



University of Dar es Salaam

# SOAF NEWS

A Newsletter of the School of Aquatic Sciences and Fisheries Technology | Vol. 2 Issue 1 | October 2024



## Celebrating the legacies of Prof. J. Machiwa and Dr. P. Onyango: *Inspiring stories of their research and academic excellence*

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Celebrating the life of our colleague, Dr. Paul Onyango



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# About SoAF

The School of Aquatic Sciences and Fisheries Technology (SoAF) was established on September 22<sup>nd</sup>, 2020 and operates at Kunduchi Campus, about 16 km away from the University of Dar es Salaam Mwalimu Nyerere Mlimani Campus.

The School's mission is to advance the economic and social development in aquaculture, fisheries and aquatic environmental sciences through effective teaching, research, innovation and knowledge exchange linked to its vision of becoming a centre of excellence for training and conducting cutting edge scientific and technological innovations in aquaculture, fisheries and aquatic environmental sciences for sustainable and inclusive development.

Despite being a recently established academic unit at the University of Dar es Salaam, SoAF possesses an intriguing history and is home to a diverse mix of both early career scientists and seasoned experts in the field. The School boasts a wide range of expertise in various fields, including marine and freshwater sciences, wetlands ecology and watershed management, fisheries science and management, aquaculture, socio-economics and aqua-business, and aquatic pollution.

SoAF is the only unit in the country that offers degree programmes in fisheries, which are complemented by a comprehensive knowledge of marine and freshwater sciences. It is an ideal learning and research place for individuals interested in pursuing a career in fisheries, aquaculture, and aquatic sciences.

In addition to providing educational opportunities, SoAF also offers support for innovative research and access to technical advice through consultancy services.

**We welcome submissions of short reports, ongoing researches, completed researches, extension/outreach activities and commentaries related to aquatic sciences.**

**Please send your articles to**  
[soaf@udsm.ac.tz](mailto:soaf@udsm.ac.tz)





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## Message from the Dean

### Dr. Blandina R. Lugendo

It is with great honour and pleasure that I present this second edition of the SoAF News, *“Celebrating the legacies of Prof. John Ferdinand Machiwa and Dr. Paul Ochieng Onyango: Inspiring stories of their research and academic excellence.”* In 2022, just two years after its establishment, the School lost two prominent staff members whose unique and significant contributions laid a solid foundation for what the School of Aquatic Sciences and Fisheries Technology (SoAF) is today. Dr. Onyango passed away in April 2022, followed by Prof. Machiwa just four months later, both after short illnesses. Their untimely demises were a profound loss to their families and to the School, and there is no better way to honour them than by celebrating their legacies.

Prof. Machiwa left an enduring legacy through his exceptional leadership and contributions to the evolution and growth of SoAF, transforming it from a unit within the Department of Zoology into an independent Faculty, the Faculty of Aquatic Sciences and Technology (FAST), to the Department of Aquatic Sciences and Fisheries Technology, and finally to the former College of Agriculture and Fisheries (CoAF). Prof. Machiwa was awarded the prestigious Best Worker (Academic) award from the University of Dar es Salaam in 2005 and the Vice Chancellor's Congratulatory Note in 2011, recognizing his significant contributions to science, leadership, and society.

Similarly, Dr. Onyango left behind a remarkable legacy and numerous unfinished initiatives. As a charismatic and visionary scholar, he was the only academic staff member with a socio-economics background at that time, which allowed him to integrate this discipline into our academic and research frameworks. His contributions were

recognized when he received the second-place award in the 'Collaborative Projects' category during the University of Dar es Salaam's 2021 Research and Innovation Week.

As the philosopher and poet Marcus Tullius Cicero noted, “The life given to us by nature is short, but the memory of a life well spent is eternal.” Though they passed on too early, the memories of their achievements will endure for many years. Capturing these memories from those who worked with them—and who may have supervised them—is a vital way to ensure their legacies do not fade. A popular Russian song reminds us, “Leave the light when passing away.” Prof. Machiwa and Dr. Onyango have certainly left behind a great deal of light! This issue highlights their achievements as recounted by former colleagues and students.

