microorganisms
- Create a sterile work zone
- Handle pathogenic biological samples

Applications

Biological safety cabinets are widely used in scientific research, teaching, clinical testing, and production in the fields of microbiology, biomedicine, genetic engineering, and biological products. They are the basic safety protection equipment in the first-level protective barrier of laboratory biosafety.

33. Steam cleaning system

Harnessing the incredible power of steam, this innovative device effortlessly tackles dirt, grime, and stains on various surfaces. From stubborn kitchen grease to bathroom mold

Steam cleaning is a form of deep cleaning that uses steam vapor to dislodge dirt and grime from surfaces.

Applications

i. Domestic applications

a) **Cleaning floors:** Steam cleaning can remove dirt and grime from floors, carpets, and rugs
b) **Cleaning upholstery:** Steam cleaning can remove dirt and grime from upholstery, mattresses, and seats
c) **Cleaning appliances:** Steam cleaning can remove dirt and grime from kitchen appliances, stoves, and oven hoods
d) **Cleaning windows:** Steam cleaning can remove dirt and grime from windows
e) **Cleaning bathrooms:** Steam cleaning can remove dirt and grime from bathroom tiles and grout lines
f) **Sanitizing:** Steam cleaning can sanitize surfaces without using harsh chemicals
g) **Removing odors:** Steam cleaning can remove odors from fabrics and garments
h) **Eliminating allergens:** Steam cleaning can eliminate allergens like dust mites and bedbugs

ii.Industrial applications

a. **Degreasing:** Steam cleaning can remove grease and dirt from engines
b. **Disinfecting:** Steam cleaning can disinfect bottling lines and air conditioners

33. Homogenizer

Homogenizing is a process that combines various substances to produce a uniformly consistent mixture. Homogenization is primarily used with components that are not dissolvable in each other, that are barely mixable or not mixable at all.

Applications

i.Food

a) **Milk:** Homogenizers improve the taste, appearance, and texture of milk by dispersing fat globules

ii.Pharmaceuticals

a. Drug development

Homogenizers help extract active ingredients from tissues, evaluate drug stability, and conduct toxicology studies

b. Drug formulation

Homogenizers help create stable products with better dispersion of active ingredients
iii.Forensics

a) **DNA analysis:** Homogenizers help extract DNA from crime scene evidence to identify suspects and provide evidence in criminal investigations

iv.Life sciences

a. Sample preparation

Homogenizers help extract intracellular components from samples like cell lysates to study cellular processes

b. Biomedical research

Homogenizers help extract biomolecules like DNA, RNA, enzymes, and proteins to study gene expression and disease mechanisms

v.Cosmetics

a) **Emulsions:** Homogenizers create stable emulsions with finely dispersed droplets using high shear, mechanical forces, and high pressure

vi.Cleaning and sterilization

a. **Ultrasonic homogenizers:** Homogenizers use sound waves to remove dirt, debris, and microorganisms from surfaces

34. Rotary microtome

A rotary microtome is a precision cutting instrument used to slice thin sections of biological specimens for microscopic examination.

Applications

a) Microscopy

Rotary microtomes prepare samples for observation under a microscope using transmitted light or electron radiation.

b) Research

Rotary microtomes are used in research to prepare sections for staining and microscopy.

35. Automatic tissue processor

An automated tissue processor (ATP) is a piece of laboratory equipment that prepares tissue samples for microscopic examination. ATPs are essential tools in pathology and histology laboratories, where they streamline and enhance the tissue processing workflow.

Applications

a. **Fixation:** Tissues are treated to protect them from the physical and chemical stresses of processing
b. **Decalcification:** Mineral content is removed from tissues like teeth and bone so they can be examined under a microscope
c. **Embedding:** A mold is filled with molten wax and the tissue is placed inside
d. **Clearing:** Organic clearing agents are used to remove water from the tissue
e. **Gross hardening:** Microwave heating is used to coagulate proteins in the tissue, which hardens it

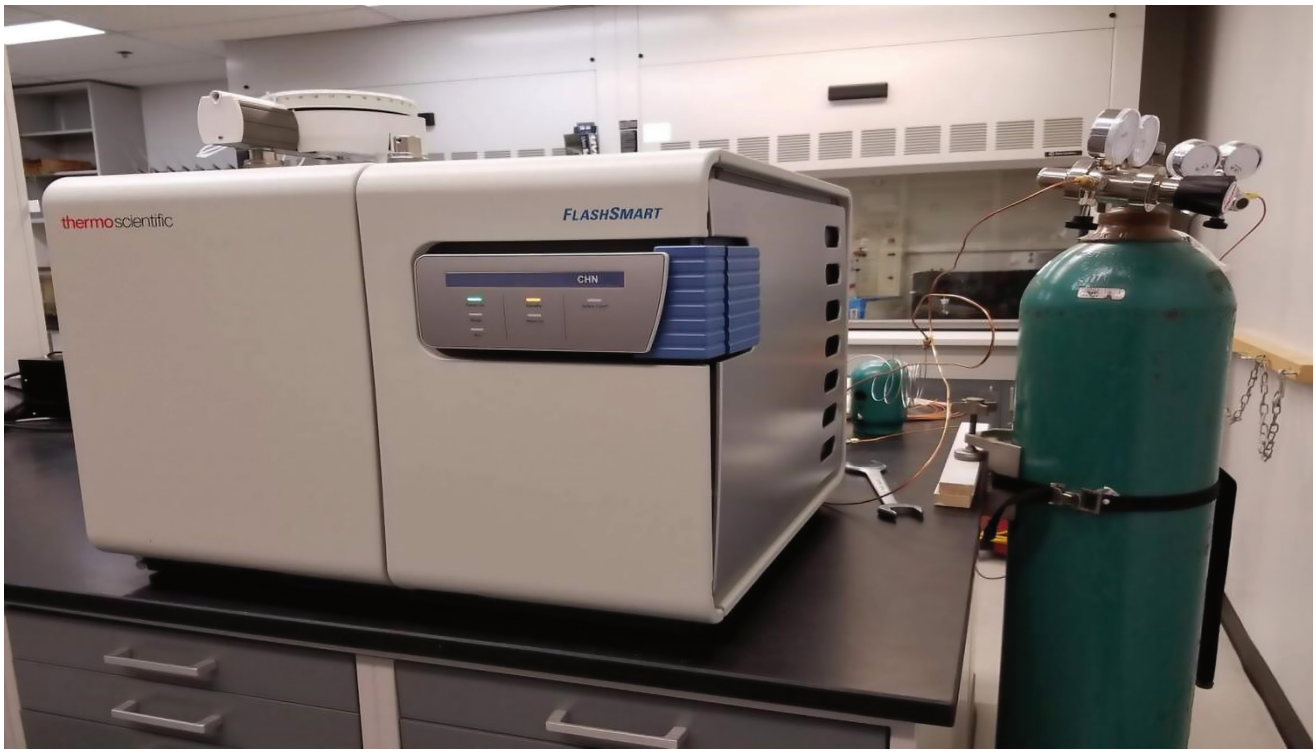
36. Struers labopol-30 and Struers discoplan

The Struers LaboPol-30 and discoplan are grinding and polishing machine used to prepare samples for digital microscopy, materialographic inspection, and other analyses:

Applications

a. **Manufacturing:** Struers equipment is used to prepare samples for quality assurance in the mass production of steel and other metals.
b. **Microelectronics:** Struers equipment is used to prepare samples of miniature electronic components.
c. **Mineralogy:** Struers equipment is used to prepare samples for mineralogical analysis.
d. **Hardness testing:** Struers equipment is used to test the hardness of materials.
e. **Marine research:** Struers equipment is used to prepare samples of fish ear stones for microscopic analysis.
f. **Transmission electron microscopy:** Struers equipment is used to prepare samples for transmission electron microscopy.

37. Elemental analyzer



An elemental analyzer is a device that determines the composition of a sample by identifying and quantifying the elements it contains. Elemental analyzers are used in many fields, including:

Applications

i.Materials

a. Mining and metallurgy: Elemental analyzers are used to analyze ores, rocks, and soils
b. Semiconductors: Elemental analyzers are used to analyze thin films and other semiconductor materials
c. Metals and ceramics: Elemental analyzers are used to analyze the composition of metals and ceramics

ii.Environment

a) Environmental monitoring: Elemental analyzers are used to analyze water, soil, and sludge samples for heavy metals
b) Drinking water quality: Elemental analyzers are used to determine the quality of drinking water

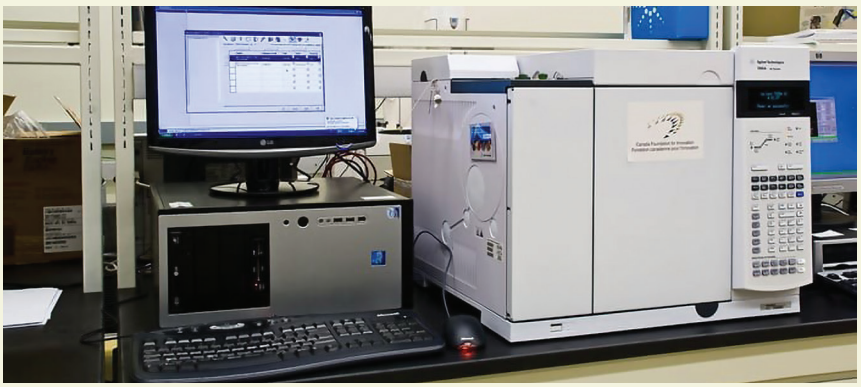
iii.Food

a. Food analysis: Elemental analyzers are used to analyze food products for heavy metals, nitrogen, and other elements
b. Protein content: Elemental analyzers are used to determine the protein content of food samples by analyzing their nitrogen content

iv.Pharmaceuticals

a) Pharmaceutical analysis: Elemental analyzers are used to analyze the elemental composition of pharmaceutical products
b) Forensic investigations: Elemental analyzers are used to analyze samples in forensic investigations

38. Gas chromatography



Gas chromatography (GC) is a common type of chromatography used in analytical chemistry for separating and analyzing compounds that can be vaporized without decomposition. Typical uses of GC include testing the purity of a particular substance, or separating the different components of a mixture.

Applications

a) **Pharmaceuticals and Medicine:** It is used to examine drug compositions, determine drug purity, and detect contaminants.

b) **Environmental analysis:** Gas chromatography is used by environmental scientists to test the quality of air and water

c) **Food and beverage industry:** Food analysis relies on Gas chromatography to evaluate the composition of flavors and perfumes, assess food quality, and discover pollutants. It is commonly used to measure components such as fatty acids, vitamins, and dietary additives

d) **Petrochemical industry :** For studying hydrocarbon mixtures, gas chromatography is a pillar of the petrochemical sector. It aids in refining operations, determining the composition of fuels, and assuring environmental compliance

e) **Chemical research:** Chemists rely on Gas chromatography for a wide range of applications, from analyzing reaction products to identifying and quantifying organic compounds

f) **Clinical and healthcare:** In clinical laboratories, GC is utilized for analyzing blood, urine, and other bodily fluids to diagnose diseases, assess metabolic disorders, and measure hormone levels

g) **Material science:** GC is used to analyze materials such as polymers, plastics, and textiles in order to evaluate their chemical composition and quality

h) **Cosmetics and fragrance industry:** The composition of perfumes, scents, and cosmetics is analyzed using gas chromatography. It aids in the identification and quantification of volatile molecules responsible for the aroma of these items

i) **Forensic science:** GC is used by forensic experts to evaluate volatile substances found at crime scenes or in evidence. It aids in the identification of accelerants in arson investigations, the detection of narcotics in bodily fluids, and the analysis of volatile substances in decomposing remains

j) **Biotechnology and life sciences:** Gas chromatography is used in biotechnology to investigate metabolic pathways, analyze fermentation products, and evaluate gas composition in biological systems

39. Elemental analysis autosampler

An elemental analysis autosampler is a device that automatically injects samples into an elemental analyzer for analysis. Autosamplers can improve the quality of results by: *Reducing manual labor, Improving injection precision and accuracy, Eliminating operation mistakes, and Enabling unattended and 24/7 operation*.

Applications

a) **Environmental monitoring:** Autosamplers can detect pollutants in water, soil, and industrial effluents.

b) **Mining:** Autosamplers can be used to analyze samples from mines.

c) **Pharmaceuticals:** Autosamplers can be used to analyze the elemental composition of pharmaceutical products.

d) **Food:** Autosamplers can be used to analyze the elemental composition of food products, such as meat and grain.

e) **Oil:** Autosamplers can be used to monitor coke build-up on refinery catalysts.

40. FTIR

FTIR, or Fourier Transform Infrared Spectroscopy, is a chemical analysis technique that uses infrared light to identify and characterize organic, polymeric, and some inorganic materials. It's a standard technique in many laboratories and is used for a variety of applications, including:

Applications

a) **Chemical Analysis:** One of the primary applications of FTIR lies in the identification and characterisation of chemical compounds. By analysing the unique absorption patterns of infrared light, FTIR enables the identification of functional groups, molecular structures, and chemical bonds present within a sample.

b) **Pharmaceutical Industry:** FTIR plays a pivotal role in pharmaceutical research and quality control. It helps in verifying the composition of drugs, ensuring batch consistency, and detecting impurities.

c) **Materials Science:** Researchers use FTIR to analyse the composition and properties of polymers, coatings, and other materials. This aids in understanding material behaviour, performance, and potential applications.

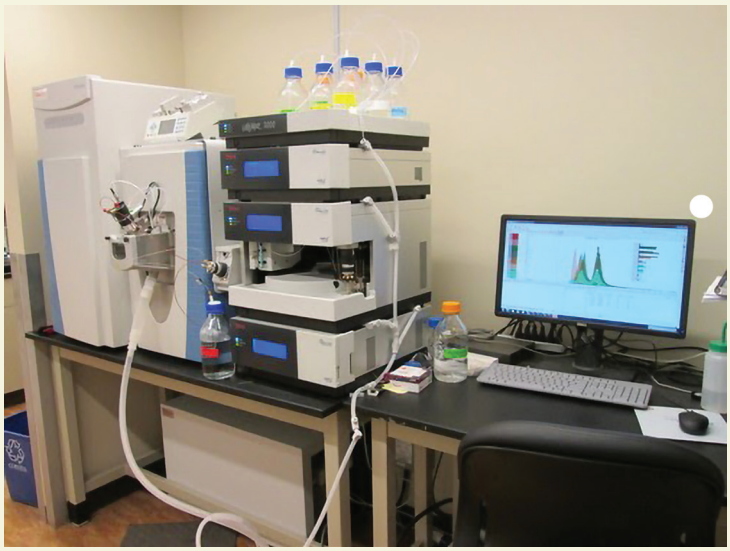
d) **Environmental Monitoring:** FTIR can detect pollutants and contaminants in environmental samples. It's employed in air and water quality assessment, facilitating early detection of harmful substances.

e) **Food and Beverage Analysis:** The food industry uses FT-IR to assess nutritional content, detect adulterants, and ensure product quality and safety.

f) **Forensics:** FTIR assists forensic experts in analysing trace evidence, identifying unknown substances, and supporting criminal investigations.

g) **Art Conservation:** FTIR aids in analysing pigments, dyes, and binding materials used in artworks, contributing to restoration and preservation efforts.

41. HPLC-MS



HPLC-MS is an effective analytical technique for determining the composition and purity of chemicals. The combination of high-performance liquid chromatography (HPLC) and mass spectrometry (MS) offers great capabilities in physical separation and mass analysis, providing accurate data on sample composition.

Applications

a) **Pharmaceutical analysis:** HPLC-MS can identify and quantify impurities in drugs, and is used in drug discovery and development.

b) **Therapeutic drug monitoring:** HPLC-MS can measure drug concentrations in blood to optimize dosing for patients with different abilities to metabolize drugs.

c) **Bioequivalence studies:** HPLC-MS can compare the pharmacokinetic parameters of different forms of a drug.

d) **Food safety:** HPLC-MS can analyze food for quality assurance and control.

e) **Environmental analysis:** HPLC-MS can analyze samples from the environment.

f) **Forensic analysis:** HPLC-MS can analyze samples for forensic purposes.

g) **Fuel analysis:** HPLC-MS can analyze fuel mixtures like biofuels, petroleum products, and natural gas.

h) **Proteomics analysis:** HPLC-MS can analyze proteins.

i) **Isomer separation and identification:** HPLC-MS can separate and identify isomers.

42. Analytical balances

Analytical balances, also known as lab balances, have many applications in science and industry. They are used to weigh samples, determine their density, and perform quality control.

Applications

i.Scientific applications

a) **Sample preparation:** Analytical balances are used to prepare samples for chemical analysis
b) **Density determination:** Analytical balances are used to determine the density of samples
c) **Reaction progress:** Analytical balances are used to determine the progress of a reaction
d) **Reaction yield:** Analytical balances are used to determine the yield of a reaction
e) **Material characterization:** Analytical balances are used to characterize materials
f) **Environmental research:** Analytical balances are used to measure chemicals and microorganisms in water, soil, and air samples

ii.Industrial applications

a. **Quality control:** Analytical balances are used to ensure quality control in manufacturing
b. **Pharmaceutical research:** Analytical balances are used to ensure accurate production of drugs
c. **Food industry:** Analytical balances are used in the food industry
d. **Construction:** Analytical balances with higher capacities are used to test large weighing materials at construction sites

43. Incubators

The Incubator is a useful tool for culturing microorganisms and cells. It can also regulate the temperature and humidity levels in an environment. This allows for optimal growth conditions for the cultures being incubated. Additionally, the Incubator can be used to shake materials inside the chamber.

Applications

i.Healthcare

a) **Cell culture:** Incubators are used to grow cells for diagnostic tests, drug development, and tissue engineering
b) **Blood incubation:** Incubators are used to store blood samples and improve the survival of patients needing a transfusion

ii.Research

a. **Microbiology:** Incubators are used to study the growth of bacteria and understand antibiotic resistance
b. **Genetics and molecular biology:** Incubators are used in gene expression studies and genetic cloning
c. **Biochemical studies:** Incubators are used to study enzyme kinetics, protein folding, and other biochemical reactions
d. **Environmental studies:** Incubators are used to measure oxygen levels in water samples to assess the health of aquatic ecosystems

iii.Agriculture

a) **Egg incubation:** Incubators are used to hatch eggs, which revolutionized food production
b) **Food and beverage testing:** Incubators are used to test food and beverages
c) **Pharmaceutical testing:** Incubators are used to test pharmaceuticals

44. Centrifuges

A centrifuge is a device that uses centrifugal force to subject a specimen to a specified constant force - for example, to separate various components of a fluid.

Applications

i.Medicine

a. Blood and urine processing: Separates solid particles from liquid samples
b. Cell and tissue culture: Harvests cells from culture media and prepares them for analysis
c. Genetics research: Extracts DNA and RNA from biological samples
d. Pharmaceutical development: Ensures drugs are the right size for stability and effectiveness
e. Immunoassays: Separates bound from free antigen-antibody complexes

ii.Environmental science

a) Separating solid particles and liquids: Separates solid particles from liquids in samples

iii.Food processing

a. Extracting fat from milk: Produces skimmed milk
b. Removing water from moist lettuce: Uses a salad spinner to remove water from lettuce
c. Spin-drying water in washing machines: Removes water from clothing
d. Diesel fuel purification: Separates diesel fuel from water and sludge

45. Multiparameters

Multiparameters are devices that measure more than one parameter. They can be used in medical, scientific, and environmental applications.

Applications

i.Medical

a. **Multiparameter monitors:** These devices monitor a patient's vital signs, such as heart rate, blood pressure, and oxygen saturation. They are often used in intensive care units, hospitals, and emergency rooms.

ii.Scientific

b. **Multiparameter pH meters:** These instruments measure the pH of a solution, as well as other parameters like conductivity, ion concentration, and dissolved oxygen. They are used in food and beverage processing, pharmaceutical manufacturing, and environmental monitoring.

iii.Environmental

c. **Multiparameter water quality meters:** These meters measure parameters like pH, conductivity, dissolved oxygen, turbidity, temperature, and pressure. They are used to monitor water quality.

46. Furnaces

A furnace is a device that produces heat for heating buildings, melting metals, or changing the properties of materials. Furnaces can be used in homes and industrial settings.

Applications

i. Melting

a. **Tube furnaces:** Melt small amounts of metals, alloys, and polymers in a controlled environment

b. **Induction furnaces:** Melt metals, including precious metals, for investment casting

ii. Heat treating

a) **Annealing furnaces:** Soften materials to improve their mechanical and electrical properties

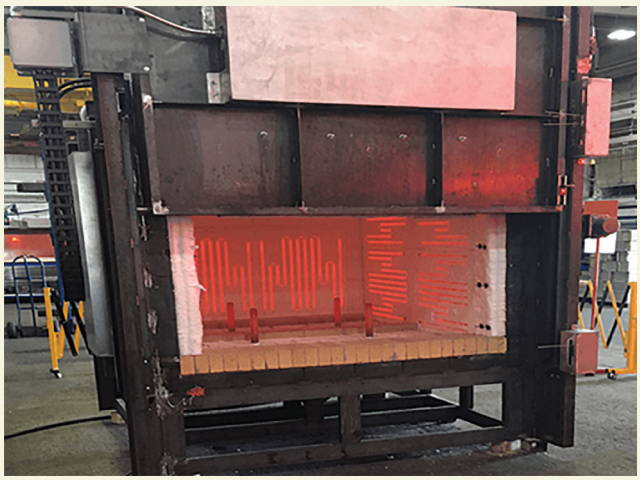
b) **Heat treatment furnaces:** Improve the properties of metal products and sinter ceramics and metals

iii. Brazing

a. **Retort furnaces:** Combine materials by melting a filler metal into the joint

iv.Consistent heating

b. **Heating furnaces:** Convert energy into heat to transfer to materials for crystallization and processing



iv. Energy efficiency

a) **Rotary furnaces:** Use insulation materials to minimize heat loss and reduce greenhouse gas emissions

v. High temperature processing

a. **High temperature processing furnaces:** Provide reliable temperature uniformity for research labs, production applications, and more

47. Advanced microwave digestor

The microwave digester system, one of the automated laboratory systems, is widely used in sample preparation for atomic absorption spectroscopy (AAS), inductively coupled plasma atomic emission spectroscopy (ICP), inductively coupled plasma mass spectrometry (ICP-MS), gas chromatography (GC), gas chromatography-mass.

Applications

a) **Food and agriculture:** Analyzing heavy metals in food and agricultural products

b) **Environmental science:** Analyzing heavy metals in environmental samples

c) **Human and animal samples:** Analyzing heavy metals in human and animal samples

d) **Textiles:** Analyzing heavy metals in textiles

e) **Alloys:** Analyzing heavy metals in alloys

f) **Cosmetics:** Analyzing heavy metals in cosmetics

g) **Mineral samples:** Analyzing heavy metals in mineral samples

h) **Lithium battery materials:** Analyzing materials for lithium batteries

i) **Hemp and cannabis:** Analyzing hemp and cannabis

48. Isomet low speed saw

The Isomet Low Speed Saw is a precision cutting tool used in many fields, including metallurgy, geology, biomedical science, and electronics. It's designed to cut materials with minimal deformation, making it ideal for applications that require precise thin cuts.

Applications

a. Metallurgy: Cut brittle or ductile metals
b. Geology: Cut materials for geological analysis
c. Biomedical science: Cut biomaterials for analysis
d. Electronics: Cut electronic components for analysis
e. Industrial: Cut materials for industrial applications

49. Autoclaves

Autoclaves operate at high temperature and pressure in order to kill microorganisms and spores. They are used to decontaminate certain biological waste and sterilize media, instruments and lab ware.

Applications

i.Medical applications

a) Sterilize surgical instruments, drapes, and linens
b) Sterilize implanted medical devices
c) Inactivate medical waste that contains bacteria, viruses, and other biological material

ii.Laboratory applications

a. Sterilize equipment, instruments, and labware
b. Sterilize media used in experiments
c. Decontaminate biological waste
d. Sterilize liquids used in laboratory experiments

iii.Industrial applications

a) Process parts and materials in manufacturing, such as pressure treated woods and specialized rubbers

iv.Food industry applications

a. Sterilize equipment and materials in the food industry

v.Research applications

a) Sterilize equipment and materials in scientific research
b) Sterilize equipment and materials in pharmaceutical research

vi.Quality assurance applications

a. Use autoclaves to ensure quality assurance.
b. Autoclaves use moist heat to sterilize materials, which coagulates proteins that microbes need to thrive. This process disables and eventually kills microbes.

50. Automatic Ice Machine

Automatic ice machines are used in many commercial and industrial settings to produce ice for food and beverage service, patient care, and more.

Applications

i. Food and beverage service

a) **Restaurants and bars:** Automatic ice machines are used to produce ice for drinks, food displays, and more

b) **Hotels:** Automatic ice machines are used to produce ice for drinks, food displays, and more

c) **Convenience stores:** Automatic ice machines are used to produce ice for drinks

d) **Sports venues:** Automatic ice machines are used to produce ice for drinks

ii.Patient care

a. **Hospitals:** Automatic ice machines are used to produce ice for patient care

iii.Other applications

a) **Cooling rooms:** Automatic ice machines can be used to produce ice for cooling rooms using an air conditioning unit

b) **Food display:** Automatic ice machines can be used to produce ice for food displays, such as seafood grocery store displays or salad bars

51. Microplate reader

A microplate reader is a laboratory instrument that is used to measure chemical, biological or physical reactions, properties, and analytes within the well of a microplate. A microplate consists of small multiple wells in which separated reactions take place, enabling the analysis of multiple samples.

Applications

a) **Enzyme-Linked Immunosorbent Assays (ELISA):** Microplate readers measure the fluorescence or absorbance signals produced during ELISA assays. ELISA is used to quantify the concentration of specific proteins in biological samples.

b) **Cell viability and cytotoxicity assays:** Microplate readers measure the metabolic activity or release of cellular markers to evaluate the effects of drugs, chemicals, or treatments on cell health.

c) **Gene expression analysis:** Microplate readers are used in reporter gene assays to study gene expression and transcriptional regulation.

d) **High-throughput screening (HTS):** Microplate readers are used in HTS to test large libraries of compounds or potential drug candidates against a specific biological target.

e) **Protein and enzyme assays:** Microplate readers are used to measure protein and enzyme assays.

f) **HIV detection:** Microplate readers are used to detect HIV.

g) **Nucleic acid quantitation:** Microplate readers are used to quantitate nucleic acids.

52. Biospetrometer

Biospectrometers are used in research laboratories to measure the concentration of analytes in liquids, and to record wavelength scans.

Applications

a) **Quantifying nucleic acids:** Biospectrometers can measure the concentration of nucleic acids by measuring light absorption at 260 nanometers.

b) **Quantifying proteins:** Biospectrometers can measure the concentration of proteins by measuring light absorption at 280 nanometers.

c) **Measuring bacteria growth:** Biospectrometers can measure bacteria growth by measuring optical density at 600 nanometers.

d) **Measuring enzyme activity:** Biospectrometers can measure enzyme activity by regulating the temperature of the sample.

e) **Measuring biomolecule concentration:** Biospectrometers can measure the concentration of biomolecules by using fluorescence measurements.

f) **Evaluating dye-labeled biomolecules:** Biospectrometers can evaluate dye-labeled biomolecules by measuring their fluorescence.

g) Biospectrometers can also be used to perform colorimetric assays, and to evaluate FOI for dye-labeled biomolecules.

h) Biospectrometers are used in research laboratories in molecular biology, biochemistry, and cell biology.

53. Esco spectrum 96

The Esco Swift Spectrum 96 Real Time Thermal Cycler is a PCR system that can be used for a variety of applications, including forensics, gene expression, and identification.

Applications

a. **Forensics:** The Spectrum 96 can be used to detect DNA and RNA in forensic samples.

b. **Gene expression:** The Spectrum 96 can be used to study gene expression.

c. **Identification and discovery:** The Spectrum 96 can be used to identify and discover new DNA and RNA sequences.

54. Liquid Scintilation analyzer

A liquid scintillation analyzer is a laboratory instrument that measures the radioactivity of samples using a process called liquid scintillation counting (LSC). LSC is a standard method for quantifying low-energy radioactive isotopes.

Applications

i.Medicine

a) **Reproductive health:** LSAs are used in prenatal testing, newborn screening, and other reproductive health tests

b) **Cancer research:** LSAs are used in cancer research, including HPV testing and ctDNA workflows

c) **Infectious disease research:** LSAs are used in the detection of pathogens, such as tuberculosis and SARS-CoV-2

ii.Environmental science

a. **Radioactive pollution:** LSAs are used to detect radioactive pollution in water, urine, and other environmental samples

b. **Environmental process rates:** LSAs are used to study the rates of environmental processes, such as groundwater movement and marine sediment mixing

ii. Nuclear safety

a) **Nuclear plant safety:** LSAs are used in nuclear plant safety inspections

b) **Radioactive waste:** LSAs are used to monitor radioactive waste and respond to emergencies caused by radioactive waste

55. DSA cryostat

A cryostat is a tool used to freeze and cut tissue samples for microscopic analysis.

Applications

Histology Equipment in Immunohistochemical Experiments

56. Climate chamber

Climate chambers are used in many industries to test the performance of products and materials in different environmental conditions

Applications

a) **Aerospace:** Test components for extreme conditions in space or high-altitude flight

b) **Automotive:** Simulate climatic conditions for quality control and R&D on vehicles and components

c) **Biological and medical research:** Study the effects of temperature and humidity on cell cultures, pharmaceutical products, and biological samples

d) **Construction, manufacturing, and materials science:** Assess how materials react to different environmental conditions

e) **Corrosion testing:** Use salt spray testing systems to test for corrosion

HUMAN RESOURCE CAPACITY

Introduction

This section provides an overview of the existing human resource capacity to conduct coastal and marine research at KMFRI, highlighting key aspects such as training programs, specialization of research scientists, technical staff capability at various directorates, support staff, knowledge transfer initiatives and future capacity needs.

Existing Capacity for Coastal and Marine Research

KMFRI has a well-structured workforce composed of highly trained research scientists, technical staff, and support personnel. The institution's coastal and marine research capabilities span various disciplines including biology, chemical and physical oceanography, fisheries science and mariculture. The expertise available at KMFRI allows it to effectively conduct research, policy advisory services, capacity-building initiatives and community engagement in the coastal and marine environment.

Training Programmes

KMFRI has developed several training programs aimed at enhancing the skills of its workforce and stakeholders. The most recent is the KMFRI Graduate School (KMFRI-GS), which is envisaged to provide demand driven and responsive research training. Other existing programs include:

- In-house training for research scientists and technical staff on new methodologies and technologies.
- Collaborative training with universities and various research institutions.
- Capacity-building workshops for government agencies, community groups and fisheries stakeholders.
- Short courses on fisheries management, aquaculture practices, and climate change resilience.

Research Scientists by Specialization

KMFRI has a diverse team of coastal and marine research scientists numbering 57, among whom 25 are women. The number of research specialists in the departments of the 4 main Directorates comprise Marine Fisheries (12), Mariculture (7), Oceanography and Hydrography (32) and Socioeconomics (6) They specialize in more than 30 disciplines as tabulated below.

Marine Ecology, genetics engineering and conservation	Climate Change and Environmental Science	Marine Geology
Fisheries Biology, Stock dynamics and assessment	Data and Information management	Biochemistry
Hydroacoustic surveys	Environmental Impact and Audit	Heavy and trace metals monitoring
Primary and secondary productivity	Socioeconomics and Policy Research	Marine algae
Plankton ecology and systematics	Aquaculture and Mariculture	Modelling and instrumentation
Ornamental fish	Seaweeds ecology and farming	Marine litter and plastics
Sea level monitoring	Seagrass ecology	Marine pollution
Biodiversity of coastal and marine organisms	Coastal and Marine Resource Management	Water quality
Natural marine products	Mangrove Ecology	Marine spatial planning
Monitoring and assessment of the coastal and marine environment	Mud crab farming	Artificial intelligence
Marine Biotechnology	Remote sensing and GIS	Ocean currents, Bathymetry and Mapping
Microbiology	Marine bioprospecting	Post-harvest technologies

This multidisciplinary expertise enables KMFRI to conduct comprehensive research addressing ecological, economic, and policy challenges in the coastal and marine sector. Currently, the academic and field qualifications span 29 PhDs of whom 10 are women, Masters degrees (20) and the rest have Bachelor's degrees.

Technical Staff Capability

KMFRI has a skilled technical team responsible for supporting coastal and marine research activities. The technical staff includes laboratory technicians & technologists, laboratory analysts, field research assistants, GIS specialists, marine surveyors, and data analysts. These personnel play a crucial role in sample collection, laboratory analysis, data management, and maintenance of research equipment.

Currently 25 technologists are engaged in Mombasa station operating an array of laboratory equipment. They are supported by 10 more field assistants based at Gazi and Shimoni.

Support Staff

KMFRI's support staff in the Mombasa, Gazi and Shimoni ensure the smooth operation of administrative and logistical functions. This category has 150 staff including finance officers, IT personnel, human resource staff, administration, procurement specialists, and facility maintenance teams. Their contribution ensures that research activities are well-coordinated and adequately resourced. This makes the ratio of researchers (57) versus technical and other support staff (35 + 150) in the coastal and marine realm 57:185, meaning 1 researcher to 3 support staff.

In developing nations, the ratio of researchers to support staff is typically much lower compared to developed countries, often with significantly fewer researchers per support staff, meaning there is a larger proportion of support staff relative to researchers due to limited funding and research infrastructure in these regions. The current ration of 1 scientist to 3 support staff meaning that the core coastal and marine research activities at KMFRI are executed effectively with few support staff.

Directorates Operating in the Coastal and Marine Environment

This Directorate undertakes research mainly in environmental, ecological, biological, chemical and physical oceanography in the coastal and marine environment of Kenya. It is responsible for generating knowledge for the sustainable management and development of the Blue Economy resources for enhanced socio-economic benefits to Kenyans. The Directorate executes its research mandate through three main research departments:

Department of Marine and Coastal Fisheries Research

The Directorate conducts routine Catch Assessment Surveys (CAS) at 16 landing sites along the Kenya coast spanning the five counties that border the coastline (Kwale, Mombasa, Kilifi, Tana River and Lamu). Researchers collect biological data on key species needed for estimating fish growth, maturity and fishing mortality - hence deriving the stock status. Outputs include annual catch and biological data collected, which is archived in a database for estimation of total fish production, as well as status of the stocks harvested to inform the development and implementation of management interventions. The Department also hosts the Natural Products and Post Harvest Technologies Research Programme which is responsible for the innovation and transfer of climate-smart interventions geared towards reducing post-harvest aquatic food and waste to enhance food and nutritional security, while enhancing the livelihoods of communities.

Department of Oceanography and Hydrography Research

The Department undertakes comprehensive research activities on marine hydrological systems, coastal dynamics and seafloor mapping to generate vital knowledge on processes that modify water movement, marine and seabed resources, climate, weather and related economic activities. Our researchers conduct systematic surveys and data collection to understand ocean dynamics and environmental patterns affecting coastal regions. Outputs include marine scientific datasets that inform climate modeling, coastal management strategies, and sustainable resource utilization. These research outputs support evidence-based key decision-making informing marine spatial planning, climate adaptation measures, and protection of critical marine and coastal ecosystems. The Department works closely with national and international partners to enhance the understanding of our ocean systems and their impact on coastal communities and economies.

The Institute Research vessel *RV Mtafiti* has also facilitated research into new frontiers and surveyed the whole of Kenyan EEZ. This has provided insights into the potential breeding and fishing areas in territorial and EEZ waters. Consequently, areas of high fish productivity have been identified such as Lamu and the North Kenya Banks. The surveys contribute information on stock status of fish and ways of exploring the Blue Economy, and promote collaboration in the protection of coastal ecosystems. Additionally, *RV Mtafiti* also allows us to think of research including bioprospecting in the Economic Exclusive Zone and Areas Beyond National Jurisdictions.

Directorate of Aquaculture

The Directorate of Aquaculture Research in the coastal region carries out research in culture systems, technologies and innovations including recirculating aquaculture systems, in-pond raceways, Integrated Multi Trophic Aquaculture (IMTA) systems, cultured species and aquatic plants e.g. seaweeds, fish health and disease management and biosecurity, innovative fish marketing, post-harvest preservation and value addition technologies. The Directorate addresses cross-cutting socio-economic issues in aquaculture, including economics, environmental performance and impact assessment, gender mainstreaming and social inclusion.

Arising from the mandate of this Directorate, the Mariculture Research Department is responsible for culturing organisms in the marine environment in order to generate knowledge for the sustainable management and development of the Blue Economy resources for enhanced socio-economic benefits to Kenyans.

Two Aquaculture centres exist in the counties of Kwale and Taita Taveta . Shimoni Centre in Kwale County is the home of the National Mariculture Research and Training (NAMARET) Centre, which specializes in mariculture research and capacity building. The centre hosts the first marine hatchery in the Western Indian Ocean (WIO) region thus providing a unique opportunity in ensuring KMFRI becomes a centre of excellence in mariculture.

Directorate of Socioeconomics Research

Directorate of Socioeconomics Research aims at promoting the sustainable use of Blue Economy resources including marine, aquaculture and other living and non-living aquatic resources for sustainable development and community empowerment. It is responsible for socioeconomic assessment and monitoring, econom-

ic valuation, benefit sharing and marketing, economic analysis and community development, and conflict resolution to address cross-cutting issues that influence the management of aquatic resources and environment.

It is responsible for conducting studies on cultural and religious practices, marine cultural heritage, ocean governance, indigenous knowledge, gender dynamics and special interest groups, conflict resolution, social and economic setting, aquatic resource users and impacts of anthropogenic activities on ecosystem health..

The Directorate also undertakes economic valuation of aquatic resources, research on benefit sharing, cost-benefits analysis of alternative technologies and livelihood sources among aquatic resource users, development and up-scaling the use of cost-effective market information systems, and market research to inform policy and guide investments.Socioeconomics researchers further conduct livelihood studies, economic analyses to support investments in the Blue Economy and related developments, value-chain analyses of fisheries and other aquatic products, provides a forum for linkages with national, regional and international agencies, and participatory management of aquatic resources to enhance social development.

Collaboration

KMFRI has established active collaborative research with local, regional and International academic institutions. Those in Kenya include the University of Nairobi (UoN), Pwani University (PU), Technical University of Mombasa (TUM), Kisii University (KSU), University of Eldoret (UoE), Egerton University (EU), Karatina University (KarU). Internationally, KMFRI is collaborating with Nelson Mandela Metropolitan University (MU, S. Africa), University of Edinburg (United Kingdom), Napier University (United Kingdom), Free University of Brussels (VUB, Belgium), Erasmus Mundus (Europe), Stockholm University (SU, Sweden), University of Dar es Salaam and Institute of Marine Sciences (UDSM; IMS, Tanzania), Institute of Marine Science (Norway) among others.

Researchers in all the Directorates operating in the coastal and marine environment have running projects in partnership with regional and international institutions and development partners including the Western Indian Ocean Marine Science Association (WIOMSA), The PEW Charitable Trusts, United Nations Environment Programme (UNEP), Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO), Global Environment Fund (GEF), UK Global Challenges Research Fund, SWIOFC, IFS, SAPPHIRE, Rufford Grant, Leibniz Centre for Tropical Marine Research (ZMT), Swedish International Development Cooperation Agency (SIDA), The Nature Conservancy (TNC), Wildlife Conservation Society (WCS), Blue Action Fund (BAF), Blue Natural Capital Financing Facility (BNCFF) World Wide Fund for Nature (WWF), among other National and County Government agencies.

Locally, through the Directorates operating in the coastal and marine environment, KMFRI has been liaising effectively with the respective coastal County Governments. Collaboration extends to the National Environment Management Authority (NEMA), Kenya Forestry Service (KFS), Kenya Fisheries Service (KeFS), National Research Foundation (NRF), Kenya Prison Service (KPS), Water Resource Management Authority (WARMA), Coast Water Services etc.

Through these and similar collaborations the World Bank and GEF have facilitated KMFRI to host and implement the Southwest Indian Ocean Fisheries Project (SWIOFP, 2007 – 2012?), Kenya Coastal Development Project (KCDP, 2011-2017), the Project on Kenya Marine Fisheries Socioeconomic Development (KEMFSED, 2020 – 2025) and more.

Knowledge Transfer Initiatives

KMFRI plays a pivotal role in transferring research knowledge to stakeholders through various initiatives. Mombasa Centre and the two coastal stations in Gazi and Shimoni have elaborately planned to systematically share critical information, skills, and expertise not only among researchers but all employee with the aim of improving overall performance, efficiency, and continuity, particularly when facing situations like employee departures or new project implementations. The plans involve strategies such as mentorship, training programs, documentation repositories, and fostering a culture of knowledge sharing among the local communities. Other approaches include:

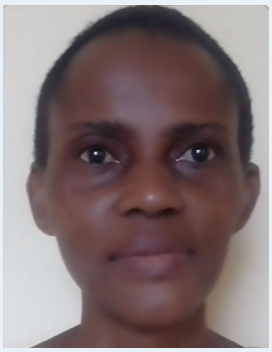
- Publishing research findings in peer-reviewed journals, books, pamphlets and policy briefs.
- Hosting stakeholder workshops and dissemination forums.
- Providing advisory services to government agencies and community organizations.
- Engaging in public awareness campaigns on sustainable marine resource utilization.
- Developing extension services for fisher communities and aquaculture enterprises.
- Translating research output and new findings into the national Kiswahili language.

Future Capacity Needs

To enhance its research capabilities and address emerging challenges in the coastal and marine sector, KMFRI requires additional capacity-building measures, including:

- Recruitment of more specialized researchers in emerging fields such as marine genetics and Blue Economy development.
- Investment in state-of-the-art laboratory and research vessel facilities.
- Expansion of training programs to incorporate modern technological advancements in marine science.
- Strengthening partnerships with more international research institutions and donors.
- Enhancing data management and digital infrastructure for better research analytics and reporting.
- Improving collaboration with Technical and Vocational Education and Training (TVET) Centres

MARINE FISHERIES RESEARCH DEPARTMENT



Dr. Esther Fondo
Research Scientist

Has worked in various national and international research projects undertaken in KMFRI, which include the Inventory of Mida Creek Biodiversity; and Status of Trawl Fishery of Malindi Ungwana Bay. She has also participated in the Biological Baseline Port Survey of Mombasa under the GloBallast program of IMO. Has undertaken a study of artisanal fishery in selected sites along the Kenyan coast; exploitation trends of Cephalopods in South Coast of Kenya and Mud crabs in the North Coast of Kenya. She holds a PhD from the University of Queensland, Australia, on the effects of fishing on ecosystem dynamics.

Location: KMFRI Mombasa

Department: Fisheries

Specialization: Fisheries and Ecosystem Based Management

Research Interests: Ecosystem functioning, fisheries and fish stock assessment

Email: efondo@kmfri.go.ke/efondo@yahoo.com

Qualifications:

- Ph.D.
- MSC
- BSc

Publications:

- **Fondo** EN, Kimani EN, Munga CN, Aura CM, Okemwa G, Agembe S (2014) A Review of the Marine Fish Resources Research in Kenya and influence on Management. *Western Indian Ocean Journal of Marine Science*. 13(2): 143-162
- **Fondo** EN, Milani C, Heymans JJ, Skilleter A (2015) Banning fisheries discards abruptly has a negative impact on charismatic marine megafauna. *PLoS ONE,* 10(12): e0144543, [https://doi:10.1371/journal.pone.0144543]
- **Fondo**, EN, Omukoto JO (2021) Observations of industrial shallow-water prawn trawling in Kenya. Pp. 44–45 in *Frontiers in Ocean Observing: Documenting Ecosystems, Understanding Environmental Changes, Forecasting Hazards* Kappel ES, JuniperS SK, Seeyave S, Smith E and Visbeck M eds, (2021) *A Supplement to Oceanography,* 34(4): 2-17 [https://doi.org/10.5670/oceanog.2021.supplement.02-17]
- **Fondo** EN and Ogutu B (2021) Sustainable crab fishery for blue economy in Kenya. *Aquatic Ecosystem Health & Management*, 24(1): 21–26, 2021. ISSN: 1463-4988 print / 1539-4077 online. [https://DOI: 10.14321/aehm.024.01.05]
- **Fondo** EN, Omukoto JO, Wambiji N, Okemwa GM, Thoya P, Maina GW, Kimani EN (2022) Diversity of Shallow-Water Species in Prawn Trawling: A Case Study of Malindi–Ungwana Bay, Kenya. *Diversity*, *14*(3): 199

Dr. Edward Kimani
Research Scientist

Currently holds the position of Chief Research Scientist in the Ocean and Coastal Fisheries Research Department at KMFRI, Mombasa Station. Research interests are fish population dynamics, stock assessment, ecosystem functioning and responses to climate and human induced changes. Current research activities include Kenya EEZ Fisheries and Environmental research survey planning and implementation, industrial and small scale fisheries Electronic Monitoring and Industrial trawl fishery monitoring.

Current Research:

- Offshore fisheries stock and environment assessment
- Kenya Industrial fisheries Electronic Monitoring Pilot project
- Small-scale fisheries digital vessels tracking and catch assessment (Digital Coasts)
- Shallow water and deep water trawl fishery assessment
- Small scale fisheries catch assessment

Research Networks: ResearchGate

Location: KMFRI Mombasa Research Centre

Department: Ocean and Marine Fisheries Research Department

Specialization: Marine fisheries research, marine and coastal ecosystems functioning, marine ecology and biodiversity conservation

Research Interests: Research areas of interest include marine fisheries and ecology. Research areas are fish population dynamics, stock assessment, ecosystem function, climate change conducted through planning and implantation of fisheries and environmental surveys

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Qualifications:

- **PhD** (Zoology)
- **MSc** (Marine Science)
- **Bsc** Honours (Zoology/Botany)

Publications:

- Aloo PA, Munga CN, **Kimani** EN, Ndegwa S (2014) A review of the status and potential of the coastal and marine fisheries resources in Kenya. *International Journal of Marine Science,* 4(24): 1-9
- Aura CM, CMunga CN, **Kimani** E, Manyara JO, Musa S (2011) Length–Weight relationships for nine deep sea fish species off the Kenya coast. *Scientific Note,* PAJAS 6(2): 188-192
- Aura CA, RAnam RO, Musa S, **Kimani** E (2013) Length-Weight Relationship and Condition Factor (K constant) of *Dentex maroccanus, Valenciennes* 1830 (Family Sparidae) at Malindi, Kenya Short Communication. *Western Indian Ocean Journal of Marine Science,* 12(1) 79-83, 2013
- Aura CM, Musa S, Osore MK, **Kimani** E, Alati VM, Wambiji N, Maina GW, Karisa HC (2016) Qualification of climate change implications for water-based management: A case study for oyster suitability sites occurrence model along the Kenya coast. *Journal of marine systems,* 165(2017): 27-35
- Aura CM, **Kimani** E, Musa S, Kundu K, Njiru J (2017) Spatio-temporal macroinvertebrate multi-index of biotic integrity (MMiBI) for a coastal river basin: a case study of River Tana, Kenya. *Ecohydrology & Hydrobiology,* 17: 113–124
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Dr. Emanuel Mbaru
Research Scientist

I am working as a senior fisheries scientist at Kenya Marine and Fisheries Research Institute (KMFRI). I hold a PhD in Marine Science (since 2018) from James Cook University, Australia. My work is primarily focused in the new concepts that link social-ecological networks and environmental outcomes. I have over 10 years of experience working on marine fisheries with a special emphasis on mitigating adverse ecological impacts of fishing on small scale fisheries, advancing widespread adoption of alternative and conservation friendly fishing technologies, improving capacity and resilience of vulnerable coastal communities affected by social and environmental change, among other broader fisheries management interventions. I am currently the national coordinator and thematic expert of a major EU funded Pan-African program entitled Global Monitoring of Environment and Security and Africa (GMES & Africa). I also work closely with international NGOs on developing local level management in nearshore fisheries in the western Indian Ocean (WIO) region. Part of my work involves developing alternative fishing for fishers affected by increased management restrictions, including community level fisheries closures.

Research Network: Research Gate

Location: KMFRI Mombasa

Department; Fisheries Research

Specialization: Social and Ecological Network Modeling

Research Interests: Social-ecological network modeling, GIS and Remote Sensing, Climate change,

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Qualifications:

- PhD Environmental and Related Studies - James Cook University, Australia
- Msc Fisheries Science – Rhodes University, South Africa
- Bsc Fisheries and Aquatic Sciences – Moi University, Kenya

Publications:

- Aura M, Odoli C, Nyamweya CS, Njiru JM, Musa S, Miruka JB, Owili MO, Omondi R, Raburu P, Manyala J, Mwamburi J, Ogari Z, **Mbaru** EK (2020). Application of phytoplankton community structure for ranking the major riverine catchments influencing the pollution status of a lake basin. *Lakes and Reservoirs Research and Management.* 2020: 00:1–15. [https://doi: 10.1111/lre.12307]
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- **Mbaru** EK *et al.*, (2010) Length-Weight- Relationship of 39 Selected Reef Fishes in the Kenyan Coastal Artisanal Fishery. *Fisheries Research,* 106: 567–569
- **Mbaru** E. K. *et al.,* (2011). Tolerance of Yolk Sac and Free Swimming Fry of African Catfish (Clarias gariepinus, Burchell 1822) to different Chemotherapeutic Doses of Formalin. *African Journal of Agricultural Research,* 6(2): 323-330.
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- **Mbaru** EK (2013) An assessment of the Kenyan coastal artisanal fishery and implications for the introduction of FADs. MSc Thesis, Rhodes University, South Africa
- **Mbaru** EK, McClanahan TR (2013) Escape gaps in African basket traps reduce bycatch while increasing body sizes and incomes in a heavily fished reef lagoon. *Fisheries Research,* 148: 90– 99
- **Mbaru** EK, Barnes M (2017) Key players in conservation diffusion: using social network analysis to identify critical injection points: *Biological Conservation,* 210: 222-232
- **Mbaru** EK *et al.,* (2018) Experimental evaluation of influence of FADs on community structure and fisheries in coastal Kenya. *Aquatic Living Resources,* 31: 6
- **Mbaru** EK, Graham NAJ, McClanahan TR, Cinner EJ (2019). Functional traits illuminate the selective impacts of different fishing gears on coral reefs. Journal of Applied Ecology [https://doi: 10.1111/1365-2664.13547]
- Mkare TK, Manyala JO, Mulanda AC, **Mbaru** EK (2010). Phytoplankton Composition and Abundance in Relation to Physico-chemical Characteristics, Chepkanga Dam, Eldoret-Kenya. Lakes and Reservoir: Research and Management 15: 99-106.
- Nyakeya K, Chemoiwa E, Moraa Nyamora J, **Mbaru** EK, Moraa Gichana Z, Basweti E (2020). Endemic Lake Baringo *Oreochromis niloticus* fishery on the verge of collapse: A review on the causes and strategies towards its recovery, conservation and management for sustainable exploitation. *Lakes and Reservoirs, Research and Management*

Dr. Fatuma Mzingirwa
***Research Scientis*t**

I am working as a senior Research Scientist at KMFRI. I hold a PhD in Fisheries Science from Rhodes University. My primary work involves stock assessment of fish for sustainable harvesting and management as a whole. I have also worked on molecular techniques to investigate genetic diversity of marine fish in the Indian Ocean. The techniques that I have used include mitochondrial DNA and nuclear microsatellites. I have also gained some skills on Next Generation Sequencing (NGS) which is an advanced method for genetic studies.

I have been involved in various national and regional projects at KMFRI including Asia-Africa BlueTech SuperHighway project (World Fish), Kenya Marine and Fisheries and Socio economic Development (KEMFSED) project, South West Indian Ocean Fisheries Project (SWIOFP) and Kenya Coastal Development Project (KCDP). I have also received grants from the Western Indian Ocean (MARG 1), International Foundation for Science (IFS) and National commission for Science Technology and Innovation (NACOSTI).

Location: KMFRI Mombasa

Department: Fisheries

Specialization: -

Research Interests: Marine Fisheries ecology and genetic, Fish Stock Assessment

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Qualifications

- **PhD.** in Fisheries Science-Rhodes University
- **MSc.** in Fisheries Management-University of Eldoret
- **BSc.** in Fisheries and Aquatic Sciences-Moi Univeristy

Publications:

- **Mzingirwa** FA, Mkare TK, Nyingi Dorothy Wanja and Njiru J (2019) Genetic diversity and spatial population structure of a deep water snapper, *Pristipomoides filamentosus* in the southwest Indian Ocean. *Mol Biol Rep* [https://DOI 10.1007/s11033-019-04962-w]
- **Mzingirwa** FA, Stomeo F, Kaunda-Arara B, Nyunja J and Mujibi FDN (2019). Genetic Connectivity of the Sky Emperor, *Lethrinus mahsena Populations Across a Gradient of Exploitation Rates in Coastal Kenya. Front. Genet. 10:1003. doi: 10.3389/fgene.2019.01003*
- **Mzingirwa** FA, Jane M. Nyamora, Johnstone O. Omukoto , Paul Tuda (2020).Stock assessment of the Tigertooth croaker, *Otolithes ruber* (Bloch & Schneider, 1801) from the commercial prawn trawl fishery by-catch in coastal Kenya. *Western Indian Ocean Journal of Marine Science,* 19(2) 2020 149-165
- Okemwa G, Wambiji N, Kimani E, Anam R, Orembo B, Ontomwa M, Nyamora J, **Mzingirwa** F, Almubarak A, Karama K (2018) Status of Small-scale Nearshore Finfish Fisheries. In: The Status of Kenya Fisheries: Towards the sustainable use of renewable aquatic resources for economic development. *Kenya Marine and Fisheries Research Institute* (KMFRI), Kenya. Pp 9 – 17
- Okemwa GM, Abubakar AA, **Mzingirwa** F, Kimani EN, Kamau JN, Njiru JM, Sauer W (2023) Characterizing gear-based exploitation patterns of artisanal tuna fisheries in the western Indian Ocean: A snapshot from Kenya, *Regional Studies in Marine Science,* Volume 61, 102877

Dr. Gladys Okemwa
Research Scientist

Dr. Gladys Okemwa is a Principal Research Scientist in Fisheries at KMFRI. She has over 30 years of experience in marine fisheries and conservation in Kenya. Her research interests are multifaceted, ranging from fish biology and ecology, gear selectivity impacts, fish stock assessment using data-limited approaches, vulnerability risk assessment of exploited species, and endangered species conservation.

She provides her technical expertise and contributions to various regional processes within the Western Indian Ocean region. Together with a team of experts, her work with the South West Indian Ocean Fisheries Commission Scientific Committee (SWIOFC) has revolved around the development of decision-support tools for fish stock assessment and implementation of the ecosystem approach to fisheries. She is listed as a Technical Assistant for the Marine Stewardship Council (MSC) and has published over 40 peer-reviewed publications and book chapters. She has served as a reviewer for various journals: Fisheries Research, Marine Policy, Ocean & Coastal Management, Western Indian Ocean Journal of Marine Science, African Journal of Marine Science, Oryx, and Scientific Reports, among others. Her passion is to empower young and upcoming fisheries scientists in the marine space.

Location: KMFRI Mombasa

Department: Fisheries

Specialization: Marine and coastal fisheries and conservation

Research Interests: My research interests broadly focus on the assessment and sustainable management of marine fisheries. In relation to this, I also undertake ecological research to understand recruitment dynamics of juvenile reef fish. I work closely with resource managers at the National and County government in developing sustainable fisheries management plans and strategies. I also have a passion in the conservation of endangered and threatened species especially sea turtles and working with community stakeholders and mentoring upcoming scientists.

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Qualifications:

- **PhD**. Fisheries & Aquatic Resource Management, University of Eldoret
- **MSc**. Biological Sciences, University of Auckland, New Zealand
- **BSc**. Zoology, University of Eastern Africa, Baraton

Publications:

- Abubakar AA, **Okemwa** GM, Kimani E (2023) Comparative assessment of the impacts of artisanal trolling and industrial longlining on yellowfin tuna exploited off the Kenyan. *Western Indian Ocean Journal of Marine Science,* 21(2) 131-140, [https://www.ajol.info/index.php/wiojms/article/view/225051/229336]
- Bourjea J, Mortimer JG, **Okemwa** GM, Godley B, Hughes G, Dalleu M, Jean C, Cicione S (2015) Population structure enhances perspectives on regional management of the Western Indian Ocean Green Turtle. Conservation Genetics [https://DOI 10.1007/s10592-015-0723-3]
- Chapter 9: Africa (2023). In: Climate Change 2023: Impacts, Adaptation, and Vulnerability. Contribution Author of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Pörtner H-O, Roberts DC, Tignor M, Poloczanska ES, Mintenbeck K, Alegría A, Craig M, Langsdorf S, Löschke S, Möller V, Okem A, Rama B (eds). Cambridge University Press. IPCC WGII Sixth Assessment Report Intergovernmental Panel on Climate Change Publisher: Cambridge University Press. [https://doi.org/10.1017/9781009325844.011]
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- Mwaluma JM, **Okemwa** GM, Mboga AM, Ngisiange N, Winder M, Kyewalyanga MS, Kilonzo J, Kinyua IM (2022) Seasonal occurrence and relative abundance of marine fish larval families over healthy and degraded seagrass beds in coastal Kenya. Diversity 2022, 14, 730. https://www.mdpi.com/1424-2818/14/9/730/pdf?version=1662371365
- Njiru J, Ruwa R, Kimani E, Ong'anda H, **Okemwa** GM and Melckzedeck Osore (eds). (2018) The *RV Mtafiti*: Marine Research towards Food Security and Economic Development for Kenya. 115 pp (KMFRI), Kenya. 177 pp.
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B (2016) Catch composition and sustainability of the marine ornamental fishery in Kenya. *Fisheries Research,* 183: 9-31

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Jane Nyamora
Research Scientist

Drs Jane Nyamora, is a research scientist with a vast experience in Fisheries, Aquaculture, Wetlands and environmental toxicology. She is currently pursuing her PhD in Fisheries at Kisii University. She holds a Master of Science Degree in Marine and Lacustrine Science and Management, a BSc Degree in Fisheries and Aquatic Science and a diploma in Analytical Chemistry.

She has international certificates in; Monitoring and Assessing Data and Capacity Poor Fisheries in the context of the Ecosystem Approach to Fisheries, Science Policy Interaction, Stakeholders Engagement, Marine Spatial Mapping, Marine Biogeographic, Scientific Cruise Planning, Oceanographic sampling Fisheries and Data Management, Environmental Science in Limnology and Wetland Ecosystems. She and her colleagues did a novel/innovative study on "Adding value to our produce" where they formulated the 1st seaweed bath soap and other products using locally grown seaweeds in the Kenya Coast which has seen KMFRI and other organizations set up a factory to formulate seaweed products at Kibuyuni, South Coast. She has carried out research in environmental toxicology using *Aselus aquaticus* as a test organism. Currently she is working on stock assessment, fish biology and ecology, fish quality and safety. She has been a Principal Investigator for two national projects that were funded by National Research Fund (NRF) and National Council of Science Technology and Innovation (NACOSTI). She has published 10 papers

in peer reviewed journals, and has presented over 17 papers in both international and national scientific conferences.

Location: KMFRI Mombasa

Department: Fisheries

Specialization: Fisheries, environmental Toxicology, Aquaculture and Wetlands

Research Interests Fisheries, Ecology, Hydro-acoustic Aquatic Ecotoxicology, Aquaculture, Climate Change and Spatial Planning.

Email: jnyamora@kmfri.co.ke;
Janenyamora8@gmail.com

Publications:

- Magondu EW, Mokaya M, Ototo A, Nyakeya K**, Nyamora,** JM (2016). Growth performance of milkfish (*Chanos chanos* Forsskal) fed on formulated and non-formulated diets made from locally available ingredients in South Coast region, Kenya. *International Journal of Fisheries and Aquatic Studies*, 4(1): 288-293
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Dr. Johnstone Omukoto
Research Scientist

Johnstone Omukoto Omuhaya is a Senior Research Scientist at the Kenya Marine and Fisheries Research Institute (KMFRI), Mombasa. He formerly worked for 3 years as a Fisheries Officer at the Ministry of Fisheries Development, Kenya (2009-2012) and earlier on as a Research Assistant at the Wildlife Conservation Society, Mombasa, Kenya for 3 years (2006-2009).

Omukoto has a BSc (Fisheries science) and a Masters (Aquatic resources management) from Moi University Eldoret. He recently (2024) finished his PhD in Environmental Science at Lancaster University, United Kingdom. He has 18 years of experience in fisheries and aquatic sciences research.

Professional commitments at KMFRI involve collection, compilation and analysis of marine and coastal fisheries statistics/data, marine fisheries exploratory surveys, fishery observer's deployment, proposal writing, marine biodiversity assessment, data analysis, technical report writing and dissemination and publishing of research findings using different dissemination tools. He has also worked on institutional projects, task teams, and individual small-grant projects and collaborated on national and regional research projects. For example, he worked on an ESPA funded Participatory modeling of wellbeing tradeoffs in coastal Kenya (P-Mowtick) project (2009-2013); ESPA research "Sustainable Poverty Alleviation from Coastal Ecosystem Services (SPACES) during 2014-2017; a WIOMSA-MASMA Project on "A socio-ecological assessment of fisheries in three estuarine systems of the SW Indian Ocean – identifying essential links for improved governance (ESTUARIZE-WIO)".

Has also worked as a participating research scientist on two Billfish Research Projects in the WIO region: 1. WIOMSA- MASMA funded project "Billfish Interactions, Livelihoods, and Linkages for FISHeries sustainability in the Western Indian Ocean (BILLFISH - WIO); and 2. PEW funded project "Strengthening data collection and capacity building for effective conservation and management of billfish fisheries in the Western Indian Ocean region".

His PhD study was focused on disentangling the determinants of fish for food and nutrition security towards tackling hidden hunger using small-scale tropical fisheries. This was funded through the European Research Council (ERC) Project FairFish-Hidden Hunger Forgotten Food at Lancaster Environment Centre, Lancaster University, UK.

Has been a lead author on 3 peer-reviewed publications and co-authored 22 peer-reviewed publications; Has made scientific disseminations in various conferences, symposia, and workshops. He has su-

pervised BSc students attached to the KMFRI. Worked as a part-time lecturer at the Kenyatta University, Mombasa campus where he taught Coastal Fisheries unit to 3rd year students.

Research Networks:

- Google scholar: https://scholar.google.com/citations?user=epCA5wsAAAAJ&hl=en&oi=ao
- X: https://x/jomukoto1
- Linkedin: https://www.linkedin.com/in/omuhaya-omukoto-4aa44359/
- YouTube: https://youtu.be/i7lYNaTX_V4?t=41
- YouTube: https://www.youtube.com/watch?v=5X5JOrXacuc

Location KMFRI Mombasa Centre and Headquarters

Department: Fisheries

Specialization: Interdisciplinary study of marine and coastal fisheries social-ecological systems, small-scale fisheries stock dynamics and catch assessment surveys; Marine policy, Fish for food and nutrition security and sustainable development.

Research Interests: Study the linkages between marine social-ecological systems, fisheries production, and fisheries contribution to livelihoods in coastal communities and the associated management strategies.

Work Email: jomuhaya@kmfri.go.ke

Alternative emails: jomukoto@gmail.com / jomukoto@yahoo.co.uk

Qualifications

- **PhD.** (Environmental Science)
- **MPhil.** (Aquatic resources management)
- **BSc.** (Fisheries)

Publications

- Allegretti A, **Omukoto** JO, Hicks CC (2025) Food, power and agency: revealing local post-harvest fisheries practices to improve food access from small-scale fisheries in coastal Kenya. *Maritime Studies* 24(9): (2025), [https://doi.org/10.1007/s40152-025-00402-7]
- Fondo EN, **Omukoto** JO (2021) Observations of industrial shallow-water prawn trawling in Kenya. Pp. 44–45 in Frontiers in Ocean Observing: Documenting Ecosystems, Understanding Environmental Changes, Forecasting Hazards. Kappel ES, Juniper SK, Seeyave S, Smith E, Visbeck M (eds) *A Supplement to Oceanography,* 34(4): [https://doi.org/10.5670/oceanog.2021.supplement.02-17]
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- James PWR, Mills DJ, Asiedu GA, Byrd K, Maria del Mar Mancha C, Cohen PJ, Fiorella KJ, Graham NAJ, MacNeil MA, Maire E, Mbaru EK, Nico G, **Omukoto** JO, Simmance F, Hicks CC 2022 Small pelagic fish supply abundant and affordable micronutrients to low- and middle-income countries. *Nature Food,* [https://doi.org/10.1038/s43016-022-00643-3]
- Mellin C, Hicks CC, Fordham DA, Golden CD, Kjellevold M, MacNeil MA, Maire E, Mangubhai S, Mouillot D, Nash KL, **Omukoto** JO, Robinson JPW, Stuart-Smith RD, Zamborain-Mason J, Edgar GJ, Graham NAJ 2022 Safeguarding nutrients from coral reefs under climate change. *Nature Ecology & Evolution,* [https://doi.org/10.1038/s41559-022-01878-w]
- Mwamlavya HM, Munga CN, Fulanda BM, **Omukoto** JO, Thoya PZ, MacKay F, Manyenze FH, Groeneveld JC. 2021. Natural resource-use in the Lower Tana River Delta based on household surveys and remote sensing of land cover and land use patterns. *Western Indian Ocean Journal of Marine Science,* Special Issue 1 / 2021 115-129
- Njiru J, **Omukoto** JO, Kimani EN, Aura CM, Van der Knaap M (2021) Kenya marine fisheries: The next frontier for economic growth? *Aquatic Ecosystem Health and Management,* 24 (2021) 97–104. [http://DOI:10.14321/aehm.024.01.14]
- **Omukoto** JO (2024). 'Disentangling the determinants of food and nutrition security from tropical small-scale fisheries: Tackling hidden hunger using forgotten food', PhD, Lancaster University. [https://doi.org/10.17635/lancaster/thesis/2447]
- **Omukoto** JO, Graham NAJ, Hicks CC (2024) Fish markets facilitate nutrition security in coastal Kenya: empirical evidence for policy leveraging. *Marine Policy,* 164 (2024), [https://doi.org/10.1016/j.marpol.2024.106179
- **Omukoto** JO, Graham NA, Hicks CC (2024) Fish contributions toward nutritional security in Kenya. Food Security. [https://doi.org/10.1007/s12571-024-01459-8]
- Thoya P, Owuor MA, von Thenen M, **Omukoto** JO (2022) Variations in community perceptions of ecosystem services within the Tana River estuary, Kenya: Implications for ocean governance. Western Indian Ocean Journal of Marine Science Special Issue 1 / 2022 47-57,[http://dx.doi.org/10.4314/wiojms.si2022.1.4]
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Janet Mwangata
Research Scientist

Janet is a young research scientist at KMFRI in the Ocean and Coastal Systems Directorate, Fisheries Department. She holds a position of Assistant Research Scientist, Fisheries Stock Assessment.

She has special interest in fisheries stock assessment, ecology and small-sca le fisheries in the Indian Ocean especially the stock status of fish, their distribution, abundance and biomass as well as fish behavioral patterns in aquatic environment (hydro-acoustics). She is also interested in research on sustainable use and protection of aquatic resources.

Janet has been involved in several stock assessment surveys both on land based and cruises at sea, data analysis and report writing as well as publication. Currently, she is involved in a project research as the PI investing the biology and as well as assessing the stock status of spangled emperor, *Lethrinus nebulosus* along the Southern Kenya Coast waters.

Location: Mombasa

Department: Fisheries

Specialization: Fish stock assessment

Research Interests: Fish stock population dynamics, and ecology of marine fisheries

- **Email:** jmwangata@kmfri.co.ke/ janetonly315@gmail

Dr. Mary Ontomwa
Research Scientist

Mary has been working in KMFRI since July, 2014 in the Ocean, coastal systems and Blue economy directorate, fisheries department.

She has special interest in fisheries stock assessment for the pelagic and demersal fisheries, marine ecology and fisheries hydro-acoustic.

She has completed her PhD from Pwani university, Kenya and has published nine peer-reviewed papers.

Mary has been able to attract three grants, two from WIOMSA through KMFRI and one NACOSTI grant through the University while doing her masters' studies.

Mary has participated in various National and international conferences. In training and capacity building Mary has attended workshops and trained on fish stock assessment and fisheries hydro-acoustics and data analysis using R-software.

Location: KMFRI Mombasa
Department: Fisheries
Specialization: Fisheries stock assessment
Research Interests: Fish stock assessment, Gear selectivity, ecology of marine fisheries, and Fisheries acoustics

Email: montomwa@kmfri.co.ke; maryontomwa@gmail.com

Qualifications

- **PhD**. Fisheries
- **MSc.** Fisheries
- **BSc.** Fisheries

Publications:

- Kimani E, Okemwa G, Aura E, Ruwa R, Wakwabi E, Wambiji N, Nyamora J, **Ontomwa** M, Mkare T, Orembo B, Mbaru E, Anam R, Okeyo B, Fondo E, Mzingirwa F and Mubarak A (2018) The status of Kenya Fisheries: Towards Sustainable exploitation of fisheries resources for food security and economic development
- Okemwa G, Kaunda-Arara B, Kimani E, Ogotu B, Ong'anda H, Obota C, **Ontomwa** M. (2015) Gear-based species selectivity and potential interactions between artisanal and aquarium fisheries in coastal Kenya: implications for reef fisheries management. *Western Indian Ocean Journal of Marine Science*, *14*(1&2): 39-51
- Okemwa G, Wambiji N, Kimani E, Anam R, Orembo B, **Ontomwa** M, Nyamora J, Mzingirwa F, Almubarak A, Karama K (2021) Status of Small-scale Nearshore Finfish Fisheries (**Book chapter**)
- **Ontomwa** MB, Fulanda BM, Kimani EN, Okemwa GM (2017) Hook size selectivity in the handline fisheries of shimoni, south coast Kenya (Doctoral dissertation, Pwani University)
- **Ontomwa** MB, Okemwa GM, Kimani EN, & Obota C (2018) Seasonal variation in the length-weight relationship and condition factor of thirty fish species from the Shimoni artisanal fishery, Kenya. *Western Indian Ocean Journal of Marine Science,* 17(1): 103-110.
- **Ontomwa** MB, Fulanda BM, Kimani EN, Okemwa GM (2019) Hook size selectivity in the artisanal handline fishery of Shimoni fishing area, south coast, Kenya. *Western Indian Ocean Journal of Marine Science*, *18*(1): 29-46
- **Ontomwa** MB, Kimani EN, Fulanda BM, Nyamweya CS (2022) Evaluation of the Kenya long line pelagic fishery: Temporal variation in fishing effort and catch rates. *Regional Studies in Marine Science*, *52*: 102320
- **Ontomwa** MB, Kimani EN, Fulanda BM, Nyamweya CS (2024) Longline pelagic fishery assemblage in Kenya's exclusive economic zone marine waters. *Marine Policy*, *160*: 105989
- **Ontomwa** MB, Okemwa GM, Mwangata J, Fidel OO (2024) Stock status of the dash-and-dot goatfish *Parupeneus barberinus* (Lacepède, 1801) in Kenya's coastal marine waters. *Kenya Aquatica Journal,* 9(1): 60-74

Josephine Marigu
Research Scientist

Ms. Josephine Marigu Njeru is an early-career researcher working as a Research Scientist in the Natural Products and Post Harvest Technologies Research Programme at KMFRI. She focuses on undertaking marine natural products and post-harvest technologies research to create solutions that enhance sustainable aquatic food systems for improved food and nutritional security among coastal communities in Kenya and beyond. She participates mainly in Fisheries research and Biological Oceanography at the Institute as well as other multidisciplinary aquatic studies. Having started her career in marine research in 2017, Ms. Njeru has endeavored to acquire specialized skills to build her capacity in Marine Science.

Ms. Njeru completed her Master's degree in Marine and Lacustrine Science and Management (Oceans and Lakes) in Belgium in 2022, with a thesis on "Chasing the bacteria in the green alga *Bryopsis plumosa.*" Her studies were supported by a prestigious VLIR-UOS Scholarship for Masters Studies in Belgium, awarded by the Flemish Interuniversities Council—University Development Co-operation. She has participated in hands-on training sessions aboard state-of-the-art vessels including the SA Aghullas II (https://www.kmfri.co.ke/index.php/about-us/13-news-and-events/166-receiving-the-button-the-next-generation-of-she-marine-scientists) and RV Dayang Yihao (https://www.kmfri.co.ke/index.php/13-news-and-events/178-capacity-building-in-deep-sea-mineral-exploration) where she gained sampling and analysis skills which she's now applying to enhance the sustainable exploitation of the Blue Economy in Kenya.

Her international experience includes working at the Flanders Marine Institute (VLIZ) Data Centre and as an Intern at the VLIZ Biological Laboratory in Oostende, Belgium, where she gained expertise in marine data management and hands-on experience in zooplankton sampling, sample processing using the ZooScan (imaging device), and analysis of zooplankton species diversity.

Ms. Njeru currently supports the National Marine Spatial Planning Secretariat and as a Junior Editor for the Kenya Aquatica Scientific Journal. She contributes towards the achievement of the Institute's mandate through participation in different research activities within the Fisheries department geared towards marine bioprospecting, post-harvest loss mitigation, value addition and fisheries catch assessment.

In December 2024, Ms. Njeru participated in the Science-Policy Lab on Innovations for Sustainable Aquatic Food Systems in Cape Town, South Africa, which focused on sharing expertise on sustainable, inclusive, and accessible innovation in aquatic food systems. She has also received specialized training in bivalve mollusc sanitation at the FAO Reference Centre in the UK and has presented her research at the VLIZ Marine Science Day, highlighting her work on seaweed-bacterial symbiosis.

As a young woman working in a traditionally male-dominated field, she was featured in a Daily Nation article (https://www.nation.co.ke/lifestyle/lifestyle/Four-girls-jumped-into-deep-sea---loved-it/1214-5141956-2fkh8h/index.html) where she shared her experience in marine science and appeals to young girls interested in STEM to venture in this highly rewarding career.

Ms. Njeru is a member of professional networks including the Western Indian Ocean Marine Science Association (WIOMSA) and formerly the African Women in Science and Engineering (AWSE). She continues to build her expertise in marine microbiology, biotechnology, and bioprospecting to contribute to sustainable blue economy initiatives in Kenya and beyond.

Qualifications:

- Master of Science in Marine and Lacustrine Science and Management (Belgium)
- Bachelor of Science (Microbiology)
- Certificate in Project Planning and Management
- Certificate in Supervisory Skills Development
- Certificate in Environmental Impact Assessment & Environmental Audit
- Certificate in Research Design, Data Management and Analysis

Publications:

- **Marigu** J, Oduor-Odote P, Odoli C, Ruwa R, Achieng R, Omega M (2023) A preliminary assessment of the post-harvest fish losses along selected fish supply chains in Kwale County, Kenya. *Kenya Aquatica Journal,* 8(1): 6-28

Dr. Thomas Mkare
Research Scientist

Dr Mkare has been working as a research scientist for Kenya Marine and Fisheries Research Institute (KMFRI), Mombasa, since April 2012. Mkare graduated with a PhD Zoology (Conservation genetics) from the University of Johannesburg, South Africa, in 2017. After his graduation, Mkare pursued postdoctoral research on Conservation genomics of endangered syngnathid fishes (seahorses & pipefishes) at CIBIO (https://cibio.up.pt), University of Porto, Portugal. Additionally, Mkare has an MSc in Zoology (population genetics) from Stellenbosch University (Cum

laude) and a BSc in Fisheries and Aquatic Sciences from Moi University. Currently, Mkare is pursuing a postdoctoral study on population genomics of rabbitfish from the Kenyan coast.

Mkare has in-depth working knowledge and experience in several biological fields, including fisheries, population genetics, conservation genetics, fisheries forensics, fish genetics and breeding, and species distribution modelling. Currently, Mkare is involved in several multidisciplinary research activities, focussing on biodiversity assessments using environmental DNA (eDNA), DNA metabarcoding, DNA barcoding, metagenomics of marine microbiomes (e.g. bacteria, fungi, viruses) and population genomic analyses of fisheries and threatened species.

Mkare is keen on establishing useful research collaborations and linkages in any biological field. Besides research, Mkare has taught undergraduate (BSc) and postgraduate (MSc) modules on Population genetics, Conservation genetics, Fish breeding and genetics, Biotechnology for fisheries science, and marine biodiversity and conservation. Mkare has supervised more than 50 students (i.e., undergraduate student projects, interns, MSc projects).

Mkare has published several research articles in high impact factor journals (https://www.researchgate.net/profile/Thomas_Mkare/research; https://scholar.google.com/citations?user=aos7ftQAAAAJ&hl=en), with several manuscripts still in preparation.

Location: KMFRI Mombasa

Department: Marine and Coastal Fisheries

Specialization: Population and conservation genetics

Research Interests: I have a broad research interest, including population genetics, conservation genetics, fisheries forensics, fish genetics and breeding, metagenomics, molecular ecology, citizen science and conservation biology.

Email: tmkare@kmfri.go.ke; thomasmkare@yahoo.com or thomasmkare@icloud.com

Qualifications:

- **PhD** Zoology (Conservation Genetics)
- **MSc** Zoology (Population Genetics)
- **BSc** Fisheries and Aquatic Sciences

Publications:

- **Mkare** TK, von der Heyden S, Groeneveld JC, Matthee CA (2014) Genetic population structure and recruitment patterns for three sympatric shallow water penaeid prawns in Ungwana Bay, Kenya, with implication for fisheries management. *Marine and Freshwater Research,* 65:255–266
- **Mkare** TK, von der Heyden S, Groeneveld JC, Matthee CA (2014) Genetic population structure and recruitment patterns for three sympatric shallow water penaeid prawns in Ungwana Bay, Kenya, with implication for fisheries management. *Marine and Freshwater Research,* 65:255–266
- **Mkare** TK, Groeneveld JC, Teske PR, Matthee CA (2017) Comparative genetic structure in two high-dispersal prawn species from the south-west Indian Ocean. *African Journal of Marine Science,* 39: 467–474
- **Mkare** TK, Van Vuuren BJ, Teske (2017) Conservation implications of significant population differentiation in an endangered estuarine seahorse. *Biodiversity and Conservation,* 26:1275–1293
- **Mkare** TK, Groeneveld JC, Teske PR, Matthee CA (2017) Comparative genetic structure in two high-dispersal prawn species from the south-west Indian Ocean. *African Journal of Marine Science,* 39: 467–474
- **Mkare** TK, Van Vuuren BJ, Teske (2017) Conservation implications of significant population differentiation in an endangered estuarine seahorse. *Biodiversity and Conservation,* 26:1275–1293
- **Mkare** TK, Van Vuuren BJ, Teske PR (2021) Conservation priorities in an endangered estuarine seahorse are informed by demographic history. *Scientific Reports 11: 4205*
- Mbaru EK, **Mkare** TK, Rasowo JO (2011) Tolerance of yolk sac and free swimming fry of African catfish (Clarias gariepinus, Burchell 1822) to chemotherapeutic doses of formalin. *African Journal of Agricultural Research,* 6:323–330
- Mbaru EK, Kimani EN, Otwoma LM, Kimeli A, **Mkare** TK (2011) Abundance, Length-Weight Relationship and Condition Factor in Selected Reef Fishes of the Kenyan Marine Artisanal Fishery. *Advance Journal of Food Science and Technology,* 3:1–8
- Mbaru EK, Kimani EN, Otwoma LM, Kimeli A, **Mkare** TK (2011) Abundance, Length-Weight Relationship and Condition Factor in Selected Reef Fishes of the Kenyan Marine Artisanal Fishery. *Advance Journal of Food Science and Technology,* 3:1–8
- Mbaru EK, **Mkare** TK, Rasowo JO (2011) Tolerance of yolk sac and free swimming fry of African catfish (*Clarias gariepinus*, Burchell 1822) to chemotherapeutic doses of formalin. African Journal of Agricultural Research 6:323–330 between phytoplankton composition and abundance and physicochemical characteristics of Chepkanga Dam, Eldoret, Kenya. *Lakes and Reservoir: Research and Management,* 15:111–118
- Mzingirwa FA, Njiru J, Nyingi DW, **Mkare** TK (2019) Genetic diversity and spatial population structure of a Deepwater snapper, Pristipomoides filamentosus in the south-west Indian Ocean. *Molecular Biology Reports,* 46: 5079–5088
- Mzingirwa FA, **Mkare** TK, Nyingi DW, Njiru J (2019). Genetic diversity and spatial population structure of a deepwater snapper, Pristipomoides filamentosus in the south?west Indian Ocean. *Molecular Biology Reports,* [https://doi.org/10.1007/s11033-019-04962-w]

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- Whitfield AK, **Mkare** TK, Teske PR, James NC, Cowley PD (2017) Life-histories explain the conservation status of two estuary-associated pipefishes. *Biological Conservation,* 212: 256-264

Athman Abubakar
Research Scientist

I am a Research Scientist at KMFRI with over 10 years of experience including various marine research projects; such as tuna fishery, lobster fishery, fisheries catch assessment survey at Faza in Lamu County, and Beach seine fishery.

Other research interests includes fish population dynamics, fish stock assessment and small-scale tuna fishery. I have been a member of longline tuna fishery in KMFRI Observer Programme taskforces.

Athman is has been running several projects; both, as the Principal Investigator and Co-investigator:

- Characterization of the small-scale tuna fishery in Kenya
- Biology of Lobster fishery In Lamu
- Effects of artisanal and industrial longline fishing on the population demography of yellowfin tuna (*Thunnus albacares*) exploited in Kenyan waters
- Enabling sustainable exploitation of coastal tuna species
- Beach Seine gear selectivity in Kiunga, Lamu county

Location: KMFRI Mombasa Research Centre

Department: Fisheries

Specialization: Biology of tuna fishery, Tuna Demography, Beach Seine fishery and fish stock assessments

Research Interests: My main research interests in marine research and largely focuses in fish stock dynamics and assessments, including the industrial and small-scale tuna fishery, Sharks and Rays

Email: aabubakar@kmfri.go.ke; alubeidy@gmail.com

Qualifications

- **Msc.** In Fisheries (underway)
- **Bsc**. Fisheries and Aquatic Sciences

Publications:

- **Abubakar** A (2017) Characterization of the small-scale tuna fishery in Kenya. Master of Science (Msc). Pwani University. pp120
- **Athman** A, Okemwa GM, Olunga J, (2021) Effects of artisanal and industrial longline fishing on the population demography of yellowfin tuna (*Thunnus albacares*) exploited in Kenyan waters, 18 pp
- Kimani EN Ontomwa M, **Almubarak** A, Ong'anda H, Orembo B, Mbaru E, Mkare TK, Mwangata J, Kiilu B, Wambiji N, Odindo C (2020) Status of longline fishery stocks and bycatch species. KMFRI pp30
- Mueni E, **Athman** A, Mike O, Kiprono J, Wellington D, Mzingirwa F, Waweru G, Manyala J, Gonda J. (2014) Kenya lobster fishery stock assessment. KCDP Project. KMFRI, Mombasa (KMFRI Research Report No. OCS/ FIS/FY /13-14/01)
- Okemwa M, **Athman** AA, Mzingirwa F, Kimani EN, Sauer W (2020) Status of the coastal tuna fishery targeting Kawakawa and Skipjack. KMFRI 15pp
- Wambiji N, Kimani E, **Athman** A, Mwamburi S, Mkare T, Olunga J (2021) An assessment of the status of key commercial fisheries (North Kenya Bank deep water snappers). Kenya Marine and Fisheries Research Institute (KMFRI). KMFRI Research Report No. OCS/FIS/2020-2021/ C1.2

Dr. Samuel Mwamburi
Research Scientist

Dr. Samuel Mwamburi, PhD. is a Research Scientist specializing in genomics, metagenomics, and single-cell omics for aquaculture, aquatic biodiversity and ecosystem resilience. His research integrates whole-genome sequencing, single-cell transcriptomics, and eDNA metabarcoding to advance marine conservation, sustainable fisheries, and aquaculture development.

Dr. Mwamburi earned his Ph.D. in Applied Marine Biosciences, where he conducted a comprehensive genomic analysis of rabbitfish (*Siganus fuscescens*). He has pioneered the application of eDNA for biodiversity assessment in critical ecosystems, single-cell omics to improve genome completeness and resolution in non-model marine species. His work also explores antimicrobial resistance, functional metagenomics, and bioprospecting for novel bioactive compounds.

His current research implements multi-omics approaches, including metagenomics, metatranscriptomics, and metabolomics, to study microbial interactions in aquatic environments. He is also investigating the potential of single-cell genomics in understanding species adaptation, host-microbe interactions, and the impact of climate change on marine biodiversity.

Dr. Mwamburi actively collaborates on international genomics and bioinformatics projects. His work contributes to high-throughput sequencing applications

in fisheries management, aquaculture disease diagnostics, and marine biotechnology.

ORCID: https://orcid.org/0000-0003-4253-3967

Location: KMFRI Mombasa Center

Department: Fisheries

Specialization: Aquatic Genomics | Metagenomics | Single-Cell Omics | Environmental DNA (eDNA) | Bioinformatics | Biodiversity Conservation.

Research Interests:

- Aquatic Genomics & Metagenomics – Exploring microbial and genetic diversity in marine and freshwater ecosystems.
- Single-Cell Omics – Advancing genome assembly and functional analysis through single-cell approaches.
- Environmental DNA (eDNA) & Biodiversity Monitoring – Utilizing eDNA metabarcoding for species detection, conservation, and fisheries management.
- Antimicrobial Resistance & Microbial Ecology – Investigating resistance genes and biosynthetic gene clusters in aquatic environments.
- Fisheries & Aquaculture Genomics – Applying genomics for selective breeding, disease diagnostics, and sustainable fisheries management.
- Climate Change & Ecosystem Resilience – Assessing the impacts of environmental stressors on aquatic biodiversity and ecosystem health.
- Computational Biology & Bioinformatics – Developing and applying computational tools for genomic data analysis and visualization.

Email: smwakisha@kmfri.go.ke;
mwakishasam@gmail.com

Qualifications:

- Ph.D. in Applied Marine Biosciences – Tokyo University of Marine Science and Technology (TUMSAT) 2024.
- M.Sc. in Biotechnology – Jomo Kenyatta University of Agriculture and Technology (JKUAT) 2021.
- B.Tech. in Biotechnology – Technical University of Kenya (TU-K) 2015.

Publications:

- Dinh-Hung N, **Mwamburi** SM, Dong HT, Rodkhum C, Meemetta W, Linh NV, Chatchaiphan S (2024) Unveiling Insights into the Whole Genome Sequencing of *Mycobacterium* spp. Isolated from Siamese Fighting Fish (Betta splendens). *Animals,* 14(19): 2833, [https://doi.org/10.3390/ani14192833]
- Guzman J P M D, **Mamburi** SM, Konishi K, Aoki M, Kuwahara H, Mikata K, Hirono I (2024) Assessing the impact of Lactiplantibacillus plantarum feed additive on Vibrio parahaemolyticus crosstalk and the gill and gut microbiota compositions in Penaeus vannamei. *Aquaculture,* 742092, [https://doi.org/10.1016/j.aquaculture.2024.742092]
- Kiti HM, Kibiti CM, Munga CN, Odalo JO, Guyo PM, **Mwamburi** SM (2022) Molecular characterization and antibacterial activities of mangrove endophytic fungi from coastal Kenya, [https://doi.org/10.5455/jabet.2022.d144]
- Mutinda J, **Mwamburi** SM, Oduor KO, Omolo MV, Ntabo RM, Gathiru JM, Nonoh JO (2023. Profiles of bacterial communities and environmental factors associated with proliferation of malaria vector mosquitoes within the Kenyan Coast. *Access Microbiology,* 5(8): 000606-v4, [https://doi.org/10.1099/acmi.0.000606.v4]
- **Mwamburi** SM, Mbatia BN, Remmy K, Kirwa EM, & Noah, N. M. (2019). Production of polyhydroxyalkanoates by hydrocarbonaclastic bacteria. *African Journal of Biotechnology,* 18(17): 352-364 [https://doi.org/10.5897/AJB2019.16763]
- **Mwamburi** SM, Uku J, Wambiji N, Kairo J, Oketch F, Oduor KO, Ishmael N (2023) Integration of environmental DNA metabarcoding technique to reinforce fish biodiversity assessments in seagrass ecosystems: A case study of Gazi bay seagrass meadows. *Environmental DNA,* 5(6): 1574-1588, [https://doi.org/10.1002/edn3.483]
- **Mwamburi** SM, Islam SI, Dinh-Hung N, Dangsawat O, Sowanpreecha R, Khang LTP, Linh NV (2024) Genomic Characterization of *Bacillus* sp. THPS1: A Hot Spring-Derived Species with Functional Features and Biotechnological Potential. *Microorganisms,* 12(12): 2476, [https://doi.org/10.3390/microorganisms12122476]
- **Mwamburi** SM, Kawato S, Furukawa M, Konishi K, Nozaki R, Hirono I, Kondo H (2024) De Novo Assembly and Annotation of the *Siganus fuscescens* (Houttuyn, 1782) Genome: Marking a Pioneering Advance for the Siganidae Family. *Marine Biotechnology,* 1-15, [https://link.springer.com/article/10.1007/s10126-024-10325-9]
- Ohowa B, Kiteresi L, Wanjeri V, **Mwamburi** S, Tunje S (2021) Sponges as simple biomonitoring tools for trace element pollution in marine environments: insights from a Kenyan study focused on the leaf sponge *Phyllospongia foliascens*. *African Journal of Marine Science,* 43(4): 533–538, [https://doi.org/10.2989/1814232X.2021.1989487]
- Puttirungroj P, Kawato S, **Mwamburi** SM, Furukawa M, Oomine R, Koiwai K, Hirono I (2024) Comparative genomics highlights the virulence and evolutionary trajectory of white spot syndrome virus. *Journal of General Virology,* 105(11): 002042, [https://doi.org/10.1099/jgv.0.002042]
- Waciral TN, Makonde HM, Bosire CM, Mzee SS, **Mwamburi** SM, & Kibiti CM (2020) Isolation and morphological characterization of endophytic fungi isolated from mangrove plants along the Kenyan coastline. *African Journal of Microbiology Research,* 14(10): 594-607, [https://doi.org/10.5897/AJMR2020.9402]

Capacity Development

- **Training programmes**

KMFRI has developed several training programs aimed at enhancing the skills of its workforce and stakeholders. These programs include:

- In-house training for research scientists and technical staff on new methodologies and technologies.
- Collaborative training with universities and various research institutions.
- Capacity-building workshops for government agencies, community groups and fisheries stakeholders.
- Short courses on fisheries management, aquaculture practices, and climate change resilience

Knowledge transfer initiatives

KMFRI plays a pivotal role in transferring research knowledge to stakeholders through various initiatives. Mombasa Centre and the two coastal stations in Gazi and Shimoni have elaborately planned to systematically share critical information, skills, and expertise not only among researchers but all employee with the aim of improving overall performance, efficiency, and continuity, particularly when facing situations like employee departures or new project implementations. The plans involve strategies such as mentorship, training programs, documentation repositories, and fostering a culture of knowledge sharing among the local communities. Other approaches include:

- Publishing research findings in peer-reviewed journals and policy briefs.
- Hosting stakeholder workshops and dissemination forums.
- Providing advisory services to government agencies and community organizations.
- Engaging in public awareness campaigns on sustainable marine resource utilization.
- Developing extension services for fisher communities and aquaculture enterprises.

Training attaches and interns as well as hosting students from academic institution visiting KMFRI for exposure to marine and coastal research in practice

OCEANOGRAPHY AND HYDROGRAPHY RESEARCH DEPARTMENT

Dr. Amina Hamza
Mangrove Ecologist

Mangrove ecologist with a background in Natural Resource Management. Her research interest is on sustainable management of marine resources; including the development of participatory tools for sustainable resource utilization. Throughout her career, she has been involved in the development and implementation of community-based nature-based solutions locally and within the WIO region including; mangrove carbon offset projects, participatory blue carbon ecosystems resources management, as well identifying mangrove forests' role in disaster risk management.

She has been involved in several mangrove research activities on the Kenyan Coast, most notably development of the National Mangrove Ecosystem Management Plan (2017-2027). She has also been involved in developing Project Idea Note (PIN) and Project Design Document (PDD) for Carbon offset projects for Gazi, Vanga and Lamu mangrove ecosystem.

Research Network: *Research Gate*

Location: KMFRI Shimoni Centre

Department: Oceanography and Hydrography

Specialization: Mangrove ecology, Community development, Cultural heritage, Climate science, Participatory forest management, Ecosystem Services Valuation

Research Interests: Design and development of sustainable resource harvest strategies and management of the marine resources (with particular interest on Mangrove ecosystem)

- **Email:** ahamza@kmfri.go.ke / amina_j2002@yahoo.com

Qualifications:

- **PhD.** Mangrove Socio-Ecology 2023 (Bournemouth University, United Kingdom)
- **MSc.** Marine and Lacustrine Science and Management 2013 (Vrije Universiteit Brussels, Belgium)
- **BSc.** Natural Resource Management 2007 (Egerton University, Kenya)

Publications:

- Bosire JO, Lang'at JK, Kirui B, Kairo JG, Mwihaki LM, **Hamza** AJ (2016) Mangroves of Kenya. *In*: Bosire JO, Mangora M, Bandeira S, Rajkaran A, Ratsimbazafy R, Appadoo C, Kairo JG, eds. *Mangroves of the Western Indian Ocean: Status and Management*. Zanzibar, town: WIOMSA, 15–31
- Dahdouh-Guebas F, Nijamdeen MTWGF, Hugé J, Dahdouh-Guebas Y, Di Nitto D, **Hamza** AJ, Arachchilage KS, Koedam N, García MM, Mohamed MOS, Mostert L, Munga CN, Poti M, Satyanarayana B, Stiers I, Van Puyvelde, K, Vanhove MPM, Vande Velde K, Ratsimbazafy HA (2022) The Mangal Play: A serious game to experience multi-stakeholder decision-making in complex mangrove social-ecological systems. *Frontiers in Marine Science* [online], 9. Available from: https://www.frontiersin.org/articles/10.3389/fmars.2022.909793/full
- **Hamza** AJ, Esteves LS, Cvitanovic M, Kairo J (2020) Past and Present Utilization of Mangrove Resources in Eastern Africa and Drivers of Change. *Journal of Coastal Research* [online], 95 (sp1), 39. Available from: https://bioone.org/journals/journal-of-coastal-research/volume-95/issue-sp1/SI95-008.1/Past-and-Present-Utilization-of-Mangrove-Resources-in-Eastern-Africa/10.2112/SI95-008.1.full
- **Hamza** AJ, Esteves LS, Cvitanović M (2022) Changes in Mangrove Cover and Exposure to Coastal Hazards in Kenya. *Land*, *11*(10), 1714; https://doi.org/10.3390/land11101714
- **Hamza** AJ, Esteves LS, Cvitanović M, Kairo JG (2023) Sustainable natural resource management must recognise community diversity. *International Journal of Sustainable Development & World Ecology* [online], 1–18. Available from: [https://doi.org/10.1080/13504509.2023.2192006]
- **Hamza** AJ, Esteves LS, Cvitanović M, Kairo JG (2024) Global patterns of mangrove resource utilization:a systematic review. *Frontiers in Sustainable Resource Management* [online], 3. Available from: https://www.frontiersin.org/articles/10.3389/fsrma.2024.1395724/full.
- Kairo JG, **Hamza** AJ, Wanjiru C, (2018) Mikoko Pamoja:A Demonstrably Effective Community Based Blue Carbon Project in Kenya. *In*: Windham-Myers, L., Crooks, S., and Troxler, T., eds. *A Blue Carbon Primer* [online]. London, UK: CRC Press, 341–350. Available from: https://www.taylorfrancis.com/books/9780429787775/chapters/10.1201/9780429435362-24.
- Okello JA, Koedam N, Dahdouh-Guebas F, Di Nitto D, Van der Stocken T, Hugé J, Fratini S, Cannicci S, Duncan C, Golléty C, **Hamza** AJ, Macamo C, Nicolau D, Rasolofomanana L, Savourey G, Wang'ondu V, Suárez EL (2024) IUCN Red List of Ecosystems. Mangroves of the Western Indian Ocean. *Nature* [online], 1–33. Available from: www.iucnrle.org.

Dr. Amon Kimeli
Research Scientist

Dr. Amon Kimeli has a doctorate degree in Geosciences from the University of Bremen, Germany, Master of Science degree in Marine and Lacustrine Science and Management from Vrije Universiteit Brussels, Ghent University and Antwerp University all in Belgium.

He also has a Post Graduate Certificate in Ocean Mapping from the University of New Hampshire, USA and a bachelor's degree in Geology from the University of Nairobi, Kenya. He has interest on sediment dynamics along the Kenyan coast trying to understand their sources, fate and the biophysical conditions that control sediment deposition & accretion and their possible effects on critical habitats including mangroves. He is also interested in mainstreaming geoscience as key contributor to ecosystem assessment, management, and the Blue Economy. He has also been involved in ocean mapping specifically, generating shallow and deep-water bathymetry by processing Singlebeam data obtained from acoustic echo-sounder (EK60) aboard *RV Mtafiti* and satellite imagery (remote sensing).