Continuing from the first issue, we also include two articles about the history of Kunduchi Campus contributed by colleagues familiar with its legacy. Professor Emerita Amelia Kivaisi earned her Diploma in Fisheries Science at the Kunduchi Marine Fisheries Research and Training Institute (KMFRTI) in 1972. Her article reflects on her time at Kunduchi, detailing the experiences and insights she gained from the diploma programme. Prof. Kamazima Lwiza, currently at Stony Brook University in the USA, provides an excellent historical background on the development of marine sciences at the University of Dar es Salaam in the early 1980s, with a focus on the main campus and Kunduchi Campus.

We are also excited to share some significant achievements in our research and activities carried out by our partners.

I hope you enjoy reading this issue ■





## Message from the Chief Editor

**Dr. Samwel M. Limbu**

Dear Readers,

I am thrilled to welcome you to the second issue of SoAF News, the School of Aquatic Sciences and Fisheries Technology (SoAF) newsletter at the University of Dar es Salaam (UDSM). It is with immense joy that I unveil the second edition of SoAF News for 2024, titled ***“Celebrating the Legacies of Prof. John Machiwa and Dr. Paul Onyango: Inspiring stories of their research and academic excellence,”*** in heartfelt remembrance of our beloved colleagues who passed away in 2022.

As esteemed academic community members, Prof. Machiwa and Dr. Onyango contributed to the growth of knowledge and profoundly influenced the lives of their students, peers, and the institution itself. Though they are no longer with us, their impact endures in classrooms enriched with insight, the groundbreaking research they pioneered, and the strong community they helped build. Reflecting on their lives, we draw strength from the lessons they imparted, both academically and personally. While their absence is deeply felt, we will continue to uphold the values they championed and the passion they infused into their work.

We pay tribute to Prof. Machiwa and Dr. Onyango in this issue by highlighting their contributions and dedication to nurturing aquatic scientists in Tanzania and beyond.

We also share inspiring success stories of cage fish farming in Lake Victoria, completed projects at the school, the unique features of the Kunduchi campus, and research produced by scientists who were mentored by them. This collection of articles serves as a reminder that the legacies of Prof. Machiwa and Dr. Onyango will continue to inspire us for years to come. Our thoughts remain with their families, friends, and all whose lives were touched by their brilliance and kindness.

I would be remiss if I did not acknowledge the dedicated scientists who authored the remarkable and inspiring articles that made this issue of SoAF News possible. I sincerely applaud and recognize their contributions.

Lastly, I extend my gratitude to the Dean of SoAF and the SoAF News Editorial Board members for their unwavering support throughout the preparation and production of this issue. The publication of the second issue is a testament to their determination, commitment, and tireless efforts to serve SoAF, the University, and the broader Tanzanian community.

On behalf of the Dean of SoAF, the SoAF News Editorial Board, myself, and the entire SoAF family, I warmly welcome our readers. I hope you find the articles in this issue both interesting and informative and feel encouraged to contribute in the future ■

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## Remembering and celebrating the life of Professor John F. Machiwa

**Dr. Rashid A. Tamatamah and Professor Yunus D. Mgaya**

(Both were colleagues of the late Professor Machiwa)



**P**rof. John Ferdinand Machiwa, who departed from us on 29 July 2022 following a valiant struggle with illness, was a revered research scientist and esteemed administrator who made impactful contributions to the field of aquatic sciences. The passing of Prof. Machiwa is a loss not only to his family and colleagues but also to the broader academic community. His legacy will endure through his groundbreaking research, mentorship of students, and dedication to the advancement of aquatic sciences. His work advanced the frontiers of scientific understanding and inspired countless individuals within the academic community. His passion for research, commitment to education, and unwavering integrity were a guiding light to many, and his absence will be keenly felt. May the memories of his accomplishments bring comfort, and may the Almighty grant his loved ones the strength to navigate this period of profound loss.