He is an Intergovernmental Oceanographic Commission of UNESCO appointed member to the General Bathymetry Chart of the Ocean (GEBCO)-Sub-Committee on Undersea Feature Names (SCUFN) and a professional member of the Geological Society of Kenya.

ResearchGate Link: https://www.researchgate.net/profile/Amon-Kimeli-2

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Marine Geology (sedimentation), Marine GIS and Hydrography/Acoustics

Research Interests

- Sediment dynamics and the biophysical conditions that control sediment deposition & accretion.
- Mineralogy
- Effects of sea level rise on sediment dynamics and subsequently on critical habitats especially mangroves
- Shallow and deep-water bathymetry and general mapping of ocean floor using acoustics.
- GIS and Remote Sensing applications in marine research

Email: akimeli@kmfri.go.ke / nm_kimeli@yahoo.com

Qualifications:

- Doctoral Degree in Natural Science, University of Bremen, Germany
- Postgraduate Certificate in Ocean Mapping and Category A Hydrography Certification from the University of New Hampshire, Centre for Coastal and Ocean Mapping, USA.
- MSc in Marine and Lacustrine Science and Management from Vrije Universiteit Brussels, Belgium.
- BSc in Geology from the University of Nairobi, Kenya

Membership

- General Bathymetry Chart of the Ocean (GEBCO) Sub-Committee on Undersea Feature Names (SCUFN).
- Geological Society of Kenya

Peer Reviewed Journals

- Fortnam M, Atkins M, Brown K, Chaigneau T, Frouws A, Gwaro K, Huxham M, Kairo J, **Kimeli** A., Kirui B, Sheen K (2019) Multiple impact pathways of the 2015-16 El Niño in coastal Kenya. *AMBIO,* 50(1): 174-189
- Kamau J, Ngisiange N, Ochola O, Kilonzi J, **Kimeli** A, Mahongo SB, Ong'anda H, Mitto C, Ohowa B, Magori C, Kimani E (2020) Factors influencing spatial patterns in primary productivity in Kenyan territorial waters. *Western Indian Ocean Journal of Marine Science*. Special Issue 1 220 pp.9-18
- **Kimeli** A, Thoya P, Ngisiang'e N, Ong'anda H, Magori C (2018) Satellite-derived bathymetry: A case study of Mombasa port channel and it's approaches. *Western Indian Ocean Journal of Marine Sciences,* 17(2): 93-102
- **Kimeli** A, Ocholla O, Okello J, Koedam N, Westphal H, Kairo J, (2021) Geochemical and petrographic characteristics of sediments along the transboundary (Kenya–Tanzania) Umba River as indicators of provenance and weathering. *Open Geosciences,* 13(1): 1064-1083
- **Kimeli** A, Cherono S, Mutisya B, Tamooh F, Okello J, Westphal H, Koedam N, Kairo J, (2021) Tracing organic matter sources in the estuarine sediments of Vanga, Kenya, and provenance implications. *Estuarine, Coastal and Shelf Science,* 263: 107636
- **Kimeli** AK, Cherono S, Baya P, Mathinji M, Okello J, Koedam N, Westphal H, Kairo J (2022) Surface elevation changes in an estuarine mangrove forest in Vanga, Kenya: implications for management and mitigation of sea-level rise. *Frontiers in Marine Science,* 2117
- Kosore C, Ojwang L, Maghanga J, Kamau J, **Kimeli** A, Omukoto J, Ngisiang'e N, Mwaluma J, Ong'anda H, Magori C, Ndirui E (2018) Occurrence and ingestion of microplastics by zooplankton in Kenya's marine environment: first documented evidence. *African Journal of Marine Science*, 40(3): 225-234
- Mutia D, Carpenter S, Jacobs Z, Jebri F, Kamau J, **Kimeli** A, Langat P, Makori A, Nencioli F, Painter S, Popova E, Raitsos D, Roberts M (2021) 'Productivity

driven by Tana River discharge is spatially limited in Kenyan coastal waters. *Ocean and Coastal Management*. 211: 105713

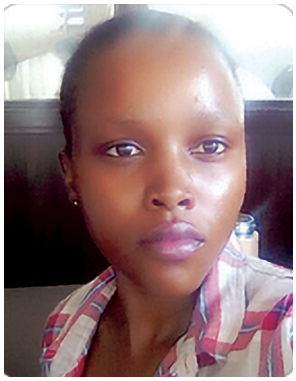
- Mwaura JM, Umezawa Y, Furaha J, **Kimeli** A, Kamau J, Aura CM (2017) Spatial variability of scleractinian coral bleaching susceptibility in 2010 El Niño–Southern Oscillation between northern and southern reefs, Kenya. *Coastal Marine Science*. 40: 17-27
- Zimmer M, **Kimeli** A 2021. Mangroven als Sedimentfallen und Küstenschützer. *Geographische Rundschau,* 7(8): 26-31

Technical Reports

- Marine and Fisheries Research Institute (KMFRI), 2017 *RV Mtafiti Cruise RVM/02/2017 Technical Report on Fish Biomass and the Environment of Kenya's Exclusive Economic Zone (EEZ)*.
- MGL15 C, Calder BR (2015) Cruise Report. Cruise to map Leg 6 of US Atlantic Continental Margin-see "Calder B, Gardner J (2008) US Law of the sea cruise to map the foot of the slope of the Northeast US Atlantic Continental Margin: Leg 6".

Book Chapter

- **Kimeli** A**,** Makori A (2018) Marine Geomorphology and Sedimentology: *in - KMFRI (2018) The RV Mtafiti: Marine Research towards Food Security and Economic Development for Kenya. (Eds) Njiru JM, Ruwa RK, Kimani EN, Ong'anda HO, Okemwa GM and Osore MK.* Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. 56-59 pp.



Amina Makori
Research Scientist

Ms Amina Makori is a Marine Geologist within Oceanography and Hydrography department. She involved in identification of geomorphological features and bathymetry studies through seafloor mapping research of Kenya's EEZ as well as sedimentology studies of marine and estuarine environments. As a result, she is conversant with use of various acoustic, geospatial and remote sensing imagery systems.

Prior to her work in KMFRI, Ms Makori has worked in various sector of geological research ranging from gold, oil and gas exploration and mining. She worked in National data center at National Oil Corporation of Kenya as an Oil and Gas data manager/analyst. She has also worked in the Acacia gold mining company within Western Kenya region, as a graduate geologist.

As a result of working in various fields of geology, her key interest in are in seafloor mapping studies as well as geomorphological studies. She is keen in the application of geophysical (geoacoustic/seismic) technologies and GIS in her research. She is also interested in geological modelling in the assessment and evaluation of geological resources

She holds a BSc. in Geology from University of Nairobi.

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Marine Geology

Research Interests: Geology of the oceans, marine geomorphology, marine sedimentology, the mineral wealth of the oceans, oil and gas exploration, marine paleoclimate and paleoenvironment studies and management of marine data.

Email: amakori@kmfri.co.ke; ochoramakori1@gmail.com

Qualifications: Bsc. in Geology

Athman Salim
Research Scientist

Athman Salim Hussein has been working on ocean water circulation and climate change for several years with long standing research experience covering diverse areas of deep and shallow ocean water. He has special interest in Ocean dynamics (Both observational and theoretical), ecosystem functioning and responses to climate and human induced changes, application of rosette CTD, AWAC Acoustic Wave And Current profiler, and TSG Thermosalinograph data collection and analysis using different software such as MATLAB, SPSS, Stata, R, QGIS, and ODV Ocean Data View. He also has skills on predicting Kenyan Potential Fishing Zone.

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrography

Specialization: Physical Oceanography

Research Interests: Ocean Circulation and Climate Change, Coastal Vulnerability mapping.

Email: athmansalim20@gmail.com / asalim@kmfri.go.ke

Qualifications

- **MSc.** in Climate Change
- Bachelor of Science in Physics

PUBLICATIONS

- **Athman SH,** Hole GM, Magori C, Ndirangu S, Zamu MS (2020) Fish Cage Site Selection at Kibuyuni in Kwale County, Kenya: Tidal Variations, Waves Height, Current Speed and direction Status. J Aquac Res Development. 12: 626
- Holeh GM, Magondu EW, Njiru JM, Tsuma S, **Salim A,** Muriuki AM, *et al.* (2020) Social Economic Survey and Feasibility Study to Initiate Cage Fish Farming in Kenyan Coastal Creeks. J Aquac Res Development. 11: 11. [https://doi: 10.35248/2155-9546.20.10.617]

Chepkemboi Labatt
Research Scientist

Research Network: Research Gate

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Marine Benthic Ecology and Phytoplankton Ecology

Research Interests: Ecosystem functioning, Ecosystem Health, Biodiversity, Benthic ecology, Small Scale Fisheries, Traditional Ecological Knowledge

Email: clabatt@kmfri.go.ke /Labatt-C@ulster.ac.uk

Qualifications

- **PhD (ongoing)**
- **MSc** Marine and Lacustrine Science and Management (Oceans and Lakes 2016)
- **BSc** Applied Aquatic Sciences (2006) International **Post-Graduate** Training in Tropical Limnology (IPGL)

Publications:

- Kamau J, Ochola O, Ohowa B, Mitto C, Magori C, **Labatt** C, Kyewalyanga MS (2020). Employing multivariate analysis to determine the drivers of productivity on the North Kenya Bank and in Kenyan territorial waters. Western Indian Ocean Journal of Marine Science, (1/2020), 33-41 DOI: 10.4314/wiojms.si2020.1.4

UNPUBLISHED:

- **Labatt** CK, M'Erimba CM, Kitaka N (2014) The Ecological integrity of the Nyangores River, Kenya In: The 8TH Egerton University International Conference Njoro, Kenya, 26-28th March 2014
- **Labatt** CK, M'Erimba CM, Kitaka N (2012) Determining ecological integrity of the Nyangores River using macroinvertebrate index of biotic integrity. In: The LVBC/EAC 3rd Scientific Conference, Entebbe-Uganda 22- 23rd October 2012

Dr. Charles Mitto
Research Scientist

Dr. Charles Mitto Kosore (Dr. CMK) is one of our research scientists at Kenya Marine and Fisheries Research Institute (KMFRI) based at the Marine and Coastal Systems and Blue Economy under the department of Oceanography and Hydrography (O & H) in Mombasa, Kenya. Dr. CMK holds an Erasmus Mundus joint Master Degree in Quality in Analytical Chemistry from the University of Algrave, Portugal and University of Cadiz, Spain and PhD in Chemistry from Pwani University, Kilifi, Kenya. D

r. CMK is an experienced scientist in the area marine environmental chemistry, in which his current interests are in marine litter pollution, especially plastics and microplastics in the biotic and abiotic compartments of marine environment, heavy metals, persistent organic pollutants (POPs), nutrient dynamics and water quality in general. Dr. CMK's Ph.D. thesis was titled, "Environmental concentrations of microplastics in surface water, sediments and biota in East African marine waters".

Dr. CMK has been involved in MPs research from 2017 and since then I have implemented a number of related research projects. Some of the projects he has undertaken are: 1) Microplastics and plastic-derived chemical contaminants in Africa: Implication on human health and the loss of aquatic biodiversity" in collaboration with the Federal University of Technology Akure (FUTA), Nigeria; 2) Adsorption-desorption of metals by plastic wastes and act as a point source of toxic metals to Kenya's marine ecosystems; 3) Assessment of the Ecological Aspects of Microplastic Pollution in Dar Es Salaam, Zanzibar and Mombasa Coastal Marine Environments.

Running projects: Project coordinator; Assessment of the Ecological Aspects of Microplastic Pollution in Dar Es Salaam, Zanzibar and Mombasa Coastal Marine Environments (MICROMARINE).

Research networks: ResearchGate

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrography

Specialization: Environmental analytical chemistry

Research Interests: Marine litter pollution, especially plastics and microplastics in the biotic and abiotic compartments of the marine environment, heavy metals, persistent organic pollutants (POPs), nutrient dynamics, and water quality in general

Email: cmitto@kmfri.go.ke, ckosore@gmail.com; ckosre@gmail.com, charleskosore86@gmail.com

PUBLICATIONS:

- Asiya A, Nchimbi D, Shilla A, **Kosore** CM, Shilla DJ, Shashoua Y, Khan FR (2022) Microplastics in marine beach and seabed sediments along the coasts of Dar es Salaam and Zanzibar in Tanzania. *Mar Pollut Bull,* 2022 Dec;185(Pt A):114305, [https://doi: 10.1016/j.marpolbul.2022.114305]
- Asiya A, Nchimbi D, **Kosore** CM, Oduor N, Shilla DJ, Shashoua Y, KhanFR (2022) Microplastics in Marine Nearshore Surface Waters of Dar es Salaam and Zanzibar, East Africa. Bulletin of Environmental Contamination and Toxicology. https://doi.org/10.1007/s00128-022-03620-5
- Díaz-de Alba M, Galindo-Riaño MD, Casanueva-Marenco MJ, García-Vargas M, **Kosore** CM (2011) Assessment of the metal pollution, potential toxicity and speciation of sediment from Algeciras Bay (South of Spain) using chemometric tools, *Journal of Hazardous Materials,* 190: 177–187
- Jenoh EM, Traoré M, **Kosore C**, Koedam N (2021) Biochemical response of Sonneratia alba Sm. branches infested by a wood boring moth (Gazi Bay, Kenya). *PLoS*

ONE, 16(11): e0259261. [https://doi.org/10.1371/journal.pone.0259261]

- Kamau J, Ngila JC, Kirui B, Mwangi S, **Kosore** CM, Wanjeri V, Okumu S (2015) Spatial variability of the rate of organic carbon mineralization in a sewage-impacted mangrove forest, Mikindani, Kenya. *J. Soils Sediments,* 15: 2466–2475.
- Kamau J, Ochola O, Ohowa B, **Kosore** CM, Magori C, Chepkemboi L, Osore M, Mahongo SB, Kyewalyanga MS (2020) Employing multivariate analysis to determine the drivers of productivity on the North Kenya Bank and in Kenyan territorial waters. *Western Indian Ocean Journal of Marine Science* Special Issue 1 / 2020 33-41
- Kamau J, Ngisiange N, Ochola O, Kilionzi J, Kimeli A, Mahongo SB, Onganda H, **Kosore** CM, Ohowa B, Magori C, Kimani E, Osore M (2020) Factors influencing spatial patterns in primary productivity in Kenyan territorial waters. *Western Indian Ocean Journal of Marine Science* Special Issue 1 / 2020 9-18
- **Kosore** CM, Ojwang L, Maghanga J, Kamau J, Kimeli A, Omukoto J, Ngisiag'e N, Mwaluma1 J, Ong'ada H, Magori C, Ndirui E (2018) Occurrence and Ingestion of Microplastics by Zooplankton in Kenya's Marine Environment: First Documented Evidence, *African Journal of Marine Science,* 10.2989/1814232X.2018.1492969
- **Kosore** CM, Galindo-Riano MD, Dı´az-de-Alba M Assessing trace-element mobility in Algeciras Bay (Spain) sediments by acid and complexing screening. *Arabian Journal of Chemistry,* 12(8): 2992-3003 (2019), [http://dx.doi.org/10.1016/j.arabjc.2015.06.041]
- **Kosore** CM, Ojwang L, Maghanga J, Kamau J, Shilla DJ, Everaert G, Khan FR, Shashoua Y (2022) Microplastics in Kenya's marine nearshore surface waters: Current status. *Marine Pollution Bulletin,* 179: 113710
- **Kosore** CM, Waiyaki E, Kimaga F. Assessing the impact of banning the single-use plastic carrier bags: a case study for Kenyan marine environment looking atmacro, meso, and microplastics. (2024) 196:329. https://doi.org/10.1007/s10661-024-12473-w
- Wanjeri VO, Okuku EO, Ohowa BO, **Kosore** CM, Ongore CO, (2013) An insight into ecotoxicological significance of PAHs contamination in selected Kenyan estuaries, *Journal of Environmental Science and Water Resources,* 2(5): 157 – 166

Damaris Mutia
Research Scientist

Ms. Mutia is a dedicated research scientist at the Kenya Marine and Fisheries Research Institute (KMFRI), specializing in Oceanography and Hydrography. Her expertise encompasses marine physics, climate science, ocean observation, and operational oceanography. She is highly skilled in GIS and Remote Sensing, big data analysis using MATLAB and R, and spatial mapping with QGIS. Over the years, she has contributed to numerous research projects both within and beyond Kenyan marine waters.

Her primary research interests include ocean modeling and numerical simulations, operational oceanography in the context of climate change; the development of real-time marine forecasting systems for fisheries; ocean instrumentation; research cruises, and ocean data management.

To advance her career, Ms. Mutia has actively participated in national and international training programs in Physical Oceanography, Climate Science, and Ocean Data Management. She is passionate about ocean observations, particularly in understanding ocean circulation, heat budgets, and their impact on biodiversity and conservation.

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Physics, Climate Science

Research Interests: Operational Oceanography, Ocean Modelling, Instrumentation

Email: dmutia@kmfri.go.k; mutiadamaris@gmail.com

Qualifications:

- **MSc.** Climate Change
- **BSc.** Physics

Dr. Elisha Mrabu
Research Scientist

Dr. Mrabu is a research officer at Kenya Marine and Fisheries Research Institute (KMFRI). He has an interest in Mangrove ecology and conservation. Specifically his interest is in Mangrove fauna where he has studied Gastropods behavior and Crustacean ecology and physiology, currently he is studying wood borer infestation in mangrove and the role of fungi in degrading mangroves. He has 9 peer reviewed publications. Apart from Mangrove ecology, he has immense experience in seaweed mariculture in Kenya.

Research Networks: ResearchGate

Location: KMFRI Shimoni. National Mariculture Resource and Training Centre (NaMaReT)

Department: Mariculture, Oceanography and Hydrology

Specialization: Mangrove ecology, Seaweed farming

Research Interests: Mangrove macrobenthos studies along the Kenyan coastline and Mozambique, Mangrove wood anatomy and physiology studies in Brussels. Natural and non natural disturbances in Mangrove and Development and commercialisation of Seaweed Mariculture in South coast of Kenya

Email: emrabu@kmfri.go.ke/elishamrabu@gmail.com

Qualification:

- **PhD:** Bio-engineering Sciences (Vrije Univesiteit Brussels Belgium)
- **MSc:** Master in Ecological Marine Management (ECOMAMA) (Vrije Univesiteit Brussels Belgium)
- **BSc:** Zoology (UEAB) University of Eastern Africa Baraton

Publications:

- Cannicci S, BartoliniF, Dahdouh-Guebas F, Fratini S, Litulo C, Macia A, **Mrabu** EJ, Lopes GP, Paula J (2009) Effects of urban wastewater on crab and mollusc assemblages in equatorial and subtropical mangroves of East Africa *Estuarine, Coastal and Shelf Science,* 84(3): 305-317
- Flower EM, Amelia B, Omar I, Benjamin P, Koushul N, Joseph JMR, **Mrabu** EJ, Joseph GW, (2013) Cultivation and utilisation of red seaweeds in the Western Indian Ocean (WIO) Region». *Journal of Applied Phycology, 26: 699–705*
- **Mrabu** EJ, Robert EMR, Lehmann I, Kioko E, Bosire JO, Ngisiange N, Dahdouh-Guebas F, & Nico Koedam **2016** Wide ranging insect infestation of the pioneer mangrove Sonneratia alba by two insect species along the Kenyan Coast. *PLoSONE* 11(5): e0154849. [https://doi:10.1371/journal.pone.0154849]
- **Mrabu** EJ, Traoré M, Kosore C, Koedam N (2021) Biochemical response of *Sonneratia alba* Sm. branches infested by a wood-boring moth (Gazi Bay, Kenya). PloSONE. 16(11): e0259261, [https://doi.org/10.1371/journal]
- **Mrabu** EJ, Bosire JO, Cannicci S, Koedam N, Dahdouh-Guebas F (2024) Mangrove die-back due to massive sedimentation and its impact on associated biodiversity *Kenya Aquatica Journa,* 9(1): 43-58
- **Mrabu** EJ, De Villiers EP, De Villiers SM, Okoth S, Jefwa J, Kioko E, Kaimenyi D, Marijke H, Dahdouh Guebas F, Koedam N (2019) Infestation mechanisms of two wood-borer species in the mangrove Sonneratia alba J. Smith in Kenya and co-occurring endophytic fungi. *PLoSONE,* 14(10): e0221285. [https://doi.org/10.1371/journal]
- Vannini M, Fratini S, Rorandelli R, Lähteenoja O, **Mrabu** EJ (2006) Tree-climbing behavior of *Cerithidea decollata* (L.), a Western Indian Ocean mangrove gastropod (Mollusca, Cerithidae). *J. Mar. Biol. Ass.* U.K. 2006, 86: 1429-1436
- Vannini M, **Mrabu** EJ, Fratini S, Rorandelli R (2007)Rythmic vertical migration of the gastropod *Cerithidea decollata* in a Kenyan mangrove forest (L.), a field experimental approach (Mollusca, Potamidedae) *Mar Biol* 2007 153: 1047–1053
- Vannini M, Cannicci S, **Mrabu** EJ, Rorandelli R, Fratini S (2008) Random walk, zonation and the food searching strategy of *Terebralia palustris* (Mollusca, Potamididae) in Kenya**.** *Estuarine, Coastal and Shelf Science,* 153:1047–1053

Dr. Erick Okuku
Research Scientist

Dr Okuku has over 18 years in marine research ranging from marine ecology, pollution, plankton, biotoxins. He has lately been involved marine litter assessments, ocean acidification and use of radioisotopes to reconstruct pollution history and determine sediment accretion rates. He has coordinated more than 20 project in the last 18 years and has published a number of peer reviewed articles.

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Marine ecology and pollution studies

Research Interests: Biogeochemistry, ecotoxicology, radioecology, ocean acidification, biotoxins, Marine Litter

Email: eokuku@kmfri.go.ke/ ochiengokuku2003@yahoo.com

Qualifications

- **PhD.** (Kathilieke University of Leuven, Belgium),
- **Msc** (VUB, Belgium),
- **BSc** (Moi University, Kenya)

Key achievements:

Spearheaded the development of the first Kenya national marine litter management action plan

Successfully coordinated 12 projects, the latest ones being:

- Marine Litter Dynamics and Monitoring in The Coastal Waters of Mombasa City, Kenya: An Input to Source Reduction and Place Based Management Initiatives
- From trash to the pockets: a community approach to reduction of marine litter pollution
- The impact of ocean acidification on seafood safety, food and nutrition security along the Kenyan Coast"
- Strengthening of The National Capacity for Monitoring Ocean Carbon Chemistry and Its Impacts on Coastal Ecosystems and Human Livelihoods (2019) (ongoing).
- Supporting an Integrated Approach for Marine Pollution Monitoring Using Nuclear Analytical Techniques project
- Supporting an Integrated Approach for Marine Pollution Monitoring Using Nuclear Analytical Techniques project

- Enhancing Regional Capability in assessment of Marine contamination in Africa project

Membership:

- Regional expert on marine litter and microplastics in WIO region by Nairobi convention
- Western Indian Ocean Marine Science Association
- Society of Environmental Toxicology and Chemistry (SETAC)

Publications:

- Borges V, Darchambeau F, Teodoru CR, Marwick TR, Tamooh F, Geeraert N, Omengo FO, Guérin F, Lambert T, Morana C, **Okuku** EO, Bouillon S (2015) Globally significant greenhouse-gas emissions from African inland waters. *Nature Geoscience*. [DOI: 10.1038/NGEO2486]
- Kiteresi LI, **Okuku** EO, Mwangi SN, Ohowa B, Wanjeri VO, Okumu S. Mkono M (2012) The influence of land based activities on the phytoplankton communities of Shimoni-Vanga system. *International Journal of Environmental Research,* 6(1) 151-162
- **Okuku** EO, Mubiana VK, Hagos KG, Kokwenda P Blust R (2010) Bioavailability of Sediment-Bound Heavy Metals Using BCR Sequential Extraction on the East African Coast**.** Western Indian Ocean Journal of Marine sciences. 9(1): 325-334
- **Okuku** EO, Ohowa B, Munga D, Mwangi SN, Kiteresi LI, Wanjeri VO, Okumu S Kilonzo J (2011) Sewage pollution in the coastal waters of Mombasa City, Kenya: A norm rather than an exception. *International Journal of Environmental Research,* 5(4): 865-874
- **Okuku** EO, Peter HK (2012) Choice of heavy metals bioindicator: a critique of the method that uses total heavy metals. *International Journal of Environmental Research,* 6(1): 313-322
- **Okuku** EO,, Mwakio T., Ochiewo J. O., Munyi F., Kiteresi LI Bouillon S (2015). The impacts of hydropower development on rural livelihood sustenance. *International Journal of Water Resources Development,* [https://DOI:10.1080/07900627.2015.1056297]
- **Okuku** EO, Mwakio T, Kiteresi LI, Bouillon S (2016) The response of phytoplankton and zooplankton to river damming in three cascading reservoirs of the Tana River, Kenya. Lakes and Reservoirs: *Research and Management,* 21: 114–132.
- **Okuku** EO, Mwakio T, Kiteresi LI, Bouillon S (2016) The response of phytoplankton and zooplankton to river damming in three cascading reservoirs of the Tana River, Kenya. Lakes and Reservoirs: *Research and Management,* 21: 114–132
- **Okuku** EO, Mwakio T, Kiteresi LI Bouillon S (2016) Role of a cascade of reservoirs in regulating downstream transport of sediment, carbon and nutrients: Case study of tropical arid climate Tana River Basin: [https://DOI: 10.1111/lre.12206]
- **Okuku** EO, Mwakio T, Kiteresi LI, Bouillon S (2018) Role of a cascade of reservoirs in regulating downstream transport of sediment, carbon and nutrients: Case study of tropical arid climate Tana River Basin: [https://DOI: 10.1111/lre.12206]
- **Okuku** EO, Wanjeri VW, Owato G, Mwalugha C (2019) Decadal Pollution Assessment and Monitoring Along the Kenya Coast (Book chapter)
- **Okuku** EO, Tole BM, Borges AV (2019) Diffusive emissions of methane and nitrous oxide from a cascade of tropical hydropower reservoirs in Kenya (Accepted for publication: *Lakes and Reservoirs: Research and Management*)
- **Okuku** EO, Kiteresi LI, Wanjeri VO, Owato GO (2020) Baseline survey of sediment contamination with 210Polonium in three peri-urban creeks of Mombasa, Kenya. *Marine pollution bulletin,* 154: 111040
- **Okuku** EO**,** Kiteresi LI, Owato G, Mwalugha C, Omire J, Mbuche M, Brenda G (2020) Baseline meso-litter pollution in selected coastal beaches of Kenya: Where do we concentrate our intervention efforts? *Marine Pollution Bulletin,* 158: 111420
- **Okuku** EO, Kiteresi LI, Owato G, Mwalugha C, Omire J, Otieno K, Mulupi L (2020) Marine macro-litter composition and distribution along the Kenyan Coast: The first-ever documented study. *Marine Pollution Bulletin,* 159: 111497
- **Okuku** EO, Kiteresi L, Owato G, Otieno K, Omire J, Kombo MM, Ndwiga J (2021) Temporal trends of marine litter in a tropical recreational beach: A case study of Mkomani beach, Kenya. *Marine Pollution Bulletin,* 167: 112273
- **Okuku** EO**,** Kiteresi L, Owato G, Otieno K, Mwalugha C, Mbuche M, Omire J (2021) The impacts of COVID-19 pandemic on marine litter pollution along the Kenyan Coast: a synthesis after 100 days following the first reported case in Kenya. *Marine Pollution Bulletin,* 162: 111840
- Ongore CO, **Okuku** EO, Mwangi SN, Kiteresi LI, Ohowa B, Wanjeri VO, Okumu S, Kilonzi J (2013) Characterization of nutrients enrichment in the estuaries and related systems in Kenya coast. *Journal of Environmental Science and Water Resources*: 2(6): 181-190
- **Wanjeri**O, **Okuku** EO, Ohowa B Kosore C (2013) An insight into ecotoxicological significance of PAHs contamination in selected Kenyan estuaries: *Journal of Environmental Science and Water Resources*, 2(5): 157-166

Charles Muthama
Research Scientist

Charles Muthama has worked in KMFRI for 32 years (since February, 1990). He first worked in the laboratory as a technologist in the biological oceanography research.

He currently works as a research scientist and has been a researcher for 10 years. He does research in seagrass ecosystem ecology and mainly interested in ecosystem conservation and restoration. As an advanced open water scuba diver, he has worked in coral ecosystems and Fish Aggregating Devices. He is a member of WIOMSA, SeagrassNET and Kenya seagrass research team.

Location: KMFRI Mombasa Research Centre

Department:

Specialization: -

Research Interests: Seagrass restoration

Email: cmuthama@kmfri.co.ke

Qualifications

- **MSc.** In Fisheries and Aquatic Sciences (Fisheries Management option) – currently being undertaken at the University of Eldoret (Thesis submitted).
  Thesis Title: *A comparison of ecological attributes in degraded and healthy seagrass beds in coastal Kenya*
- **BSc.** In Fisheries and Aquatic Sciences from Moi University, Eldoret (2012) – 2nd Class
  Dissertation title*: A comparison of Benthic invertebrate community structure of fragmented and continuous seagrass beds in coastal Kenya.*
- Diploma in Applied Biology - The Mombasa Polytechnic (now Technical University of Mombasa) (1997).
  Project title: *Macrofaunal assemblages of littoral seagrass communities in Nyali beach, Kenya.*

Professional Training

- Sustainable Use of Coastal and Marine Resources (SUCOMAR) – Advanced professional course offered in Germany – 2004
- Reef Check Training of Trainers – in Malindi Kenya by Reef Check International – 2002.
- Sea weed Mariculture course – university of Western Cape in South Africa (funded by International Oceanography Institute – IOI) – 1999.

Publications:

- **Muthama** CM A comparison of Benthic invertebrate community structure of fragmented and continuous seagrass beds in coastal Kenya. Dissertation, BSc. Fisheries and Aquatic Sciences (Moi Uni). 38pp
- **Muthama** CM JN Uku (2003) Macrofaunal assemblages of littoral seagrass communities. Jan Hoorweg & Nyawira Muthiga (eds.). Recent Advances in Coastal Ecology. *African Studies Centre Research Report,* 70:51-63
- Ochiewo J, de la Torre-Castro M, **Muthama** CM, Munyi F Nthuta JM (2010) Socio-economic features of sea cucumber fisheries in southern coast of Kenya. *Ocean and Coastal Management. ELSEVIER.* 53: 192 – 202

Gilbert Atuga
Research Scientist

I work with Kenya Marine and Fisheries Research Institute since 2010 as a research scientist in Oceanography and Hydrography department. I hold a Bachelor of Science degree in Biochemistry from Kenyatta University (2000 to 2004). I did a Master's of Science degree in Marine Biotechnology from Wageningen University, The Netherlands (2012 to 2014).

I have done various professional courses from various universities which include: Advanced masters' course on Technologies for Water resource management Jointly Organized by University of Antwerp and Ghent University Belgium; Use of Constructed wetlands for water quality control and wastewater treatment from UNESC-IHE University, The Netherlands; Ocean governance and sustainable fisheries management from Australia National University, Australia, and Environmental/ Pest risk assessment, offered by Africa Center of Excellence, Addis Abba University, Ethiopia. I have also been involved in Oceanography research cruises which Includes: International Indian Ocean Expedition II Cruise South Africa, Tanzania and Comoros waters on board South Africa Agulhas II, 2018, and *RV Mtafiti* Territorial water cruise, Kenya territorial waters.

Innovations: Developed mobile application for plastic monitoring in Kenya. Already registered under copyright board of Kenya, and in the process of patenting. It is on google store with name "Macroplastics application"

Funded projects: Citizen Science for monitoring macroplastics in Kenya using mobile Technology collaborative project with University of Antwerp Belgium, Funded by Vlir-uos under South-North initiative.2019 o 2021 Ongoing. Amount: 68, 750 Euros. https://www.vliruos.be/en/projects/project/22?pid=4148

Second Grant, Mwache Mangrove forest regeneration: Integrated approach to restore mangrove forest, project award by Rufford Small Grant Foundation 5,000 sterling pounds ongoing. Amount 5,000 sterling pounds (July 2019 to July, 2020). https://www.rufford.org/projects/gilbert-nyabochwa-atuga/mwache-mangrove-forest-regeneration-integrated-approach-to-restore-mangrove-habitat-MTU1MTQ/

First Grant, Mwache Mangrove forest regeneration: Integrated approach to restore mangrove forest, project award by Rufford Small Grant Foundation 5,000 sterling pounds July 2017 to July 2018. https://www.rufford.org/projects/gilbert-nyabochwa-atuga/mwache-mangrove-forest-regeneration-integrated-approach-to-restore-mangrove-habitat/

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Marine Biotechnology, Risk Assessment, Ecological engineering, and Bioprocess engineering

Research Interests: Micro and Macroplastics pollution, Citizen Science for environmental pollution monitoring, Environmental risk assessment and management in the Indian Ocean, Wetlands conservation in light of climate change, Wastewater treatment for pollution control and resource recovery.

Email: gatuga@kmfri.go.ke;
atuga20024@yahoo.com or atuga2016@gmail.com

Qualifications

- **Currently:** PhD student in Applied Systems, Osnabruck University, Germany
- **MSc**
- **BSc**

Publications:

- **Atuga** G *et al.*, (2016) Enrichment of chlorobenzenes degrading cultures from Zeebrugge harbor river sediments» Proceedings of the 2016 Jomo Kenyatta University of Agriculture and Technology Scientific Technological and Industrialization Conference. http://41.204.187.99/index.php/jscp/article/view/1346
- **Atuga** G *et al.*, (2016) "Influence of Temperature on Digested Black Water Nitrification: Suitable Conditions for algae growth" Proceedings of the 2016 Jomo Kenyatta University of Agriculture and Technology Scientific Technological and Industrialization Conference. http://41.204.187.99/index.php/jscp/article/view/1341
- **Atuga** G, (2020) Improper disposal of COVID-19 face masks likely to hurt ocean health, increase plastic pollution. https://www.kmfri.co.ke/images/pdf/Mtafiti-Monthly-May-issuefinal-1.pdf
- **Atuga** G, (2020) COVID-19 pandemic and the Blue Economy: From Plastic pollution perspective. https://www.kmfri.co.ke/index.php/13-news-and-events/196-covid-19-pandemic-and-the-blue-economy-from-plastic-pollution-perspective
- **Atuga** G (2021) Mobile application for plastics monitoring in Kenya. Mobile publication Patent KE/P/2021/3833
- **Atuga** G (2021) Development of Standard Operation Protocols for Macroplastics Monitoring Using a Mobile App to ensure quality data input, KMFRI, Advancing Development of Kenya's Blue Economy: Highlights of KMFRI Marine Research and Innovation (2020/2021). (Eds) G. M. Okemwa, J. Uku, S. Wachia and J. Kiguta. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya 55 pp
- **Atuga** G (2021) Development of a mobile application for monitoring plastics pollution in Kenya, KMFRI, Advancing Development of Kenya's Blue Economy: Highlights of KMFRI Marine Research and Innovation (2020/2021). (Eds) G. M. Okemwa, J. Uku, S. Wachia and J. Kiguta. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya 55 pp
- Diemont E, Draugelyte E, Felix GF, **Atuga** G, Bos R (2014) Democratizing knowledge: co-creating the future, insights from the iweek 2013. In paper Book 6th Living knowledge Conference, (pp. 88-97). https://library.wur.nl/WebQuery/wurpubs/fulltext/359092

Technical reports

- **Atuga** G, (2021). Assess the extent of Personal Protective Equipment plastic litter along the Kenyan coast to understand the extent of COVID-19 PPE waste pollution. KMFRI technical report series.
- **Atuga** G, (2021) Mobile application for plastic pollution monitoring in Kenya using citizen science. KMFRI technical report series.
- **Atuga** G, (2021) Standard Operation Protocols. Monitoring macroplastics in Kenya – Guideline. KMFRI technical series.

Articles published in other media

- **Atuga** G, Johannes T (2021) Monitoring Kenya's Plastic Problem: How Citizen Science can help monitoring macroplastics in Kenya using mobile technology. Environment, Coastal & Offshore, Special issue UN Ocean Decade. http://digital.ecomagazine.com/publication/frame.php?i=707374&p=&pn=&ver=html5&view=articleBrowser&article_id=4031512
- **Atuga** G, (2020) Fighting Covid-19 brings new danger: Daily Nation newspaper article on improper disposal of facemasks used for Covid-19 Prevention. https://nation.africa/kenya/blogs-opinion/opinion/fighting-covid-19-brings-new-danger--549214

Research dissemination in local television media

- https://www.standardmedia.co.ke/thenairobian/ktn-leo/video/2000210676/kisunzi-cha-barakoa-makala-maalum-kuhusu-athari-ya-barakoa-siku-za-usoni-nchini-kenya
- https://www.standardmedia.co.ke/thenairobian/ktn-prime/video/2000210684/masked-disaster-looming-disaster-as-75-per-cent-of-face-masks-end-up-in-the-environment
- https://www.standardmedia.co.ke/health/amp/health-science/article/2001411239/unmasked-how-poorly-disposed-face-masks-will-end-up-in-your-food

Justine Kibet Rutto
Research Scientist

Justine Kibet Rutto is an Assistant Research Scientist (ARS) in the department of Oceanography and Hydrography at Kenya Marine and Fisheries Research Institute (KMFRI), Mombasa, Kenya.

He holds a Bachelor's Degree in Biochemistry from University of Kabianga ,UoK (2015 to 2018)

Research Interests:

- Cruise Surveys to Assess Quality of Water for Aquaculture Farms.
- Monitor Impacts of Climate Change and Ocean Acidification.
- Assessment and Characterization of Economical Natural Products.
- Monitoring and Assessment of Marine Pollution.

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Marine Ecology and Biotechnology

Email: jrutto@kmfri.go.ke; justinerutto@gmail.com

Qualifications:

- **BSc**. Biochemistry

Harrison Ong'anda
Research Scientist

Joined the Institute in 1988 in training position after completion of a BSc degree in Mathematics and Statitics from the University of Nairobi. Proceeded in 1990 to a Master's degree program in Marine Ecology at the Free University of Brussels in Belgium.

Professional contributions have been many and varied. Implemented the first GIS based Kenya coastal resource database and atlas. Involved in ocean data management through the IOC-UNESCO beginning in 1997 to date. Is presently coordinating the Kenya National Oceanographic Data Center (KeNODC). Has been involved in data management components for major projects in the WIO region including the SWIOFP and ASCLME projects. Presently chairing the WIO task group on Marine Spatial Planning and also leading the data process for the cumulative impacts assessment under the WIOSym Norway initiative. Lastly been conducting and coordinating short trainings for scientists being implemented at the OTGA Regional Training Center (RTC) in KMFRI Mombasa, targeting mainly the English speaking countries in Africa.

Research Networks: Research Gate

OceanExpert

Location: KMFRI Mombasa

Department: Data and Knowledge Management

Specialization: Marine Spatial Planning, Data science, GIS and Remote Sensing

Research Interests: Spatial data applications and knowledge management

Email: honganda@kmfri.go.ke
hochieng2003@gmail.com; hochieng2003@yahoo.com

Qualifications

- **MSc**, post graduate diploma GIS & Remote Sensing

Publications:

- Kimeli A, Thoya P, Ngisiang'e N, **Ong'anda** H, Magori C 2018 Satellite-derived bathymetry: A case study of Mombasa Port Channel and its approaches, Kenya. Western Indian Ocean Journal of Marine Science 17(2): 2018 93-102
- Knockaert C, Tyberghein L, Goffin A, Vanhaecke D, **Ong'anda** H, Wakwabi EO, Mees J (2019) Biodiversity data rescue in the framework of a long-term Kenya-Belgium cooperation in marine sciences. Springer *Nature* (2019) 6:85
- Kosore C, Ojwang L, Maghanga J, Kamau J, Kimeli A, Omukoto J, Ngisiag'e N, Mwaluma J, **Ong'anda** H, MagoriC Ndirui E (2018) Occurrence and ingestion

of microplastics by zooplankton in Kenya's marine environment: first documented evidence. *African Journal of Marine Science,* 40(3): 225-234

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- Muhando CA**, Ong'anda** H, Bydekerke L. (2004) *Overview of the Physical Alteration and Destruction of Habitats in the Eastern African Region using Geographical Information Systems (GIS).* UNEP/GPA/WIOMSA. 70pp
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- **Ong'anda HO** *The dynamics of carbon and nitrogen in the mangrove forest of Gazi, Kenya. A numerical modelling approach*. MSc Thesis, Free University of Brussels, Belgium. 1992
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- Munga CN, Mwangi S, **Ong'anda** H, Ruwa R, Manyala J, GroeneveldJC, Kimani E, Vanreusel A (2014) Fish catch composition of artisanal and bottom trawl fisheries in Malindi-Ungwana Bay, Kenya: A cause for conflict? *Wsetern Indian Ocean J. Mar. Sci.,* 13(2): 177-188

Dr. James Kairo
Research Scientist

James Gitundu Kairo is a Pew Fellow (2019) and Chief Scientist at the Kenya Marine and Fisheries Research Institute - a national research institute mandated to research and advice the government on wise use of aquatic resources. Kairo obtained BSc and MSc in Biology from the University of Nairobi (Kenya) before proceeding for his PhD at the Free University of Brussels (VUB, Belgium) on the theme of ecology and restoration of mangrove systems.

Kairo has vast knowledge and working experience on the conservation, rehabilitation, and sustainable utilization coastal and marine resources, which has earned him several national and international awards. In 2010, Dr. Kairo was awarded Kenya's Presidential Award of the Moran of the Order of the Burning Spear (MBS) for his contribution in the advancement of marine conservation in the country. In 2019, Kairo was nominated a Pew Fellow in marine conservation.

Dr. Kairo is member of International Scientific Working Group on Blue Carbon and served as the coordinating lead author (CLA) of the IPCC's special report on oceans and cryosphere (SROCC).

Research networks: ResearchGate

Location: KMFRI Shimoni/Gazi

Department: Oceanography and Hydrography

Specialization:

Research Interests: Biodiversity and Ecosystem Functions, Estuarine and Coastal Ecosystems, Sustainable Development, Ecology and Restoration of Mangrove Systems, management planning, climate change.

Email: jkairo@kmfri.go.ke; gkairo@yahoo.com

Qualifications

- **PhD** (VUB, Belgium), Marine Resources Management
- **MSc** (UoN, Kenya). Plant Biology
- **BSc** (UoN, Kenya). Plant Biology

Publications:

- Abram N. **Kairo** JG (2019) Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate. IPCC.
- Addo SA, **Kairo** J, Coastal Development: Resilience, Restoration and Infrastructure Requirements
- Bosire JO, Kaino JJ, Olagoke AO, Mwihaki LM, Ogendi GM, **Kairo** JG, Berger U, Macharia D (2014) Mangroves in peril: unprecedented degradation rates of peri-urban mangroves in Kenya. *Biogeosciences* 11: 2623–2634
- Celine F, **Kairo** JG, Mohamed O, Mohamed S (2017) Involvement, knowledge and perception in a natural reserve under participatory management, Mida Creek, Kenya. *Ocean & Coastal Management,* 142(15): 28 – 36
- Dahdouh-Guebas, **Kairo** JG, Curnick DJ (2020) Public perceptions of mangrove forests matter for their conservation. *Frontiers in Marine Science,* 7, p.901.
- Dahdouh-Guebas F, Hugé J, **Kairo**, JG (2020) Reconciling nature, people and policy in the mangrove social-ecological system through the adaptive cycle heuristic, Estuarine, *Coastal and Shelf Science* (2020), [https://doi: https://doi.org/10.1016/j.ecss.2020.106942]
- Di NittoD, Neukermans G, Koedam N, Defever H, Pattyn F, **Kairo** JG, Dahdouh-Guebas F (2014) Mangroves facing climate change: landward migration potential in response to projected scenarios of sea level rise. *Biogeosciences* 11: (857-871)
- Gress SK, Huxham M, **Kairo** JG, Mugi LM, BriersRA (2016) Evaluating, predicting and mapping belowground carbon stores in Kenyan mangroves. *Global Change Biology* (2016),[doi:10.1111/gcb.134https://38]
- Hamza JA, Esteves LS, Cvitanovic M, and **Kairo** J (2020) Past and Present Utilization of Mangrove Resources in Eastern Africa and Drivers of Change. *Journal of Coastal Research* 95(sp1): 39-44, [https://doi.org/10.2112/SI95-008.1]
- Hijbeek R, Koedam N, Khan NI, **Kairo** JG, Schoukens J, Dahdouh-Guebas F (2013) An evaluation of plotless sampling using vegetation simulations and field data from a mangrove forest. *PLos One,* 8(6): e67201, [https://doi:10.1371/jounal.pone.0067201]
- Huxham M. Emerton I, **Kairo** J, Munyi F, Abdirizak H, Muriuki T, Nunan F, Briers RA (2015) Applying Climate Compatible Development and economic valuation to coastal management: A case study of Kenya's mangrove forests. *Journal of Environmental Management,* 157: 168–181
- Fortnam, M, Atkins M, **Kairo** JG (2020) Multiple impact pathways of the 2015–2016 El Niño in coastal Kenya. *Ambio* (2020).[https://doi.org/10.1007/s13280-020-01321-z]
- **Kairo** JG, Lang'at JKS, Dahdouh-Guebas F, Bosire JO, Karachi M (2008) Structural Development and Productivity of Replanted Mangrove Plantations in Kenya. *Forest Ecology and Management,* 255: 2670 -2677
- **Kairo** JG, Bosire J, Langat J, Kirui B, Koedam N (2009) Allometry and biomass distribution in replanted mangrove plantations at Gazi Bay, Kenya. *Aquatic Conserv: Mar. Freshw. Ecosyst.* [https://DOI: 10.1002/aqc.1046]
- **Kairo** JG, Mangora MM (2020) Edn. Guidelines on Mangrove Ecosystem Restoration for the Western Indian Ocean Region. UNEP, Nairobi, 54 pp: www.nairobiconvention.org/; www.wiomn.org; www.wiomsa.org
- **Kairo** J, Langat J (2021) Ocean Climate Solutions: Blue carbon Now Incorporated in the Updated Kenya's Nationally Determined Contributions to Paris Agreement
- Kirui KB, **Kairo** JG, Bosire J, Viegever KM, Rudra S, Huxham M, Briers RA (2012) Mapping of mangrove forest land cover change along the Kenya coastline using Landsat imagery. *Ocean & Coastal Management* (2012), [https://doi:10.1016/j.ocecoaman.2011.12.004]
- Mungai F, **Kairo** J, Mironga J, Kirui B, Mangora M, Koedam N (2019) Mangrove cover and cover change analysis in the transboundary area of Kenya and Tanzania during 1986–2016. *Journal of the Indian Ocean Region,* 15:2, 157- 176, DOI:10.1080/19480881.2019.1613868
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- Wang'ondu VW, **Kairo** JG, Kinyamario JI, Mwaura FB, Bosire JO, Dahdouh-Guebas F, Koedam N (2010) Phenology of Avicennia marina (Forsk.) Vierh. in a Disjunctly-zoned Mangrove Stand in Kenya. Western Indian Ocean J. Mar. Sci. 9 (2):135-144,

Prizes and Awards

- **The Moran of the Order of the Burning Spear (MBS):** Conferred on 12th Dec. 2010; by His Excellency Mwai Kibaki, President of the Republic of Kenya, in recognition of the distinguished services I have rendered to my Country in the areas of marine conservation
- **National Heroic Award:** Awarded by Kenya's Ministry of Fishery Development, on the Occasion to mark World Ocean Day, Mombasa. The award was in recognition of my contribution in the advancement of mangrove conservation in Kenya.
- **WIOMSA Fellowship Award:** Awarded by the Western Indian Ocean Marine Science Association WIOMSA) in recognition of my contribution to the advancement of marine science in the region (visit: www.wiomsa.org for details of the award and nomination)
- **WWF-Practitioner Fellow:** Awarded by Alcoa Foundation's Conservation and Sustainability Program to

undertake research on productivity of replanted mangrove forests in Kenya (see web for details of nomination: www.iie.org/programs/practitionerfellows)

- **International Cooperation Prize –** Awarded by the Belgian government in recognition of the relevance of my work in promoting international development cooperation and sustainable development (see web for details of nomination: http://www.devcoprize.africamuseum.be/en/laurea02/00r1.htm)

Dr. Joseph Kamau

Research Scientist

Dr. Joseph Nyingi Kamau is a senior scientist and the Assistant Director (Oceanography and Hydrography) at the Kenya Marine Fisheries Research Institute, Mombasa, Kenya. He is a biogeochemist with a focus on providing research information to assist managers to regulate and manage the environment effectively. His research interest is in establishing the fate and pathway of pollutants in the environment. The project is entitled "Sustainable Oceans, Livelihoods and food Security Through Increased Capacity in Ecosystem research in the Western Indian Ocean (SOLSTICE-WIO). He reviews projects for NRF South Africa and is a College member of UKRI International Development Peer Review College. He is a member of the Golden Key International and is the National Technical Focal Point for FAO project GCP/GLO/660/NOR.