### Field work for undergraduate students

Born in Kinesi, Rorya District, Tanzania, in 1956, Prof. Machiwa's educational path was marked by notable achievements and contributions. After completing his primary and secondary education, Prof. Machiwa pursued his interest in fisheries and marine research by enrolling at the Kunduchi Marine Fisheries Research and Training Institute (KMFRTI). There, he obtained a Fisheries Diploma in 1979, marking the beginning of his formal education in the field. After attaining his diploma, Prof. Machiwa embarked on a career as an Assistant Fisheries Officer in the Ministry of Natural Resources and Tourism. His academic journey continued as he pursued undergraduate studies at the University of Dar es Salaam, culminating in the award of a BSc (Ed) degree in 1984.

Upon completing his Bachelor's degree, Prof. Machiwa was recruited as a Tutorial Assistant in the Department of Zoology and Marine Biology at the University of Dar es Salaam, where he further honed his expertise and contributed to the academic community. Eager to broaden his horizons and deepen his knowledge, Prof. Machiwa pursued advanced



Prof. Machiwa at IMS during his PhD. ©Ron Johnstone

studies abroad, earning a Master of Philosophy (M. Phil.) from the University of Wales (UK) in 1988 and a PhD in Biogeochemistry from the University of Stockholm (Sweden) in 1999. These academic achievements underscore his commitment to scholarship and research in Aquatic Sciences.

Having attained the rank of professor in 2011, Prof. Machiwa dedicated a total of 38 years of service to the University of Dar es Salaam. This period comprised 32



## Remembering and celebrating the life Professor John F. Machiwa

years of permanent service from 1984 to 2016, during which he imparted knowledge and expertise to generations of students. Even after his statutory retirement in 2016, Prof. Machiwa continued to serve the university for an additional 6 years on a contract basis, showcasing his ongoing dedication to academia. Throughout his academic career, Prof. Machiwa's affiliation with the Department of Aquatic Sciences and Fisheries Technology, established in 2002, underscored his specialization and expertise in the field. Before the department's inception, he was a valued member of the Department of Zoology and Marine Biology, where he laid the foundation for his distinguished career in academia.

As a respected educator, Prof. Machiwa taught various courses in aquatic sciences, covering essential topics such as Oceanography, Aquatic Pollution, Aquatic Biology, Aquatic Resources and Management, and Water Quality and Pollution Control. His commitment to providing high-quality education and fostering a deeper understanding of critical environmental issues has left an enduring mark on his students and the academic community at large.

Prof. John Ferdinand Machiwa's impact as an educator and mentor transcended the confines of academia, as evidenced by his profound influence on numerous postgraduate students. Through his unwavering dedication and exceptional guidance, Prof. Machiwa played a pivotal role in nurturing the academic and personal growth of individuals under his tutelage, leaving an indelible mark on their lives. During his illustrious career, Prof. Machiwa had the privilege of advising a diverse cohort of undergraduate and postgraduate students, supervising the research and academic pursuits of 9 Master's students and 14 doctoral candidates. His mentorship extended beyond the confines of his own institution, as he also served as an External Examiner for 4 postgraduate students from Kenya and South Africa, further showcasing his commitment to fostering scholarship beyond borders.

Those fortunate enough to have been mentored by Prof. Machiwa were recipients of his boundless generosity, compassion, and expertise. His approach to teaching and advising was characterized by a profound care for his students, exemplifying a commitment to their holistic development. Prof. Machiwa's involvement in the lives of his students transcended mere academic instruction; he served as a role model, actively engaging in their personal and intellectual growth and providing a paradigmatic example of excellence and dedication. The impact of Prof. Machiwa's mentorship reverberates through the achievements and successes of the students he guided, reflecting the lasting legacy of his teaching philosophy

and unwavering support. His influence as a mentor continues to shape the trajectories of his students, instilling in them the values of scholarship, integrity, and compassion that he exemplified throughout his career.

Prof. John Ferdinand Machiwa's invaluable contributions extend far beyond the realm of academia, encompassing a multifaceted career marked by pioneering research, impactful administrative roles, and dedicated service to the University of Dar es Salaam. His diverse portfolio of accomplishments underscores his exceptional leadership qualities and unwavering commitment to advancing the fields of aquatic sciences and fisheries technology. As a prolific researcher, Prof. Machiwa's scholarly output is a testament to his intellectual prowess and dedication to advancing scientific knowledge. With 48 journal papers, three books, and chapters to his credit, he has significantly enriched the academic discourse in his areas of expertise, leaving a lasting imprint on the field.

In addition to his research endeavors, Prof. Machiwa's leadership extended to the coordination of two major projects—the Support to Riparian University Component of the Lake Victoria Environment Management Project (LVEMP) from 1998 to 2008 and the PUMPSEA project from 2005 to 2008. His stewardship of these projects underscores his ability to facilitate collaborative initiatives and drive impactful research endeavours aimed at addressing critical environmental challenges. His pivotal role in the establishment of the Faculty of Aquatic Sciences and Technology (FAST) in 2002 and later, the College of Agricultural Sciences and Fisheries Technology (CoAF) in 2015, highlights his instrumental role in fostering the growth and development of academic programmes in these disciplines.

Throughout his tenure, Prof. Machiwa held various administrative positions, including Head of the Department of Aquatic Environment and Conservation, Dean of FAST, Deputy Principal (Planning, Finance and Administration) at Mkwawa University College of Education (MUCE), and Acting Principal in CoAF. In each capacity, he exemplified exceptional leadership skills, a collaborative spirit, and a steadfast commitment to mentorship, guiding both students and colleagues toward academic and professional excellence.

In this article, we are reflecting on the remarkable life and legacy of Prof. John Ferdinand Machiwa, a distinguished scholar, mentor, and visionary leader whose contributions have left an indelible mark on the University of Dar es Salaam and the scientific community at large. Prof. Machiwa's unwavering



## Remembering and celebrating the life Professor John F. Machiwa

dedication and exemplary service to the university and the nation were met with well-deserved recognition and accolades, throughout his illustrious career. The honours he received, including the prestigious award of Best Worker (Academic) of the University of Dar es Salaam in 2005 and the Vice Chancellor's Congratulatory Note in 2011, are a testament to his outstanding commitment to academic excellence and exemplary service to the community.

Beyond his professional achievements, Prof. Machiwa's impact went far beyond academia; he was cherished by colleagues and friends for his kindness, generosity, and sense of humour. His unwavering optimism in the face of challenges served as a source of inspiration and comfort to those around him, leaving a lasting impression on all who had the privilege of knowing him. In addition to his contributions to academia, Prof. Machiwa dedicated his time and expertise to public service, serving as a member of various boards and as the Chairperson of the Board of Trustees of the Marine Parks and Reserves Unit (MPRU). His commitment to environmental conservation and community service exemplified his deep-rooted values of stewardship and

responsibility towards his nation and its natural resources.

Prof. Machiwa's legacy extends far beyond his professional achievements. He leaves behind a loving family—his wife Praxeda, two daughters Dr. Herrieth and Doreen, a son Eric, three grandsons, and one granddaughter—who were the centre of his world and the source of his greatest joy and inspiration. Their love and support undoubtedly fueled his passion for his work and his unwavering dedication to making a difference in the world.

As we celebrate his life, his contributions to science and society, and the enduring impact he had on the lives of those around him, are highlighted. His research, mentorship, and profound influence will continue to inspire future generations of scholars, ensuring that his legacy remains alive and thriving in the hearts and minds of all who had the honour of knowing him.