Research Networks: Research Gate

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Biogeochemist

Research Interests: Biogeochemistry: Determining the fate and pathway of pollutants as well as nutrient cycling Microplastics: Determine distribution, characterize and assess toxicity risk Antifouling agents: Development of antifouling paints from marine natural products. Disinfectant by-products (DBP): Assess the situation in Kenya's water treatment plants; characterize the DBP and natural organic matter (NOM) composition in the water treatment plants. Assess cancer risk. (they have a strong membrane technology research unit) Disinfectant by-products (DBP): Assess the situation in Kenya's water treatment plants; characterize the DBP and natural organic matter (NOM) composition in the water treatment plants. Assess cancer risk.

Email: jkamau@kmfri.co.ke; josephkamau@yahoo.com

Qualifications:

- **PhD,**
- **Msc**

Publications:

- **Kamau** JN (1998) Pollution dynamics and trace metal levels at Makupa creek Kenya. Book of extended abstracts; International symposium on Marine Pollution; Monaco 5th to 9th Oct 1998
- **Kamau** JN (1999) Proceedings of the 3rd International symposium on Environmental Geochemistry in Tropical Countries in Nova Friburgo, Rio de Janeiro, Brazil 25th to 29th Oct 1999
- **Kamau** JN (2000). Killindini creek a pollutant sink or pathway. Symposium proceedings, 2nd open water science Joint Global Ocean Flux Studies (JGOFS) Bergen, Norway
- **Kamau** J N **(2001)** Heavy metals distribution in sediments along Makupa and Kilindini creeks. *Hydrobiologia, 458*: *235-240*
- **Kamau** JN (2002) Heavy metals distribution and enrichment at Port-Reitz creek Mombasa, Kenya. *Western Indian Ocean J. Mar. Sci. 1(1):: 65-70*
- **Kamau** JN., Dehairs F, Marteen L, Kazungu J (2005) Anthropogenic influence on the mobilization of heavy metals at the back waters of Makupa creek. Conference proceedings Pacem in Maribus Conference Oct. 31-Nov. 3rd 2005, Australia, pp. 96-106
- **Kamau** JN (2005) Effect of Seasonal Physicochemical Variation on Metal Speciation, Implication on Water Quality in Lake Naivasha, Kenya. *MSc Thesis Jomo Kenyatta University of Agriculture and Technology.*
- **Kamau** JN, Dehairs F, Marteen L, Kazungu J (2006) Sediment-water Exchange of Selected Heavy Metals at the backwaters of Makupa Creek, Kenya. *Western Indian Ocean J. Mar. Sci. Vol. 5, No. 1, pp. 153–162*
- **Kamau** J, Gachanja, A, Ngila JC, Kazungu J (2007). The Seasonal and Spatial Variations of labile Cu, Fe, Mn, Pb and Zn sediment fractions in Lake Naivasha, Kenya. *Lakes & Reservoirs: Research and Management,* 12: 303-313
- **Kamau** JN, Kirui B, Kristensen E, Mwangi S, Okumu S (2007) Sewage phytoremediation; an insight on the silent services offered by mangroves ecosystem in carbon and nutrients mineralization. 5th WIOMSA Scientific Symposium, Durban, South Africa from 22nd to 26th October 2007 book of abstracts
- **Kamau** JN, Gachanja A, Ngila JC, Kazungu J, (2008) Anthropogenic and seasonal influence on the sediment-water fluxes for selected metals at Lake Naivasha, Kenya. *Lakes & Reservoirs: Research and Management,* 13: 145-54
- **Kamau** JN, Ngila JC, Kindness A, Bush T (2011) Equilibrium and Kinetic Studies for Extracting Cu, Mn and Fe from Pulp Wastewater onto a C-18 Column with Acetylacetone Complexing Ligand. *Analytical letters, 44: 1-15*

- **Kamau** JN, Ngila JC, Kindness A, Bush T (2012) Investigating the pathway and fate of inorganic impurities in a bisulphate dissolving pulp production process. *PhD Thesis University of KwaZulu Natal, South Africa.*
- **Kamau** JN, Gachanja A, Ngila C, Kazungu JM, Zhai M (2014) The seasonal influence on the spatial distribution of dissolved selected metals in Lake Naivasha, Kenya. *Physics and Chemistry of the Earth* 67–69 (2014) 111–116
- **Kamau** JN, Ngila JC, Kirui B, Mwangi S, Kosore CM, Wanjeri V, Okumu S (2015) Spatial variability of the rate of organic carbon mineralization, in a sewage impacted forest, Mikindani Kenya. *Journal of Soils and Sediments,* 15: 2466-2475
- **Kamau** JN, Kuschk P, Machiwa J, Macia A, Sibylle M, Mwangi S, Munga D, Kappelmeyer U (2015) Investigating the distribution and fate of Cd, Cu, Fe, Mn and Zn in sewage impacted mangrove fringed creeks of Kenya, Tanzania and Mozambique. Journal of Soils and Sediments 15:2453-2465 **Kamau** JN (2019). Elemental Speciation | Overview. In Worsfold P, Poole C, Townshend A, Miró M, (Eds.), *Encyclopedia of Analytical Science,* (3rd ed.). 3: 9–22, Elsevier
- Kitheka JU Ohowa BO, Mwashote BM, **Kamau** J (1999) Water circulation, groundwater outflow and nutrients dynamics in Mida creek, Kenya. *Mangrove and Salt Marshes Journal. 3: 135-146*
- Kosore C, Ojwang L, Maghanga J, **Kamau**, A Kimeli, Omukoto J, Ngisiag'e N, Mwaluma J, Ong'ada H, Magori C, Ndirui E (2018) Occurrence and ingestion of microplastics by zooplankton in Kenya's marine environment: first documented evidence. *African Journal of Marine Science 2018,* 40(3): 225–234
- Mwaluma J, Osore M, **Kamau** JN, Wawiye P, (2003) Composition, Abundance and seasonality of zooplankton in Mida creek, Kenya *Western Indian Ocean J. Mar. Sci 2(2): 147-155*
- Mwangi IW, Ngila JC, **Kamau** JN, Okonkwo J (2011) Adsorption Studies of Lead, Copper II and Cadmiun Ions in Aqueous Solution by Ethylene Diamine Modified Amberlite 4 XAD-1180. In: Chemistry for Sustainable Development, P. Ramasami *et al.* (eds.), [https://DOI 10.1007/978-90-481-8650-1 20], © Springer Science+Business Media B.V. 2
- Mwangi IW. Ngila JC. Ndungu P. Msagati TAM. **Kamau** JN (2013) Immobilized Fe (III)-doped titanium dioxide for photodegradation of dissolved organic compounds in water. *Environ Sci Pollut Res*
- Munga D, **Kamau** JN, Abuodha P, Ikubi JG (2003) Concentrations of heavy metals in sediments and biota and implications of pollution of the Ungwana and Malindi Bays in Kenya. Proceedings of the Third WIOMSA Scientific Symposium, Maputo, Mozambique, 15-18 October 2003
- Munga D, **Kamau** JN (2005) Status of Marine Pollution Monitoring in Kenya. Regional Workshop on Ecotoxicology Monitoring and Control, Zanzibar February 2005 40p
- Mwaura J, Umezawa Y, Furaha J, Kimeli A, **Kamau** J, Aura CM (2017) Spatial variability of scleractinian coral bleaching suceptibility in 2010 El Nino-Southern Oscillation between northern and souther reefs, Kenya. *Coastal Marine Science* 40(1): 17-27
- Mwaura J, Umezawa Y, Nakamur T, **Kamau** J (2017) Evidence of chronic anthropogenic nutrient within coastal lagoon reefs adjacent to urban and tourism centers, Kenya: A stable isotope approach. *Marine Pollution Bulletin* 119: 74–86
- Nomngongo PN, Ngila JC, **Kamaua** JN, Msagatia TAM, Marjanovic L, Moodley B (2013) Pre-concentration of trace elements in short chain alcohols using different commercial cation exchange resins prior to inductively coupled plasma-optical emission spectrometric detection. *Analytica Chimica Acta,* 787:78– 86
- Nomgongo P, Ngila JC, **Kamau** JN (2013) Preconcentration of molybdenum, antimony and vanadium in gasoline samples using Dowex 1-x8 resin and their determination with inductively coupled plasma-optical emission spectrometry, *Talanta*
- Preston MR, **Kamau** JN (2019). Water Analysis | Seawater: Organic Compounds. In Worsfold P, Poole C, Townshend A, Miró M, (Eds.), *Encyclopedia of Analytical Science,* (3rd ed.). 10: 359–370, Elsevier

Dr. Juliet Karisa
Research Scientist

Juliet is a coral reef ecologist and conservationist and her research activities include coral reef monitoring, biodiversity assessment, socio-ecological resilience assessments, habitat mapping and coral reef restoration. Recently, Juliet has engaged in research on paleoclimate reconstruction using coral organisms. She is also participating in deep sea research on benthic ecology that includes studying mesophotic reefs.

She also does regular trainings and capacity building to coastal communities on sustainable utilization of marine resources. She is an avid scuba diver with divemaster certification and has recently trained in underwater cinematography and storytelling. Juliet has a BSc. in Fisheries and Aquatic Science, an MSc. in Fisheries Management and a PhD in Biodiversity.

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrology

Specialization: Coral Reef Ecology and Conservation

Research Interests: Coral reef resilience, Coral reef restoration, Paleoclimate reconstruction, Mesophotic reefs, deep sea benthic ecology, Marine Protected Areas

Email: jkarisa@kmfri.co.ke/jfuraha@gmail.com

Qualifications:

- PhD.
- MPhil.
- BSc.

Publications:

- Grimsditch D, Pisapia C, Huck M, **Karisa** J, Obura D, Sweet M (2017) Variation in size frequency distribution of coral populations under different fishing pressures in two contrasting locations in the Indian Ocean. *Marine Environmental Research,* 131: 146-155
- Hollander J, Linden O, Gudka M, Duncan M, Obura D, James N, Bhagooli R, Nyanapah J, Onyango C, Duvane J, Louis Y, Ngotho D, Mvungi E, Mamboya F, George R, Hamad H, Issa M, Adeleke B, Ngoa E, Harlay J, Oduor N, Fondo E, Wambiji N, Raharinaivo L, Winkler A, Okemwa G, **Karisa** J, Madi M, Mtaki K, Randrianandrasana J (2020) Marine Organisms Response to Climate Change Effects: Adaptation or Extinction. *Journal of Indian Ocean Rim Studies,* 3: 33-59
- **Karisa** J, Obura D, Kaunda-Arara B (2008) Temporal and Spatial Variation in Coral Recruitment and Mortality in Coastal Kenya. *CORDIO Status report* 2008, 223-233
- **Karisa** J (2008) Temporal and Spatial Patterns of Juvenile Corals on Lagoonal Reefs in Coastal Kenya. MPhil. Dessertation, Moi University, Kenya
- **Karisa** J, Obura D, Chen C. Spatial heterogeneity of coral reef benthic communities in Kenya (2020). *PLOS ONE 26*, 15(8): [https://doi.org/10.1371/journal.pone.0237397]
- Mwaura J, Umezawa Y, **Karisa J**, Kimeli A, Kamau J, Aura C (2017) Spatial variability of scleractinian coral bleaching and mortality induced by the 2010 ENSO, between northern and southern reefs, Kenya. *Coastal Marine Science,* 40: 17-27
- Obura D, Mwaura J**, Karisa J** (2005) Coral settlement patterns in the Mombasa Marine National Park. *CORDIO Status report* 2005, 167-173
- Obura D, Gudka M, Samoilys M, Osuka K, Mbugua J, Keith D, Porter S, Roche R, van Hooidonk R, Ahamada S, Araman A, **Karisa** J, Komakoma J, Madi M, Ravinia I, Razafindrainibe H, Yahya S & F Zivane (2022) Vulnerability to collapse of coral reef ecosystems in the Western Indian Ocean. *Nature Sustainability* 5: 104–113. [https://doi.org/10.1038/s41893-021-00817-0]
- Wanyonyi I, **Karisa** J, Gamoyo M, Mbugua J (2018) Factors influencing migrant fisher access to fishing grounds. *Western Indian Ocean Journal of Marine Science,* 16: 27-39

Dr. Jelvas Mwaura

Research Scientist

Dr. Jelvas MWAURA holds a PhD in Fisheries Science from the University of Nagasaki in Japan. As a coral reef scientist, he has contributed immensely to the development and conservation of coral reefs in Kenya, through a number of projects such as development of Kenya's MPA management plans, annual reef monitoring programme of government-MPAs and non-protected reefs (fished), publications of scientific and newspaper articles on status of coral reefs in relation to climate change, fishing pressure and pollution.

As a SCUBA diver, he contributes scientific knowledge towards Environmental Impact assessments (EIAs) along Kenya coast, especially on safeguarding marine and coastal ecosystems from adverse impacts due to coastal development projects such as sand harvesting, disposal of drenched materials. Further, his work also contributes to rehabilitation of degraded reefs through partnerships with local fishing communities along Kenyan coast and relevant government agencies. He is periodically a reviewer of Kenya Aquatic and Cognetta Journals.

Dr. Mwaura has served as the national coordinator for coral reef task force-Kenya chapter in charge of updating and profiling the data sets from different partners, useful for reporting at the national and Western Indian Ocean regional levels (2017 WIO-GCRMN coral reef status report and the 2017/18 post-bleaching assessment). He is currently the Technical focal point (TFP) for a new regional Blue Economy project funded through FAO and Government of Japan partnerships, where he contributes towards enhancing management of coral reefs and alternative livelihoods in Kenya.

Donor funded research awards

- 2020-2024: Community-based reef restoration in Pate-Kiunga, Kenya. TNC & NRT donor funded project
- 2020-2024: Enhancing livelihoods and coral reef management through increased resilience of fishing communities in Kenya. A FAO-Kenya / Japan partnering project
- 2020-2021: Strengthening biodiversity conservation, fisheries management and reef rehabilitation in Shimoni marine areas. UNDP/GEF Small grant programme
- 2019-2020: Promoting the conservation and rehabilitation of critical habitats of the Wasini Co-Management area, Kenya. UNDP/GEF Small Grant Programme

- 2017-2019**:** Mohamed bin Zayed Species Conservation Fund on project "Assessment of humphead wrasse (*Cheilinus undulatus*), spawning aggregation sites for their enhanced protection in Kenya.
- 2015-2016 MARG 1: Research project "Investigating land-based nutrient enrichment in coastal lagoons, adjacent to urban and tourism center, Kenya".
- 2011-2013: International Foundation for Science (IFS, Sweden) Research Grant; entitled "Effects of habitat quality and protection levels on groupers (Pisces: Serranidae) within coral reefs, Kenya".
- 2012: International Coral Reef Initiative (INCRI), Great Barrier Reef, Research Grant entitled "A review and assessment of the effects community conservation areas (CCAs) on coral reefs".

Research Networks: ResearchGate

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrography

Specialization: Coral reefs and fisheries conservation

Research Interests: Marine ecological rapid assessment (i.e., marine biodiversity and taxonomy), Spatial mapping of marine resources and users, Land-based pollution dynamics and impacts on marine environment, Capacity building on locally Marine Management Areas (LMMAs), and Community-based coral reef restoration/rehabilitation.

Email: jmwaura@kmfri.go.ke/ jelvasmwaura@yahoo.com Telephone: +254 712-705688

Qualifications:

- **PhD**-Nagasaki University, Japan (Environmental and Fisheries Science)
- **M.Sc.-**VLIR University, Brussels, Belgium (Marine Ecosystems Management)
- **B.Sc.** -Egerton University, Kenya (Natural Resource Management)

Publications:

- Coast Development Authority (2020) The Kenya National Coral Reef Restoration Protocol. KCCAP Project, CDA, Mombasa, Kenya (**Mwaura** J. –KMFRI)
- Government of Kenya (GOK 2017) **Mwaura** J. (eds) in State of the coast report 11: enhancing integrated Management and marine resources in Kenya. NEMA, Nairobi
- Grimsditch G, **Mwaura** J, Kolonzi J, Obura D (2009) Seasonal fluactuations in zoozanthellae densities in corals in the Mombasa Marine Park, 1998-2006. Hoorweg Jan and Nyawira Muthiga (Eds) Advances in Coastal Ecology: People, processes and Ecosystems in Kenya Chapter 11: African Studies Center
- Grimsditch G., Tamelander J, **Mwaura** J, Zavagli M, Takata Y, Gomez T (2009) Coral Reef Resilience Assessment of the Pemba Channel Conservation Area, Tanzania. Gland, Switzerland: IUCN. 40pp
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- Grimsditch G, Tamelander J, **Mwaura** J, Zavagli M, Takata Y, Gomez T (2016) Coral recruitment and coral reef resilience on Pemba Island, Tanzania. *Estuaries of the World, 42 pp*
- Gudka M, Obura D, **Mwaura** J, Porter S, Yahya S, Mabwa R (2018) Impact of the 3rd Global Coral Bleaching Event on the Western Indian Ocean in 2016. Global Coral Reef Monitoring Network (GCRMN)/Indian Ocean Commission. pp. 65
- Gudka M, Obura D, Treml E, Samoilys M, Aboud SA, Osuka K, Mbugua J, **Mwaura** J, Karisa J, Knoester E, Musila P(2024) Leveraging the Red List of Ecosystems for national action on coral reefs through the Kunming-Montreal Global Biodiversity Framework. *bioRxiv*.2024-02
- Kimanga K, Ochiewo J, Waiyaki E, Munyi F, **Mwaura** J, Karani N (2021) The socio-economic impacts of coral reef rehabilitation: coastal community perspective from Wasini in the southcoast of Kenya. *Kenya Aquatica Journal,* 6(1): 17-31
- Mutiso DM, Arab Bi, **Mwaura** J (2023) "Monitoring coral reefs in Kenyan Marine Protected Areas using remote sensing observations." *Remote Sensing of the Ocean, Sea Ice, Coastal Waters, and Large Water Regions*. Vol. 12728h. SPIE, 2023.
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Book chapters and magazine articles

- Coral reef and seagrass ecosystems conservation strategy plan 2015-2019 (**Mwaura** J. Editorial member)
- Grimsditch G, **Mwaura** J, Kolonzi J. Obura, D. (2009) Seasonal fluactuations in zoozanthellae densities in corals in the Mombasa Marine Park, 1998-2006. Hoorweg Jan and Nyawira Muthiga (Eds) Advances in Coastal Ecology: People, processes and Ecosystems in Kenya Chapter 11: African Studies Center
- Gudka M, **Mwaura** J. *et al.*, (2020) Status and trends of coral reefs of the Western Indian Ocean region. In Souter D (Eds) Status of coral reefs of the World:2020
- Kenya Coastal Development Programme (2012-2016): lessons learned in implementing multi-disciplinary project (**Mwaura** J. editor in Natural resource management and conservation section)
- **Mwaura** J, Murage D, Uku J, Mwang, S, Abubabakr M (2020) Low-tech methods and community support secure coral rewards at Wasini Island. *The WIOMSA Magazine, Issue no.* 11; 10-13
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Public/ Outreach Articles

- **Tourism, livelihoods in threat as coral reefs undergo mass bleaching:** Tourism, livelihoods in threat as coral reefs undergo mass bleaching | Nation
- Women and youth are leading Kenya's coral reef revival :-https://www.climatechangenews.com/2021/05/14/women-youth-leading-kenyas-coral-reef-revival/
- **Restoring Coral :How Islanders are restoring degraded corals in Kwale:** Restoring Coral :How Islanders are restoring degraded corals in Kwale. (youtube.com)
- Kenyan plant coral reefs to save them from bleaching: YouTube article: https://youtu.be/OD75NjG61S
- Kenya Using low technology to restore coral reefs: https://www.watertower.co.ke/kenya-using-low-technology-to-restore-coral-reefs/
- Fish decline prompts Wasini to reef restoration-STAR; July 2019
- Lobster and Octopus are back after reef restoration-The Guardian; Nov2019.
- Fishermen breathe life into Kenya's dying coral reefs- People Daily newspaper; October 2019
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- Kwale youth move to save coral reefs. THE SUNDAY NATION, JUNE 8, 2014.
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- Warming hits local corals. The effects of climate change is causing the bleaching of corals which could hurt marine life at the Coast. DAILY NATION Thursday April 29, 2010

Dr. Judith Okello
Research Scientist

Dr. Okello has worked along the coast of Kenya in different organizations and in varying capacities for well over 10 years, a period during which she has gained a wide range of experience in ecological management of coastal resources.

At KMFRI, she is currently serving as a Senior Research Scientist mainly working in the mangrove ecosystem with special interests in stress-driven physico-chemical dynamics and the associated physio-anatomical response of mangrove trees. Dr. Okello has played a pivotal role in development of a number of key documents which are instrumental in the management of Coastal ecosystems including, The National Mangrove Ecosystem Management Plan- Launched in 2017; and The Second Edition of the State of Coast Report (2018) among others. She represents KMFRI in the National Mangrove Management Committee- which plays a technical advisory role to the Chief Conservator of Forests (CCF) in matters pertaining to KFS implementation of the management plans in the mangrove ecosystem. She has also demonstrated excellent skills in interacting with the local communities while creating awareness on conservation of forest resources. She is currently collaborating with the Wetland International in championing for the concept of Community Based Ecosystem Restoration (CBEMR) along the Coast.

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Eco-physiology

Research Interests: Ecosystems' response to disturbance, Restoration ecology, Community awareness, population dynamics

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Judith_okello2003@yahoo.com

Qualifications

- **PhD:** Bio-engineering Sciences
- **MSc:** Master in Ecological Marine Management (ECOMAMA) - **O**ption of Marine Pollution and Risk Management.
- **BSc:** Forestry

Publications:

- Cohen R, Jelagat J, **Okello** JA**,** Bosire JO, Kairo JG, Huxham M, Mencuccini M (2013) Propagating unceratinity to estimate above-ground biomass for Kenyan mangroves: a scaling procedure from tree to landscape level. *Forest Ecology and Management,* 310: 968-982
- De Deurwaerder H, **Okello** JA, Koedam N, Schmitz N, Steppe K (2016) How are anatomical and hydraulic features of the mangroves *Avicennia marina* and *Rhizophora mucronata* influenced by siltation? *Trees,* [https://DOI 10.1007/s00468-016-1357-x]
- Elisabeth MR, Schmitz N, **Okello** JA**,** Boeren I, Beeckman H, Koedam N (2011) Mangrove growth rings. Fact or fiction? *Trees, 25: 49-58*
- Emmanuel JE, Mangora M, Carl C, Trettin CC, **Okello** JA (2019) Natural recovery of mangroves in abandoned rice farming areas of the Rufiji Delta, Tanzania. *Western Indian Ocean Journal of Marine Science* 18(2): 25-36
- Kimeli A, Ocholla O, **Okello** JA, KoedamN., Westphal H, Kairo J, (2021) Geochemical and petrographic characteristics of sediments along transboundary (Kenya-Tanzania) Umba River as indicators of provenance and weathering. *Open Geosciences* 13: 1064-1083
- Kimeli A, Cherono s, Mutisya B, Tamooh F, **Okello** J, Westphal H, Koedam N, Kairo J, (2021) Tracing organic matter sources in the estuarine sediments of Vanga, Kenya, and provenance implications. *Estuarine Coastal and Shelf Science* 263, [https://doi.org/10.1016/j.ecss.2021.107636]
- Lang'at JK, Tamooh F, **Okello** JA, Kairo JG (2009) Mangrove plantation experiments for controlling coastal erosion in Kenya; *Coastal Ecology Series* 9:1-7
- **Okello** JA, Schmitz N, Kairo JG, Beeckman H, Dahdouh-Guebas F, Koedam N (2013) Self-sustenance potential of peri-urban mangroves: a case of Mtwapa Creek Kenya. *Journal of Environmental Science and Water Resources,* 2(8) 277-289
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- **Okello** JA, Alati V, Kodikara S, Kairo JG, Dahdouh-Guebas F, Nico K, (2019) The status of Mtwapa Creek mangroves as perceived by the local communities. *Western Indian Ocean Journal of Marine Science* 18(1): 67-81
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- **Okello** JA, Osuka KE, Maina GW, Mbugua J, Samoilys MA (2022) The structure of the mangrove forests

of Kiunga-Pate Island conservancies in Kenya are shaped by selective harvesting and natural mortalities. *Estuarine, Coastal and Shelf Science* 272. Doi.org/10.1016/j.ecss.2022.107885

- **Okello** JA**,** Kairo JG, Okuku Eo (2011) Challenging poverty in a healthy environment: a case study of the local communities living along Mtwapa creek, Kenya. In, Kamino Y and Khudori D (Eds) Towards A Sustainable Ecology

Julius Okondo
Research Scientist

Okondo is an officer who has worked at KMFRI marine and coastal section for over 25 years. His area of research has mainly been on benthic ecology within the 3 critical habitats of Mangroves, seagrass and coral reefs. Key studies have been assessment of faunal diversity between degraded and relatively less degraded ones. The other one has been the effect of human activity like bait fishery on benthic community structure and the environment.

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrography

Specialization: Benthic ecology

Research Interests: Biodiversity assessment of macrobenthos in critical habitats (Mangrove, Seagrass, Coral and Esturine) • Assessment of benthic bait extraction, use in fishery and environmental effects • *RV Mtafiti* cruises benthic diversity assessment

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Qualifications

- **MSc** Marine ecology
- **BSc** Bot/Zoo
- Cert. EIA
- Cert MSP

Publications:

- Kihia CM, Hendrick Y, Muthumbi AW, **Okondo** JP, Nthiga A, Njuguna VM (2015) Morphometric and developmental characteristics of fish landed by artisanal bait fishers at the Mida Creek, Kenya. *International Journal of Fisheries and Aquaculture,* 6(2): 15-24, 2015
- Kihia CM, Hendrick Y, Muthumbi AW, **Okondo** JP, Nthiga A, Njuguna VM, (2015) Diet and trophic status of fish landed by tropical artisal bait fishermen,Mida Creek, Kenya. *International Journal of Marine Science,* 5(42): 1-9, 2015
- Kihia CM, Muthumbi AW, **Okondo** JP, Nthiga A, Njuguna VM (2015) Gastropods shell utilization among hermit crabs targeted by bait fishers along a tropical mangrove fringed creek, Mida, Kenya. *Wetlands Ecology and Management.* 23(5): 921-932, 2015
- Kihia C. M., Muthumbi A. , **Okondo** JP, Njuguna V, Nthiga A, Mchiri JM (2016) Valuation of fishery among artisanal bait fishers that use non-commercialized intertidal bait at the Mida Creek, Kenya. *International Journal of Marine Science,* 6(23): 1-9, 2016
- Mohamed SH, Muthumbi A, Githaiga J, **Okondo** J (2018) Sediment macro- and meiobenthic fauna distribution along the Kenyan continental shelf. western indian ocean *Journal of Marine Science*, 17(2): 103-116, 2018
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- Wafula M, Muthumbi AW, Wangondu V, Kihia CM, Okondo J (2020) Nematodes as bio-indicators of physical disturbance of marine sediments following polychaete bait harvesting. *Western Indian Ocean Journal of Marine Science,* 19(2): 117-130

Dr. Jacqueline Uku
Research Scientist

Dr. Jacqueline Uku is a Chief Research Scientist at KMFRI and conservation leader who works on the ecology and physiology of marine flora with a special focus on seagrasses.

She has a special interest on community development having worked extensively with coastal communities during the Kenya Coastal Development Project as the Project Leader. She serves as the Coordinator of Research at KMFRI. Jacqueline is the recent past President of the Board of the Western Indian Ocean Marine Science Association (WIOMSA) and also serves on the Executive Committee of the Scientific Committee for Oceanic Research (SCOR). She is currently serving as the Chair of the Africa Ocean Decade Taskforce, whose main mandate is to support the implementation of the Africa Ocean Decade Roadmap (https://unesdoc.unesco.org/ark:/48223/pf0000381488). Jacqueline is also a member of the expert group for Ocean Literacy.

Research Networks: Research Gate

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrography

Specialization: Seagrass physiology, Coral reef ecology, Seaweed ecology

Research Interests: Seagrass restoration and ecosystem management, community livelihood development, ocean literacy

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Qualifications:

- **PhD**
- **MSc**
- **BSc**

Publications:

- Aura M, Hassan F, Osore M, Morara G, **Uku** J (2015) A Comprehensive public-private partnership concept for resources sustainability from a mega project management multi-level perspective. *International Journal of Management and Sustainability*, 4(11): 218-236
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- Ruwa RK, **Uku** JN, Osore MK, Mwangi SN (Eds) (2021) From Ridge to Reef: A legacy for sustainable coastal development in Kenya. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. xiv + 412p
- Shaghude W, Mburu JW, **Uku** J, Ochiewo J, Nyandwi N, Onganda H, Magori C, Sanga I, Arthurton RS (2013) Beach Sand Supply and Transport at Kunduchi in Tanzania and Bamburi in Kenya. *Western Indian Ocean J. Mar. Sci*., 11(2): 135-154
- **Uku** J, Daudi L, Alati V, Nzioka A, Muthama C (2021) The status of seagrass beds in the coastal county of Lamu, Kenya. *Aquatic Ecosystem Health and Management,* 24: 35–42
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Reports

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- Mwatha, Fondo E, **Uku** J, Kitheka J (1998) Biodiversity of Mida Creek, Kenya. Final Technical Report Submitted to Kenya Wildlife Service and Funded by the Netherlands Wetlands Program. 197pp
- Obura D, **Uku** N, Wawiye OP, Mwachireya S, Mdodo R (2000) Kenya, reef status and ecology. In Souter D, Obura D, Linden O (eds) Coral reef degradation in the Indian Ocean. Status report. Published by SAREC Marine Science Programme, Stockholm, Sweden. 25 – 34
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- **Uku** N, Martens EE, Mavuti KM (1996) An ecological assessment of littoral seagrass communities in Diani and Galu Beaches, Kenya. In Bjork AK, Semesi M, Pedersen M, Bergman B (eds) Current trends in Marine Botanical Research in the East African Region. A SIDA publication. 280-302
- **Uku** J, Wakibia J, Ndirangu S, Muthama C, Kimanthi A, (1998) Macroalgae and Seagrasses of Mida Creek. In G. K. Mwatha K, Fondo E, Uku, Kitheka J (eds) Biodiversity of Mida Creek, Kenya. Final Technical Report Submitted to Kenya Wildlife Service and Funded by the Netherlands Wetlands Program. 99 – 113
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- **Uku** J , Ndirangu S (2001) Seagrass Habitats of the Diani-Chale area. In N, Muthiga (ed). The Biophysical and Ecological Profile of Diani-Chale. An ICAM project
- **Uku** J, Kitheka J (eds) (2002) Mida Creek. The Physical and Biophysical Aspects. KWS Technical Series Report
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Thesis

- **Uku** J. (1995) An Ecological Assessment of Littoral Seagrass Communites in Diani and Galu Coastal Beaches, Kenya. M. Sc. Thesis. University of Nairobi. 185 pp
- **Uku** N (2003) Productivity of Tropical Seagrasses and their Epiphytes. Licentiate Thesis. Botany Department, Stockholm University
- **Uku** N (2005) Seagrasses and their epiphytes: Characterization of abundance and productivity in tropical seagrass beds. PhD thesis. Botany Department, Stockholm University. (See http://www.diva-portal.org/su/abstract.xsql?dbid=527)

Lilian Daudi
Marine Ecologist

Ms. Daudi is a marine ecologist with a master in marine ecological management. She is a research scientist with more than twelve years research experience in seagrass ecology, structure and function, seagrass restoration, seagrass monitoring and seagrass ecosystem services.

Her current research focus is on seagrass habitats and the impact of ecosystem disturbance on the ecological functioning at the lower trophic levels (microalgae and epiphytic meiofauna) as well as the higher trophic levels (macroinvertebrates and fish assemblages). Her research focuses at providing the ecological basis for decision support on the functioning of nearshore marine habitats.

She has special competences in biomarker techniques (stable isotope and fatty acid analyses) as well as microscopy (Light microscopy). Further, she has statistical analytical skills both in univariate and multivariate datasets. She also has extensive experience working with cross-functional scientific and research teams. She has also been involved in regional and international networks such as the Western Indian ocean Seagrass Network (WIOSN) and International Network Seagrass Experts (ISEN) within which she is participating as a reviewer in the development of the Global seagrass report. She has further played significant role in the development of the regional and national guidelines for seagrass ecosystem restoration.

Research Networks: Research Gate

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrography

Specialization: Marine Biology and Ecology

Research Interests: Ecosystem ecology, Ecosystem structure and functioning, Ecosystem restoration and monitoring, Ecosystem services, Mapping ecosystems and their services.

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Qualifications:

- Ghent University, Ghent, Belgium, ongoing -Doctoral Programme Marine biology
- Vrije Universiteit, Brussels, Belgium, MSc. (Ecological Marine Management)- 2009
  Maseno University, BSc. (Environmental Studies)

Publications:

- Alati VM, Olunga J, Olendo M, **Daudi** LN, Osuka K, Odoli C, Tuda P, Nordlund LM (2020) Mollusc shell fisheries in coastal Kenya: Local ecological knowledge reveals overfishing. *Ocean and coastal management,* 195: 105285. **Peer reviewed**
- **Daudi** LN (2009) Restoration of Kenyan seagrass beds: an experimental study of the associated meiofauna using artificial seagrass mimics. Thesis. https://aquadocs.org/bitstream/handle/1834/7788/ktf0462.pdf?sequence=2
- **Daudi LN,** Lugomela C, Uku JN, De Troch M (2012) Effect of nutrient enrichment on seagrass associated meiofauna in Tanzania. *Marine Environment Research,* 82: 49-58. **Peer reviewed**
- **Daudi** LN, Uku JN, De Troch M (2013) Role of the source community for the recovery of seagrass associated meiofauna: a field colonization experiment with seagrass mimics in Diani Beach, Kenya. *African Journal of Marine Science,* 35(1): 1-8. **Peer reviewed**
- **Daudi** LN, Uku J, De Troch M (2019) Implications of meadow structural alteration on associated epiphytic fauna in Kenyan seagrass meadows 11th WIOMSA conference 1st-6th July 2019, Mauritius.____https://symposium.wiomsa.org/wp-content/uploads/2020/02/Book-of-Abstracts-JAN-2020-FINAL.pdf
- **Daudi** LN, Uku JN, De Troch M (2020) Pigment and fatty acid profiling reveal differences in epiphytic microphytes among tropical *Thalassodendron ciliatum Aquatic Botany,* 166: 103253. **Peer reviewed**
- SEAGRASS REHABILITATION GUIDE FOR KENYA. A Guide for Community- based Seagrass Rehabilitation. **Daudi L**, Alati VM, Muthama C, Uku J, Salyani A (2019) A publication of Kenya Marine and Fisheries Research Institute
- Uku J, **Daudi** L, Alati V, Nzioka A, Muthama C (2021) The status of seagrass beds in the coastal county of Lamu, Kenya. *Aquatic Ecosystem Health and Management,* 24(1):35-42. **Peer reviewed**
- UNEP-Nairobi Convention/WIOMSA (2020) Guidelines for Seagrass Ecosystem Restoration in the Western Indian Ocean Region. UNEP, Nairobi, 63 pp. (**Community-based seagrass bed restoration trials at Diani and Wasini Island, Kenya- Case study 10**). https://www.nairobiconvention.org/clearinghouse/sites/default/files/Guidelines%20for%20Seagrass%20Ecosystem%20Restoration%20in%20the%20Western%20Indian%20Ocean%20Region.pdf
- UNESCO-IOC, 2017. Stories of Africa's Ocean and Coasts: Volume 2: Kenya's Coastal and Resources and Environment, Mwanyuma H, Odido M, Lamin AR, Mackongo LA (Eds) IOC Information Document, 1319. **Book chapter**

Linet Imbayi
Research Scientist

Ms Kiteresi has been working on marine ecosystems for over 9 years with long standing research experience covering diverse areas of marine pollution and seafood safety. She has special interest in application of nuclear techniques in environmental pollution monitoring and harmful algae and climate change for seafood safety due to stressors from both human and natural phenomenon.

She has participated in various regional projects funded by IAEA on marine pollution and HABs and WIOMSA funded project on Marine litter Currently, she is a trainer on Marine litter collection techniques for various surveys at a national level. She has published several papers, in line with aquatic ecosystem issues

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrography

Specialization: Marine pollution, Harmful Algae and Seafood safety

Research Interests: Marine pollution studies, radioisotopes, biogeochemistry, Harmful Algal Blooms and marine biotoxins, marine litter.

Email: limbayi@kmfri.go.ke;
lyn81ke@gmail.com or yn81ke@yahoo.com

Qualifications

- **Master of Philosophy** Degree in Environmental Studies (Environmental Health) at Moi University, Eldoret.
- **Bachelor of Science** (Fisheries) at Moi University, Eldoret with a Second Class Honors.

PUBLICATIONS:

- **Kiteresi**, LI (2009) Water Quality Assessment for Precursors of Disinfection By-Products and Fish Culture. Masters Thesis. Moi University, Kenya
- **Kiteresi** LI, Okuku O, Mwangi SN, Ohowa B, Wanjeri VO, Okumu S, Mkono M (2012) Influence of land based activities on the phytoplankton communities of Shimoni-Vanga system. *International Journal of Environmental Research,* 6(1): 151-162
- **Kiteresi** LI, Okuku O, Mwangi SN, Mkono M (2013) Potential Harmful algal species along the South coast of Kenya. A norm or a threat? *Journal of Environment and Earth Science,* 3 (9): 1-11
- Okuku EO, Ohowa B, Munga D, Mwangi SN, **Kiteresi** LI, Wanjeri VO, Okumu S, Kilonzo J (2011) Sewage pollution in the coastal waters of Mombasa City, Kenya: A norm rather than an exception *International Journal of Environmental Research,* 5(4): 865-874)
- Okuku O, Ohowa B, Ongore CO, **Kiteresi** LI, Wanjeri VO, Okumu S, Ochola O (2013) Screening of potential ecological risk of metal contamination in some Kenyan estuaries *Research Journal of Physical and Applied Sciences,* 2(4): 052 - 063)
- Okuku O, Bouillon S, Ochiewo JO, Munyi F, **Kiteresi** LI, Tole M (2015) The impacts of hydropower development on rural livelihood sustenance. *International Journal of water Resources Development,* 32 (2): 267-285, [https://DOI:10.1080/07900627.2015.1056297)
- Okuku O, Tole M, **Kiteresi** LI, Bouillon S (2016) The response of phytoplankton and zooplankton to river damming in three cascading reservoirs of Tana River, Kenya. *Lakes & Reservoirs: Research and Management,* 21: 114-132
- Okuku EO, **Kiteresi** LI, Owato GO, Wanjeri VO, Mwalugha CS, KOmbo MM, Mwangi S, Oduor N (2019) Decadal Pollution Assessment and Monitoring along the Kenya Coast In *Houma B.F., (Eds)* Monitoring of Marine Pollution. Intechopen, United Kingdom
- Okuku EO, **Kiteresi** LI, Owato GO, Mwalugha C, Omire J, Mbuche M, Chepkemboi P, Ndwigwa J, Nelson A, Otieno K, Mulupi L, Gwada B (2020) Baseline meso-litter pollution in selected coastal beaches of Kenya: Where do we concentrate our intervention efforts? *Marine Pollution Bulletin,* 158: 111420, [https://Doi.org/10.1016/j.marpolbul.2020.111420]
- Okuku EO, **Kiteresi** LI, Owato GO, Mwalugha C, Omire J, Otieno, K., Mbuche, M., Nelson, A., Gwad, B., and Mulupi, L. (2020) Marine macro-litter composition and distribution along the Kenyan Coast: The first-ever documented study. *Marine Pollution Bulletin,* 159: 111497. doi.org/10.1016/j.marpolbul.2020.111497
- Okuku EO, **Kiteresi** LI, Owato GO, Otieno K, Omire J, Kombo, M.M., Mwalugha, C., Mbuche, M., Gwada, B., Wanjeri V, Nelson A, Chepkemboi P, Achieng Q, Ndwiga J (2021). Temporal trends of marine litter in a tropical recreational beach: A case study of Mkomani beach, Kenya. *Marine Pollution Bulletin,* 167: 112273. doi.org/10.1016/j.marpolbul.2021.112273
- Okuku,EO, **Kiteresi** LI, Owato GO, Otieno K, Mwalugha C, Mbuche M, Gwada B, Nelson A, Chepkemboi P, Achieng O, Wanjeri V, Ndigwa J, Mulupi L, Omire J (2021) The impacts of COVID-19 pandemic on marine litter pollution along the Kenyan Coast: Asynthesis after 100 days following the first reported case in Kenya. *Marine Pollution Bulletin,* 162: 111840. [https://doi.org/10.1016/j.marpolbul.2020.111840]
- Okuku EO, **Kiteresi L**, Ohowa BO, Mwangi SN, Munga D, Kamau J, Wayayi VW, Okumu P, Gatagwu J, Kilonzo J. Nutrients dynamics and cycling in three tropical rivers draining into the Indian Ocean. (Under review, *Western Indian Ocean Journal of Marine Science*)
- Ongore CO, Okuku EO, **Kiteresi** LI, Wanjeri, V. O., Okumu, S. and Kilonzi, J. (2013). Characterisation of the Nutrients Enrichment in the Estuarine and related systems of the Kenya coastline. *Journal of Environmental Science and Water Resource,* 2(6): 181–90

Dr. Levy Otwoma
Research Scientist

I am a marine ecologist who studies human-environment interactions on tropical coasts. My background is in molecular ecology and my passion is sustainability-focused research at the intersection of molecular science, marine ecology, and fisheries.

I frequently collaborate with social scientists to uncover the complex linkages between social and ecological systems, working on topics such as: defining the conditions that lead to sustainability; locating and learning from conservation; and examining how coastal societies and ecosystems respond to global environmental change. I began my career in marine conservation in 2009 as an Assistant Research Scientist at Kenya Marine and Fisheries Research Institute. I have worked in Kenya, Tanzania, Mozambique, Madagascar, South Africa, Indonesia, Malaysia, Philippines, Thailand, Poland, and Germany, where my research has had impacts on policy and on-the-ground conservation. I have taxonomic expertise in Cetacea, Fish, Invertebrate, Plant, corals, mollusks, clams, sea grass, and mangroves and have published more than 10 scientific articles.

Research Networks: Research Gate

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Coral reef ecology, molecular ecology, taxonomy, fish biodiversity

Research Interests: Connectivity of reef species in the Western Indian Ocean, efficiency of marine protected areas, population dynamics of coral reef species, and population genetics of reef species

Email: lotwoma@kmfri.go.ke; levyot@yahoo.com

Qualifications

- **Ph.D:** in natural science (Dr. rer. Nat). Universitäit Bremen, Germany.
- **MSc:** Master of Biology, Vrije Universiteit Brussel, Belgium.
- **BSc:** Bachelor of science in Zoology and Chemistry, University of Nairobi, Kenya.

PUBLICATIONS:

- Aura MC, Musa S, Ogello EO, **Otwoma** LM, Wainaina M, Kundu R (2011) Methane Emissions from Swampy and Riverine Coastal Wetlands: Influence of Open and Macrophyte Infested Areas. *Lakes and Reservoirs: Research and Management,* 16: 265-272
- Buckley SM, McClanahan TR, Quintana Morales EM, Mwakha, V, Nyanapah, J, **Otwoma, ML** and Pandolfi, J.M. (2018) Identifying species threatened with local extinction in tropical reef fisheries using historical reconstruction of species occurrence. *PLoS One,* 14(2).e0211224
- Mbaru EK, Kimani EN, **Otwoma** LM, Kimeli K, Mkare TK (2011) Abundance, Length-Weight Relationship and Condition Factor in Selected Reef Fishes of the Kenyan Marine Artisanal Fishery. *Advance Journal of Food Science and Technology*. 3: 1-8
- Mwakha VA, Osuka K, **Otwoma** ML, Tuda P, Nordlund LM (2023). Gender analysis in fisheries: The case of the shelled mollusc fisheries in Kenya. *Marine Policy.* 158, 2023,105863
- Mwaura JM, Murage D, Karisa JF, **Otwoma** LM, Said HO (2023) Artificial reef structures and coral transplantation as potential tools for enhancing locally-managed inshore reefs: a case study from Wasini Island, Kenya. *WIO J Mar Sci* 21(2): [https:doi: 10.4314/ wiojms.v21i2.8]
- **Otwoma** LM, Kochzius M (2016) Genetic Population Structure of the Coral Reef Sea Star *Linckia laevigata* in 494 the Western Indian Ocean and Indo-West Pacific. *PLoS ONE* 11: e0165552
- **Otwoma** ML, Diemel V, Reuter H, Kochzius M, Meyer A (2018) Genetic population structure of convict surgeonfish, *Acanthurus triostegus*. *Journal of Fish Biology.* 93:597-605. DOI: 10.1111/jfb.13686
- **Otwoma ML**, Reuter H, Timm J, Meyer A. (2018). Genetic Connectivity in herbivorous coral reef fish (*Acanthurus leucosternon*) in the Eastern African region. *Hydrobiologia,* 806: 237-250
- **Otwoma** ML, Reuter H (2019) Do differences in mating behaviour lead to differences in connectivity patterns of reef fishes? Insights from two sympatric surgeonfish species in the Indian Ocean. *Marine Environmental Research,* [https://doi.org/10.1016/j.marenvres.2019.104760]
- **Otwoma** ML (2021) Response to exploitation and life history characteristics of two Acanthurus fish species with divergent mating behaviour along the Kenyan coastline. *Regional Studies in Marine Science,* [https://doi.org/10.1016/j.rsma.2021.101979]
- Stefanoudis PV, Talma S, Fassbender N, Swanborn D, Ochieng CN, Mearns K, Komakoma JD, **Otwoma** LM, Mbije NE, Osuka KE, Samoilys M, Shah N, Samaai T, Trotzuk E, Tuda A, Zivane F, Wagner D, Woodall LC (2022) Stakeholder-derived recommendations and actions to support deep-reef conservation in the Western Indian Ocean. *Conservation Letters,* 00, e12924. [https://doi.org/10.1111/conl.12924]

Dr. Melckzedeck Osore
Research Scientist

- **Coastal and marine ecological and taxonomic research:** Ecological and taxonomic studies of zooplankton in Gazi Bay, Port of Mombasa, Tudor Creek, Mombasa Marine Park and Reserve, Mtwapa Creek, Mida Creek and Kilifi Creek. Collaborative research and development of projects and laboratory techniques in Belgium, Brazil, Ecuador, Germany, Netherlands, Taiwan and United Kingdom. Years of experience: 28 (1990 to present)
- **Participation in the Netherlands Indian Ocean Programme** – Moonsoons and Coastal Ecosystems in Kenya (1992 – 1993). Responsible for studies on zooplankton . Monsoons and coastal ecosystems in Kenya / eds.: C.H.R. Heip, M.A. Hemminga & M.J.M. de Bie. - Leiden : National Museum of Natural History. - Ill., with ref. - (Cruise reports Netherlands Indian Ocean Programme, ISBN 90-73239-29-X ; VO~. 5) Publ. on behalf of the Netherlands Geosciences Foundation (GOA). - ISBN 90-73239-28- 1 Monsoons and Coastal Ecosystems in Kenya
- **Kenya - Kenya Coastal Development Project : P094692** - Implementation Status Results Report : Sequence 12 (English)
- **Coordination of the international programme** - Regional Cooperation on Scientific Information Exchange in the Western Indian Ocean (RECOSCIX-WIO). A programme of the Intergovernmental Oceanographic Commission of the United Nation Education Scientific and Cultural Organization (IOC-UNESCO). Years of experience: 3 (1999-2002)
- **Kenya National Coordinator for Marine Invasive Species (MIS) initiative and the Global Ballast Water Management (GLOBALAST) Programme for the Eastern Africa Coast**. Founder team member of the Indian Ocean Coastal and Marine Biodiversity Programme under the auspices of Census of Marine Life (CoML). 2003-2004
- **Census of Marine Life Partners and Sponsors**
- **Regional Research Coordinator responsible for marine and coastal research at the Western Indian Ocean Marine Science Association (WIOMSA).** Responsible for monitoring and evaluating projects on marine sciences and fisheries researches conducted in ten countries of the western Indian Ocean region: Kenya, Tanzania, Mozambique, South Africa, Madagascar, Comoros, Seychelles, Reunion, Mauritius and Somalia. Years of experience: 6 (from 2004 to 2010)
- **Western Indian Ocean Marine Science Association - MASMA**
- **Chief Editor of KMFRI scientific journal** – the Kenya Aquatica (from 2018 to date): http://www.kmfri.co.ke/images/pdf/kenya_aquatica.pdf; http://www.kmfri.co.ke/images/Kenya-Aquatica-Journal-artwork--updated---05-03-2020-1.pdf http://www.kmfri.co.ke/images/Kenya_Aquatica_Journal_Vol_4_No_1-1.pdf
- **Building human capacities for enhancing livelihoods in the marine and coastal environment:** Development and implementation of capacity building strategy and coordinating improvement of capacity for 30 KCDP agency staff and 200 coastal community youths to obtain livelihood skills at the level of certificate, undergraduate and Masters degree. Linked with the three major coastal universities and ten others nationally and two training institutions. Including coordinating the development and implementation of the KCDP communication products https://www.facebook.com/KeyCDP/; http://www.kws.go.ke/content/kenya-coastal-development-programme-kcdp

Years of experience, implementation and application: 6 (From 2011 To 2017)

- **Development and delivery of communication strategies with outstanding products such as websites, news briefs, policy briefs, documentaries** etc. Established collaboration with various coastal CBOs in Kenya and many national, regional and international NGOs. Providing editorial reviews for manuscripts and proposals for the National Geographic, Biodiversity and Ecosystem Service Sustainability (BESS) Secretariat under the auspices of the Natural Environment Research Council (NERC) of United Kingdom, New Scientist etc. 2010 to present

- **Implementation and successful delivery of Community Driven Development (CDD) approach in a World Bank funded programme Hazina ya Maendeleo ya Pwani (HMP)**, enabling coastal communities to create, manage and deliver own livelihood and natural resource management projects through the engagement of 14 staff comprising 2 Managers and 12 liaison officers based in 6 Kenya coastal counties of Lamu, Kilifi, Tana River, Mombasa, Taita Taveta and Kwale. Years of experience: 4 (from 2013 to 2017)
- **Identification of community inspired solutions from the coastal and marine environment of Kenya** and promoting them for learning and replication at the regional and global level through collaboration with the PANORAMA programme on Solutions for a healthy planet (2020 to present) https://panorama.solutions/en/user/melckzedeck-osore

Collaboration with universities and other research and academic institutions

Kenya Wildlife Services (KWS)

Climate Vulnerability and Capacity Analysis of the Lamu Land/ Seascape (2014). Kulima Integrated Development Solutions based on fieldwork conducted by WWF and Kenya Wildlife Services. 94pp

https://kulima.com/wp-content/uploads/2011/03/Climate-Vulnerability-and-Capacity-Analysis-of-the-Lamu-Sea-Landscape.pdf

Pwani University (PU)

Supervision of Doctorate and Masters degree student at universities nationally, regionally and globally since 2004.