Rest in eternal peace, Prof. Machiwa. Your light will continue to shine brightly through the lives you touched and the legacy you leave behind ■



Prof. Machiwa (L), as one of the judges during the Research and Innovation Week in 2021. ©SoAF



## The late Prof. John Machiwa: Dedication to nurturing aquatic scientists in Tanzania

**Dr. Sihaba Ramadhani Mwaitega**

Senior Research Officer, Tanzania Fisheries Research Institute (TAFIRI)

**I**n 1997, I enrolled as a first-year B.Sc. General student at the University of Dar es Salaam, specifically in the then Department of Zoology and Marine Biology. During my second year, I was uncertain about which field to choose. However, my academic journey and passion for aquatic ecosystems began when I registered for the Marine Pollution course taught by the late Prof. John Machiwa. This course laid the foundation for my career path, ultimately leading to successfully completing my higher education and attaining advanced degrees in aquatic sciences and related fields under Prof. Machiwa's guidance. His most enduring contributions lie in his commitment to mentorship and support, which inspired me to pursue a career in aquatic sciences. Below are a few examples highlighting Prof. Machiwa's dedication to nurturing aquatic scientists in Tanzania.

### Broken light meter

Prof. Machiwa was remarkably humble and patient, even when angry, he never raised his voice at students. I recall an incident during my doctoral research when I returned from the field with a broken light meter. I was anxious about how Prof. Machiwa, my research supervisor, would react to this news. With encouragement from Mzee Richard Masinde, the Chief Field Technician who had accompanied me, I finally entered Prof. Machiwa's office, light meter in hand. Upon seeing me, he immediately asked if I had collected light intensity data, to which I replied that I had only been able to gather data from some stations, not all. He then inquired about the remaining stations from which data had yet to be collected. I confessed that the meter was not functioning because it had broken while taking measurements under the submerged coral rag.

After a moment of silence, he said, "At the Ph.D. level, you should be familiar with how to operate delicate research instruments in various environments carefully. Now, how will we obtain the light data? As you know, this data is crucial for the primary productivity experiment." I was silent, but he then

encouraged me by stating that what had happened was in the past, and we needed to find a replacement instrument to continue my research quickly.

Prof. Machiwa was a dedicated mentor who maintained an open-door policy, fostering a positive learning environment where students felt comfortable seeking advice or clarification at any time. Most of his appointments were scheduled early in the morning, allowing him to read students' work throughout the day and provide same-day feedback. His editing process often involved reviewing, correcting, and setting strict submission deadlines. He was always punctual in reviewing his students' work.

Prof. Machiwa's mentorship extended to the publication process, where he actively guided students in publishing their research findings in peer-reviewed journals. This commitment to academic excellence contributed significantly to the vibrant academic achievements of his graduate student community. His emphasis on ethical conduct resonated strongly with mentees, instilling in them a sense of responsibility and honesty research. Prof. John Machiwa's mentorship was characterized by a hands-on approach that transcended traditional guidance. He engaged in one-on-one sessions with students, tailoring his mentorship to their unique needs and aspirations.

### Hands-on training

During my PhD studies, one of my objectives was to analyze the metal concentration in the Pangani estuary using an Atomic Absorption Spectrophotometer (AAS). At that time, the only functional AAS was at the Institute of Marine Sciences (IMS) in Zanzibar. However, the IMS AAS utilized an expensive gas that had to be imported from South Africa, and several lamps were not operational. At the time, the Faculty of Aquatic Sciences and Technology (FAST) also had an AAS that had not yet been installed. Prof. Machiwa took the initiative to address this issue by arranging for an AAS expert from Germany to come and install the unit at FAST.



## The late Prof. John Machiwa: Dedication to nurturing aquatic scientists in Tanzania

I recall spending an entire day in the laboratory with Prof. Machiwa and other students, learning how to operate the equipment following its installation. His knowledge stemmed primarily from his experiences as a graduate student using the same machine. During these moments, his hands-on training skills truly shone, nurturing the next generation of aquatic scientists. Additionally, Prof. Machiwa was pivotal in developing the curriculum, research programmes, and academic policies related to aquatic sciences at the University of Dar es Salaam. Under his guidance, the university, particularly FAST and later the College of Agricultural Sciences and Fisheries Technology (CoAF at that time), flourished as a hub for learning and research in this specialized field.