- **Latest supervision to completion:** Dr. Farida Abdullahi Hassan (2021). *Assessment of Community Participation in Development initiatives on access to Environmental Resources at the Coast of Kenya: A cawe Study of Hazina ya Maendeleo ya Pwani*. PhD Thesis, pp. 141
- **On-going supervision:** Noah Ngisian'ge (PhD, Stockholm University), Robert Mokua (Msc, Pwani University), Josephat Mtwana (Msc, Uniuversity of Nairobi).
- **Adjunct lecturer** at Pwani University since 2016 instructing courses on Environment and Agriculture (KAG G808); Introduction to Planning (MPM B102).

Translation Service English/Kiwahili/French

Recent translations work completed:

- KMFRI Service Delivery Charter in Kiswahili *Hati ya Huduma* https://www.kmfri.co.ke/images/pdf/KMFRI-service-charter-2020-2021.pdf; https://www.kmfri.co.ke/images/pdf/service_charter_amended.pdf
- **Kiswahili translation of the Project Grants Manual (PGM)** of the Kenya Marine Fisheries and Socio-Economic Development (KEMFSED) Project: https://kemfsed.org/wp-content/uploads/2021/05/KEMFSED-PGM_Kiswahili_Sep-2020_FINAL.pdf

Research Network: Research Gate

Location: KMFRI Mombasa Research Centre

Department: Oceanography and Hydrography

Specialization: Marine ecology and systematic, project management, networking and capacity building, strategy engagement with vulnerable and marginalized groups

Research Interests: Marine Biodiversity, Ecology and Systematic , Linking user Communities to Coastal and Marine Sciences; Communication Science and Networking

Email: mosore@kmfri.go.ke/babaalmasi@yahoo.co.uk

Qualifications

- **PhD** - Biodiversity and Productivity of the Kenya Coast
- **Msc** - Fundamentals and Applied Marine Ecology and Taxonomy
- **Bsc** - Zoology and Chemistry
- **Diploma** – Management of Small and Medium Enterprises

Publications:

- Kadagi NI, Wambiji N, Mann B, Parker D, Daly R, Thoya P, Rato DAM, Halafo J, Gaspare L, Sweke EA, Ahmed S, Raseta SB, **Osore M**, Maina J, Glaser S, Ahrens R, Sumaila UR (2022) Status and challenges for sustainable billfish fisheries in the Western Indian Ocean. *Reviews in Fish Biology and Fisheries*. [https://doi.org/10.1007/s11160-022-09725-8]
- Ruwa R, Uku J, **Osore M**, Mwangi S (2021) Reflections on Lessons Learned in Building A Legacy for Sustainable Coastal Development. (Eds). Ruwa, R.K., Uku, J.N., Osore, M.K., Mwangi, S.N. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. Pp 335-348
- **Osore** MK (2021) A Report of the Scoping Study on the Role of Civil Society Organizations and Local Communities in Promoting an All-Inclusive Sustainable Blue Economy in Coastal Kenya.

Submitted to Tuna Fisheries alliance of Kenya (TUFaK). 54p

- **Osore MK**, Hassan F, Morara G (2022) Perceived benefits and barriers to community participation in development projects – The case of Hazina ya Maendeleo ya Pwani on the Kenya coast. *WIO Journal of Marine Science,* 21: 35 - 49, [https://DOI: 10.4314/wiojms.v21i1.3]
- Co-author, compiling and editing of Chapters on: Part 1 – Environmental Aspects for Consideration in the MSP Process and Part 2 – Capacity Assessment needs for MSP in Kenya. In: Uku JN, Allela A, **Osore** MK, Wambiji N (2021) Publication Report on Deliberations of the two Marine Spatial Planning (MSP) Workshops organized by KMFRI and State Department of Fisheries and the Blue Economy and UNESCO-IOC in the Framework of the Joint roadmap for MSP process worldwide in the context of the UN decade of Ocean Science for Sustainability Development
- Co-Investigator (2018 – 2021) – Larval Fish Production and Dispersal in Critical Habitats of Coastal East Africa.Marine Science for Management (MASMA) Programme Budget USD 330,000. collaborating institutions: KMFRI (Kenya), IMS (Tanzania), SU (Sweden) https://www.wiomsa.org/ongoing-project/ecological-food-security-in-the-western-indian-ocean-region-through-sustainable-fish-recruitment-2-2/
- Collaborating Scientist in the Project SOLSTICE-WIO - Sustainable Oceans, Livelihoods and food Security Through Increased Capacity in Ecosystem research in the Western Indian Ocean (2017 – 2021). Researching on recent advances in marine technologies, local knowledge and research expertise to address challenges facing the Western Indian Ocean region in a cost-effective way via state-of-the-art technology transfer, collaborative environmental and socio-economic research and hands-on training. Linking researchers from United Kingdom (NOC, SAMS, PML); South Africa (RU, UCT, SAEON, BCRE, SASMIA, DoAFF, DSI, ACEP); Tanzania (UDSM-IMS, EFE, WIOMSA, FAFIRI,WWF); Kenya (KMFRI, CORDIO,) Madagasvcar (IHMS); Mozambique (IIP); Seychelles (UoS).
- Collaborator (2019 – 2022) – Billfish interactions, Livelihoods and Linkages for Fisheries Sustainability in the Western Indian Ocean (BILLFISH-WIO). Marine Science for Management (MASMA): ABF, KMFRI, UDSM, C3, ORI, DSFA,Budget USD 524,940 https://billfishwio.com/project-team/
- Collaborating Scientist on communication and development of documentary, flyers, brochures and policy briefs in the Project on Western Indian Ocean (WIO) Large Marine Ecosystems (LMEs) Strategic Action Programme Policy Harmonization and Institutional Reforms – SAPPHIRE. The Project aims to achieve effective long-term ecosystem management in the LMEs of WIO in line with the strategic Action Programme as endorsed by the participating countries. SAPPHIRE is funded through GEFs International Water Focal area, whose mandate is to support transboundary cooperation in shared marine and freshwater ecosystems.GEF investment in International Waters has three key objectives: 1) Strengthen National Blue Opportunities, 2) Improve management in the Areas Beyond National Jurisdiction and 3) Enhance water security in freshwater systems. Research by KMFRI is conducted mainly in the North Kenya Bank (NKB).

Selected publications

2021

- Guyo P, **Osore** M, Morara G, Hassan F (2021) Building the next Generation of Coastal Practitioners through Academic Training. (Eds) Ruwa RK, Uku JN, **Osore** MK, Mwangi SN Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. Pp 335-348
- Mwaluma J, Ngisiang'e N, **Osore** MK, Stuart CP (2021) Assemblage structure and distribution of fish larvae on the North Kenya Banks during the Southeast Monsoon season. *Ocean & Coastal Management* 212(1): 105800 [DOI: 10.1016/j.ocecoaman.2021.105800]
- KMFRI (2021) From Ridge to Reef: A legacy for for Sustainable coastal development in Kenya. (Eds). Ruwa RK, Uku JN, **Osore** MK, Mwangi SN. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. xiv + 409p
- **Osore** M. Hassan F, Morara G (2021) Building the Capacity of Communities through the Community Driven Development Approach. (Eds) Ruwa RK, Uku JN, **Osore** MK, Mwangi SN. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. Pp 283-303

2020

- Hassan FA, **Osore** MK, Ongayo HA (2020) Determinants of sustainability for community based water projects: the case of Hazina ya Maendeleo ya Pwani in coastal Kenya. Western Indian Ocean Journal of Marine Science 19(1):99-112 [https://DOI: 10.4314/wiojms.v19i1.8]
- Kamau J, Ngisiange N, Ochola O, Kilonzi J, Kimeli A, Mahongo SB, Onganda H, Mitto C, Ohowa B, Magori C, Kimani E, **Osore** M (2020) Productivity in Kenyan territorial waters. *WIO Journal of Marine Science* Special Issue 1/2020. 9 - 18, [https://DOI: 4314/wiojms.si2020.1.2]
- Kamau J, Ochola O, Ohowa B, Mitto C, Magori C, Chepkemboi L, **Osore** M, Mahongo SB, Kyewalyanga MS (2020) Employing multivariate analysis to determine the drivers of productivity on the North Kenya Bank and in Kenyan territorial waters. *WIO Journal of Marine Science* Special Issue. 1/2020. 33 - 41 [https://DOI: 4314/wiojms.si2020.1.4]

2019

- Hassan FA, Ong'ayo AH, **Osore** MK (2019) Assessing the Influence of Demographic Factors on Community Participation in a Demand Driven Development Project: The Case of Hazina Ya Maendeleo Ya Pwani Approach in Coastal Kenya. Open Journal of Social Sciences 07(01):209-224. DOI: 10.4236/jss.2019.71018

- Mabwa R **Osore** MK, Obura D, Gudka M (2019) Biological baseline survey of marine invasive species in the Lamu Archipelago - Kenya, Symposium.https://www.researchgate.net/publication/334372606_Biological_baseline_survey_of_marine_invasive_species_in_the_Lamu_Archipelago_-_Kenya

2018

- Hassan FA, Ong'ayo HA, **Osore** MK, Morara GN, Aura CM (2018) Assessment of Beneficiary Satisfaction with Community Based Solid Waste Management Service. A case of Okoa Maisha Project in Mnarani Village, Kilifi County, Kenya. *International Journal of Scientific Research and Management*, 6(03), FE-2018, [https://doi.org/https://doi.org/10.18535/ijsrm/v6i3.fe01]
- Hassan FA, Ong'ayo HA, **Osore** MK (2018) Measuring the Level of Community Partic-ipation in a Demand Driven Development Project: Case of Hazina Ya Maendeleo Ya Pwani Approach in Coastal Kenya. *Open Journal of Social Sciences,* 6, 189-203, [https://doi.org/10.4236/jss.2018.612017]
- KMFRI (2018). The *RV Mtafiti*: Marine research towards food Security and Economic Development of Kenya (Eds) Njiru JM, Ruwa RK, Kimani EN, Ong'anda HO, Okemwa GM, **Osore** MK (2019) Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. 102pp http://www.kmfri.co.ke/images/pdf/RV-Mtafiti-Book-Final-updated-Artwork-24-01-2019.pdf

2017

- Hassan F, Ong'ayo H, **Osore** M, Morara G, Aura C (2017) Effect of Community Participation in Access to Social Services: A Case Study of *Hazina Ya Maendeleo Ya Pwani*Approach in Coastal Kenya. *Open Journal of Social Sciences,* 5: 160-180, [https://doi: 4236/jss.2017.511012]

2016

- Aura CM, Musa S, **Osore** MK, Kimania EN, Mwakha VA, Wambiji N, Mainac GE, Charo-Karisa H (2016) Quantification of climate change implications for water-based management: A case study of oyster suitability sites occurrence model along the Kenya coast. *Journal of Marine Systems,* 165: 27-35, [DOI: 10.1016/j.jmarsys.2016.09.007]
- Aura CM, Hassan F, **Osore** MK, Musa S, Morara G, Uku J (2016) A comprehensive public-private partnership concept for resources sustainability from a mega-project management multi-level perspective. *International Journal of Management and Sustainability,* 4(11): 218-236, [https://doi: 10.18488/journal.11/2015.4.11/11.11.218.236]

2015

- Morara NG, Hassan F, Osore K (2015) Sustaining Local Livelihoods through Coastal Fisheries in Kenya. *In* Latawiec, A. & Agol, D. (2015). *Sustainability Indicators in Practice. Berlin: De Gruyter Open.* Pp 99 – 125

2013

- Mwaguni S, Munga D, **Osore** MK, Mwaluma J (2013) Environmental implications of the proposed material handling and ship-loading facility for the export of titanium at the Port of Mombasa, Kenya. *Journal of Environment and Earth Science*, 3(4) ISSN 2224-3216 (paper) 2225-0948 (online) www.iiste.org

2011

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2010

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2009

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2004

- **Osore** MKW *et al*. (2004) Zooplankton Composition and Abundance in Mida Creek, Kenya. *Zoological Studies,* 43(2): 415-424
- **Osore, M. K. W.***et al*. (2004). The Marine Species Database for Eastern Africa (MASDEA), in: Vanden Berghe, E. *et al*. (Ed.) (2004). Proceedings 'The Colour of Ocean Data': international symposium on oceanographic data and information management with special attention to biological data Brussels, Belgium, November 25-27, 2002. IOC Workshop Report, 188: pp. 65-70

2003

- **Osore** MKW *et al*. (2003) Copepod Composition, abundance and diversity in Makupa Creek, Mombasa, Kenya. *WIO J. Mar. Sci*., 2(1): 65-73
- **Osore** MKW *et al*. (2003) Composition, Abundance and Seasonality of Zooplankton in Mida Creek, Kenya. *WIO J. Mar. Sci*., 2(2): 147-155

2002

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1999

- Fani R, Bazzigalupo M, Messana G, Mwaluma J, **Osore** MK and Vannini M (1999) A first attempt to analyze parental relationships in populations of *Sphaeroma terebans* from Kenya through DNA technique. Bio.135: 321 - 333

1997

- **Osore** MK, Tackx M, Daro MH (1997) Effect of rainfall & tidal rhythm on the community structure & abundance of the zooplankton of Gazi Bay, Kenya. *Hydrobiologia* 356: 117-126

1994

- Messana G, Bartolucci V, Mwaluma J **Osore** MK(1994). Preliminary observations on parental care in *Sphaeroma cf. terebans* Bate, 1866 (Isopoda, Sphaeromatidae) a Mangrove wood borer from Kenya. *Ecol. Evol.* (spec. Issue), 3: 125-129

1992

- **Osore** MK (1992) A note on seasonal distribution of zooplankton in a tropical mangrove creek system, Gazi, Kenya. *Hydrobiologia.* Kluwer Academic Publ., Dordrecht, The Netherlands. Pp.119 -120

Selected funded research projects

- Co-Investigator (2019 – 2021) – Larval Fish Production and Dispersal in Critical Habitats of Coastal East Africa.Marine Science for Management (MASMA) Programme Budget USD 330,000. collaborating institutions: KMFRI (Kenya), IMS (Tanzania), SU (Sweden)
- Fani R, Bazzigalupo M, Messana G, Mwaluma J, **Osore** MK, Vannini M (1999) A first attempt to analyze parental relationships in populations of *Sphaeroma terebans* from Kenya through DNA technique. *Mar. Bio.,* 135: 321 - 333
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Dr. James Mwaluma
Research Scientist

Dr James Mwaluma is the Acting CEO/Director General of Kenya Marine and Fisheries Research Institute. He has scientific background in research spanning different spheres with specific research interest in marine zooplankton and fish larvae. He has participated in numerous multidisciplinary research within the institute and other institutions including universities, national and international research institutions through development of joint research initiatives and partnerships to enhance uptake of research activities in the Kenyan coast.

Administratively he is involved implementation of the institute's management and policy documents including terms and conditions of service, scheme of service, research policy, intellectual property rights, ICT policy and interpret government guidelines and circulars through consultations in order to align the institute's policies to national and international standards. Other administrative duties include, Research co-ordination in Directorates of Coastal and Ocean Systems which includes Fisheries & Oceanology & Hydrography programmes. He is responsible for guiding research activities to ensure optimum use of the institute's human and infrastructure capacity.

Currently he is working on identification of fish larvae from coastal and offshore waters from the projects he is involved in. In other programmes, he is involved in cage culture of rabbitfish and marine tilapia in Kilifi and Kwale, as well as promotion and adoption of new crab cages for fattening mud crabs with CBOs along the coast of Kenya.

Dr Mwaluma runs several projects in which he is the Principal Investigator such as:

- Larval Fish Production and Dispersal in Critical Habitats of Coastal East Africa funded by WIOMSA
- Design and optimisation of marine cage culture systems for rabbitfish and tilapia funded by National Research Fund (NRF)
- 1st Marine Hatchery in Shimoni (NRF)
- Fish juvenile recruitment in coastal habitats of Western Indian Ocean
- A Manual for identification of off-shore Fish Larvae from the Western Indian Ocean

Research Network: Research Gate

Location: KMFRI Mombasa

Department: Directorate of Oceans and Coastal Systems (Oceanography and Hydrography) Directorate of Aquaculture (Mariculture)

Specialization: Fish larvae and zooplankton ecologist and taxonomist (systematics)

Research Interests: Fish larvae/zooplankton interactions, ecology and systematics, Marine cage culture of rabbitfish, marine tilapia and lobsters

Email: jmwaluma@kmfri.go.ke

Qualifications:

- **Ph.D**. Zoology (Ecology).
- **M.Sc.** (Hydrobiology)

Publications

- Anyango JO, Mwatete C, **Mwaluma** J (2017) Abundance, diversity and trophic status of wild fish around seaweed farms in Kibuyuni, south coast Kenya. *International Journal of Fisheries and Aquatic sciences,* 5(3): 440-446
- Kamau JN, Jacobs ZL, Jebri F, Kell S, Kimani E, Makori A, **Mwaluma** J, Mueni E, Onganda H, Painter SC, Palmer M, Popova E, Roberts MJ,, Taylor SFW, Wihsgott J (2021) Managing environmental change within the emerging fisheries of the North Kenya Banks. *Ocean and Coastal Management, 209: (2021)*
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- **Mwaluma** J, Ngisiange N, Osore M, Kamau K, Onganda H, Kilonzi J, Roberts M, Popova E, Painter SC (2021)Assemblage structure and distribution of larval fish on the North Kenyan Banks during the South East Monsoon season. *Oceans and Coastal sciences* 212: (2021) 105800
- **Mwaluma** J, Kaunda-Arara B (2021)Growth and survival of mud crab, *Scylla serrata* reared in bottom and floating cages within Mida creek mangroves, coastal Kenya *Aquatic Ecosystem Health and Management (AHEM) 24(1): 27-34*

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- Kosore C, Ojwang L, Maghanga J, Kamau J, Kimeli A, Omukoto J, Ngisiange N, **Mwaluma** J, Ong'anda H, Magori C, Kimani E. (2018) *Microplastic pollution: documented evidence in Kenya's marine waters*.

In The *RV Mtafiti* Marine Research Towards Food security and Economic Development in Kenya (Eds) Njiru JM, Ruwa RK,Kimani EN, Ong'anda HO, Okemwa GM and Osore MK The *RV Mtafiti*: Marine Research towards food security and Economic development in Kenya. KMFRI 102pp

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- **Mwaluma** JM, (2018) *Primary and secondary productivity* (Eds) Njiru JM, Ruwa RK, Kimani EN, Ong'anda HO, Okemwa GM, Osore MK The *RV Mtafiti* : Marine Research towards food security and Economic development in Kenya. KMFRI 102pp
- **Mwaluma** J, Mirera D, Wairimu E, Wainaina M, Kimathi A (2018) *Mud crab farming policy brief-2.-Improving livelihoods through mud crab farming in coastal Kenya; Research innovations for food security and livelihoods*. KMFRI Mariculture publications no. 002/2018
- **Mwaluma** J, Mirera D, Magondu E, Mukami M, Wainaina M, Nyabeta J, Kimathi A, Wanjiru C (2020) *Marine and coastal Aquaculture: Production, Status and Prospects*. In State of Aquaculture in Kenya 2020. Towards Nutrition Sensitive Fish Food Systems. (Eds) Munguti J, Obiero K, Musa S, Mwaluma J, Orina P, Opiyo M, Kyule D, Mirera D, Ochiewo J (Eds) (2020) State of Aquaculture Report 2020: Towards Nutrition Sensitive Fish Food Systems. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya July 2020
- **Mwaluma** J, Mirera D, Magondu E, Mukami M, Wainaina M, Holeh G, Nyabeta J, Kimathi A, Wanjiru C, (2021) *Marine and coastal Aquaculture: Production, Status and Prospects*. In State of Aquaculture Report 2021. Towards Nutrition Sensitive Fish Food Systems (Eds) Munguti J, Obiero K, Musa S, **Mwaluma** J, Orina P, Mirera D, Kyule D, Musa S, Opiyo M, Ochiewo J, Ogello E, Njiru J, Haiwara A
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- **Mwaluma** J (2021) National Marine Ecosystem Diagnostic Analysis (MEDA). UNDP/GEF ASCLME Project (in press)

Dr. Veronica Wanjeri
Research Scientist

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Environmental Chemistry

Research Interests: Analytical chemistry, Radionuclides, Biogeochemistry, Emerging organic pollutants, nanotechnology, ocean acidification, biotoxins

Email: vwanjeri@kmfri.go.ke; wanjeriogolla@yahoo.com, wayayinica@gmail.com

Qualifications:

- Master of Technology in Applied Chemistry, University of Johannesburg in South Africa
- Bachelor of Technology in Applied Chemistry, Technical University of Mombasa
- Higher diploma in Analytical Chemistry
- Diploma in Analytical Chemistry

Membership to professional bodies

- Member of Western Indian Ocean Marine Science Association (WIOMSA)
- Member of Women in Nuclear Kenya

Publications:

- Wanjeri VWO, Okuku EO, Barsanti M, Schirone A, Delbono I, Owato G, Delfanti R (2021) Baseline radionuclide and heavy metal concentrations in sediments of Sabaki River estuary (Kenya, Indian Ocean). *Marine Pollution Bulletin,* 164: 112033
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- Ongore C, Okuku E, Mwangi S, Kiteresi L, Ohowa B, **Wanjeri** V, Okumu S, Kilonzi J (2013) Characterization of nutrients enrichment in the estuaries and related systems in Kenya coast
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Noah Ngisiang'e
Research Scientist

I am an accomplished senior research sientist at the Kenya Marine and Fisheries Research Institute (KMFRI), Mombasa, with over a decade of experience in marine ecosystems monitoring, geospatial analytics, and blue assets mapping. A passionate advocate for sustainable marine resource management, I have dedicated my career to advancing research and policy on Kenya's coastal and offshore ecosystems through cutting-edge science and technology. I began my tenure at KMFRI as a research Scientist, contributing extensively to the understanding of Kenya's ocean and coastal systems.

Over this decade, my work focused on key issues such as: addressing the bycatch of non-target species to promote sustainable fishing practices, climate change monitoring to track and mitigate its impacts on Kenya's coastal environment, employing GIS and remote sensing to analyse habitat changes and assess their ecological implications coupled with seabed and benthic characterization, to understand the diversity and distribution of marine species in Kenyan waters. This period marked a solid foundation for more advanced work in marine ecosystem monitoring and resource management.

In 2022, I transitioned into the role of Senior Research Scientist at KMFRI, further expanding my contributions to marine ecosystems monitoring and blue assets mapping. In this capacity, I have taken on a leadership role, spearheading research across diverse thematic areas of ocean and coastal systems. My key responsibilities include but not limited to; conducting assessments of wind, currents, and wave energy potential to support Kenya's transition to sustainable energy sources, leveraging early warning systems to predict and mitigate climate-related risks in marine and coastal environments, using acoustic technologies to evaluate fish populations and inform sustainable management strategies. mapping both coastal and offshore fish larvae patterns to support marine biodiversity conservation efforts. undertaking habitat mapping, in situ surveys, and environmental impact assessments to protect these critical ecosystems, applying innovative approaches to understand and predict marine ecosystem dynamics and providing insights into seabed environments and marine biodiversity.

My work in these areas has not only contributed to advancing scientific knowledge through peer reviewed publications, reports, management briefs but also directly supports policy advisory and planning, particularly in identifying coastal resource hotspots and mitigating environmental impacts. I am a dedicated mentor and collaborator, fostering partnerships with policymakers, academic institutions, and other stakeholders to promote evidence-based decision-making for Kenya's blue economy. With an unwavering commitment to innovation and sustainability

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Robotics, climate change monitoring, Mapping, computational modelling and hydroaccoustics

Research Interests: Predictive scenario assessment, early warnings systems

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Qualifications:

- **PhD** Fellow, Marine Biology, DEEP, University of Stockholm, Sweden
- Master of Science in Computer Systems (Artificial Intelligence)
- Bachelor of Science (Hons) in business information technology
- Advanced Diploma in Computer Studies
- Diploma in Computer Studies

Publications:

- Jenoh EM, Robert EMR, Lehmann I, Kioko E, Bosire JO, **Ngisiange** Wide Ranging Insect Infestation of the Pioneer Mangrove *Sonneratia alba* by Two Insect Species along the Kenyan Coast N *PLoS One* 11(5): e0154849
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- **Ngisiange** N, Tarimo B, Daudi L, Mwangi S, Malesa F, George R Seasonal fish larvae abundance and composition in seagrass habitats of coastal East Africa *Scientific Reports* 14(1): 11203
- **Ngisiange** NN, Rimiru R, Okeyo G, Wambiji N, Aura CM Multi-Agent Systems and Distributed Constraint Satisfaction for Decision Support in Marine Ecosystem Management J. *Comput Sci Syst Biol* 9: 154-162
- **Ngisiange** NN, Rimiru R, Okeyo G, Wambiji N, Aura C (2016) Multi-Agent Systems and Distributed Constraint Satisfaction for Decision Support in Marine Ecosystem Management. *J Comput Sci Syst Biol* 9: 154-162. doi:10.4172/ jcsb.1000233

Patrick Gwada
Research Scientist

Patrick Gwada is a Senior Research Officer, with over 25 years' Research and Consultancy in Marine Critical Habitats (Intertidal flats, Mangrove, Seagrass, Seaweeds) and large-scale infrastructural developments within the coastal and marine areas.

Research interests include marine and terrestrial biodiversity; ecological functions and services; environmental impacts related to port environment infrastructural developments; off-shore oil and gas developments, and submarine sand harvesting hazards/risks. Additional interests are in contingency planning, causal chain analysis (CCA), root-cause analysis (RCA), strategic environmental assessment (SEA), environmental and social management framework (ESMF) development, strategic action planning, ecological service restoration, mitigation and management of impacts.

He is a member of a number of several professional bodies: WIOMSA in Zanzibar; the International Society for Mangrove Ecosystems (ISME) in Japan; Kenya Sea Turtle Conservation Committee, (KESCOM); Kenya National Oceanographic & Hydrographic Committee (KNOHC), the Environment Institute of Kenya (EIK) and the National Quality Institute of Kenya (NQI). He is a licensed Practitioner and Lead Auditor of ISO – 9001:2015; ISO 14001:2015, ISO/IEC 17025:2005 and ISO 27001:2015.

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Consultancy in Marine Critical Habitats (Intertidal flats, Mangrove, Seagrass, Seaweeds)

Research Interests: Research interests include marine and terrestrial biodiversity; ecological functions and services; port area invasive species research; environmental hazards / risk assessment. Additional skills include contingency planning, causal chain analysis (CCA), root-cause analysis (RCA), strategic environmental assessment (SEA), environmental and social management framework (ESMF) development, strategic action planning, ecological service restoration, mitigation and management of impacts.

Email: pgwada@kmfri.co.ke; patrickgwada@yahoo.com

Qualifications:

- **Msc**
- **Bsc**

PUBLICATIONS:

- Bolton J, Oyieke HA, **Gwada** P (2007) The seaweeds of Kenya: Checklist, history of seaweed study, coastal environment, and analysis of seaweed diversity and biogeography. *S Afr J Bot*. 73(1): 76-88.
- Munga C, Mwangi S, Kamau J, Nguli MM, **Gwada** P, Daudi LN, Ong'anda H, Mwaguni SM, Massa HS, Tole M, Onyari JM (2006) Land-based activities, pollution sources and levels in water and sediment in the coastal and marine area of Kenya; *UNEP-GEF WIO-LaB Project report*: Addressing Land Based Activities in the Western Indian Ocean, UNEP
- **Gwada** P (2003) An assessment of seagrass survival and functioning in response to manipulations in sediment redox at Nyali Lagoon, Kenya. *WIOMSA*
- Kairo G, Dahdouh-Guebas F, **Gwada** P, Ochieng C, Koedam N (2002) Regeneration status of mangrove forests in Mida Creek, Kenya: a compromised or secured future? *AMBIO A Journal of the Human Environment*, 31(7-8): 562-8
- Muthiga N, Mwangi S, Kirugara D, McClanahan TR, Uku J, Ndirangu S, **Gwada** P, Pakia M, Moragwa G, Kioko S (2001) The Biophysical and Ecological Profile of Diani-Chale. KWS technical reports
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Consultancy reports most cited since 2020

- World Bank EIA Report Disclosed (Report Number SFG5623) –
  url: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/856121562908569421/environmental-and-social-impact-assessment
- Consultancy for the 2021 JICA funded port development project, hosted by KMFRI, on Water Quality, Biodiversity Assessments and Hydrodynamics Survey of the Kenya Port environments and Kenyan lagoons for the proposed Offshore dumpsite for the Port of Mombasa;
- Consultancy for the 2020 Spain's Alma Water Servicios Espana SL funded project, hosted by KMFRI, on Water Quality, Biodiversity Assessments and Hydrodynamics Survey of the Kenyan reef flats and lagoons, for proposed Desalination Plants for Mombasa County

Dr. Pascal Thoya
Research Scientist

Pascal Thoya is a research scientist at the Kenya Marine and Fisheries Research Institute (KMFRI). He has background training in marine spatial planning and has over Ten years' experience in marine research working in the Western Indian Ocean.

Research Networks: Research Gate

Location: KMFRI Mombasa

Department: Fisheries Research

Specialization: Blue economy Geo-information, Spatial planning, Spatial ecology, Environmental impact, Fisheries,

Research Interests: Marine Spatial Planning, Blue eocnomy in the Indian Ocean, Illegal, Unreported and Unregulated (IUU) fishing, Fisheries spatial monitoring.

Email: pthoya@kmfri.go.ke; pascalthoya@gmail.com

Qualifications

- **PhD.** Student
- **Msc.**
- **BSc.**

Publications:

- CinnerJE, Daw T, Huchery C, Thoya P, Wamukota A, Cedras M, Abunge C (2014) Winners and Losers in Marine Conservation: Fishers' Displacement and Livelihood Benefits from Marine Reserves, Society & Natural Resources: *An International Journal,* 27(9): 994-1005, [https://DOI: 10.1080/08941920.2014.918229]
- Kaunda-Arara B, Munga C, Manyala J, Kuguru B, Igulu M, Chande M, Kangwe S, Mwakiti S, Thoya P, Mbaru E, Ruwa R (2016) Spatial variation in benthopelagic fish assemblage structure along coastal East Africa from

recent bottom trawl surveys. (*Regional Studies in Marine Science*)

- Kimeli A, Thoya P, Ngisiang'e N, Ong'anda H, Magori C, (2018) Satellite-derived bathymetry: A case study of Mombasa Port Channel and its approaches, Kenya. *Western Indian Ocean Journal of Marine Science,* 17(2), pp.93-102
- Okemwa GM, Maina GW, Munga CN, Mueni E, Barabara MS, Ndegwa S, Thoya P, Ntheketha N (2017) Managing coastal pelagic fisheries: A case study of the small-scale purse seine fishery in Kenya. *Ocean Coast. Manag.* 144: 31–39, [https://doi:10.1016/j.ocecoaman.2017.04.013]
- Thoya P, Kaunda-Arara B, Omukoto J, Munga, C, Kimani E, Tuda AO (2019) Trawling effort distribution and influence of vessel monitoring system (VMS) in Malindi-Ungwana Bay: Implications for resource management and marine spatial planning in Kenya. *Marine Policy*, 109: 103677
- Thoya P, Daw TM (2019) Effects of assets and weather on small-scale coastal fishers' access to space, catches and profits. *Fisheries research,* 212: 146-153
- Thoya P, Pérez-Jorge S, Okemwa G, Mwamlavya H, Tuda A, Wambiji N, Maina JM (2020) Spatial patterns and environmental risks of ring nets along Kenyan coast.(*African Journal of Marine Science*)
- **Thoya** P, Maina J, Möllmann Schiele CS (2021) AIS and VMS Ensemble Can Address Data Gaps on Fisheries for Marine Spatial Planning. Sustainability 13(7), 3769
- Tuda AO, Thoya P (2017) "Cumulative impacts assessment to support ecosystem based marine spatial planning in Kenya" Kitsiou D. and Karydis M. (Ed) Marine Spatial Planning: Methodologies, Environmental Issues and Current Trends. Nova publishers. (2017)
- Tuda AO, Thoya P (2020) Marine & coastal areas under protection (Kenya). UNEP-Nairobi Convention, GEF and WIOMSA. 2020. Western Indian Ocean Marine Protected Areas Outlook: Towards achievement of the Global Biodiversity Framework Targets. UNEP and WIOMSA, Nairobi, Kenya, 276 pp.

Stephen Mwangi
Research scientist

Research scientist with interest and wide experience in water quality research, microbial foodwebs and primary production in coastal and marine ecosystems. Has been involved in various projects and programmes geared towards sustainable Natural Resource Management and especially aquatic resource management. A scientist with organizational and communication skills with passion for demand driven research likely to have impact on livelihoods while ensuring environmental and socioeconomic sustainability.

Location: KMFRI Mombasa

Department: Oceanography and hydrography

Specialization: Water quality, microbiology, ecosystem health.

Research Interests: Human impacts on biodiversity and ecosystem functioning,

Email: smwangi@kmfri.go.ke; snmwangi40@yahoo.co.uk or snmwangi2013@gmail.com

Qualifications

- **Msc.**
- **B.Ed** (Sci).

Publications:

- Kamau Joseph N, Kuschk, Peter, Machiwa, John, Macia, Adriano., Mothes, Sibylle, **Mwangi, Stephen**, Munga, Daniel, and Kappelmeyer, Uwe (2015). Investigating the distribution and fate of Cd, Cu, Fe, Mn and Zn in sewage impacted mangrove fringed creeks of Kenya, Tanzania and Mozambique. Journal of Soils and Sediments DOI 10.1007/s11368-015-1214-3
- Kamau N, Ngila JC, Kirui B, **Mwangi** S, Kosore CM, Wanjeri V, Okumu S (2015) Spatial variability of the rate of organic carbon mineralization, in a sewage impacted forest, Mikindani Kenya. *Journal of Soils and Sediments* (in press)
- Kiteresi LI, Okuku EO, **Mwangi** SN, Ohowa B, Wanjeri VO, Okumu S, Mkono M (2012) The influence of land based activities on the phytoplankton communities of Shimoni-Vanga system. *Int. J. Environ. Res.,* 6(1) 151-162
- Kiteresi LI, Okuku EO, **Mwangi** SN, Mkono M (2013) Potentially Harmful Algae along the Kenyan Coast: A Norm or Threat. *Journal of Environment and Earth Science*: 3(9): 1-11
- Munga D**, Mwangi** S, Onganda H, Kitheka JU, Mwaguni SM, Mdoe F, Barongo J, Massa HS, Opello G (2006) Vulnerability and pollution of groundwater in Kisauni, Mombasa, Kenya. In; Groundwater pollution in Africa: edited by Yongxin Xu, brent Usher
- Munga CN, **Mwangi** S, Ong'anda H, Ruwa R, Manyala J, Groeneveld JC, Kimani E, Vanreusel A (2013) Species composition, distribution patterns and population structure of penaeid shrimps in Malindi-Ungwana Bay, Kenya, based on experimental bottom trawl surveys. *Fisheries Research,* 147: 93 – 102
- Okuku EO, Ohowa B, Munga D, **Mwangi** SN, Kiteresi LI, Wanjeri VO, Okumu S, Kilonzo J (2011) Sewage pollution in the coastal waters of Mombasa City, Kenya: A norm rather than an exception. Int. *J. Environ. Res.,* 5(4): 865-874

- Okuku Eric Ochieng , Kiteresi Linet Imbayi, Owato Gilbert Omondi, Wanjeri Veronica Ogolla Wayayi, Mwalugha Catherine Sezi, Kombo Mokeira Maureen, **Stephen Mwangi** and Nancy Oduor (2019). Decadal pollution assessment and monitoring along the Kenya coast. In *Monitoring of Marine Pollution*. IntechOpen
- Ongore CO, Okuku EO, **Mwangi** SN, Kiteresi LI, Ohowa BI, Wanjeri VO, Okumu S, Kilonzi J (2013) Characterization of nutrients enrichment in the estuaries and related systems in Kenya coast. *Journal of Environmental Science and Water Resources,* 2(6): 181-190
- Orwa PO, Omondi R, Okuku EO, Ojwang W **Mwangi,** S (2014) Composition, abundance and feeding guilds of macroinvertebrates in Lake Kenyatta, Kenya. *International Journal of Environmental Monitoring and Analysis,* 2(5): 239-243
- Penha-Lopes G, Xavier S, Okondo J, Cannicci S, Fondo E, Ferreira S, Macamo C, Macia A, **Mwangi** S**,** Paula J (2010) Effects of urban wastewater loading on macro and meiofauna assemblages in subtropical east

Dr. Victor Mwakha
Research scientist

Mr Alati is interested in understanding local knowledge held by coastal communities of Kenya. He is currently pursuing his PhD in Social Anthropology at the University of Roehampton, London. His study focuses on maritime heritage practices of coastal fishing communities. It utilizes ethnographic approaches to understand fishing community's sociocultural experiences, practices, beliefs, opinions, moralities, values, identities and way of life.

Research Network Link: Research gate

Location: KMFRI Mombasa

Department: Oceanography and Hydrography

Specialization: Socioecological systems; Social anthropology

Research Interests: Social anthropology; Socioeconomics; and Fisheries management.

Email: vmwakha@kmfri.go.ke; vmwakha@gmail.com

Qualifications

- **PhD.** student, Social Anthropology, The University of Roehampton, London.
- **MSc.** in Ecological Marine Management**,** Free University Brussels, Belgium.
- **BSc.** in Applied Aquatic Sciences, Egerton University, Kenya.

Publications:

- **Alati** VM, Olunga J, Olendo M, Daudi LN, Osuka K, Odoli C, Nordlund LM (2020) Mollusc shell fisheries in coastal Kenya: Local ecological knowledge reveals overfishing. *Ocean & Coastal Management*, 195: 105285 [https://doi.org/10.1016/j.ocecoaman.2020.105285]
- Aura C, Musa S, Osore MK, Kimani E, **Alati** VM, Wambiji N, Maina G, Charo-Karisa H (2017) Quantification of climate change implications for water based management: a case study of oyster suitability sites occurrence model along the Kenya coast. *Journal of Marine Systems,* 165: 27–35 [https://DOI: 10.1016/j.jmarsys.2016.09.007]
- Buckley SM, McClanahan TR, Quintana Morales EM, **Alati** VM, Nyanapah J, Otwoma LM, Pandolfi JM (2019) Identifying species threatened with local extinction in tropical reef fisheries using historical reconstruction of species occurrence. *PLoS ONE* 14(2): e0211224, [https://doi.org/10.1371/journal.pone.0211224]
- Okello JA, **Alati** VM, Kodikara S, Kairo J, Dahdouh-Guebas F, Koedam N (2019) The status of Mtwapa Creek mangroves as perceived by the local communities. *Western Indian Ocean Journal of Marine Science*, 18(1); 67-81
- Omukoto JO, Owiti H, **Alati** VM, Munga CN, Wamukota AW (2018) Participatory assessment of priority fishery profiles in an overfished urban inshore seascape in Kenya. *WIO Journal of Marine Science,* 17(2): 79-92
- Wanyonyi IN, Wamukota A, Tuda P, **Alati** VM, Nguti LM, (2016) Migrant fishers of Pemba: Drivers, impacts and mediating factors. *Marine Policy*, 71: 242 – 255. [https://doi.org/10.1016/j.marpol.2016.06.009]
- Wanyonyi IN, Wamukota A, **Alati** VM, Osuka K (2021) The influence of 'space'on migrant fisher livelihoods. *African Identities*, 1-16 [https://doi.org/10.1080/14725843.2021.1937050]

Catherine Mwalugha
Research Scientist

Location: KMFRI Mommbasa

Department: Oceanography and Hydrography

Research Interest: Phytoplankton studies, plastic pollution, Ocean Acidification

Email: cmwalugha@kmfri.go.ke; kateagneta@gmail.com

Qualification:

- Bachelor of Science (Botany & Zoology) at University of Nairobi

Membership

- Western Indian Ocean Early Career Scientists (WIO-ECSN)
- Organization for Women In Science for Developing World (OWSD)

Publications

- Okuku EO, Kiteresi LI, Owato G, **Mwalugha** C, Omire J, Mbuche M, Chepkemboi P, Ndwiga J, Nelson A, Kenneth O, Lilian M (2020) Baseline meso-litter pollution in selected coastal beaches of Kenya: Where do we concentrate our intervention efforts? *Marine Pollution Bulletin,* 158: 111420
- Okuku EO, Kiteresi LI, Owato G, **Mwalugha** C, Omire J, Otieno K, Mulupi L (2020) Marine macro-litter composition and distribution along the Kenyan Coast: The first-ever documented study. *Marine Pollution Bulletin,* 159: 111497
- Okuku E O, Kiteresi L, Owato G, Otieno K, **Mwalugha** C, Omire J, Kombo MM, Ndwiga J (2021) Temporal trends of marine litter in a tropical recreational beach: A case study of Mkomani beach, Kenya. *Marine Pollution Bulletin,* 167: 112273
- Okuku E, Kiteresi L, Owato G, Otieno K, **Mwalugha** C, Mbuche M, Omire J (2021) The impacts of COVID-19 pandemic on marine litter pollution along the Kenyan Coast: a synthesis after 100 days following the first reported case in Kenya. *Marine Pollution Bulletin,* 162; 111840
- Okuku E, Owato G, **Mwalugha** C, Wanjeri V, Kiteresi L, Mwangi S (2022) Water pollution and its impact on the Blue Economy initiative: A lesson learned from the Kenyan Coast. *Aquatic Ecosystem Health & Management,* 25(4): 12-21
- Okuku EO, Owato G, Kiteresi LI, Otieno K, Kombo M, Wanjeri V, **Mwalugha** C (2022) Are tropical estuaries a source of or a sink for marine litter? Evidence from Sabaki Estuary, Kenya. *Marine Pollution Bulletin,* 176: 113397.
- OKUKU E, Mbuche M, Owato G, Otieno K, Kombo M, **Mwalugha** C, Wanjeri V (2023) The Complexity of Litter Pollution in Transboundary Lakes: A Case Study of Lakes Jipe and Chala in Kenya and Tanzania. *Available at SSRN 4375965*
- Okuku EO, Kombo M, **Mwalugha** C**,** Owato G, Otieno K, Mbuche M, Wanjeri V (2023) Are tropical mangroves a sink for litter leaking from land- and sea-based sources? Evidence from selected Kenyan mangroves. *Marine Pollution Bulletin, 187*: 114590
- Okuku E, Kombo MM, **Mwalugha** CS, Chiphatsi MM, Otieno K, Chepkemboi P, Otieno CO (2024) Anthropogenic litter pollution in selected African transboundary and Great Rift Valley lakes. *Journal of Great Lakes Research*, 50: 102382

Book chapters

- Okuku EO, Imbayi KL, Omondi OG, Wayayi WVO, **Sezi** MC**,** Maureen KM, Oduor N (2019) Decadal pollution assessment and monitoring along the Kenya Coast. In *Monitoring of Marine Pollution*. IntechOpen.
- Okuku E, Otieno K, Owato G, **Mwalugha** CS, Kombo M, Chepkemboi P, Chiphatsi M, Otieno C (2023) Trawl Surveys for Floating Meso litter. In: Barnardo T, Marlin D, Ribbink AJ, Pichegru L (eds) 2023. African Litter Monitoring Manual. 2nd Edition. African Marine Network, Sustainable Seas Trust. Gqeberha, South Africa
- Okuku E, Chiphatsi M, Chepkemboi P, Kombo M**,** **Mwalugha** CS, Otieno K(2023) Buried Litter Surveys on Beaches. In: Barnardo T, Marlin D, Ribbink AJ, Pichegru L (eds). 2023 African Litter Monitoring Manual. 2nd Edition. African Marine Network, Sustainable Seas Trust. Gqeberha, South Africa.

Titus Komen
Research Scientist

Komen is a degree holder in BCS Biochemistry from Pwani University. He is currently working at KMFRI Mombasa center as a researcher who is interested in Microbiology, Molecular Biology, Biotechnology and waste water treatment for pollution control.

He worked in pharmaceuticals industry for six years helping in finding feedback of pharmaceutical brands from medical practitioners and writing reports for actions by the manufacturers to improving the quality of their brands.

Location: KMFRI Mombasa center

Department: Oceanography and Hydrography

Specialization: Biochemistry

Research Interest: Microbiology, Molecular Biology, Biotechnology and Waste water treatment for pollution control.

Qualification: BSC Biochemistry

Email: komeniac6@gmail.com

MARICULTURE RESEARCH DEPARTMENT

Alex Kimathi
Research Scientist

Alex is a Research Scientist at Kenya Marine and Fisheries Research Institute (KMFRI) with an MSc in Botany (Plant Ecology), Jomo Kenyatta University of Agriculture and Technology, Thika, Kenya, BSc. Hons (Fisheries and Aquatic Sciences), University of Eldoret, Kenya, and Diploma in Applied Biology, Technical University of Mombasa.

With over 15 years of experience in marine research, Alex has a wide knowledge of marine plants ecology and has specialized in seaweed research interventions in Kenya. Currently, Alex is attached to the Mariculture department under Aquaculture Division and is specifically charged with the coordination and supervision of seaweed mariculture research activities. Alex is among the leading scientists in the introduction of commercial seaweed cultivation in Kenya as an alternative livelihood for coastal communities. Alex was a key player in the implementation of Kenya's coastal development projects, specifically the scaling of commercial seaweed farming in villages on the southern coast of Kenya between 2009 and 2015. Alex's other research responsibilities include site suitability mapping for the expansion of seaweed farming on the Kenyan coast, the development of innovative and sustainable cultivation technologies to maximize seaweed production, and the promotion of seaweed value addition in Kenya. Being a trained SCUBA diver and an active member of the seagrass Net group in KMFRI, Alex also participates in seagrass research activities including seagrass habitat mapping and ecological monitoring in coral reef ecosystems. As a researcher and a dedicated team player, Alex has collaborated with various stakeholders in the aquaculture industry, including local government agencies, Non-Governmental Organizations, private organizations, community leaders, and local farmers to successfully achieve project objectives. In KMFRI Alex is also a member of the Scientific Monitoring and Evaluation Committee. Alex is an author and co-author of several research articles in peer-reviewed journals, book chapters, policy briefs, and newsletters.

Location: KMFRI, Shimoni Station

Division: Aquaculture

Department: Mariculture

Specialization: Site suitability assessments, Seaweed mariculture production systems, seagrass ecological monitoring and fish aquaculture production.

Research Interests

- Linking seaweed mariculture research innovations with community livelihood to support local household economy.
- Development of policy briefs related to mariculture issues (culture systems, value addition and post-harvest) for dissemination of information and development of a sustainable Mariculture Industry.

Research gate link: https://www.researchgate.net/publication/329601116

Orchid link: https://orcid.org/000-0002-7008-222X

https://www.semanticscholar.org/paper/How-effective-are-MPAs-Predation-control PDF] Seaweed Farming Policy Brief – 1 41.89.141.8 › kmfri › bits tream

Email: akimanthi@kmfri.go.ke/kimathialex04@gmail.com, kimathi_alex@yahoo.com

Qualifications

- **2015 - 2020: MSc** in Botany (Plant Ecology), Jomo Kenyatta University of Agriculture and Technology, Thika, Kenya.
- **2009-2013: BSc.** Hons (Fisheries and Aquatic Sciences), University of Eldoret, Kenya.
- 1**998- 2000: Diploma** in Applied Biology, Technical University of Mombasa

Publications

- Eklöf, Fröcklin S, Lindvall A, Stadlinger N, **Kimathi** A, Uku J, Tim McClanahan TR (2009) How effective are MPAs? Predation control and 'spill-in effects' in seagrass–coral reef lagoons under contrasting fishery management. *Marine Ecology Progress Series,* 384: 83-96
- **Kimathi** AG, Kaunda-Arara B (2013) Diet and food preference of sea urchin; Tripneustus gratilla (Linnaeus, 1758) in a seaweed cultivated and non-cultivated seagrass beds at Kibuyuni-Shimoni, Kenya (Unpublished undergraduate thesis)
- **Kimathi** A, Mirera HOD, Wainaina M, Ntabo J, Wairimu ME (2018) Seaweed farming Policy brief-1. Seaweed farming Industry in Kenya; Tapping into the blue Economy and mitigating climate change impacts. KMFRI Mariculture publications number, 001/2018
- **Kimathi** AG, Wakibia JG, Gichua MK (2018) Growth rates of *Eucheuma denticulatum* and *Kappaphycus alvarezii* (Rhodophyta; Gigartinales) cultured using modified off-bottom and floating raft techniques on the Kenyan coast. *WIO Journal of Marine Science,* 17(2): 11-24
- **Kimathi** AG (2020) Growth rates and net yields of *Eucheuma denticulatum* and *Kappaphycus alvarezii* cultured under three techniques on the Kenyan coast. A thesis submitted in partial fulfillment for the Degree of Master of Science in Botany (Plant Ecology) at the Jomo Kenyatta University of Agriculture and Technology

- **Kimathi** AG, Mirera D, Mwaluma J, Magangi N, Hinzano S. (2023) Assess growth of seaweeds in deep water and intertidal nurseries at Kibuyuni, Kwale County for informed decision making. 2022/2023 PC No. C V

- **Kimathi** AG, Wakibia JG, Gichua MK, Mirera D (2023) The potential of three culture techniques to mitigate environmental challenges and enhance yields of Eucheumoids (Rhodophyta; Gigartinales) in deep water on the Kenyan Coast, Kenya. A*quatica Journal* 8(1): 74-88

- **Kimathi** AG, Mwaluma J, Mirera D, Kairo J, Wakibia J (2024) Seaweed Production in Kenya amid Environmental, Market, and COVID-19 Pandemic Challenges. Tropical Phyconomy Coalition Development. *Development in Applied Phycology* 11: 229-238, [https://doi.org/10.1007/978-3-031-47806-2_18]

- Mirera DO, **Kimathi** A, Ngarari MM, Magondu EW, Wainaina M, Ototo A (2020) Societal and environmental impacts of seaweed farming in relation to rural development: The case of Kibuyuni village, south coast, Kenya. *Ocean and Coastal Management,* 194: 105253.

- Uku J, Daudi L, Muthama C, Alati V, **Kimathi** A, Ndirangu S. (2021) Seagrass restoration trials in tropical seagrass meadows of Kenya, *Western Indian Ocean Journal of Marine Science,* 20(2): 69-79

Technical reports

- Holeh GM, Magondu EW, Mwaluma J, Mirera OD, Nyabeta G, Wainaina M, Mukami M, **Kimathi** A, Hinzano S (2020) Socio-economic survey and feasibility study of cage fish farming in Kilifi (Dabaso) and Kwale (Comtach) counties of Coastal Kenya. *KMFRI Mariculture Technical Report 2019/2020* PC. No. C1.12 (v)

- Magondu EW, Holeh GM, Mirera D, Mwaluma JM, **Kimathi** A, Wainaina M, Ngarari MM, Hinzano SM (2023) Assessment of feed performance and aggression behaviour of rabbitfish and marine tilapia at Kibokoni Umoja self-help group and KMFRI for enhanced mariculture. KMFRI Mariculture Technical Report 2022/2023 PC. No. C10.iii

- Mirera OD, Holeh GM, Magondu EW, **Kimathi** A (2023) Conduct growth trials in cages and intertidal ponds under Integrated Multi Trophic Aquaculture (IMTA) system with Bonje community and Dabaso Conservation groups in Kwale and Kilifi Counties respectively. 2022/2023 PC No. C1

- Mwaluma JM, **Kimathi** A, Magondu EW, Mirera D, Wainaina M, Holeh GM, Ngarari MM, Kendi J, Hinzano SM, Nyabeta G (2021) Formulation and effectiveness of using Terebralia palustris as an alternative source of protein for mud crab (*Syalla serata*) at Dabaso mariculture group in Kilifi County for enhanced mariculture KMFRI Mariculture Technical Report 2020/2021 PC. No. C10.iii.

- Mwaluma J, Mirera HOD, Wainaina M, Wairimu ME, **Kimathi** A (2018) Mud crab farming policy brief-2: Improving livelihoods through mud crab farming in coastal Kenya; Research innovations for food security and livelihoods. KMFRI mariculture publications number 002/2018.

- Ngarari MN, **Kimathi** A, Mirera OD, Wainaina M, Hinzano S, Mwaluma J, Kendi J, Magondu EW, Mwaka GH, Nyabeta J (2021) Seaweed Suitability Mapping in the North Coast of Kenya. KMFRI Mariculture Technical Report 2020/2021 PC. No. C1.12 (v)

- Uku JN, Wakibia JG, Ndirangu S, Muthama C, **Kimathi** A. (1998). In: Mwatha, G.K., Fondo, E., Uku, J.N., Kitheka, J.U. (Eds.) Macroalgae and seagrasses of Mida Creek. KMFRI Technical Report, pp. 99–113.

- Wainaina M., Mirera DO, Nyabeta J, Ollando J, Magondu EW, Mwaka GH, Hinzano S, Mukami M, Mwaluma J, **Kimathi** A, Kendi J (2020) Conduct a needs assessment for fresh water prawn farming in Kilifi County to inform domestication and breeding needs. KMFRI Mariculture Technical Report 2020/2021 PC. No. C12. (1V).

Newspaper articles

- Women in Kenya reap ecological and economic rewards from seaweed | Devex https://www.devex.com/news/women-in-kenya-reap-ecological-and-economic-rewards-from-seaweed-99439
- Seaweed Farming: Recovery Efforts amid Losses | Science Africa. https://scienceafrica.co.ke/seaweed-farming-recovery-efforts-amid-losses/
- Farmers incur Ksh 3 million loss as tide washes away seaweed. Frida, September, 11 2020. The Standard Newspaper.

Membership to professional bodies

- Member of Western Indian Ocean Marine Sciences Association (WIOMSA)

- Member of Kenya Sea Turtle Conservation Movement (KESCOM)

- Member of Marine Biology Career Network

Dr. Anthony Nzioka
Research Scientist

Anthony is a Senior Research Scientist with 20 years of experience in marine and coastal research. While his work has primarily focused on biodiversity assessments, his current research is dedicated to the sustainable development of marine aquaculture (mariculture) in Kenya. His scientific journey has evolved from classical marine biology and ecology into the application of molecular biology in marine conservation, fisheries management, and aquaculture innovation. This interdisciplinary approach allows him to explore marine ecosystems at both ecological and cellular levels, bridging traditional field-based research with advanced laboratory techniques.

His early career focused on marine biodiversity, ecological monitoring, and the conservation of reef-associated ecosystems. He has conducted extensive fieldwork, including underwater visual surveys of marine fish populations, coral reef assessments, and habitat mapping. His work in integrated coastal zone management (ICZM) has contributed to conservation strategies and the sustainable use of marine and coastal resources.

As his research progressed, Anthony ventured into molecular and cellular biology to better understand the physiological responses of marine organisms to environmental stressors. He earned his PhD in Marine Environment and Resources from the University of Basque Country (UPV/EHU), Spain, in December 2023. His doctorate research, entitled ***"Reproductive constraints and gonadal alterations in fish locally exposed to pollutants: how life history shapes exposure,"*** examined how environmental contaminants affect fish reproduction at the molecular and cellular levels. This transition into molecular biology has allowed him to integrate genetic, molecular, and physiological analyses into his broader ecological studies, providing deeper insights into fisheries management, mariculture sustainability, species adaptation and aquatic ecosystem health.

Anthony is committed to leveraging his extensive background in oceanic research, applying his expertise in marine ecology and molecular biology to address critical challenges facing marine and coastal environments. Through interdisciplinary research, conservation initiatives, and sustainable aquaculture development, he strives to enhance the responsible exploitation of marine resources while promoting ecosystem resilience and biodiversity conservation. Currently, Anthony is actively involved in mariculture research aimed at enhancing the livelihoods of coastal communities. From developing Kenya's first marine hatchery to expanding marine fish farming along the Kenyan coast, his research activities support communities and contribute to the growth of the blue economy.

Online research links:

- **Research gate link:** https://www.researchgate.net/profile/Anthony-Nzioka?ev=hdr_xprf
- **Google Scholar link:** https://scholar.google.com/citations?user=D4N6f_sAAAAJ&hl=en
- **ORCID iD:** https://orcid.org/0000-0001-7541-0184
- **ResearcherID:** http://www.researcherid.com/rid/F-1787-2018
- **Scopus Author ID:** http://www.scopus.com/inward/authorDetails.url?authorID=57212133804&partnerID=MN8TOARS
- **Ocean Expert link:** https://oceanexpert.org/expert/nzioka
- **LinkedIn lnk:** https://www.linkedin.com/in/dr-anthony-nzioka-70399817/

Location: KMFRI Shimoni Centre

Department: Mariculture

Specialization: Marine Biology and Ecology; Reproductive Biology and Environmental Physiology; Molecular and Genomic Sciences. .

Research Interests:

- **Aquaculture Innovation & Reef Restoration** – Developing modern biotechnological tools for marine fish and shellfish aquaculture, enhancing fish production, and restoring degraded coral reef ecosystems.
- **Reproductive Biology of Marine Species** – Studying reproductive mechanisms, sex determination, and endocrine regulation in marine fish, shellfish, and invertebrates to improve fisheries management and mariculture sustainability.
- **Molecular Marine Biology & Environmental Physiology** – Understanding how environmental stressors, such as pollutants, affect the endocrine and reproductive systems of marine organisms, with applications in conservation, fisheries, and aquaculture.

Email: anzioka@kmfri.go.ke; nzioka.mutua@gmail.com; nzioka@hotmail.com

Qualifications:

- **PhD** Marine Environment and Resources (MER) (2018 – 2023), University of the Basque Country (UPV/EHU) (SPAIN)
- **Erasmus Mundus MSc**. Marine Environment and Resources (MER), University of the Basque Country (UPV/EHU) – University of Liège (ULiège) – University of Southampton (SOTON) Joint Degree (SPAIN)
- **Specialty Oceanography**, University of Bordeaux (UBX) Double Degree (FRANCE)
- **BSc.**Fisheries and Aquatic Sciences, Moi University (KENYA)

Publications:

- Mwachireya SA, **Nzioka** AM, Mutiso DN, (2017) Coral Recruit-Algae Interactions in Coral Reef Lagoons Are Mediated by Riverine Influences. *Int. J. Ecol.* 2017, 1–10 https://doi.org/10.1155/2017/1351854
- **Mutua,** A. N. (2012) Morphometric and meristic variation between populations of white-spoted rabbitfish, Siganus sutor (Valenciennes, 1835) from the Kenyan Coast (Bachelor's thesis)
- **Mutua** A N (2016) Gametogenesis related genes and apoptosis marker genes during the reproductive cycle of the thick-lip grey mullet (*Chelon labrosus* Riso, 1927) of Pasaia harbour (Bay of Biscay, South-western Europe); possibilities for development of molecular markers of xenoestrogenic exposure. (Masters thesis)
- **Nzioka** A, Lingdi T, Que D, Gain D (2014). Benthic ecology, diversity and community structure of Zostera marina seagrass beds and adjacent sand habitats of Arcachon Bay lagoon in the Southwest of France. *Technical Report.* [https://doi.org/10.13140/RG.2.1.1689.7042]
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- **Nzioka** A, (2023) Reproductive constraints and gonadal alterations in fish locally exposed to pollutants: how life history shapes exposure. PhD Thesis. Department of Zoology and Animal Cell Biology, *University of the Basque Country*, 296 pp. https://addi.ehu.es/handle/10810/67448
- **Nzioka** A, Cancio I, Diaz de Cerio O, Pinto E, Almeida A, Correia AT, (2023) Otolith shape and elemental signatures provide insights into the connectivity of euryhaline *Chelon labrosus* inhabiting two close estuaries with different burdens of xenoestrogens in the Southern Bay of Biscay. *Mar. Environ. Res.* 189, 106075, https://doi.org/10.1016/j.marenvres.2023.106075
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- Waithaka E, Boera P, Morara G, **Nzioka** A, Mutie A, Keyombe J (2019) Trends in fishing on Lake Naivasha and their implications for management. *African Journal of Tropical Hydrobiology and Fisheries,* 19: 9–15
- Waithaka E, Boera P, Mutie A, **Nzioka** A, Morara G, Obegi B, Loki P, Khamala E, (2018) Assessment of Macrophyte Populations in Lake Naivasha, Kenya; Using GIS and Remote Sensing. *J. Environ. Pollut. Manag.* 1: 1–8
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Books & book chapters

- Mukami M, Nzioka A (2023) Environmental considerations for habitat conversion for aquaculture. In Uku J, Allela A, Osore M, Wambiji N (Eds.) Marine Spatial Planning and the Sustainable Blue Economy (pp. 47–51). Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization and the Secretariat Office of its Sub-Commission for Africa and the Adjacent Island States (IOCAFRICA). Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000384930.locale=en

Dr. David Mirera
Research Scientist

Dr. Mirera Oersted David holds a PhD from Linnaeus University, Sweden, is a Principal Research Scientist working for Kenya Marine and Fisheries Research Institute (KMFRI). Dr. Mirera holds significant hands on training experience in mariculture development in Kenya and the Western Indian Ocean (WIO) Region. As a scientist and extension agent. He is the brainchild of community mariculture development in Kenya through milkfish (*Chanos chanos*) and mud crab (*Scylla serrata*) farming in more than 50 farming groups along the coast of Kenya. Have participated in various taskforces including developed of the 1st National aquaculture policy 2011 and Review of the policy in 2023. Have engaged in several mariculture development interventions including providing expertise in assessment of the suitability of mud crab farming in Seychelles, Potential of mariculture development

in Kenya and Evaluation of the level of implementation of mariculture and fisheries interventions and collaboration between the United Republic of Tanzania and FAO. Have made a number of innovations in mariculture that include development of drive-in cages for mud crab cages, fabrication of innovated plastic cages for mud crab fattening, design and development of simple marine earthen ponds that are regulated by the tides, introduction of freshwater Nile tilapia into marine waters to address lack of fingerlings for farmers, design of marine fish cages and development of the 1st marine hatchery in Kenya. He is a mentor and supervisor to a number of scientists, MSc. and PhD Students from different Universities in Kenya and abroad. He has implemented a number of research projects through different funders like NRF, WIOMSA, IFS, National Research fund, Rufford grant, WWFefn, the Nature Conservancy, Plan international, World Fish, St. Andrews University, IRD, USAID, Swedish University of Agriculture among others. He has published more then 30 peer reviewed publications and reviewer with different peer review journals.

- **Linkedin:** https://www.linkedin.com/in/david-mirera-563a8730/
- **Youtube:** https://www.youtube.com/@davidmirera334
- **KMFRI website link:** https://www.kmfri.co.ke/index.php/component/comprofiler/userprofile/dmirera
- **DIVA portal:** http://lnu.diva-portal.org/smash/person.jsf?pid=authority-person%3A30287&dswid=-3808
- **ORCID ID:** https://orcid.org/0000-0003-1556-096X
- **Publons Link:** https://publons.com/researcher/1243486/david-oersted-mirera/peer-review/
- **Academia link:** https://independent.academia.edu/DavidMirera/Analytics/activity/overview

Location: KMFRI Mombasa

Department: Mariculture Department

Specialization: Aquaculture Innovations, Management of Production Systems, Marine cage design, Fish Nutrition, Marine Fish Breeding, Training and Extension, Monitoring and Evaluation, EIA

Research Interests; Research on aquaculture innovation, culture systems, Feed nutrition, Training and extension, fisheries, development of scientific papers and policy briefs in aquaculture related issues. .

Email: dmirera@kmfri.go.ke; dimirera@yahoo.com, dmirera@gmail.com

Qualifications:

- **PhD. in Science:** Linnaeus University, Kalmar, Sweden -February 2014
- **MSc. in Natural Resource Management:** Egerton University, Nakuru, Kenya – July 2007
- **BSc. Fisheries and aquaculture:** Moi University, Eldoret, Kenya – December 2000

Publications:

- Bacha NA, Munga C, **Mirera** OD (2024) Macroalgae Diet Indicates Potential in Mariculture Production of Shoemaker Spinefoot Rabbitfish. *Multidisciplinary Journal of TUM* 3(1): 2024 47–56 [https://doi.org/10.48039/mjtum.v3i1.74]
- Gabriel AK, Mwaluma J, **Mirera** D, Kairo J, Wakibia J. (2024) Seaweed Production in Kenya amid Environmental, Market, and COVID-19 Pandemic Challenges. In: Critchley AT, Hurtado AQ, Neish IC (eds) Tropical Phyconomy Coalition Development. *Developments in Applied Phycology,* 11: Springer, Cham. [https://doi.org/10.1007/978-3-031-47806-2_18]
- Holeh GM, Ochiewo JO, Tsuma S, **Mirera** DO (2020) Impact of Aquaculture and Mariculture Information Dissemination to the Local Coastal Communities in Kenya. *J. Aquaculture research and development,* 11:(9) 608 ISS
- Kimani E, Omukoto J, Mueni E, **Mirera** OD, Fondo E (2018) Status of Crustacean Fisheries In Kimani *et al.*, (Eds.) (2018) The Status of Kenya Fisheries: Towards the sustainable exploitation of fisheries resources for food security and economic development. Kenya Marine and Fisheries Research Institute (KMFRI), Mombasa. 135 pp
- Kimathi GA, Wakibia GJ, Gichua KM, **Mirera** OD (2023) The potential of three culture techniques to mitigate environmental challenges and enhance yields of Eucheumoids (Rhodophyta; Gigartinales) in deep water on the Kenyan Coast. *Kenya Aquatica Journal,* 8(01): 74 – 88
- Magondu EW, **Mirera** DO, Okemwa D (2022) Performance of diets composed of Artemia biomass and fish meal fed to juvenile marine Tilapia in cages. *Aquatic Ecosystem Health & Management,* 25(4): 60-67
- **Mirera** DO, Okemwa D (2023) Salinity tolerance of Nile tilapia (*Oreochromis niloticus*) to seawater and growth responses to different feeds and culture systems. *WIO Journal of Marine Science,* 22(2): 75-85 [https://doi: 10.4314/wiojms.v22i2.6]
- **Mirera** OD, Magondu WE, Wainaina WM, Muli B, Okemwa D, Angulu R, Heba KI, Moyoni H (2023) Fish preference at different value chain levels and implications for management of mariculture. *Marine Policy,* 157: 105845
- **Mirera** OD (2009) Mud crab (*Scylla serrata*) culture, undertanding the technology in a silvofisheries perspective. *WIO Journal of Marine science,* 8(1): 127-137
- **Mirera** OD, Mtile A (2009) A preliminary study on the response of mangrove mud crab (*Scylla serrata*) to different feed types under drive-in cage culture system. *J. Ecol. Nat. Environ.*, 1(1): 7 – 14

- **Mirera** OD, Kairo JG, Kimani EN, Waweru FK (2010) A comparison in fish assemblages in mangrove forests and on intertidal flats at Ungwana bay, Kenya. *African Journal of Aqautic Science,* 35(2): 165-171
- **Mirera** OD (2011a) Trends in exploitation, development and management of artisanal mud crab (*Scylla serrata*-Forskall-1775) fishery and small-scale culture in Kenya: An overview. *Oceans and Coastal Management,* 54: 844 – 855
- **Mirera** HOD (2011b) Experimental polyculture of milkfish (*Chanos chanos*) and Mullet (*Mugil cephalus*) using earthen ponds in Kenya. *WIO Journal of marine science,* 10(1): 59-71
- **Mirera** OD (2012) Mariculture development in Kenya-an overview In Troell M, Hecht T, Beveridge M, Stead S, Bryceson I, Kautsky N, Mmochi A, Ollevier F (Eds) (2011) Mariculture in the WIO region – challenges and prospects. WIOMSA Book Series No. 11. viii+59pp
- **Mirera** OD, Moksnes P-O (2013) Cannibalistic interactions of juvenile mud crabs (*Scylla serrata*): The effect of habitat and crab size. *African Journal of Marine Science,* 35: 545-553
- **Mirera** OD, Ochiewo J, Munyi F, Muriuki T (2013) Heredity or traditional knowledge: Fishing tactics and dynamics of artisanal mangrove crab (*Scylla serrata*) fishery. *Ocean & Coastal Management,* 84: 119-129
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- **Mirera** OD, Mosknes P-O (2015) Comparative performance of wild juvenile Scylla serrata (Forsskål) in different culture systems: net cages, mangrove pens and earthen ponds. *Aquaculture international,* 23: 155–173
- **Mirera** OD (2017) Intertidal mangrove boundary zones as nursery grounds for the mud crab, *Scylla serrata* (Forsskal-1775). *African journal of marine science. African Journal of Marine Science,* 39(3): 315-325
- **Mirera** OD (2017) Status of mud crab fishery in Kenya: A review. *WIO journal of marine science,* 16(1): 35-45
- **Mirera** OD (2019) Small scale milkfish (*Chanos chanos*) farming in Kenya: An overview of the trend and dynamics of production. *WIO Journal of Marine Science,* 18(2): 11-24 2019
- **Mirera** OD, Kimathi A, Ngarari MM, Magondu EW, Wainaina M, Ototo A (2020) Societal and environmental impacts of seaweed farming in relation to rural development: The case of Kibuyuni village, south coast, Kenya. *Ocean and coastal managemen,*. 194: 105253
- **Mirera** D, Nyonje B, Opiyo M, Obiero K, Fonda JA, Holeh, G, Kendi J Okechi,J (2021) Aquaculture Research and Training in Kenya. In Munguti *et al.*, (Eds). State of Aquaculture in Kenya 2021: Towards Nutrition Sensitive Fish Food Production Systems. Techplus Media House, Nairobi, Kenya. 190 pp
- **Mirera** DO, Salim A, Kendi K (2023) Hydrodynamics of nearshore coastal waters: Implications for marine cage farming in Kenya. *WIO Journal of Marine Science,* 22(2): 25-41 [https://doi: 10.4314/wiojms.v22i2.3]
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- Moksnes P-O, **Mirera** OD, Bjorkvik E, Hamad ID, Mahudi HM, Nyqvist D, Jiddawi N, Troell M (2015). Natural growth of *Scylla serrata* in East Africa: A valuable tool for assessing growth of mud crabs in aquacultures. *Aquaculture research,* 46: 2938–2953
- Munguti J, Obiero K, Orina P, **Mirera** D, Mwaluma J Kyule D Musa S, Opiyo M, Ochiewo J, Njiru J, Ogello E, Hagiwara A (Eds) (2021). State of Aquaculture in Kenya 2021: Towards Nutrition Sensitive Fish Food Production Systems. Techplus Media House, Nairobi, Kenya. 190 pp
- Mwaluma J, **Mirera** D, Magongu E, Mukami M, Wainaina M, Holeh G, Nyabeta J, Kimathi A, Wanjiru C (2021). Marine and Coastal Aquaculture: Production, Status and Prospects. In Munguti *et al.*, (Eds). State of Aquaculture in Kenya 2021: Towards Nutrition Sensitive Fish Food Production Systems. Techplus Media House, Nairobi, Kenya. 190 pp
- Nduku G, **Mirera** OD, Nyabeta J (2022) Sex reversal dynamics of Nile Tilapia (*Oreochromis niloticus*) and impact on growth performance. *Aquatic Ecosystem Health and Management,* 25(4): 68–74
- Okemwa DN, Ngugi CC, **Mirera** DO (2022) Growth, Nutritive Value and Bioconversion Efficiency of Pre-Pupal Black Soldier Fly Fed On Urban Household and Market Waste. *E. Afri. Agri. For. J* 85(1-4): 325-335
- Shikami K, Mwangi S, Ndegwa S, Kiilu B, Mueni E, Barabara M, Okemwa G, Mwaluma J, **Mirera** D, Nyonje B, Ndoro C, Odote P, Ogutu B, Wambiji N (2018) Sustainable Fisheries Management. In Ruwa *et al.*, (Eds) (2018). The Kenya Coastal Development Project: Lessons learned implementing a multidisciplinary project. 69pp

Book and book chapters

- Munguti J, Obiero K, Orina P, **Mirera** D, Kyule D, Mwaluma J, Opiyo M, Musa S, Ochiewo J, Njiru J, Ogello E, Hagiwara A (Eds) (2021) State of Aquaculture Report in Kenya 2021: Towards Nutrition Sensitive Fish Food Systems. Techplus Media House Nairobi 190 p (KMFRI), Mombasa. 135pp
- Mwaluma J, **Mirera** OD, Magondu E, Mukami M, Wainaina M, Holeh G, Nyabeta J, Kimathi A, Wanjiru C (2021) Marine and Coastal Aquaculture: Production, Status and Prospects. In Munguti *et al.*, (Eds) (2021). State of Aquaculture Report in Kenya 2021: Towards Nutrition Sensitive Fish Food Systems. Techplus Media House Nairobi 190 p (KMFRI), Mombasa. 135pp

- **Mirera** OD, Nyonje B, Opiyo M, Obiero K, Awour FJ, Holeh G, Kendi J, Okechi J (2021) Aquaculture Research and Training in Kenya. In Munguti *et al*., (Eds) (2021) State of Aquaculture Report in Kenya 2021: Towards Nutrition Sensitive Fish Food Systems. *Techplus Media House* Nairobi 190 p (KMFRI), Mombasa. 135pp
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- Mwaluma J, **Mirera** OD, Wainaina M, Mukami M, Wairimu E, Wanjiru C, Anyango J, Ogello E, Nyonje B (2017) Coastal Aquaculture in Kenya. In Munguti JM, Obiero KO, Orina PS, Musa S, Mwaluma J, Mirera DO, Ochiewo J, Kairo J, Njiru JM (Eds.) State of Aquaculture in Kenya (133 pp). Nairobi, Kenya: Laxpress Services

Current running projects

- **WIOMSA:** An innovative aquafeed formula: Consumption of seaweed and Black soldier fly aquafeed by Nile tilapia (*Oreochromis niloticus*) adapted to seawater and in freshwater conditions. January 2025 - June 2025. USD 16,800.
- **EU through:** Swedish University of Agricultural Sciences: Sustainable Agri-food systems Intelligence- Science - Policy Interface (SASI- SPI) Workshop grant. August 2024 - March 2025. USD 55,000.
- **USAID:** Feed the future innovation lab: Funded through world fish. Improving Food and Nutrition Security in Kenya through development of Affordable, Safe and Efficacious Fish Powder. Samaki Kwa Lishe Bora (SALIB project): 2025 - 2028. USD, 500,000.
- **World fish Centre:** Asia-Africa BlueTech Superhighway (AABS) project: 2024/2025: 35,000,000 Ksh. Work Package 2: Integrated Multi-Trophic Aquaculture (IMTA).
- **Plan international (COSME) and CASCADIA:** Establishment of the seaweed nursery facility at the Shimoni NAMARET hatchery as a laboratory seaweed bio-bank: 2024-2026: 44,800,000 Ksh.
- Plan international and COSME: Suitability assessment for seaweed farming in Kwale County: 2024: 9,400,000 Ksh.
- **African Marine Aquaculture conference (AfriMAQUA), 2**3rd - 18th October 2023: 2023-2024: 6,500,000 Ksh.
- **Mawingu LTD:** Longline seaweed farming in Faza , Lamu County: 2024: 1,350,000 Ksh.
- T**NC: S**trengthening conservation and community stewardship actions to improve livelihoods and coastal ecosystem management in Kenya› (SCOSALEM): 2023-2024: 65,000 US
- **AfriMAQUA:** Comparative assessment on growth performance of hatchery cultured juvenile, *Siganus sutor*, fed on marine macroalgae and a commercial fish meal and Comparison of the growth performance of rabbit fish in intertidal earthen ponds using Spinosum seaweed feed; 20

Selected consutancies and corporate experience

- **AFRACA and FAO: August 12th** – 15th: Facilitation of AFRACA Blue Financing Training at Pride Inn, Diani, Kenya.
- **BFA Global TECA program:** March 2024: Facilitating field visits by Triggering Exponential Climate Action (TECA) innovators to different sites in the North coast of Kenya.
- **BFA Global TECA program:** September 2022: Facilitating field visits by Triggering Exponential Climate Action (TECA) innovators to different sites in the south coast of Kenya.
- **Sote HUB: July 2022:** Training SMEs on aquaculture enterprises development.
- **Griot Consulting LTD: Consultant** – mangrove carbon: December 2022 – January 2023: The Baseline Survey of the Sabaki Estuary Mangrove Ecosystem Carbon Estimation and Livelihood interventions
- **ADVANCE AFRICA AND GO BLUE: February 2022:** Training of Master Trainers in mud crab farming as a business
- **WIOMSA: February 2021**- April 2021: Development of online marine courses (Blue Economy and Marine Spatial planning) with the Pwani University.
- **ADVANCE AFRICA AND SEYCHELLES FISHING AUTHORITY: 2018-2019:** Suitability assessment of the potential for mud crab fisheries and aquaculture in Seychelles.

Professional affiliations/contribution

- Proposal reviewer for British Ecological Society grants
- External examiner in different universities in Kenya for thesis examination
- Wageningen University Centre for Development Innovation; fisheries group
- Member Western Indian Ocean Marine Science Association (WIOMSA)
- Sustainable Aquaculture Research networks in Sub-Saharan Africa/networking aquaculture practitioners and scientist across the world
- World Aquaculture Society
- NEMA registered EIA associate expert
- Reviewer with several international journals including: WIO journal of marine science, Ocean and coastal management, Aquaculture research, Aquaculture international.
- Reviewer with Indian Ocean Commission biodiversity project
- Earth Systems Governance (ESG), Taskforce leader – Aquaculture

Dr. Esther Magondu
Research Scientist

Dr. Esther Wairimu is a Research Scientist at Kenya Marine and Fisheries Research Institute (KMFRI). She has been working under marine aquaculture research division with an experience of more than 8 years. Her research interest covers; culture systems with specific interests in Integrated Multitrophic Aquaculture, fish nutrition, selective breeding, brood stock management, seed production, ornamental fish culture and population genetic studies on fish.

She is involved in on farm training of fish farmers and coastal community groups for technology transfer.

She has been involved in collaborative projects in the region and has been a project investigator of three donor funded projects one from Western Indian Ocean Marine Science Association (WIOMSA) investigating on fish nutrition for marine cultured fish and two from The National Research Fund (NRF) a research fund on seaweed farming methods and an innovation grant on seaweed value addition.

She is currently a co-investigator in two projects, The first is on undertaking research in validating and promoting Improved Fish Strains and Health Management Practices for Climate Smart Aquaculture in Western Kenya under the Kenya Climate Smart Agriculture Project (KCSAP) funding, 2020 -2022.

The second is by the Western Indian Ocean Marine Association (WIOMSA) MASMA programme to undertake a research on Blue Growth Initiative through Farming of Silver Pompano (Trachinotus Blochii) and Rabbit Fish (Siganus Sutor) for Food Security and Improved Livelihood in East Africa (BLUEGRASI), November 2020 - December 2022.

Esther has published 12 papers in peer reviewed journals, developed technical reports, policy briefs, and participated in regional and local seminars, workshops, conferences, and open days.

Research Networks: Research Gate

Location: KMFRI Mombasa Research Centre

Department: Mariculture

Specialization: Fish nutrition, Fish breeding, culture systems, Fish health management, Project management, Technical reports development

Research Interests: Research on aquaculture nutrition, working on aquaculture community projects that offer solutions to fish farmers like use of innovative farming technologies, fish selective breeding techniques, and genetics to offer better strains for culture and domestication.

Email: emogondu@kmfri.co.ke, nimmss2003@yahoo.com, estherwairimu82@gmail.com

Qualifications:

- **2019 to Date:** Ongoing PhD/ Fisheries and Aquaculture. Pwani University
- **2010 to 2012:** Master of Science degree in Aquaculture and Marine Resources Management Wagening University, The Netherlands.
- **2004 to 2008:** Bachelor of Science Degree in Fisheries and Aquatic Sciences, Moi University, Eldoret, Kenya.

Publications:

- Holeh GM, **Magondu** EW, Njiru JM, Tsuma S, Salim A, Muriuki AM, Fulanda A, Kilonzo J, Ochola O, Ndirangu S, Zamu MS, Athoni G, Luyesi J (2020) Social Economic Survey and Feasibility Study to Initiate Cage Fish Farming in Kenyan Coastal Creeks. *J Aquac Res Development,* 11: Iss. 11 No: 617.
- **Magondu** EW, Rasowo J, Oyoo-Okoth E, Charo-Karisa H (2011) Evaluation of sodium chloride (NaCl) for potential prophylactic treatment and its short-term toxicity to African catfish *Clarias gariepinus* (Burchell 1822) yolk-sac and swim-up fry. *Aquaculture,* 319(1-2): 307-310
- **Magondu** EW, Verdegem MCJ, Kobingi N, Mokaya NM (2015) Production of aerobic and anoxic bioflocs from Tilapia sludge. *International journal of fisheries and aquatic studies,* 2(5): 347-352
- **Magondu** EW, Charo-Karisa H, Verdegem MCJ, Kobingi N (2015) Enhancing productivity of Labeo victorianus ponds using maize flour as a carbohydrate source. . *Aquaculture Nutrition,* 21: 942-951
- **Magondu** EW, Charo-Karisa H, Verdegem MCJ (2013) Effect of C/N ratio levels and stocking density of Labeo victorianus on pond environmental quality using maize flour as a carbon source. *Aquaculture,* 410-411: 157-163
- **Magondu** EW, Mokaya NM, Ototo A, Kobingi N, Nyamora J (2016) Growth performance of milkfish (*Chanos chanos* Forsskal) fed on formulated and non-formulated diets made from locally available ingredients in Kenya, South coast region. *International Journal of Fisheries and Aquatic Studies,* 4(1): 288-293
- **Magondu** EW, Verdegem MCJ, Nyamora J Kobingi N (2016) Proximate composition, nutritional properties and attractiveness of Aerobic, Anaerobic and Anoxic bioflocs as a fish feed. *International Journal of Fisheries and Aquatic Studies,* 4(1): 280-287
- **Magondu** *EW*, Fulanda BM, Munguti JM, Mlewa CM (2021) Toward integration of sea cucumber and cockles with culture of shrimps in earthen ponds in Kenya. *Journal of the World Aquaculture Society,* 53(5) 1–15, [https://doi.org/10.1111/jwas.12861]
- **Magondu** EW, Fulanda BM, Munguti JM, Mlewa CM (2022) Productivity in marine shrimp ponds using integrated multitrophic aquaculture technology. *E.Afri. Agri. For.Journal,* 85(1-4) 220-232

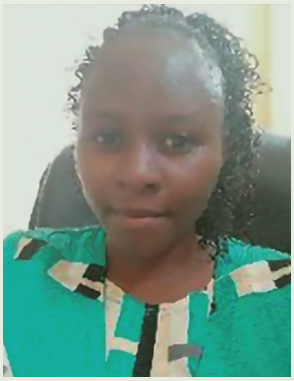
- Mirera DO, Kimathi A, Ngarari MM, **Magondu** EW, Wainaina M, Ototo A (2020) Societal and Environmental Impacts of Seaweed Farming in Relation to Rural Development: The Case of Kibuyuni Village, South Coast Kenya. *Ocean and Coastal Management* 194: 105253
- Nyakeya K, Raburu PO, Odipo O, Masese FO, Tsuma J, Nyamora JM, **Magondu** EW, Gichana ZM, Ondiba RN, Jepkosgei M, Kemunto D (2017) A comparative study on emergence and abnormalities of the Chironomus species as bioindicators of riverine ecosystems in the Lake Victoria Basin, Kenya. *African Journal of Tropical Hydrobiology and fisheries,* 2(2): 126-133
- Nyamora JM, Nyakeya K, **Magondu** EW, Mwihaki G, Muya J (2018) Long Line Seaweed Farming as an alternative to other Commonly used Methods in Kenyan Coast, KMFRI, *Kenya Aquatica Journal,* 4(1): 23-28

Published book chapters

- Fish disease management and biosecurity systems, (2021.) Opiyo M, Mziri V, Musa S, Kyule D, Hinzano S, Wainaina M, **Magondu** E, Werimo K, and Veronica Ombwa (Chapter 7) in Munguti J, Obiero K, Orina P, Mirera D, Kyule D, Mwaluma J, Opiyo M, Musa S, Ochiewo J, Njiru J, Ogello E, Hagiwara A (Eds) (2021) State of Aquaculture Report in Kenya 2021: Towards Nutrition Sensitive Fish Food Systems. Techplus Media House Nairobi 190 p

Membership to professional bodies

- Member Western Indian Ocean Marine Sciences Association (WIOMSA)
- Member of Sustainable Aquaculture Research Networks in Sub Saharan Africa (SARNISSA)
- Member of Wageningen University of Life Sciences, The Netherlands Alumni
- Member of East African Forum For Payment of Ecosystem Services (EAFPES)
- Member of Research Network for Sustainable Marine Aquaculture in Africa (AfriMAQUA)



Eng. **Kendi Josyline**
Research Scientist

Eng. Josyline is currently an Aquaculture Engineer Research Scientist affiliated with the mariculture department. Josyline has a vast knowledge in the design and interpretation of structural drawings for various culture systems; conversant with the structural engineering standards; and well acquainted with design and modelling tools including AutoCAD, MATLAB, ANSYS, CAE softwares and Prokon. Her research extends collaboratively across multiple disciplines to advance the understanding of the complex culture systems and their optimization to inform on the most efficient culture system designs. Josyline incorporates numerical modelling and field measurements to improve understanding of the complex engineering systems. She mainly focuses on the development and application of modelling tools to better predict and design the most optimal aquaculture production systems.

She is a member of the Contract Implementation Team (CIT) for the provision of outsourced construction works at KMFRI which oversees the outsourced contractual works to ensure they meet the required standard in line with the institute's core mandate.

Research Project Participation

- European Union. Climate Smart Agricultural Productivity Project (CS APP). Leveraging on aquaculture technologies to enhance productivity, resilience and adaptation to climate change. February 2019 to 2021. **Research Assistant**

Research Network:

Research gate link: https://www.researchgate.net/profile/Josyline-Kendi

Google Scholar link: https://scholar.google.com/citations?user=6sZiP48AAAAJ&hl=en

LinkedIn link: linkedin.com/in/josyline-kendi-9930b294

ORCID iD: https://orcid.org/0000-0001-9302-0059

Location: KMFRI Mombasa Centre

Department: Aquaculture (Mariculture)

Specialization: Aquaculture Engineering systems research and development; culture systems design, Hatchery facilities design and Management, water quality management and CFD modelling

Research Interests: Optimal culture systems design, efficient aquatic systems, Hatchery facilities design, Numerical modelling (CFD and FSI), Water treatment system design

Email: jkendi@kmfri.go.ke; kendij93@gmail.com, kendijosyline@yahoo.com

Qualifications:

Msc. Aquaculture Engineering, Indian Institute of Technology, Kharagpur

B.Sc. Civil Engineering (Structural Engineer), Technical University of Mombasa

Publications:

- Mirera DO, Salim A, **Kendi** J (2023) Hydrodynamics of nearshore coastal waters: Implications for marine cage farming in Kenya. *Western Indian Ocean Journal of Marine Science,* 22(2): 25-41
- Abwao J, Opiyo M, Kyule D, **Kendi** J, Munga D, Ojuok

T (2023) Feasibility of hydropower reservoirs for fish cage Aquaculture: A strategy for fish farming in drought risk areas in Kenya. *Marine and Life Sciences,* 5(1): 16-25 [https://doi.org/10.51756/marlife.1221254]

- Kyule DN, Fonda JA, Ochiewo J, Munguti JM, Obiero KO, Ogello EO, Opiyo MA, Abwao J, **Kendi** J (2020) Perceived consumer preferences fisheries.

Books and books chapters

- Kyule-Muendo D, Awuor FJ, Githukia C, **Kendi** J., Mziri, Obiero K, Orina P (2021) Post-Harvest Management, Value Addition and Fish Marketing. In: Munguti *et al*., (Eds) State of Aquaculture in Kenya 2021: Towards Nutrition -Sensitive Fish Food Production Systems; Chapter 6: Pages 103-112. Kenya Marine and Fisheries Research Institute, Mombasa, KENYA.
- Mirera D, Nyonje B, Obiero K, Awuor FJ, Holeh G, **Kendi** J, Okechi J (2021) Aquaculture Research and Training in Kenya. In: Munguti *et al*., (Eds). State of Aquaculture in Kenya 2021: Towards Nutrition -Sensitive Fish Food Production Systems; Chapter 8: Pages 156-166. Kenya Marine and Fisheries Research Institute, Mombasa, KENYA.

Membership to professional bodies

- Member of Engineers Board of Kenya (EBK) and Institute of Engineers of Kenya (IEK) - Graduate Engineer
- Member of African Women in Science and Engineering (AWSE)
- Member of Sustainable Aquaculture Research Networks in Sub Saharan Africa (SARNISSA)

Morine Mukami
Research Scientist

Morine Mukami Ngarari is a seasoned Senior Research Scientist in the Mariculture Division at the Kenya Marine and Fisheries Research Institute (KMFRI), bringing over 15 years of expertise in aquaculture.

With a solid foundation in natural and environmental sciences, she is currently pursuing a PhD. in Environmental Studies at Karatina University, Kenya. An expert in Geographical Information Systems (GIS) and Remote Sensing, Morine has been instrumental in leveraging cutting-edge technology to advance aquaculture research. She has successfully led and executed numerous aquaculture projects, collaborating with national, regional, and international partners to drive innovation and sustainability in the sector. Morine is not only a skilled scientist but also a strategic thinker and project leader, excelling in team management, complex problem-solving, and decision-making under demanding conditions. Her ability to align research with national goals and industry priorities has positioned her as a key player in shaping Kenya's aquaculture landscape. A firm believer in continuous learning and collaboration, she actively participates in professional conferences, workshops, and training programs, expanding her network and staying ahead of industry trends. Her passion, expertise, and commitment to sustainable marine and fisheries development make her a driving force in the future of aquaculture in Kenya.

Online research links:

- **Research gate link:** https://www.researchgate.net/profile/Morine_Mukami
- **Google Scholar link:** https://scholar.google.com/citations?hl=en&user=QXwD0IYAAAAJ&view_op=list_works&gmla=AJsN-F7pY-0zlqdmUy3Ek-HfMJjleRp3KwYuIYWBei3p-aO-IStrFxZ_6BnRzce_rc9idzE2sqlPk0PJFkLWEa7SnG-Zwe8W805Zg
- **ORCID iD:** https://orcid.org/0000-0002-5611-1784
- **Ocean Expert link:** https://www.oceanexpert.net/expert/mukami05mauryne
- **LinkedIn link:** https://www.linkedin.com/in/morine-mukami-ngarari-4b8853186/

Location: KMFRI Mombasa Research Centre

Department: Aquaculture – Mariculture section

Specialization: Artemia culture, Remote sensing, GIS, Environmental managementt

Research Interests: Improving community livelihoods through production of Artemia cyst biomass and eventually developing the aquaculture industry nationally, regionally and internationally

Email: mmukami@kmfri.go.ke

Qualifications

- **PhD** in BioScience Engineering ongoing at the Artemia Research Center of Ghent University, Belgium
- **2010:** Environmental Information Systems (GIS and Remote Sensing) Moi University, Eldoret, Kenya
- **2005: B.Sc.** Hons (Fisheries), Moi University, Eldoret, Kenya

Publications:

- Hinzano SM, Okalo FA, **Ngarari** MM, Opiyo MA, Ogello EO, Fulanda AM, Odiwour DO, Nyonje BM, (2022) Phytoplankton distribution along a salinity gradient in two Kenyan saltworks (Tana and Kurawa. *WIO Journal of Marine Science,* 21(1): 2022 113-124 [https://www.ajol.info/index.php/wiojms/

article/view/220638]

- Hinzano SM, **Ngarari** MM, Opiyo M, Okalo F, Mindraa BN, Midumbi D, Gitari D (2023) Effects of feeding different densities of Artemia nauplii on the growth and survival of larvae of the hairy river prawn, Macrobrachium rude (Heller, 1862). *Ege Journal of Fisheries and Aquatic Sciences,* 40(4):259-265, [https://doi.org/10.12714/egejfas.40.4.04]
- Mirera DO, Kimathi A, **Ngarari** MM, Magondu EW, Wainaina M, Ototo A (2020) Societal and environmental impacts of seaweed farming in relation to rural development: The case of Kibuyuni village, south coast, Kenya. *Ocean and Coastal Management,* 194: 105253
- Munguti J, Musa S, **Mukami** M, Magondu E, Ondiba R, Abwao J, Mutune M, Holeh G, Njiru J (2021) Fish feed Development, Production Trends and Distribution Networks in Kenya. In Munguti *et al.*, (Eds) State of Aquaculture in Kenya2021: Towards Nutrition-Sensitive Fish Food Production Systems. *Techplus Media House,* Nairobi, Kenya. Chapter 4: pp 58-88.
- Mwaluma J, Mirera D, Magondu E, **Mukami** M, Wainaina M, Nyabeta J, Kimathi A, Wanjiru C (2021) Marine and Coastal Aquaculture: Production, Status and Prospects. In Munguti *et al.*, (Eds). State of Aquaculture in Kenya2021: Towards Nutrition-Sensitive Fish Food Production Systems. *Techplus Media House*, Nairobi, Kenya. Chapter 3: pp 39-57
- Mwaluma J, Mirera D, Nyonje B, **Mukami** M (2021) Aquaculture investments and opportunities for coastal counties. Chapter 7: p. 245-264 IN: From Ridge to reef: a legacy for sustainable coastal development in Kenya by Ruwa R, Uku J, Osore M, Mwangi S
- **Ngarari** MM, Hinzano SM, Opiyo MA, Rugendo DG, Midumbi DO, Okalo FA *et al.*, (2024). Salinity tolerance, growth and survival of three *Artemia franciscana* (Kellogg, 1906) populations under laboratory conditions. *Aquaculture, Fish and Fisheries,* 4: e166, [https://doi.org/10.1002/aff2.166]
- **Ngarari** MM, Nzioka A (2023) Environmental considerations for habitat conversion for aquaculture. In Uku J, Allela A, Osore M, Wambiji N (Eds.) Marine Spatial Planning and the Blue Economy in Kenya. Paris. Nairobi, UNESCO. (IOC Technical Series, 177)
- **Ngarari** MM, Mirera OD (2018) Artemia policy brief: Artemia/Brine shrimp (*Artemia franciscana*) production in Kenya "Towards efficient larval rearing in hatcheries". *KMFRI Mariculture Publication* No. 004/2018.
- **Ngarari** MM, Okalo FA, Nyonje BM, Ochuodho D, Mirera HOD, Mwaluma J, Wainaina M (2018) A Farmers' Manual on the Production of Artemia in Kenyan Salt Ponds. *KMFRI Mariculture Publication* No. 003/2018.
- **Ngarari** MM (2010) Use of GIS and Remote Sensing in assessing aquaculture sites in Embu District, Kenya. MPhil Dissertation. Moi University
- Okalo F, **Mukami** MN, Nyonje BM (2021) Screening Antibacterial Properties of *Eucheuma denticulatum* Extracts against *Vibrio harveyi.* In Phycologia (Vol. 60, pp. 123-123). 2-4 Park Square, Milton Park, Abingdon OR14 4RN, Oxon, England: Taylor & Francis LTD.
- Preston N (2024) Hatchery manual for the Indian white prawn (*Fenneropenaeus indicus*) production in Kenya. Mariculture Extension Manuals for Namaret No. 6 - Vol. 1. *Editors*: Mwaluma J, Munguti J, **Ngarari** M, Magondu E, Mirera D, Hinzano S, Jilani P, Mueni E, Kinyua I, Nduku G, Kiara P
- Preston N (2024) Hatchery manual for the Rabbitfish (*Siganus Sutor*) production in Kenya Mariculture Extension Manuals for Namaret No. 5 - Vol. 1. *Editors*: Mwaluma J, Munguti J, **Ngarari** M, Magondu E, Mirera D, Hinzano S, Jilani P, Mueni E, Kinyua I, Nduku G, Kiara P
- Preston N (2024) Hatchery manual for the sea cucumber (*Holothuria scabra*) production in Kenya. Mariculture Extension Manuals for Namaret No. 4 - Vol. 1. *Editors*: Mwaluma J, Munguti J, **Ngarari** M, Magondu E, Mirera D, Hinzano S, Jilani P, Mueni E, Kinyua I, Nduku G, Kiara P
- Preston N (2024) Hatchery manual for the Milkfish (*Chanos chanos*) production in Kenya Mariculture Extension Manuals for Namaret No. 3 - Vol. 1. *Editors*: Mwaluma J, Munguti J, **Ngarari** M, Magondu E, Mirera D, Hinzano S, Jilani P, Mueni E, Kinyua I, Nduku G, Kiara P
- Preston N, (2024) Hatchery manual for the mud crab (*Scylla serrata)* production in Kenya . Mariculture Extension Manuals for Namaret No. 2 - Vol. 1. *Editors*: Mwaluma J, Munguti J, **Ngarari** M, Magondu E, Mirera D, Hinzano S, Jilani P, Mueni E, Kinyua I, Nduku G, Kiara P
- Preston N, Mirera D. (2024) Hatchery manual for the saline tolerant Nile Tilapia (*Oreochromis niloticus*) production in Kenya Mariculture Extension Manuals for Namaret No. 1 - Vol.1. *Editors*: Mwaluma J, Munguti J, **Ngarari** M, Magondu E, Hinzano S, Jilani P, Mueni E, Kinyua I, Nduku G, Kiara P

Project assignments and awards

- Conservation and Sustainable Management of Coastal and Marine Ecosystems (COSME) project - Working with Plan International Kenya to implement the sustainable seaweed farming part of the project. - (2023-2025) **Principal Investigator**
- Aquaculture of Seaweeds and Fish: Opportunities ror Blue Economic Empowerment and Covid-19 Resilience of Fisher Women in Kenya (Blue-Empowerment). Funded by IDRC. (2021 – 2024) **Co-Investigator**
- Developing a Data-Driven Communication Platform for Improving Farmed Fish Distribution in Kenya – Funded by SFTC UK. (**2021 – 2022**) – **Co-Investigator**
- Optimizing Artemia Production Technology for Sustainable Aquaculture Development (APTSAD), Food Security and Economic Growth for the East African Coastal Communities, MASMA Project funded by WIOMSA (**2020-2022**) – **Co-PI**

- Commercialization of mariculture of tilapia (*Oreochromis niloticus*) and rabbit fish (*Siganus argenteus*) in Kibokoni, Mwazaro and Kijiweni for better livelihoods of fisher communities in Kilifi and Kwale Counties" project. A sub-grant through the EU-KARLO AgriFI Climate Smart Agriculture Productivity Project (**2020-2022**). **Team Member**
- "Diversifying blue livelihoods through holistic ocean farming" project. Funded by the Bridge Spark Fund https://www.kmfri.co.ke/index.php/13-news-and-events/194-kenya-marine-and-fisheries-research-institute-kmfri-among-the-2020-bridge-spark-fund-winners **2020 Team Member**
- Development of Milkfish (*Chanos chanos*) and Kimarawali (*Stolephorus delecatulus*) Solar Drying-Cooling Technology, Value Addition and Quality Assurance (SolCoolDry project). Funded by BMEL – Germany (**2018-2022**) **Team Member**
- Establishment of the 1st Marine Hatchery in Kenya at Shimoni, Kwale County. An Institutional Infrastructure Support Project funded by NRF – Kenya. **Team Member (2019 – 2021)**
- Design and optimization of marine cage culture systems for rabbitfish (*Siganus argenteus*) and tilapia (*Oreochromis niloticus*) in Kwale and Kilifi County (DOCS). A collaborative multi-disciplinary Project funded by NRF – Kenya (**2018-2020**) **Team Member**
- Screening Antibacterial Activity of *Eucheuma denticulatum* extracts against Selected Vibrio Species Pathogenic to Fish (APSP) Project. Funded by WIOMSA (**2018-2019**)– **Project Coordinator**
- Improvement of the living standard of rural communities in Kenya through Artemia production in coastal saltworks. Funded by VLIR – Belgium (2010-2015) **- Project Coordinator**

Media articles

Videos

- https://anchor.fm/radiorahma/episodes/Kilimo-BahariniPart-1-e1qhmcl
- https://anchor.fm/radiorahma/episodes/Kilimo-BahariniPart-2-e1qhmfc
- https://www.youtube.com/watch?v=w4LPT4MNDRM
- https://www.youtube.com/watch?v=zvLM04NIU_M
- https://www.youtube.com/watch?v=QsOM1KEt04E&t=483s
- https://www.youtube.com/watch?v=6wOo-rmHEQo&t=221s
- Makala: mfahamu kiumbe maji Artemia na umuhimu wake kuelekea uchumi wa buluu https://www.mifugouvuvi.go.tz/news/artemia-awa-gumzo-kuelekea-uchumi-wa-buluu-wananchi-wachangamkia-fursa
- Artemia awa gumzo kuelekea uchumi wa buluu, wananchi wachangamkia fursa https://habarimifugouvuvi.blogspot.com/2022/09/artemia-awa-gumzo-kuelekea-uchumi-wa.html and Mwanzo | Wizara ya Mifugo na Uvuvi (mifugouvuvi.go.tz)
- Using IMTA technology to empower in Kenya's Coast http://acts-net.org/images/Publications/Newsletters/ACTS-Newsletter-Aug22.pdf or http://acts-net.org/news/using-imta-technology-to-empower-women-in-kenya-s-coast
- Webinar on the history of Artemia activities in Africa hosted by KMFRI https://artemia.info/news/?id=32
- Blue Empowerment - Empowering Fisher Women in Kenya's Coastal Region https://www.youtube.com/watch?v=QypDZ41QAVk&t=88s
- Tanzanian and Kenyan Researchers work on a new fish feed substitute. The East African pg.30 on 6th February, 2021
- Dormant brine shrimp eggs excite fish hatchery farmers. People daily newspaper – Kenya Pg. 23 under the Agri biz section on 9th February, 2021 https://www.pd.co.ke/business/dormant-brine-shrimp-eggs-excite-fish-hatchery-farmers-67624/
- Kenya and Tanzania bank on new feed to improve fish production. Daily Nation Kenya (Healthy Nation Marine section under research) on 9th February, 2021 https://nation.africa/kenya/healthy-nation/kenya-and-tanzania-bank-on-new-feed-to-improve-fish-production-3298324
- Project on optimizing brine shrimp production advances aquaculture farming in East Africa https://www.rootooba.com/project-on-optimizing-brine-shrimp-production-advances-aquaculture-farming-in-east-africa/ - Aired on 8th February, 2021
- https://www.businessdailyafrica.com/corporate/enterprise/Peasants-growing-small-fortunes-from-Artemia/4003126-4380852-5aio0sz/index.html on 12th April, 2018
- An Article on the Fish Site on my work published by Bonnie Waycott on 12th February, 2018 https://thefishsite.com/articles/women-in-aquaculture-morine-mukami
- The Star Bi-monthly Magazine dated 16th – 31st March 2012: Making of billionaires out of small time fishing (article by Kigondo Ndavano) awfcs.org/dmdocuments/reject/Reject_058.pdf.
- Newspaper article in Business Daily (Nairobi) Kenya: Scientists Use Salt Pans to Reduce Fish Food Import Bill by Rawlings Otini, 27 December, 2011 http://www.businessdailyafrica.com/Scientists+use+salt+pans+to++reduce+fish+food+import+bill/-/1248928/1295118/-/item/0/-/2prni2/-/index.html

Membership to professional bodies

- Organization for Women in Science for the Developing World (OWSD) Full Membership (**Member ID: 11536**)
- Member of the Aquatic Network (**Member ID: 785**)
- Member of World Aquaculture Society (WAS) (**Member No.: 20170420**)
- Member of the Western Indian Ocean Marine Science Association (**Membership No. KE/081**)
- Member of Women in Marine Science (WiMS) Network.
- Sustainable Aquaculture Research Networks in Sub Saharan Africa (SARNISSA) Member

Miriam Wainaina
Research Scientist

Mirriam Wainaina is a research scientist at Kenya Marine and fisheries research Institute her research revolves around development of sustainable aquaculture, aquatic nutrition, fish health management, marine resource conservation, and eco-friendly aquaculture practices. Miriam's work addresses key challenges such as optimizing feed efficiency in hatchery and grow-out systems, reducing the ecological footprint of aquaculture operations and improving fish health, working closely with stakeholders, government agencies, and conservation groups to design and implement eco-friendly aquaculture practices.

Miriam has taken part in the implementation of funded projects, also actively involved in community outreach and training programs for fish farmers both in marine & freshwater. She has participated in the development of several peer reviewed scientific articles, faRmer's handbook and has undergone numerous trainings related to aquaculture.

Researchgate Link: https://www.researchgate.net/profile/Miriam_Wainaina

Google Scholar link: https://scholar.google.com/citations?user=3rblPpIAAAAJ&hl=en

Location: KMFRI Mombasa

Department: Aquaculture (Mariculture)

Specialization: Aquaculture (Mariculture)

Research Interests: Sustainable aquaculture, fish health management, aquatic nutrition, marine resource conservation, and eco-friendly aquaculture practices

Official Email: mwainaina@kmfri.co.ke

Qualifications:

- **MSc..** Aquaculture University of Ghent, Belgium
- **BSc:** Fisheries, Moi University, Kenya
- **Associate Expert:** Environmental Impact Assessment & Auditing,Technical University of Mombasa.

Publications

- Mirera, DO, Kimathi A, Ngarari MM, Magondu EW, **Wainaina** M, Ototo A (2020) Societal and environmental impacts of seaweed farming in relation to rural development: The case of Kibuyuni village, south coast, Kenya. *Ocean & coastal management,* 194: 105253
- Mirera DO, Magondu EW, **Wainaina** MW, Muli B, Okemwa D, Angulu R, Heba I, Moyoni H (2023) Fish preference at different value chain levels and implications for management of mariculture. *Marine Policy,* 157: 105845.
- Nyonje BM, Opiyo MA, Orina PS, Abwao J, **Wainaina** M, Charo-Karisa H (2018) Status of Brood-stock Management and Fish Seed Production in Kenya. *Livestock Research for Rural Development,* 30(1): 2018
- Opiyo M, Mziri V, Musa S, Kyule D, Hinzano S, **Wainaina** M, Magondu E, Werimo K, Ombwa V (2020) Fish disease management and biosecurity systems. *State of Aquaculture in Kenya*, pp.97-126
- **Wainaina** M, Opiyo MA, Charo-Karisa H, Orina P, Nyonje B (2022) On-farm assessment of different fingerling sizes of nile Tilapia (*Oreochromis niloticus*) on growth performance, survival and yield. *Aquaculture Studies,* 23(2)
- **Wainaina** M, Nyonje B, Mwaluma J (2023) Mariculture needs in the Marine Planning Proces: In Uku J, Allela A, Osore M, Wambiji N (Eds.) Marine Spatial Planning and the Blue Economy in Kenya. Paris. Nairobi, UNESCO. (*IOC Technical Series,* 177)

Books and book chapters

- Opiyo MA, Charo-Karisa H, Nyonje B, Omollo B, Orina P, **Wainaina** M, Obiero KO, Munguti JM (2017) Good aquaculture practices for seed production in Kenya: *Tilapia and catfish.* 1: 49 ISBN: 978-9966-100-07-8
- Mwaluma J, Mirera D, Magondu E, Mukami M, **Wainaina** M, Nyabeta J, AKimathi A, Wanjiru C (2020) Marine and Coastal Aquaculture: Production, Status and Prospects.Im Munguti J, Obiero K, Musa S, Mwaluma J, Orina P, Opiyo M, Kyule D, Mirera D, Ochiewo J (Eds) (2020) State of Aquaculture Report 2020 (160pp): Towards Nutrition Sensitive Fish Food Systems. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya.
- Mwaluma J, Mirera D, **Wainaina** M, Mukami M, Wairimu E, Wanjiru C, Anyango J, Ogello E, Nyonje B (2017) Coastal Aquaculture in Kenya. In Munguti

JM, Obiero KO, Orina PS, Musa S, Mwaluma J, Mirera DO, Ochiewo J, Kairo J, Njiru JM (Eds.) *State of Aquaculture in Kenya* (133 pp). Nairobi, Kenya: Laxpress Services.

- Mwaluma J, Mirera D, Mangundo E, Mukami M, **Wainaina** M, Hole G, Nyabeta J, Kimathi K, Wanjiru C (2020) Marine Coastal Aquaculture: Production status and prospects in Kenya. In Munguti J, Obiero K, Musa S, Mwaluma J, Orina P, Opiyo M, Kyule D, Mirera D, Ochiewo J (Eds) State of Aquaculture Report 2020: Towards Nutrition Sensitive Fish Food Systems. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya
- Orina P, Kembenya E, Opiyo M, **Wainaina** M, Ondiba R, Abwao J, Nyabeta J, Mwaluma J (2020) Fish seed sector: Genetic breeding and reproduction technologies. In Munguti J, Obiero K, Musa S, Mwaluma J, Orina, P, Opiyo M, Kyule D, Mirera D, Ochiewo J (Eds). State of Aquaculture Report 2020: Towards Nutrition Sensitive Fish Food Systems. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya
- Opiyo M, Mziri V, Musa S, Kyule D, Hinzano S, **Wainaina** M, Mangundo E, Werimo K, Ombwa V (2020) Fish disease management and biosecurity system. In Munguti J, Obiero K, Musa S, Mwaluma J, Orina P, Opiyo M, Kyule D, Mirera D, Ochiewo J (Eds) State of Aquaculture Report 2020: Towards Nutrition Sensitive Fish Food Systems. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya

Grants

- Marine and Coastal Science for Management (MASMA) programme (2020). Blue Growth Initiative through Farming of Silver Pompano (*Trachinotus blochii*) and Rabbit Fish (Siganus sutor) for Food Security and Improved Livelihood in Kenya & Tanzaniaa (BLUEGRASI)
- Marine Research Grant (MARG) Programme (2014): Cage culture of seaweed Kappaphycus (Small-scale intensive aquaculture): production comparison with the traditional off-bottom technique in Kenya
- Scientific mission Grant supported by IRD, in the framework of the Research Network for Sustainable Marine Aquaculture in Africa – AfriMAQUA (2021). At the Marine Research Aquarium of the Department of Forestry, Fisheries and the Environment (DFFE) in Cape Town (South Africa)

Membership to professional bodies

- Member of Western Indian Ocean Marine Science Association (WIOMSA)
- Member of Sustainable Aquaculture Research Networks In Sub-Saharan Africa (SARNISSA)

Sheban Hinzano
Research Scientist

Mr. Hinzano is a trained aquaculturist and holds a MSc degree in aquaculture from University of Gent Belgium. Besides academic training, Mr. Hinzano has also received professional trainings in live feed production and marine hatchery development and management.

Mr Hinzano has also participated in a number of aquaculture livelihoods development projects. Before appointment to KMFRI, Mr Hinzano was working as a technical assistant in a project funded by the Australian Department of Foreign Affairs and Trade that piloted breeding of local Penaeid shrimp and spearheaded breeding of local shrimp species in Kenya. Through these engagements, Mr. Hinzano gained rich experience in marine fish and crustacean breeding and laviculture, and live feed production more so algae, rotifers and Artemia. Mr. Hinzano has taken part in book chapters development and peer reviewed journal publications as a Co-author. Currently, his research focuses on application of dietary herbs and single cell protein technologies in improvement of quality and robustness of hatchery produced crustacean larvae.

Online research links:

- **Research gate link:** https://www.researchgate.net/profile/Sheban-Hinzano
- **ORCID iD:** https://orcid.org/0000-0003-3816-6930
- **LinkedIn lnk**: https://www.linkedin.com/in/sheban-hinzano-575918122/?originalSubdomain=ke

Location: KMFRI Shimoni Centre

Department: Mariculture

Specialization: Fish breeding

Research Interests:

- Breeding and grow-out trials of local Kenyan shrimp stocks (*Penaeus monodon* and *Fenneropenaeus indicus*).
- Optimizing Artemia production technologies for sustainable aquaculture development and improved livelihoods.
- Live food production and larviculture.
- Integrated fish farming technologies and the development and operationalization of a multispecies marine fish hatcheries.

Email: s hinzano@kmfri.go.ke; himdzo84@gmail.com

Qualifications:

- **September 2017: MSc Degree** Aquaculture from the Department of Animal production and Nutrition, Gent University, Belgium. Thesis title: "Halophilic bacteria and Archaea as food for Artemia against osmotic stress"
- **December 2011: BSc Degree** in Fisheries and Aquatic Sciences, Moi University, Eldoret, Kenya. Dissertation title: "Effects of soaking regime on catch rates of dema traps at Mombasa marine reserve, Kenya."

Honors and awards

VLIR UOS Scholarship-MSc Aquaculture at University of Gent, Belgium

Publications:

- Dey BK, Dugassa GH, Hinzano SM, Bossier P (2020) Causative agent, diagnosis and management of white spot disease in shrimp: A review. *Reviews in Aquaculture*, 12(2): 822- 865
- **Hinzano** SM, Okalo FA, Ngarari MM, Opiyo M., Ogello EO, Fulanda AM, Nyonje B (2022) Phytoplankton distribution along a salinity gradient in two Kenyan saltworks (Tana and Kurawa). *Western Indian Ocean Journal of Marine Science,* 21(1): 113-124
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- Ngarari MM, **Hinzano** SM, Opiyo MA, Rugendo DG, Midumbi DO, Okalo FA, Gatune CW (2024) Salinity tolerance, growth and survival of three *Artemia franciscana* (Kellogg, 1906) populations under laboratory conditions. *Aquaculture, Fish and Fisheries,* 4(2): e166
- Opiyo M, Mziri V, Kyule D, Musa S, Hinzano S, Wainaina M, Ombwa V, Magondu E, Werimo, K (2021) Fish disease management and biosecurity systems in Kenya. In: Munguti *et al*., (Eds). State of Aquaculture in Kenya 2021: Towards Nutrition Sensitive Fish Food Production Systems; Chapter 7: pp 113-126
- Orina PS, **Hinzano** S, Kyule D, Jacob A, Githukia CM, Orina T, Chepkirui M (2023) Aquaculture and its conservation potential of critically endangered Jipe Tilapia (*Oreochromis jipe*) in Lake Jipe. *Annals of Marine Science,* 7(1): 045-050
- Orina PS, Onyango DM, Lungayia H, Oduor A, Sifuna AW, Otuya P, Owigar RA,Kowenje, CB, **Hinzano** SM (2020) Water Quality of Selected Fishing Beaches of Lake Victoria Kenyan Gulf. *Open Journal of Ecology,* 10(1): 22-35

Technical reports

- **Hinzano** M, Opiyo M, Mukami M, Nyonje B, Midumbi D, Gitari D, Okalo F (2022) The effects of feeding different densities of *Artemia nauplii* on the growth and survival of larvae of the Hairy River prawn, Macrobrachium rude (Heller, 1862). *KMFRI Mariculture Technical Report,* 2022
- Mukami N, **Hinzano** M, Opiyo M, Nyonje B, Okalo F, Midumbi D, Rugendo D (2022) Salinity tolerance, growth and survivability of three *Artemia franciscana* (Kellog 1906) populations under laboratory conditions. *KMFRI Mariculture Technical Report,* 2022
- Musa S, Githukia C, Hinzano S, Orina P (Eds.) (2020) Assessment of the Impact of cage fish farming on water and bottom sediment quality in Lake Victoria, Kenya. *KMFRI Research Report No.* AQUA/FWS/2019-2020/10
- Onyango J, Kosambo L, Mukami M, Kilelu C, Komba E, Munanie A, **Hinzano** M, Magangi N, Opondo V, Obondo, J (2023) Opportunities for blue economic empowerment and covid-19 resilience of fisherwomen in Kenya. Interim report
- Orina P, Musa S, Githukia C, **Hinzano** S (Eds.) (2020) Assessment of the impact of cage fish farming in Lake Victoria to inform on Lake Management. *Report No. AQUA/FWS*/2019-2020/12

Membership to proffessional bodies

- Sustainable Aquaculture Research Networks in Sub Saharan Africa-Member
- Western Indian Ocean Marine Science Association (WIOMSA)-Member
- The Forum for Agricultural Research in Africa (FARA)-Member

Dr. Betty Nyonje
Research Scientist

- Member Technical Committee, High Level Panel for a Sustainable Ocean Economy – Executive Office of the President.
- Member of Blue Economy Secretariat – Executive Office of the President
- National Project Coordinator, FAO – Blue Growth Initiative Projects in Coastal Kenya
- Head, Mariculture Division, Ministry of Agriculture Livestock and Fisheries

PROJECTS

- Building a Strategic Framework for Aquaculture Education in Kenya. January 2017 to date, Funded by VLIR-UOS. Principle Investigator (2017 – 2020.)
- Rediscovering the road to prosperity – A Blue Economy Implementation Committee National program; overseeing mariculture aspects of the program (2016 -date)
- Blue Economy Challenge: SeaPower - Improved seaweed farming technology for livelihoods, women's empowerment and environmental protection. A collaborative project with Institute of Marine Science, Zanzibar (2016 -2018). Funded by the Australian Economic Diplomacy Program. (DFAT)
- Blue Growth Initiative in Kenya –Implementing an ecosystems approach to aquaculture in selected coastal areas of Kenya and in support of Food Security and Nutrition, Poverty Alleviation and Healthy Oceans. (2015 - 2017)
- Solving the bottleneck: improved practices for larval production of freshwater fish in East Africa. 2015. *VLIR-UOS. Short Training Initiative (STI)*: Principle Investigator
- Blue Growth Initiative in Kenya –Implementing an ecosystems approach to aquaculture in selected coastal areas of Kenya and in support of Food Security and Nutrition, Poverty Alleviation and Healthy Oceans. (2015 - 2017) FAO Funded - National Coordinator
- Preparation and Implementation of The World Bank Funded Kenya Coastal Development Project (KCDP) Aquaculture sub-component activities including, up scaling seaweed farming, up scaling community based fish and shell fish production, building community capacity in good quality seed and seed production. Building the capacity of Artisanal salt farmers to produce Artemia. (2007 -2014)
- Implementation of the Fish Farming Enterprise productivity Program (National Aquaculture Program) , initiated under the framework of the GOK funded Economic Stimulus program (2009 -2013)
- Commercializing aquaculture production through sustainable technologies and market linkages. A Kenya Agricultural Productivity and Agribusiness Project (KAPAP), funded by the World Bank (2012 - 2015)
- Piloting commercial Artemia production in the solar salt belt of Kenya through a community initiative "Improvement of the living standard of rural communities in Kenya through Artemia production in coastal saltworks". Funded by the Belgian Inter University Council (VLIR). (2010 – 2015)
- Lead scientist; commercialization of seaweed farming in the South Coast of Kenya. The initiative targeting poor fishing communities addressing the development of the seaweed industry along the value chain. KMFRI provides an oversight role including, provision of seed for the farmers, training, implementation of an Environmental Management Plan and provision of market linkages through Private Public Partnerships (2010- date).

Research Network: https://www.researchgate.net/profile/Betty_Nyonje

Location: KMFRI Nairobi Office

Department: Aquaculture (Mariculture)

Specialization: Aquaculture Research and policy, Fish seed production and Hatchery Management; Seaweed farming, Artemia production

Research Interests: Artemia, Blue economy, Seaweed research

Email: bnyonje@kmfri.co.ke; bnyonje@hotmail.com

Qualifications:

- **2006: PhD** Agriculture (Aquaculture) Humboldt University, Germany
- **2000: MSc.** Aquaculture, Ghent University, Belgium
- **1989: BSc.** Zoology, University of Khartoum, Sudan

Publications:

- Aloo PA, Charo-Karisa H, Munguti J, **Nyonje** BM (2017) A review on the potential of Aquacuture development for poverty alleviation and food security. *AJFAND,* 2017(1): 11832 – 11847
- Arori M, Muthumbi A, Mutia G, **Nyonje** B (2019) Potential of seaweeds (*Hypnea cornuta* and *Hypnea musciformis*) in Nile tilapia (*Oreochromis niloticus*) fingerling diets. Intern. Journ. *Fish and Aquatic Studies* 7(2): 2019 103 – 107
- **Nyonje** BM, Charo HK, Macharia S, Mbugua HM (2012) Aquaculture development in Kenya; Status, Potential and Challenges. *Samaki News* 7(1): 8 – 19
- **Nyonje** BM, Charo HK, Opiyo MA, Wainaina MW (2012) Building capacity for good quality tilapia seed production in Kenya: Evaluating quality of seed produced by accreditated hatcheries for the Fish Farming Enterprise Productivity Program.
- **Nyonje** BM, Gwada PO, Ochiewo J, Mwangi SN, Okuku EO, Anyango JO, Nzioka AM, Magangi NO (2013) Introduction of the seaweed Kappapycus alvarezi in the South Coast of Kenya : Seaweed farming progress report. 41 pg.
- **Nyonje** BM, Opiyo MA, Orina PS, Abwao J, Wainaina M, Charo Karisa H (2018) Current status of freshwater fish hatcheries, broodstock management and fingerling production in the Kenya aquaculture sector. Livestock *Research for Rural Development,* 30(1):
- Ogello EO, **Nyonje** BM, Van Stappen G (2014) Genetic differentiation of *Artemia franciscana* (Kellog, 1906) in Kenyan coastal saltworks. *IJAR,* 2(4): 1154 – 1164
- Ogello EO, Mlingi FT, **Nyonje** BM, Charo-Karisa H, JM Munguti J (2013) Can integrated livestock-fish culture be a solution to East Africa's food insecurity? *A review. AJFAND,* 13(4): 8059 – 8076
- Opiyo MA, Orina PS, Kyule D, Munguti JM, **Nyonje** BM, Charo-Karisa H (2017) Growth performance and survival of three strains of African catfish (*Clarias gariepinus*, Burchell 1882) reared in hapas in Kenya. Bull. *Anim. Hlth. Prod. Afri. Fish* 64(2):(2016)31-39
- Musa S, Aura CM, Owiti G, **Nyonje** B, Orina P, Charo-Karisa H (2012) Fish farming enterprise productivity program (FFEPP) as an impetus to *Oreochromis niloticus* (L.) farming in Western Kenya: Lessons to learn. *African Journal of Agricultural Research,* 7(8): 1324-1330
- Gwada PO, Mwangi SN, **Nyonje** BM, Ochiewo JO (2010) Implementing an Environmental Monitoring Plan for demonstration and commercial seaweed farms in the South Coast of Kenya: Monitoring and Mitigation of impacts of seaweed farming the south coast of Kenya.
- **Nyonje** BM, Mrabo E, Magangi N, Kimathi A, Odiwuor D (2010) Seaweed Farming In Kenya: A Community Initiative For Poverty Alleviation And Employment Creation: Aquatic Resources of Kenya (Ark-II) Aquatic Research for Development, (16th - 19th November, 2010) held at the Kenya Wildlife Training Institute, Naivasha Kenya
- **Nyonje** BM, Kirshbaum F (2010) Experimental studies on cyclical reproduction of tropical African freshwater catfish Paraeutropius buffei. Resources of Kenya (Ark-II) *Aquatic Research for Development*, (16th -19th November, 2010) held at the Kenya Wildlife Training Institute, Naivasha Kenya

Books

- Opiyo MA, Charo-Karisa H, Obiero K, Munguti JM, Orina PS, Ogello EO, Nyoro J, Kyule DN, **Nyonje** B, Omollo BO (2017) Overview of Good Aquaculture Practices in Kenya. *Kenya Marine and Fisheries Research Institute* (KMFRI), 34pp.
- Opiyo M, Charo-Karisa H, **Nyonje** B, Omollo B, Orina P, Wainaina M, Obiero K, Munguti J (2017) Good Aquaculture Practices in Seed Production in Kenya. (KMFRI), *Kenya Literature Bureau*, Kenya 60pp

Membership to professional bodies

- Member of African Women in Science and Engineering (AWSE)
- Member of Sustainable Aquaculture Research Networks in Sub Saharan Africa (SARNISSA)
- Alumni of Ghent University,

SOCIOECONOMICS RESEARCH DIRECTORATE

Dr. Jacob Ochiewo
Socio Economist

Dr. Jacob Ochiewo, PhD, is the Director of Socio-Economics Research at Kenya Marine and Fisheries research Institute. He has 27 years of research in socioeconomics, natural resource policy analysis, development studies, governance analysis, value chain analysis, fish trade and marketing, ecosystem approach to Fisheries/Aquaculture, community training, livelihood analysis, preparation of policy briefs and science communication.

He has participated in the development and implementation of many multidisciplinary multi institutional research projects and development initiatives both in Kenya and the Western Indian Ocean Region.

Administratively he is involved in the development and implementation of KMFRI's policy documents including corporate strategic plans, research policy, public participation guidelines, intellectual property rights policy, and annual institutional performance contracts. Other administrative responsibilities include, Research coordination in Socioeconomics Research Directorate which includes advising the Board and Management on matters that fall in three departments namely: - socioeconomic assessment and monitoring, economic valuation and marketing, and economic analysis and community development. He is responsible for guiding socioeconomics research activities to ensure optimum use of the institute's resources.

Research Network Link: Research Gate

Location: KMFRI Headquarters, Mombasa

Directorate: Socioeconomics Research

Specialization: Development studies and environmental economics

Research Interests: Socioeconomic assessments and monitoring, economic valuation, governance analysis including institutional capacity analysis, causal chain analysis, drivers-pressures- state- impact- response (DPSIR) analysis, natural resource policy analysis, project design and implementation, development studies, fisheries value-chain analysis, and preparation and monitoring the implementation of fisheries management plans.

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Qualifications

- **Ph.D** (Development Studies), Jomo Kenyatta University of Agriculture & Technology, P.O. Box 62000, 00200 Nairobi, Kenya.
- **MA** in Economics, University of Nairobi, P.O. Box 30197, 00100 Nairobi, Kenya
- **BA** (Upper Second Class Honours), Kenyatta University, P.O. Box 43844, Nairobi, Kenya

Publications:

- Fonda JA, Obiero K, Munguti J, Oginga JO, Kyule D, Opiyo MA, Odote PO, Yongo E, Owiti H, **Ochiewo** J (2019)Market Linkages and Distribution Channels of Cultured, Captured and Imported Fish in Kenya. *Aquaculture Studies, 19(1): 57-67*
- Holeh GM, **Ochiewo** JO, Tsuma S, Mirera DO (2020) Impact of aquaculture and mariculture information dissemination to the local coastal communities in Kenya. *Journal of Aquaculture Research & Development,* 11(9): [https://Doi:10.35248/2155-9546.20.10.608.
- Kyule DN, Fonda JA, **Ochiewo** J, Munguti JM, Obiero KO, Ogello E O, Opiyo MA, Abwao J, Kendi J (2020) Perceived consumer preferences of fisheries products retailed in Kenyan markets. *Bioscience Research,* 17(4): 2486-2496
- Mwaguni S, Ruwa R, Odhiambo-**Ochiewo** J, Osore M, (2016) Integrated Water Resources Management in a Changing Climate: The Implications of Anthropogenic Activities on the Tana and Athi/Sabaki Rivers Water System. In: Diop S, Scheren P, Machiwa FJ (eds) Estuaries: A Lifeline of Ecosystem Services in the Western Indian Ocean. *Estuaries of the World. Springer, Cham.* 10.1007/978-3-319-25370-1_7
- Odhiambo-**Ochiewo** J, Ruwa RK, Osore M, Mutiso D, Mwaguni S (2016) The Socioeconomic Causes and Impacts of Modification of Tana River Flow Regime. In: Diop S, Scheren P, Machiwa FJ (eds) Estuaries: A Lifeline of Ecosystem Services in the Western Indian Ocean. *Estuaries of the World. Springer, Cham*. [DOI: https://doi.org/10.1007/978-3-319-25370-1_8]
- Odhiambo **Ochiewo** J, Wakibia J, Sakwa MM (2020) Effects of monitoring and evaluation planning on implementation of poverty alleviation mariculture projects in the coast of Kenya. *Marine Policy,* 119: 104050, [https://doi.org/10.1016/j.marpol.2020.104050]
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- **Ochiewo** J, Munyi F, Waiyaki E, Kimanga F, Karani N, Kamau J, Mahongo S (2020) Livelihood impacts and adaptation in fishing practices as a response

to recent climatic changes in the upwelling region under East African Coastal Current. *WIO Journal of Marine Science*, Special Issue 1/2020:89-109, [https://dx.doi.org/10.4314./wiojms.si2020.1]

- **Ochiewo** JO, Wakibia J, Sakwa MM, Munyi F, Owiti H, Waiyaki E (2021) The effects of situation analysis practices on implementation of poverty alleviation mariculture projects in the coast of Kenya. *Aquatic Ecosystem Health & Management,* 24(1): 90–96, ISSN: 1463-4988 print / 1539-4077 online, [https:// DOI: 10.14321/aehm.024.01.13]
- Onyango HO, **Ochiewo** JO, Karani NJ (2021) Socio-economic prospects and problems in under-exploited offshore marine fisheries: The case of Fish Aggregating Devices (FADs) in Kenya coastal fisheries. *Regional Studies in Marine Science,* 44: 2021, 101706. ISSN 2352-4855, [https://doi.org/10.1016/j.rsma.2021.101706]
- Onyango HO, **Ochiewo** J, Aura CM, Kayanda R, Sunil SS, Otuo PW, Obuya JA, Njiru JM (2021) The Lost Coin: Redefining the economic and financial value of small-scale fisheries, the case of Lake Victoria, Kenya. *Social Sciences & Humanities Open* 4 (2021) 100221

Selected peer reviewed publications

- Bosire J, Church J, Gang P, Kamula J, Kairo J, Mohammed A, Mommanyi A, Obura D, **Ochiewo** J, Ondari J (2009) Kenya - State of the Coast Report: Towards the Integrated Management of Kenya's Coastal and Marine Resources. Kenya – State Coast Report
- Conand C, Muthiga N, Aumeerudy R, De La Torre Castro, Frouin P, Mgaya Y, Mirault E, **Ochiewo** J, Rasolofonirina R (2006) A three-year project on sea cucumbers in the Southwestern Indian Ocean: National and regional analyses to improve management. *SPC Beche-de-mer Information Bulletin* # 23: 11-15
- Crona BI, Ronnback P, Jiddawi N, **Ochiewo** J, Maghimbi S, Bandeira S (2009) Murky water: Analyzing risk perception and stakeholder vulnerability related to sewage impacts in mangroves of East Africa. *Global Environmental Change,* 19: 227–239
- De la Torre-Castro M, **Ochiewo** J, Mbaga TK, Pinault M, (2007) A framework for addressing socioeconomic and management aspects of sea cucumber resources in the Western Indian Ocean. *SPC Beche-de-mer Information Bulletin* # 25: 22-28
- Kairo JG, Wanjiru C, **Ochiewo** J (2009) Net Pay: Economic Analysis of a Replanted Mangrove Plantation in Kenya. *Journal of Sustainable Forestry, 28(3): 395- 414*
- Mirera DO, **Ochiewo** J, Munyi F, Muriuki T (2013) Heredity or traditional knowledge: Fishing tactics and dynamics of artisanal mangrove crab (*Scylla serrata*) fishery. *Ocean & Coastal Management,* 84: 119-129
- Mirera DO, **Ochiewo** J, Munyi F (2014) Social and economic implications of small-scale mud crab (*Scylla serrata*) aquaculture: the case of organized community groups. *Aquaculture International,* 22(2), [https://DOI 10.1007/s10499-014-9762-x]
- Muthiga N, **Ochiewo** J, Kawaka J (2007) *Sea cucumbers in Kenya. In Conand C and Muthiga N (eds) Commercial sea cucumbers: A review for the Western Indian Ocean.* WIOMSA Book Series No. 5. 67pp
- Muthiga N, **Ochiewo** J, Kawaka J (2010) Strengthening capacity to sustainably manage sea cucumber fisheries in the western Indian Ocean. *SPC Beche-de-mer Information Bulletin* #30 – March 2010
- Ochiewo J (2001) Socio-economic aspects of water management along the coast of Kenya. *Hydrobiologia,* 458**:** 267-273
- Ochiewo J (2004) Changing fisheries practices and their socioeconomic implications in South Coast Kenya. *Ocean & Coastal Management,* 47: 389-408
- **Ochiewo** J, de la-Torre Castro M, Muthama C, Munyi F, Nthuta JM (2010) Socio-economic Features of the Sea Cucumber Fishery in Southern Coast of Kenya. *Ocean and Coastal Management,* 53: 192-202
- Okemwa GM, Fulanda B, Kimani EN, **Ochiewo** J (2009) Exploitation of marine aquarium reef fisheries at the Kenyan Coast. In Hoorweg J, Muthiga N (eds.) Advances in Coastal Ecology - People, processes and ecosystems in Kenya. African Studies Centre, *African Studies Collection,* vol. 20
- Okuku EO, Bouillon S, **Ochiewo** JO, Munyi F, Kiteresi LI, Tole M (2015) The impacts of hydropower development on rural livelihood sustenance. *International Journal of Water Resources Development,* [DOI:10.1080/07900627.2015.1056297]
- Wakibia JG, **Ochiewo** J, Bolton JJ (2011) Economic Analysis of *Eucheumoid* Algae farming in Kenya. *Western Indian Ocean Journal of Marine Sciences,* 10(1): 195-212.
- Wanyonyi IN, Wamukota A, Mesaki S, Guissamulo AT, **Ochiewo** J (2016) Artisanal fisher migration patterns in coastal East Africa. *Ocean & Coastal Management, 119: 93-108*
- Zorini OL, Contini C, Jiddawi N, **Ochiewo** J, Shunula J, Cannicci S (2004) Participatory appraisal for potential community-based mangrove management in East Africa. *Wetlands Ecology and Management,* 12: 87-102

Selected Scientific Conference presentations

- Owiti H, Omunyang'oli P, Awuor M, **Ochiewo** J, (2016) Socio-Economic Assessment of Artisanal Shrimp Fishery of the Malindi Ungwana Bay. *VLIZ Marine Scientist Day. Vives Brugge, Belgium*. 12th Feb, 2016. Book of Abstracts: VLIZ Special Publication 75, May 2016 (Oral presentation)

- Owiti H, **Ochiewo** J, Kimanga F, Angwenyi R (2015) Assessment of Biodiversity, Socio-Economic Status and Conservation Options at the Kisite-Mpunguti Marine Park in South Coast, Kenya. *Book of Abstracts*: *9th WIOMSA Symposium,* 26th-30th October 2015, Wild Coast, South Africa (Poster presentation)
- Owiti H, **Ochiewo** J, Muriuki T, (2010) "Bursting Beach": An Assessment of the SocioEconomic issues for the Development of a management plan for the Jommo Kenyatta Public Beach. *The Second International Conference on Aquatic Resources of Kenya* (ARK II), 16th – 19th November 2010, Naivasha, Kenya (Poster presentation)
- Moksnes P, Mirera D, Lokina R, **Ochiewo** J, Mahudi H, Jiddawi N, Hamad M, Troell M (2012) Small-scale, grow-out aquacultures of mud crabs *Scylla serrata*: A sustainable livelihood in East Africa. *Final Report of Commissioned Research Project MASMA*/ OR/2008/06
- WIOMSA (2011) Migrant fishers and fishing in the Western Indian Ocean: Socio-economic dynamics and implications for management. *Final Report of Commissioned Research Project MASMA*/ CR/2008/02
- **Ochiewo** J (2006) Harvesting and Sustainability of Marine Fisheries in Malindi-Ungwana Bay, Northern Kenya Coast. MARG I Contract No. 13/2004. *Technical Report*. Available at: http://wiomsa.org/publications.
- Ruwa RK, Kulmiye AJ, Osore MKW, Obura D, Mutoro D, Shunula, J.P., **Ochiewo** J, Mwaguni S, Misana S (2004) Global International Waters Assessment (GIWA) – Sub-*Regional Report*: Somali Coastal Current Sub-region No.46. GIWA. 178pp
- Kazungu JM, Munga D, Mwaguni SM **Ochiewo** J (2001) Kenya National Report. Phase I: Integrated problem analysis. GEF MSP Sub-Saharan Africa Project (GF/6010-0016). 70p

Book chapters

- **Ochiewo** J, Gichukia C, Awuor JF, Ondiba R, Mangondu E, Mutune M, Nyonje B, Orina P, Wanjitu C, Kimathi A (2021) Cross-cutting themes in aquaculture development in Kenya. In Munguti J, Obiero K., Orina P, Mirera D, Kyule D, Mwaluma J, Opiyo M, Musa S, **Ochiewo** J, Njiru J, Ogello E, Hagiwara A. (Eds) State of aquaculture in Kenya 2021: Towards nutrition sensitive fish food production systems. *Techplus Media House*, Nairobi, Kenya. 190 pp. (Lead author)
- Uku J, **Ochiewo** J, Mwangi S (2021) Building assets with the vulnerable and marginalized groups of the Kenya Coast. In Ruwa RK, Uku JN, Osore MK, Mwangi SN (Eds) From Ridge to Reef: A legacy for sustainable coastal development in Kenya, Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. xiv + 410p.(**Contributing author**)
- Munguti J, Obiero K, Orina P, Mirera D, Kyule D, Mwaluma J, Opiyo M, Musa S, **Ochiewo** J, Njiru J, Ogello E, Hagiwara A (Eds) State of aquaculture in Kenya 2021: Towards nutrition sensitive fish food production systems. Techplus Media House, Nairobi, Kenya. 190 pp
- Kimani EN, Aura MC, Okemwa GM (eds.) (2018) The Status of Kenya Fisheries: Towards the sustainable exploitation of fisheries resources for food security and economic development. Kenya Marine and Fisheries Research Institute (KMFRI), Mombasa. 135 pp. (Lead author)
- KMFRI (2018) The *RV Mtafiti*: Marine Research towards Food Security and Economic Development in Kenya. (Eds) Njiru JN, Ruwa RK, Kimani EN, Ong'anda HO, Okemwa GM, Osore, MK. (Contributing Author)
- **Ochiewo** J, Owiti H, Munyi F (2017) Chapter 6. Kenyan Coastal Communities: History and Economic Activities. In: NEMA (2017). The Kenya State of Coast, 2016. Ministry of Environment and Natural Resources, GoK. (Lead author).
- Ochiewo J (2015) Social and economic impacts of capture fisheries and mariculture. In UNEP-Nairobi Convention and WIOMSA. The Regional State of the Coast Report: Western Indian Ocean. UNEP and WIOMSA, Nairobi, Kenya, 546 pp. (Lead author).

Procedings

- Owiti H, **Ochiewo** J, Karani N, Abunge C, (2018) Socio-economic prospects and problems in under-exploited offshore marine fisheries: The case of Fish Aggregating Devices (FADs) in Kenya coastal fisheries, UNESCO 5th Africa Engineering Week/3rd Africa EngineeringConference 25, Pride In, Mombasa – Kenya, 17-21 Sept 2018

Edward Waiyaki
Research Scientist

I I am a Research officer within KMFRI's Socio-economics Directorate. Our research basically looks at ways the local coastal communities exploit coastal and marine resources for their subsistence and commercial welfare, while also examining the effects of this exploitation on the state of the resources.

Location: KMFRI Mombasa Research Centre

Department: Socio Economics

Specialization: Socio-economic issues relating to the exploitation of coastal and marine resources by local communities

Research Interests: My primary research interests are: Social dimensions of Climate Change, Blue growth pathways for Kenya's coastal communities, Artisanal marine fisheries market systems and Computational Social Science.

Email: ewaiyaki@kmfri.go.ke

Qualifications:

- **M.A** (Social Policy for Development)
- **B.A** (Economics)

Publications:

- Kimanga F, Ochiewo J, **Waiyaki** E, Munyi F, Mwaura J, Karani N (2021) The Socioeconomic impacts of Coral reef rehabilitation: Community perspectives from Wasini in the south coast of Kenya. *Kenya Aquatica Journ. 6*(1): 17 – 31
- Kosore C, **Waiyaki** E, Kimanga F (2024) Assessing the impact of banning the single-use plastic carrier bags: a case study for Kenyan marine environment looking at macro, meso, and microplastics. *Environmental Monitoring and Assessment,* 196(3): 1-15
- Odhiambo Ochiewo J, Wakibia J, Sakwa MM, Munyi F, Owiti H, **Waiyaki E** (2021) The effects of situation analysis practices on implementation of poverty alleviation mariculture projects in the coast of Kenya. *Aquatic Ecosystem Health & Management,* 24(1): 90–96, ISSN: 1463-4988 print / 1539-4077 online, [https://DOI: 10.14321/aehm.024.01.13]
- Ochiewo J, Munyi F, **Waiyaki** E, Kimanga F, Karani N, Kamau J, Mahongo SB (2020) Livelihood impacts and adaptation in fishing practices as a response to recent climatic changes in the upwelling region of the East African coastal current. *Western Indian Ocean Journal of Marine Science,* (1/2020): 105-125
- Owiti H, Ochiewo JO, Swaneerain S, Munyi F, **Waiyaki** E, Njiru JN, Olela P (2018) Economic and Financial Impact Assessment (EFIA) for Marine Fisheries, Kenya. *Kenya Marine and Fisheries Research Institute* (Vol. 1). Technical Report KMF/GOK/RS/2018
- **Waiyaki E** (2022) "Short-term gain begets long-term loss": Community benefits and impacts associated with Lakes Chala and Jipe, Taita Taveta County, Kenya. Kenya *Aquatica, Journal,* 7(1): 52 – 61
- **Waiyaki** E, Moyoni H, Kimanga F, Karani N (2024) The suitability of incentives in social research on artisanal fishing communities in coastal Kenya: A perspective. Short Communication. *Kenya Aquatica Journal,* 9(1): 91 – 96

Faith Kimanga
Socio Economist

Faith Kimanga is Socio-economic researcher with a background in sustainable community development studies.

Interest and Specialization: Passionate about the dynamics and sustainability of the fishing community in reference to the socioeconomic aspects of marine and aquatic resources. This include; research focus on sustainable development of coastal communities, promoting alternative livehoods to ease pressure on marine ecosystems while improving the economic status of the community. In addition focus on gender roles, poverty alleviation, socio and economic wellbeing of the communities dependent on the aquatic and marine resources.

Actively spearheaded 2019-2020: Funded under MARG I Grant for research on Assessing fishing tourism ["pescatourismo"] as an alternative livelihood in the coastal small scale fisheries of Kenya in the context of the blue economy by Western Indian Ocean for Marine Science. This project achievements :-Assessed the status-quo of pesca tourismo in the small scale fisheries from selected fishing areas along the Kenya coast; II. Identified the potential, existing regulations and challenges regarding the practice of pesca tourismo, along the Kenya coast, and III. Provided recommendations for policy and management decision-making in practicing pesca-tourismo along the Kenya coast

Currently actively involved in a variety of research programmes at the institute, including the Gendered seaweed value chain and Opportunities for women and youth with regard to the Integrated Multi trophic Aquaculture in the coastal communities.

Location: KMFRI Mombasa

Department: Socio-Economics

Specialization: Socioeconomic Research community participatory approach, Community need assessment, Community consultation processes, Project management

Research Interests: Resource use patterns and the influence of perceptions on marine resource management that is aimed at developing alternative livelihoods to ease pressure on marine ecosystems while improving the economic status of the community, Gender aspects of marine and aquatic resources, and poverty alleviation promoting community development

Email: fkimanga@kmfri.co.ke

Qualifications

- BSc of Development Studies
- MSc in Development studies
- Advanced specialized Post Graduate on Sustainable Development of coastal communities- CIHEAM Bari, Italy
- Training on Data Analysis and use course using MS Excel, SPSS, Stata & QGIS-IRES
- Training on Scientific Research Paper Writing and Science Communication at International Livestock Research Institute, Nairobi Kenya

Publications:

- Karama S, Aura C, Okemwa G, Kimani E, Mwakiti S, Rashid A, Ochiewo J, Munyi F, Waiyaki E, Owiti H, **Kimanga** F, Ndegwa S (2016) Experiences of the beach seine dominated fishery sites in Lamu, KenyaCoast: lessons to learn (Manuscript)
- **Kimanga** F, Ochiewo J, Waiyaki E, Munyi F, Mwaura J, Nicholas Karani (2020). The socioeconomic impacts of coral rehabilitation: Coastal community perspectives from Wasini in the South coast of Kenya.
- **Kimanga** FK**,** Ochiewo J, Waiyaki E, Munyi F, Karani JMN (2021) The Socioeconomic Impacts of Coral Reef Rehabilitation: Coastal Community Perspectives from Wasini in the South Coast Of Kenya. *Kenya Aquatic Sci. J. Kenya Marine and Fish. Res. Ins.*, *6*(1), 17-31.
- Kosore C, Waiyaki E, **Kimanga** F (2024) Assessing the impact of banning the single-use plastic carrier bags: a case study for Kenyan marine environment looking at macro, meso, and microplastics. *Environmental Monitoring and Assessment*, 196(3): 329
- Ochiewo J, Waiyaki E, Munyi F, **Kimanga** F, Karani N, Kamau J, Mahongo SB (2020) Livelihoods impacts and adaptation in fishing practices in response to changes in the upwelling region under East African Coastal current under the WIO Journal
- Onyango HO, Ochiewo J, **Kimanga** F, Angwenyi R (2016) Assessment of Biodiversity, Socio- Economic Status and Conservation Options at the Kisite-Mpunguti Marine Park in South Coast, Kenya.
- Waiyaki E Moyoni H, **Kimanga** F, Karani N (2024) The suitability of incentives in social research on artisanal fishing communities in coastal Kenya: *A perspective. Aquatica* 9:

Fridah Munyi
Socio Economist

Ms. Munyi has been involved in the coordination of the Swahili Seas project on "Socio-Economic valuation of mangrove resources" which aided in generation of necessary knowledge on the value and use of mangrove goods and services in selected coastal communities. The resultant product has been accreditation in the voluntary market in October 2011 (http://www.plan-vivo.org/projects) for Mikoko pamoja (MPP) project under the Plan Vivo scheme. MPP is a small scale carbon feasibility project in the South Coast of Kenya and the first REDD+ project in Kenya.

Research Networks: ResearchGate

- https://orcid.org/0000-0003-2513-3558
- https://bioinnovate-africa.org/fridah-munyi-kenya/
- https://publons.com/researcher/4486027/fridah-munyi/
- https://orcid.org/0000-0003-2513-3558

Location: KMFRI Mombasa

Department: Socio-Economics

Specialization: • Social Policy analysis. • Monitoring and Evaluation. • Project design and coordination. • Socio-Economics data collection. • Data compilation, analysis using (SPSS, MINITAB, STATA and SAS) and reporting. • Analysis of the legal and policy framework relevant to different projects. • Proposal writing. • Internal Quality Auditor. • Intern's supervision. • Board Of Trustee for KMFRI staff pension scheme.

Research Interests: Socioeconomics, Policy analysis, Monitoring and Evaluation, Quality Auditor, Data analyst, Gender analysis, Project Management

Email: fmunyi@kmfri.co.ke; fri.munyi@yahoo.com

Qualifications:

- **Post Graduate** -Ongoing- Doctor of philosophy in development studies in the Department of Economics & Development Studies-University of Nairobi
- **MSc** in Social Policy Analysis. Katholieke University (Leuven, Belgium) and CEPS/INSTEAD, (Luxembourg)
- **BA** (Economics & Sociology) University of Nairobi, College of Humanities and Social Sciences
- **Post graduate** certificate in Scientific Methods (Edinburgh Napier University, United Kingdom)

Publications:

- Huxham M, Emerton L, Kairo J, **Munyi** F, Abdirizak H, Muriuki T, Nunan F, riers AR (2015) Applying Climate Compatible Development and economic valuation to coastal management: A case study of Kenya›s mangrove forests. *Journal of Environmental Management* 157: 168-181
- Mirera OD, Ochiewo J, **Munyi** F, Muriuki T (2013) Heredity or Traditional Knowledge: Fishing Tactics and Dynamics of Artisanal Mangrove Crab (*Scylla Serrata*) Fishery. *Ocean & Coastal Management,* 84: 119-129
- Mirera OD, Ochiewo J, **Munyi** F 2014 Social and economic implications of small-scale mud crab (*Scylla serrata*) aquaculture: the case of organised community groups. *Aquaculture International*, 22: 1499–1514
- **Munyi,** F, (2009) The social and economic dimensions of destructive fishing activities in the south coast of Kenya. *REPORT NO: WIOMSA/MARG*-I/2009 –01
- **Munyi** F, Munga C, Ochiewo O, Kimanga F, Waiyaki E, Fondo E (2014) Socio-economic assessment of spear gun fishing in Kenyan marine artisanal fisheries: The case of Msambweni and Vanga fish landing sites, South coast Kenya (Manuscript)
- Ochiewo J, de La Torre-Castro M, Muthama C, **Munyi** F, Nthuta JM (2010) The socio-economics features of the sea cucumbers fishery in the southern coast of Kenya. *Ocean & Coastal Management*, 53:1 92-202
- Ochiewo J, **Munyi** F, Owiti H (2017) Chapter five: *State of Coast Report for Kenya* (Second Edition): Enhancing Integrated Management of Coastal and Marine Resources in Kenya
- Ochiewo J, **Munyi** F, Waiyaki E, Kimanga F, Karani N, Kamau J, Mahongo S (2018) Livelihood impacts and adaptation in fishing practices in response to changes in the upwelling region under East African Coastal Current. *Western Indian Ocean Journal of Marine Science*, Under Review Submitted Manuscript
- Okuku EO, Bouillon S, Ochiewo J, **Munyi** F, Kiteresi LI, Tole M (2016) The impacts of hydropower development on rural livelihood sustenance. *International Journal of Water Resources Development*, 32:2, 267-285

Other scientific publications

- Barabara M, Losepicho S, Murage D, **Munyi** F, Mututa W (2015) Ecological risk assessement for the Malindi Ungwana Bay fisheries(*KCDP Technical report*-90pp)
- Kairo JG, **Munyi** F, Ochiewo J, Waiyaki E, Wanjiru C, Karani N, Kimanga F (2018) Governance and tenure of mangrove forests in Kwale County, *Kenya. Report.* Pp 48 – CIFOR, INDONESIA
- Karama KS, Kimani EN, Okemwa G, Mwakiti SM, Aura CM, Ochiewo O, **Munyi** F, Waiyaki E, Owiti H, Kimanga F, Ndegwa S (2016) Rapid assessment of Beachseine fishery in Lamu, Kenya. (*KCDP Technical Report*-67 pp)
- Kimani E, Ochiewo J, Munga C, **Munyi** F (2013) Baseline survey on socio-economic benefits of artisanal tuna fishery in the coast of East Africa – Kenya. WWF 2013: Report.
- Mahongo S, **Munyi** F, Ochiewo J (2016) Report of the first joint consortium planning workshop for the project on: Responses of biological productivity and fisheries to changes in atmospheric and oceanographic conditions in the upwelling region associated with the East African Coastal Current. (WIOMSA/MASMA progress report-18pp)
- Munga C, **Munyi** F, Ochiewo O, Kimanga F, Waiyaki E Fondo E (2014) Socio-economic assessment of spear gun fishing in Kenyan marine artisanal fisheries: The case of Msambweni and Vanga fish landing sites, South coast Kenya. (*KMFRI Technical report*)
- **Munyi** F, Ochiewo O, Waiyaki E, Owiti H, Kimanga F, Karani N (2016) An assessment of the social economic dimensions of the beach seine fishery in Lamu county; faza, kizingitini and kiunga(*KCDP Technical report*-27pp)
- Mwaluma J, Nyonje BM, Mirera OD, Wanjiru C, Wainaina MW, Magondu EW, Ototo A, Ochiewo J, **Munyi** F, Kamakya G, Ngisiange N (2015) Status of Mariculture in Kenya Aquaculture baseline site assessment, social-economic dynamics, production status, challenges and possible Interventions along the coast of Kenya.(*KCDP Technical report*-61pp)
- Ochiewo J, Muthama C, Angwenyi R, **Munyi,** F, Nthuta JM (2008) The social and economic dimensions of the Malindi-Ungwana Bay fishery. KMFRI 2008. *Technical Report*

Grants / achievements:

- **April 2019:** Competitive Regional Training sponsorship on "Quantification and Valuation of Marine and Coastal Ecosystem Services", sponsored by Western Indian Ocean Marine Science Association (WIOMSA).
- **2017-2018.** Competitive Research Grants: Award from the Center for International Forestry Research (CIFOR);Consultative Group on International Agricultural Research (CGIAR) to implement a project on *"Governance and Tenure of Mangrove Forests in Kwale District, Kenya"*.

- **2016-2018:** Competitive Research Grants: As a consortium of institutions we won a Marine and Coastal Science for Management (MASMA) programme Award from the Western Indian Ocean Marine Science Association(WIOMSA) to implement a project titled *"Responses of Biological Productivity and Fisheries to Changes in Atmospheric and Oceanographic Conditions in the Upwelling Region Associated With the East African Coastal Current".*
- **2014:** Consultancy services as the lead external evaluator to conduct an external evaluation of `Delivering for young mothers project` implemented by St. Lukes Mission Hospital in partnership with German Foundation for World Population (DSW) and Women Fighting AIDS in Kenya (WOFAK) funded by the Euroupean Union.
- **2013:** Fellowship award by the Netherlands Government (NFP/TP-fellowship) for the course on Climate change governance: adaptation and mitigation as institutional change processes.
- **2011**: Scholarship award from CEPS/INSTEAD, the Luxembourg Social Science Research Centre to undertake an International Msc in Social Policy Analysis (IMPALLA).
- **5th July 2007:** Competitive Research Grants: Won a Marine Research Grant I (MARG I) from the Western Indian Ocean Marine Science Association (WIOMSA) to implement a project entitled *"The social and economic dimensions of destructive fishing activities in the south coast of Kenya".*

Scientific presentations:

- Oral presentation on 'Livelihood impacts and adaptation in fishing practices in response to changes in the upwelling region under East African Coastal Current'- (WIOMSA) *Scientific Symposium* in July 1st – 4th 2019, Mauritius University, Mauritius.
- Poster presentation on 'Governance and tenure of mangrove forests in Kwale district, Kenya'- (WIOMSA) *Scientific Symposium* in October 30th - 4th November 2017, Dar es Salaam, Tanzania.
- Poster presentation on 'Mikoko pamoja: mangrove restoration in Gazi bay, Kenya'-Wageningen University-Netherlands, CDI training workshop September 2nd -13th 2013.
- Oral presentation on 'Valuation of mangrove ecosystem services: current knowledge'(Kenya) Edinburgh Napier University, CAMARV workshop: 12-13th May 2009.
- •Poster presentation on 'The social and economic dimensions of destructive fishing activities in the south coast of Kenya'- (WIOMSA) Scientific Symposium in La Réunion Island in August,24th -29th 2009.

Nicholas Karani
Research Scientist

Location: Mombasa Centre

Department: Socio Economics

Specialization: Environmental Economist; EIA & EA; Data management (SPSS, STATA, R, Ms. Excel); and Community engagement, and Monitoring and evaluation

Research Interests: Socio economic research with keen interest on Sustainable Resource Exploitation, Economic Analysis, Gender Analysis, Market Systems, Ecosystem valuation; Resource valuation and Socio-economics assessment and monitoring.

Email: nkarani@kmfri.go.ke; nickarani78@gmail.com

Qualifications

- **MSc.** Environmental Economics
- **Link: ORCID:** https://orcid.org/0000-0001-7209-6310

Publications:

- Kairo JG, Munyi F, Waiyaki E, Wanjiru C, Kimanga F, Ochiewo J, **Karani** N (2018) Governance and tenure of mangrove forests in Kwale County, Kenya. T*echnical Report*. Pp 48 – CIFOR, INDONESIA
- Kimanga KF, Ochiewo J, Waiyaki E, Munyi F, Mwaura J, **Karani** N, (2021). The Socioeconomic Impacts of Coral Reef Rehabilitation: Coastal Community Perspectives from Wasini in the South Coast Of Kenya. *Kenya Aquatica,* 6(1): https://www.kmfri.co.ke/images/pdf/kenya_aquatica.pdf
- Ochiewo J, Munyi F, Waiyaki E, Kimanga F, **Karani** N, Kamau J, Mahongo BS (2021) Livelihood impacts and adaptation in fishing practices as a response to recent climatic changes in the upwelling region of the East African Coastal Current. *Western Indian Ocean Journal of Marine Science*. [https://DOI: 10.4314/wiojms.si2020.1.10]
- Onyango OH, Ochiewo OJ, **Karani** JN (2021) 'Socio-economic prospects and problems in under-exploited offshore marine fisheries: The case of Fish Aggregating Devices (FADs) in Kenya coastal fisheries'. *Regional Studies in Marine Science.* 44 (101706). https://doi.org/10.1016/j.rsma.2021.101706
- Runya RM, **Karani** NJ, Muriuki A, Mariga D, Kamau AW, Ndomasi N, Njagi K, Munga C, Okello JA (2022) Local perceptions, opportunities, and challenges of community-based ecotourism in Gazi Bay, Kenya. *WIO J Mar Sci* 21(2): 95-108 [doi: 10.4314/wiojms.v21i2.9]

Hellen Ngoa
Research Scientist

Hellen Moyoni Ngoa is a Socioeconomic researcher with a background in sustainable community development studies.

Location: KMFRI Mombasa

Department: Socio-Economics

Specialization: Socioeconomic Research community participatory approach, Community need assessment, Community consultation processes, Project management

Research Interests: Resource use patterns and the influence of perceptions on marine resource management Community based conservation that is aimed at developing alternative livelihoods to ease pressure on marine ecosystems while improving the economic status of the community

Email: hngoa@kmfri.go.ke

Qualifications:

- Bachelors of Development Studies
- Training on Data Analysis and use course using MS Excel, SPSS, Stata &
- QGIS-IRES
- International Training on Empowerment of Women for Rural Development- National Institute of Rural Development and Panchayati, Raj-Hyderabad City-India

Interest and Specialization: Passionate about the dynamics and sustainability of the fishing community in reference to the socioeconomic aspects and emerging issues as far as marine and aquatic resources. This includes; research focus on sustainable development of coastal communities, promoting alternative live hoods to ease pressure on marine ecosystems while improving the economic status of the community. In addition, focus on gender roles, poverty alleviation, socio and economic well-being of the communities dependent on the aquatic and marine resources. Correspondingly Interest Focus on attitudes and perceptions of the community towards sustainable utilization of marine and aquatic resources, in return spurring the food security, diverse livelihoods and sustainable utilization of the resources for blue economy development in the coastal region of Kenya.

Actively engaged in the Reef Restoration project in Kiunga, Lamu, Kenya. We collaborated with agencies namely: Northern Rangeland Trust (NRT), Kenya Wildlife Service (KWS), Flora& Fauna International and the County Fisheries of Lamu in the implementation of a gear exchange programme. This was aimed at improving capacity and understanding on the impact of different fishing gears to livelihood and the environment. Key output of the project was the exchange of Beach Seine with the legal and ecologically friendly fishing gears; coral restoration and the endorsement of the guideline and an action plan for the gear exchange program within Kiunga Conservancy in Lamu County.

Has been actively involved in a variety of research programmes at the institute, including the Kenya Coastal Development Project (KCDP), Marine spatial planning (MSP-KEMFSED) project which dealt with undertaking a scoping study on the status of marine spatial planning in Kenya's nearshore and offshore waters, in the context of effective management of fisheries and other competing uses of marine resources for blue economy development

Hands-on experience on socioeconomic data collection, Data analysis using SPSS, STATA and Excel, Resource use patterns and the influence of perceptions on marine resource management Community based conservation that is aimed at developing alternative livelihoods to ease pressure on marine ecosystems while improving the economic status of the community. Socioeconomic Research, community participatory approach, Community needs assessments, Community consultation processes and Project management.

PUBLICATIONS

- Kimanga F, Waiyaki E, **Ngoa** H, Baraka P, Ong'anda H (2022) A rapid assessment of the socio-economic impacts of the Bitumen spill at Shelly Beach, Likoni, Mombasa County. https://www.kmfri.co.ke/images/pdf/BITMEN--FACTSHEET_FINAL_DRAFT.pdf
- Mirera D, Wainaina M, Muli B, Okemwa G, Angulu R, Heba I, Moyoni H (2020) Fish preference at different value chain levels and implications for management of Mari culture in East Africa. Marine and Policy journal (Manuscript in Press)
- Munyi F, Ochiewo J, Waiyaki E, Karani N, Okemwa G, Uku J, Moyoni H, Maina G, Lumosi YC, Hussein BP (2021) Challenges and opportunities for executing a successful gear exchange program In Kiunga, Lamu, Kenya, Technical Report. The Nature Conservancy (TNC)/KMFRI. Grants Details: Sub-Grant No.f104765 – KMFRIRESTORATION -24062020
- Munyi.F, Ochiewo J, Karani N, Waiyaki E, Kimanga F, **Ngoa** H (2023) The Social and Economic Impacts of Covid-19 Pandemic on the Fisheries Sector in The Coast of Kenya. *Journal of Humanities and Applied Social Sciences*. (In press; Manuscript Number: JHASS-06-2023-0076)

LIST OF INSTITUTIONS THAT VISITED KMFRI LABORATORIES MOMBASA CENTRE ON ACADEMIC TOUR FROM 2022 TO 2024

No.	Date	Name of institutions	Area of study	No. of visitors
		2022		
1	05/07/2022	Coast Institute of Technology	Certificate in Science Laboratory	27
2	06/07/2022	Jomo Kenyatta University of Agriculture and Technology	BSc. Public Health	62
3	13/07/2022	Multi-Media University	BSc. Analytical & Industrial Chemistry	43
4	14/07/2022	Chuka University	BSc. Marine Biology	17
5	28/07/2022	Women Leaders in Nuclear visit	Regional Workshop for Future Women Leaders in Nuclear Conference	40
6	19/09/2022	Kangundo High School	-	65
7	29/09/2022	Institute of Meteorological Training and Research	Middle Meteorological Technician Course	19
8	19/10/2022	Technical University of Kenya	Bachelor of Technology (Environmental Resource Management)	35
9	8/11/2022	Egerton University	BSc. Enviromental Science students,	37
10	10/11/2022	Mount Kenya University	Bachelor of Pharmacy	47
11	06/12/2022	Maseno University	BSc. Medical Biotechnology	68
12	09/12/2022	Kenarab School	Secondary School	24
		2023		
1	12/01/2023	Kabarak University	Natural Sources of Drugs	92
2	03/02/2023	Nairobi Technical Institute	Biology and Chemistry	22
3	06/02/2023	National Defence University of Kenya	National Industrial Capacity	26
4	13/03/2023	Burhhaniya Academy	Primary School	25
5	17/03/2023	Murang'a University	Marine Ecology	19
6	22/03/2023	Chuka University	Marine Biology	17
7	23/03/2023	Multi-Media University	BSc. Analytical Chemistry	121
8	03/04/2023	Multimedia University	Instrumentation optics and material science	119
9	06/04/2023	Masinde Muliro University of Science and Technology	Renewable energy, electronics and material science	58
10	10/05/2023	Masinde Muliro University of Science and Technology	Pure and Applied Chemistry	83
11	18/05/2023	Technical University of Kenya	Biochemistry and Biotechnology	28
12	22/05/2023	Maseno University		24
13	07/06/2023	Jeddy's Academy	Primary School	64
14	11/07/2023	Technical University of Kenya	Analytical and Industrial Chemistry	45

No.	Date	Name of institutions	Area of study	No. of visitors
15	14/07/2023	Mount Kenya University	Biology and Chemistry	42
16	15/07/2023	Mama Ngina Girls High school	High School	43
17	18/08/2023	Sigona Junior primary school	Primary School	66
18	27/08/2023	Kisauni Vocational Training	Maritime Affairs	158
19	17/10/2023	Technical University of Kenya		46
20	26/10/2023	Jomo Kenyatta University of Agriculture and Technology		42
21	15/11/2023	Taita Taveta University		47
22	16/11/2023	Mount Kenya University		59
23	16/11/2023	Technical University of Kenya		23
		2024		
1	11/01/2024	Kabarak University	Pharmacy	88
2	28/02/2024	MSB Education Institute of Mombasa	Labaratory	42
3	13/03/2024	Multimedia University	Analytical Chemistry	57
4	21/03/2024	Chuka University	Chemistry	32
5	22/03/2024	Maseno University	Analytical Chemistry	51
6	26/03/2024	Muranga University	Chemistry	17
7	28/03/2024	Mt Kenya University	Chemistry	39
8	10/05/2024	Masinde Muliro University	Oceanography	54
9	28/05/2024	Technical University Of Kenya	Oceanography	26

RESOURCE MOBILIZATION FOR COASTAL AND MARINE RESEARCH

Individual KMFRI researchers have demonstrated remarkable success in securing research funding for coastal and marine research. As evidenced by the grant portfolio for fiscal years 2018-2025, KMFRI researchers have attracted over KES 1.15 billion (approximately USD 8.9 million) across 61 multidisciplinary research projects. These grants reflect the researchers' scientific excellence and international reputation in addressing critical coastal and marine challenges. The funding profile spans multiple thematic areas including fisheries management, marine biodiversity conservation, blue carbon initiatives, climate change vulnerability assessment, marine pollution monitoring, and sustainable coastal development. Particularly notable are significant investments in mangrove conservation and blue carbon initiatives, innovative fisheries electronic monitoring systems championed and the North Kenya Banks resilience assessment valued at KES 56 million.

KMFRI has successfully established diverse funding partnerships with multinational development agencies (United Nation Environment Programme, European Union, World Bank), philanthropic foundations (The Nature Conservancy, PEW Charitable Trusts), regional bodies (WIOMSA, African Union Commission), bilateral agencies (Swedish International Development Agency), and academic institutions across Europe, Africa, and North America. This diversified portfolio helps insulate the Institute from funding volatility while expanding its collaborative research network. Researchers' project durations typically span 2-4 years, allowing for comprehensive scientific investigations while maintaining accountability to funding partners. Many projects feature cross-departmental collaboration, leveraging multidisciplinary expertise to address complex marine challenges. Grant sizes range from modest MARG I grants of approximately KES 1 million to major initiatives exceeding KES 40 million, demonstrating researchers' capacity to manage targeted research and large-scale programs.

This robust funding landscape not only demonstrates existing capacity to design and implement complex research initiatives but also highlights available pivotal role in generating the scientific knowledge necessary for evidence-based marine resource management in Kenya and the wider Western Indian Ocean region.

GRANTS FROM DONOR PARTNERS FOR VARIOUS INDIVIDUAL SMALL RESEARCH PROGRAMMES FOR 2022/2023, 2023/2024 and 2024/2025 FY

2022/2023 FY PROJECTS

S. No	Project	Donors	Researcher	Total Amount KShs	Start Date	End date
1.	One System Many Drivers – The Case for Assessing and Quantifying the Resilience of the North Kenya Banks	SDGF	Dr. Joseph Kamau, Dr. James Mwaluma, Dr. Amon Kimeli	56,000,000	July 2022	June 2025
2.	Quantifying local extinctions and shifting baselines of Kenya's exploited reef fishes	University of Pretoria and The Carnegie Corporation of New York	Dr. Levy Otwoma	3,200,000	July 2022	July 2024
3.	Fish barcoding and functional ecology: monitoring the status of the marine and coastal systems	Volkswagen Stiftung/ Leibniz Centre for Tropical Marine Research (ZMT)	Dr. Levy Otwoma	9,900,000	January 2022	January 2023
4.	SALT-MINE	SIDA	Dr. J. Kamau	10,700,000	2020	2024
5.	Mikindani constructed wetland project	Go-Blue	Dr. Kamau; Mr Stephen Mwangi, Eng. Kendi, Eng Aloyo	40,000,000	2022	2024

GRANTS FROM DONOR PARTNERS FOR VARIOUS INDIVIDUAL SMALL RESEARCH PROGRAMMES FOR 2022/2023, 2023/2024 and 2024/2025 FY						
2022/2023 FY PROJECTS						
S. No	**Project**	**Donors**	**Researcher**	**Total Amount KShs**	**Start Date**	**End date**
6.	Ocean Acidification (MASMA)	MASMA-WIOMSA	Dr. Erick Okuku	10,000,000	April 2019	September 2022
7.	Marine Litter Project (MASMA)	MASMA-WIOMSA	Dr. Erick Okuku	7,000,000	April 2019	September 2022
8.	Offshore damping baseline assessment	JICA	Dr. Eric Okuku	11,000,000	April 2021	August 2022
9.	Downstream ecological impacts of Mwache Dam	Ministry of water	Dr. Eric Okuku	13,000,000	Jan 2022	Jan 2023
10.	Hitching on plastics projects of Mwache Dam	Explorer Discovery	Dr. Eric Okuku	4,600,000	June 2022	June 2023
11.	FOA gear modification Project	FAO	Dr. Eric Okuku	4,600,000	Jan 2022	Jan 2023
12.	Sea based Litter action plan development	FAO	Dr. Eric Okuku	1,150,000	Jan 2022	Jan 2023
13.	Aquatica Journal series	WIOMSA	Dr. Osore	4,200,000	Dec 2021	2024
14.	Industrial fisheries Electronic Monitoring	The Nature Conservancy	Edward Kimani Esther Fondo Janet Mungata	4,880,000	January 2022	June 2023
15.	Biology and stock assessment of spangled emperor, *L. nebulosus* along the southern coast of Kenya.	MARG 1-WIOMSA	Ms Janet Mwangata	900,000	August 2021	September 2022
16.	Impacts on population pressure on the distribution and abundance of panaeid shrimps in Tudor Creek	MARG WIOMSA	Boaz Orembo	1,000,000	August 2021	September 2022
17.	Enabling sustainable exploitation of coastal tunas	MASMA	Dr Gladys Okemwa & Dr Joseph Kamau	8,800,000	2019	2023
18.	Slippery resource in peril Ecology of Western Indian Ocean Anguillid eels and their contribution to sustainable fisheries and livelihood along the East Coast of Africa	MASMA	Dr E. Mbaru Kakunde	4,000,000	December 2019	December 2022
19.	GMES & Africa Phase II	AUC	Dr E. Mbaru Kakunde	9,000,000	September 2022	September 2025
20.	Strengthening data collection and capacity building for effective conservation and management of billfish in the Western Indian Ocean region	Pew	Dr Nina Wambiji	15,000,000	April, 2020	2023
21.	Characterization of Kenya Marine Fisheries genetic resources for improved fisheries sustainability and food security	NRF	Dr Thomas Mkare	19,486,280	July 2020	June 2023
22.	Deep sea crabs (Distribution, population structure and fishery potential of the golden deep-sea crab)	MARG I-WIOMSA	Dr Esther Fondo	1,000,000	March 2022	March 2023

GRANTS FROM DONOR PARTNERS FOR VARIOUS INDIVIDUAL SMALL RESEARCH PROGRAMMES FOR 2022/2023, 2023/2024 and 2024/2025 FY						
2022/2023 FY PROJECTS						
S. No	**Project**	**Donors**	**Researcher**	**Total Amount KShs**	**Start Date**	**End date**
23.	Defining and mapping fishing grounds of artisanal fishers targeting tuna	WIOMSA-MARG1	Fatuma Mzingirwa	1,000,000	February 2021	February 2022
24.	"Upgrading of silver cyprinid (Rastrineobola argentea) value chain through multi-stakeholder partnerships and novel climate-smart postharvest processing technologies and practices for improved rural livelihoods."	AIRTEA	Dr. Peter Odote	2,000,000	1st March 2022	30th October 2024
25.	An enquiry into the role of women in fisheries as a component of Marine Spatial Planning	WWF Education for Nature Fellowship	Fridah Munyi	2,139,840	July 2022	2023
26.	Ecological and Socio Vulnerability Assessment at the Kenyan Coast: Go-Blue Project	UNEP- Nairobi Convention	Dr. Jacob Ochiewo and Dr. Jacqueline Uku	1,000,000	August 2022	Agreement to be signed
27	Managing Mangroves for Climate Change Regulations and Other Ecosystem Services in Kenya	UNEP	Dr J. Kairo	6,000,000	August 2019	2022
28.	IKI project	UNEP	Dr J. Kairo	30,000,000	2018	2022
29.	Pew Fellows	PEW	Dr J. Kairo	15,000,000	2019	2022
30.	Accreditation of carbon credits	Punguza	Dr J. Kairo	12,000,000	2018	2022
31.	A thousand flowers	International Development Research Centre (IDRC)	Dr J. Kairo	3,861,402	2020	2022
32.	Local roots	Napier University	Dr J. Kairo	2,855,704	2020	2022
33.	Gender and Fisheries	UNDP and the Embassy of Ireland	Dr J. Kairo, Caroline Wanjiiru and Josphat Nguu	3,568,217	2020	2022
34.	Coastal & Mangrove Indicators and Targets for inclusion in the Post-2020 Global Biodiversity Framework (Post 2020 GBF)	IUCN	Dr J. Kairo, Amina Juma, Caroline Wanjiiru and Fredrick Mungai	1,924,725	2021 April	2022
35.	GEF Blue Forests Project	GRID-Arendal	Dr J. Kairo & Amina Juma	7,980,900	2020	2022
36.	Blue Action Fund (BAF) project in the Transboundary Conservation Area	Wildlife Conservation Society for Blue Action Fund (BAF)	Dr J. Kairo & Dr Jacqueline Uku	11,910,008	November 2020	2022
Total				**KES 338,657,076 (USD 2,635,464)**		

GRANTS FROM DONOR PARTNERS FOR VARIOUS INDIVIDUAL SMALL RESEARCH PROGRAMMES FOR 2022/2023, 2023/2024 and 2024/2025 FY						
2023/2024 FY PROJECTS						
S. No	**Project**	**Donors**	**KMFRI Researcher (PI)**	**Total Amount KShs**	**Start Date**	**End date**
37.	Industrial fisheries Electronic Monitoring	The Nature Conservancy (TNC)	Edward Kimani Esther Fondo Janet Mungata	4,880,000	January 2022	Dec 2023
38.	Strengthening conservation and community stewardship actions to improve livelihoods and coastal ecosystem management in Kenya - Coastal Fisheries Component (SCOSALEM)	The Nature Conservancy (TNC)	Dr Gladys Okemwa	6,000,000	May 2023	July 2024
39.	GMES & Africa Phase II	African Union Commission(AUC)	Dr E. Mbaru Kakunde	10,000,000	January 2023	January 2026
40.	Transboundary fisheries project	AXA	Emmanuel Mbaru	19,000,000	April 2023	April 2025
41.	Fish2Sustainability	National Research Foundation (South Africa)	Dr. Esther Fondo	5,368,912	1 August 2022	31 August 2023
42.	Characterization of Kenya Marine Fisheries genetic resources for improved fisheries sustainability and food security	NRF	Dr Thomas Mkare	19,486,280	July 2020	June 2024
43.	Airtea-Silver Cyprinid	EU through FARA to ASERECA	Peter Oduor Odote	1,000,000	March 2022	2 Aug 2024
44.	Baseline report on mobulids	Newcastle University	Dr Nina Wambiji	90,000	2022	2023
45.	Quantifying local extinctions and shifting baselines of Kenya's exploited reef fishes	University of Pretoria and The Carnegie Corporation of New York	Dr. Levy Otwoma	3,200,000	July 2022	July 2024
46.	Piloting biodegradable twines in conservation to reduce marine litter	Catch green	Dr Okuku	6,000,000	June 2023	May 2027
47.	Estimating lost or abandoned fishing net and contribution to ALFDG	FAO	Dr Okuku	4,200,000	July 2023	July 2024
48.	Port development baseline survey	JICA/ KPA	Gwada Dr Okuku Harrison Ochiewo Juliet Amon	14,000,000	June 2023	July 2024
49.	Mwache downstream ecological impacts assessment	Ministry of Water	Dr. Okuku, Dr. Kairo	18,000,000	June 2022	Dec 2023

GRANTS FROM DONOR PARTNERS FOR VARIOUS INDIVIDUAL SMALL RESEARCH PROGRAMMES FOR 2022/2023, 2023/2024 and 2024/2025 FY						
2023/2024 FY PROJECTS						
S. No	**Project**	**Donors**	**KMFRI Researcher (PI)**	**Total Amount KShs**	**Start Date**	**End date**
50.	Microplastics and plastic-derived chemical contaminants in Africa: Implication on human health and the loss of aquatic biodiversity	The 2021 Jennifer Ward Oppenheimer (JWO) Grant	Dr. Mitto	1,290,000	January 2022	January 2024
51.	Supporting marine small-scale fisheries sustainability as a basis of safeguarding food security and livelihoods in East African region (SAVE-FISH)	VLIR-UOS	Dr. Levy Otwoma	40,000,000	1st September 2022	31st August 2027
52.	Fish barcoding and functional ecology	Volkswagen Stiftung	Dr. Levy Otwoma	5,000,000	1st November 2021	31st December 2023
53.	Spatial pattern in the resilience of coral reefs from climatic disturbances in Kenya	IFS	Dr. Juliet Karisa	1,500,000	1st January 2022	31st December 2023
54.	Strengthening Conservation and Community Stewardship Actions to Improve Livelihoods and and Coastal Ecosystem Management in Kenya-Coral reef restoration component	TNC	Dr. Juliet Karisa	6,700,000	1st April 2023	30th March 2024
55.	Reconstruction of climate and non- climatic stressors in the Western Indian Ocean (WIO), Kenyan coast	NRF	Dr. Jacqueline Uku & Dr. Juliet Karisa	2,000,000	1st January 2023	1st July 2024
56.	Assessing local knowledge on Halavi Guitarfish in Kenya	Save Our Seas Foundation	Dr. Victor Mwakha	951,750	May 2023	Apr 2024
57.	Strengthening conservation and community stewardship actions to improve livelihoods and coastal ecosystem management in Kenya (SCOSALEM- Kenya)	TNC	Dr Kairo	45,526,000	April 2023	2024
58.	Public-private-people partnerships for biodiversity conservation of threatened and degraded Kenyan coastal forests, in the context of major economic development	WWF Germany	Dr. Kairo	30,614,200	2019	Oct 2023

GRANTS FROM DONOR PARTNERS FOR VARIOUS INDIVIDUAL SMALL RESEARCH PROGRAMMES FOR 2022/2023, 2023/2024 and 2024/2025 FY						
2023/2024 FY PROJECTS						
S. No	**Project**	**Donors**	**KMFRI Researcher (PI)**	**Total Amount KShs**	**Start Date**	**End date**
59.	Biological and Soil Surveys for the mangroves of the Mwache Creek	Kenya Water Security and Climate Resilience Project	Dr. Kairo	2,000,000	May 2023	July 2023
60.	Climate Change Vulnerability Assessment (Ecological aspects) for selected counties	UNEP -EU	Dr. Uku	24,602,528	2023-	2025
61.	Socio-economic for CCVA Climate Change Vulnerability Assessment(Socioeconomic aspects) for selected counties	EU-UNEP	Dr Ochiewo	13,264,960	2023-	2025
62.	National Marine Spatial Planning/Marine Expert for development of Integrated, Ecosystem-based Land-Sea Planning Framework for Kenyan coast	EU-UNEP	Harrison Ong'anda	2,358,750	2023-	2025
63.	Mikindani constructed wetlands	UNEP -EU	Dr. Kamau	47,937,450	2023	2025
64.	Development of blue carbon project in Lamu-Tana Seascape	UNEP-EU	Dr Kairo	37,242,750	2023	2025
65.	Sustainable Ocean Livelihood And Food Security Through Increased Capacity In Ecosystem Research In The Western Indian ocean-SOLSTICE-WIO project	National Ocean Centre	Dr. Kamau	12,760,800	2018	2023
66.	Mineral Extraction from seawater desalination brine and seawater greenhouse farming-SALT-MINE	SIDA	Dr. Kamau	10,700,000	2020	2024
67.	Strategic Action Programme Policy Harmonization And Institutional Reforms-SAPHIRE_WIO Project	UNEP	Dr. Kamau	15,000,000	2019	2023
68.	Biodiversity climate risk assessment and GIS mapping in Kwale and Kilifi Counties	Plan International	Dr. Judy Okello	17,216,408	1 July 2023	30 December 2023
Total				**KES 427,890,788 (USD 3,329,890)**		

GRANTS FROM DONOR PARTNERS FOR VARIOUS INDIVIDUAL SMALL RESEARCH PROGRAMMES FOR 2022/2023, 2023/2024 and 2024/2025 FY						
2023/2024 FY PROJECTS						
S. No	**Project**	**Donors**	**KMFRI Researcher (PI)**	**Total Amount KShs**	**Start Date**	**End date**
69.	GMES and Africa	AUC, CSIR	Emmanuel Mbaru	9,300,000	October 2022	October 2025
70.	INNOECOFOOD	EU	Peter Oduor-Odote	90,000,000	1st Jan 2024	31st Dec 2026
71.	AIRTEA	FARA-EU	Peter Oduor-Odote	1,700,000	1st March 2021	31st Aug 2024
72.	KMFRI Go-Blue Project	UNEP	Dr J Ochiewo Dr J Uku Dr J Kamau Dr J Kairo Mr H Ong'anda	126,165,400	01.03.2023	30.12.2024
73.	Evaluation of sediment organic carbon provenance using eDNA analysis of mangrove sediments in Vanga, Kenya	IFS	Dr A Kimeli	1,945,000	01.10.2023	30.10.2024
74.	Collation and compilation of Multi-Scale and Multi-Resolution Bathymetric Data in the Western Indian Ocean (WIObathy)	GEBCO/USNH	Dr A Kimeli	41,301,999	01.01.2024	30.06.2025
75.	Strengthening conservation and community stewardship actions to improve livelihoods and coastal ecosystem management in Kenya (SCOSALEM- Kenya)	TNC	Dr Kairo	45,526,000	April 2023	2025
76.	Blue carbon project in the Republic of Guinea under the voluntary carbon market	West Africa Blue (WAB)	Dr Kairo	10,102,950	2023	2024
77.	Fuel Efficient Cookstoves for Carbon Offset	SOA	Dr Kairo	1,300,000	2023	2024
78.	Take it Further	Gordon and Betty Moore Foundation	Dr Kairo	6,500,000	2024	2025
79.	Asia-Africa Blue-tech Superhighway Project	Worldfish	Dr. Okemwa	22,472,622	2024	2025
80.	Electronic Monitoring of industrial fisheries	TNC	Dr. Kimani	6,218,747	2024	2025
81.	KMFRI-FAO Weight of Evidence (WOE)	FAO	Dr Gladys Okemwa	10,000,000	Dec 2023	Nov 2024
82.	Strengthening implementation of fisheries co-management and protected area plans in Pate Island (SCOSALEM - Component 2)	The Nature Conservancy	Dr. Gladys Okemwa	6,000,000	2023	2024
83.	Marine and Coastal Operations for Southern Africa and the Indian Ocean (MarCOSIO)	EU	Dr Emmanuel Mbaru	11,000,000	2022	2025
GRAND TOTAL				**KES 1,156,080,582 (USD 8,996,736)**		

Eternal Stewards of Knowledge: Honouring the Legacy of our Departed Visionary Scientists

A true scientist is not just a seeker of knowledge but a steward of progress. In a special way, we remember with heavy hearts yet profound gratitude to honour the memory of our dearly departed colleagues from the Kenya Marine and Fisheries Research Institute (KMFRI) who were involved in marine and coastal research. Their unwavering dedication to scientific discovery and their commitment to the advancement of coastal and marine research in Kenya have left an indelible mark on both our institution and the broader scientific community.

They did not labour for personal acclaim but for the greater good—driven by a passion to protect, conserve, and understand the marine and coastal ecosystems that sustain us. Their work, their sacrifices, and their tireless pursuit of knowledge continue to inspire us, even in their absence. The ripples of their efforts extend far beyond their years, influencing generations of researchers and shaping the future of environmental stewardship in our country.

We remember them not only for their professional excellence but for their kindness, their mentorship, and the camaraderie they shared. They were more than colleagues; they were visionaries, mentors, and friends whose legacies are woven into the very fabric of KMFRI. Each discovery they made, each report they authored, each student they guided contributes to an unbroken chain of knowledge—one that continues to illuminate the path ahead.

Though they are no longer with us, their contributions endure. Their hands may no longer collect data, analyse samples, or write research papers, but their influence persists in every experiment conducted, every policy informed by their work, and every young scientist who follows in their footsteps. We take comfort in knowing that their dedication was not in vain. Their legacy will live on, inspiring us to continue the pursuit of truth and innovation.

As we stand in solemn tribute, we pledge to honour their memory not just with words but with action. We will carry forward their dreams, build upon their work, and ensure that the knowledge they so passionately sought will never be forgotten. Their names will forever be etched in our hearts and in the annals of KMFRI's history.

In Loving Memory:

- **Dr. Michael Nguli** – *Research Scientist*
- **Dr. Caroline Wanjiru** – *Research Scientist*
- **Mr. Shaban Mwachireya** – *Research Scientist*
- **Mr. Samuel Ndirangu** – *Laboratory Technologist*
- **Mr. Mathew Nguli** – *Information Technologist*
- **Mr. Alfred Obinga** – *Laboratory Technologist*
- **Mr. Haron Omooria** – *Laboratory Technologist*
- **Mr. Stacky Okumu** – *Laboratory Technologist*
- **Mr. Anthony Kiema** – *Laboratory Technologist*
- **Mr. Meshack Okirigiti** – *Laboratory Technologist*
- **Mr. Benard Oyango** – *Laboratory Technologist*
- **Mr. Nicholas Kalundu** – *Laboratory Technologist*

May their dedication to science, their passion for discovery, and their commitment to KMFRI serve as a beacon for all who follow. May we never forget the gifts they gave us and may their spirits rest in eternal peace.

Authors' Instructions – The Kenya Aquatica

Editorial Policy

The Kenya Aquatica is the research publication of the Kenya Marine and Fisheries Research Institute (KMFRI). It publishes original research papers or other relevant information in all aspects of Kenya's marine and freshwater fisheries, aquaculture, environmental and ecological studies, and marine research including chemical and physical oceanography.

All manuscripts submitted to the Kenya Aquatica are accepted for consideration on the understanding that they are original and their content has not been published elsewhere and not under consideration by any other journal.

Manuscripts and all illustrations should be prepared according to the instructions provided below and submitted in electronic format as attachments via e-mail. Submissions will be subject to a pre-review by the Editorial Board and those that fall within the remit of the journal, make a substantial contribution to the field of research, and are in the correct style and format will be sent for review. Manuscripts that do not meet these criteria will be rejected. Every manuscript will be reviewed by at least two referees competent in the field of interest. The choice of reviewers is made by the Chief Editor or the Editorial Board.

The Manuscript

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3. By submitting your manuscript, you are agreeing to any necessary originality checks it may undergo during the peer-review and production process.
4. Contributions must be written in English. Any consistent spelling and publication styles may be used. Please use single quotation marks, except where 'a quote is "within" a quotation'. Long quotations of 40 words or more should be indented without quotation marks. If English is not your first language we suggest that an English-speaker edits the text, before submission.
5. All persons who have a reasonable claim to authorship must be named in the manuscript as co-authors; the corresponding author must be authorized by all co-authors to act as an agent on their behalf in all matters pertaining to publication of the manuscript, and the order of names should be agreed by all authors.
6. The manuscript must be typed in a normal type font (e.g. Times Roman, font size 12) and at least with 1.5 line spacing. The total number of pages should not exceed 20 manuscript pages (excluding figures and tables), both for Original Articles and Review Articles. Short Communications must not exceed 8 manuscript pages. A separate sheet should be used for each table and figure.
7. Species names must be in italics; the genus is written in full at the first mention in the Abstract, again in the main text and the figure and table legends, and abbreviated thereafter.
8. Illustrations (figures, tables) should be placed separately at the end of the manuscript. Originals of all figures should be in black and white (graphs) but colour is acknowledged for figures such as maps and diagrams, and complex graphs where black and white does not allow good separation of patterns; the lettering should be of a size readable after reduction for the final layout.

   Figure legends (captions) should be written on a separate page. Table legends must incorporate all the information needed and placed on the same page as the table. Authors are requested to indicate the recommended position of figures and tables in the left-hand margin of the text.
9. The international system of units (SI Units) must be used throughout; abbreviations and acronyms should be defined where they first appear; mathematical symbols and formulae should be used only when absolutely necessary and should be clearly explained and defined in the text.
10. A complete Original Article manuscript must include the following: title page, abstract, keywords, introduction, materials and methods, results, discussion, acknowledgements, references, tables and figures (with figure legends) in that order.
11.
    a. Title Page: This should contain a concise title and the names of authors followed by affiliations and their complete postal addresses, phone numbers, and email addresses. The corresponding author and email address must be indicated.

b. Abstract: The abstract should not exceed 200 words, and should be on a separate page. It should briefly describe the main points of the manuscript, i.e. the topic, the main findings and the conclusions.

c. Keywords: four to six key words are required for indexing purposes.

d. Introduction: A brief survey of relevant literature and objectives of the work should be given in this section. Thus, the introduction should largely be limited to the scope, purpose and rationale of the study.

e. Materials and Methods: In this section, the methodology used should be clearly explained, including relevant references, such that anyone else can repeat the procedures. It should provide the framework to gain answers to the questions or problems identified. Sampling methods must be elaborated as well as analytical frameworks and model specifications.

f. Results: Make the text as objective and descriptive as possible. Only material pertinent to the subject should be included. Presentation of the same information in both graphical and tabular form should be avoided.

g. Discussion: This section could be combined with the above to present "Results and Discussion". It should interpret the results in view of the problems identified in the introduction, as well as in relation to other published work. The final paragraph of this section could include concluding remarks and recommendations for future work. "Dicsussion and Conclussion" or "Conclusion and Recommendations" could also be combined to form separate sections or presented individually.

h. Citations: Authors should be cited using their surnames, followed by the year of publication. Two authors should be separated by 'and'. If there are more than two authors, only the first author, followed by "*et al.*", should be given. This and other Latin or foreign terms should be italicized.

i. Acknowledgement/s: This section should be brief. Authors are advised to limit acknowledgements to substantial contributions to the scientific and technical aspects of the paper, financial support or improvements in the quality of the manuscript.

j. References: The reference section must contain an alphabetical list of all references mentioned in the text of the manuscript. Limit punctuation and special fonts as indicated and give all journal names in full. Examples for citations from periodicals, books and composite works are given below:

• Periodicals. Here the following should be sequentially listed: author's name/s, initials, year of publication, full title of paper, periodical (in full), volume, first and last page numbers. Example: Edmonton K, Randall J, Allistair J (1984) Adaptation of unicellular algae to irradiance: An analysis of strategies. The New Scientist 94: 168-183

• Books. The following should be listed: author's or editor's name, initials, year of publication, full title, publisher, place of publication, total pages. Example: Klan OJP (1980) Light and photosynthesis in aquatic ecosystems. Cambridge University Press, Cambridge. 204 pp

• Composite works or serials. The sequence should be as above, but also should include full title of paper followed by In: editor(s) if any, full title of publication, publisher, etc., and the first and last page numbers. Example: Nathwani P, Slatter J (1995a) Satelite analysis of benthic secondary production. In: Zhu MPC, Vanini WX (eds) Determination ofsecondary production from the molecular to the global Scale. ICES Marine Science Symposia, Vol. 95, Copenhagen. pp 337-432

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12. A complete Review Article manuscript must include the following: title page, abstract, keywords, introduction, main body text (the central sections vary with specific divisions according to the theme), acknowledgements, references, tables and figures (with figure legends) in that order.

13. A complete Short Communication manuscript must include the same structure as an Original Article in a shorter format.

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