### Maintained close contacts with his students

Beyond academics, Prof. Machiwa fostered long-term relationships with his mentees, providing ongoing support as they advanced in their careers. His ability to recognize and nurture individual strengths in his students allowed him to tailor his mentorship, impacting their lives. Prof. Machiwa genuinely cared about his students' academic and social well-being. I recall one early morning when I received a call from him asking if we could meet that day. Initially, I felt apprehensive, wondering what pressing issue required such an urgent meeting. To my surprise, he simply wanted to check on how I was doing; we discussed social issues rather than academics. He offered valuable advice on balancing professional challenges and delicate social matters. Prof. Machiwa consistently encouraged his students to complete their studies on time, often saying, "No matter what happens, this is your life, and you must finish it for your own good." He frequently used uplifting phrases like, "I know you are capable, I believe in you, and I am proud of you." Just imagine how difficult life could have been with a supervisor who lacked the patience and compassion of Prof. Machiwa.

### His legacy lives on through his students

Although Prof. Machiwa is no longer with us, his legacy endures through the many aquatic scientists he mentored, some of whom now hold managerial positions in research, higher education, and conservation institutions, such as the Tanzania Fisheries Research Institute (TAFIRI), various universities, and the National Environment Management Council (NEMC). He made significant contributions to advancing scientific endeavours at both national and international levels. Upon reflecting on his life and work, it becomes evident that Prof. Machiwa's influence extends far beyond the classroom. He devoted his life to understanding and preserving aquatic ecosystems while helping the students he mentored and supervised realize their full potential.

The impact of his work is still felt today, inspiring ongoing efforts to conserve and sustainably manage Tanzania's aquatic ecosystems. He produced graduates who carry forward his vision for a sustainable and scientifically informed approach to aquatic resource management.

In conclusion, Prof. Machiwa's contributions extend beyond those of a brilliant scientist; he was a compassionate mentor and a driving force behind the advancement of aquatic science in Tanzania. His legacy will continue influencing the hearts and minds of those fortunate enough to learn from and work alongside him. By honouring Prof. Machiwa, we recognize his transformative impact and commit to ensuring his dedication inspires and shapes the scientific landscape for years. To me, Prof. Machiwa was not just a supervisor but also a father figure. May God grant him eternal peace. Amen! ■



Prof. Machiwa, as the Chairperson of the Marine Parks and Reserves (MPRU) Board with Board members and MPRU staff. ©MPRU



## Dr. Paul Ochien'g Onyango: the person I found, mentored, and admired!

**Prof. Philip O. J. Bwathondi**

Retired Associate Professor (UDSM), Retired Director General - Tanzania Fisheries Research Institute (TAFIRI) & Part-time Instructor at SoAF

**I** first came to know the late Dr. Paul Ochien'g Onyango when he joined a Kisumu-based NGO, OSIENALA (which means 'Friends of Lake Victoria'), after completing his first degree in Bachelor of Arts at the University of Nairobi. He graduated in 1993. OSIENALA, established in 1992 as a membership organization of local communities who live and are dependent on the Lake for their livelihoods, provided a forum for addressing environmental challenges facing the Lake. At the organization, he authored several articles in its newsletter on Lake Victoria's environment and its importance for the livelihoods of the communities around the lake and beyond. These articles attracted my attention, and I was interested in meeting him and learning more about what he was also doing at the organization. Since the Nile perch industry was booming around the Lake at the time, he was also responsible for the tree-planting campaign at OSIENALA. The campaign provided a window of opportunity to offset the loss of firewood used to dry the Nile perch. These two activities laid a good foundation for what he could come and do later in his career.

### How Dr. Onyango joined TAFIRI

I met Paul for the first time in 1994 in Rorya, where we both come from. At the time, I was the Director General of the Tanzania Fisheries Research Institute (TAFIRI), and coincidentally, TAFIRI was looking for a social scientist as there was a need for the Institute to start exploring human dimensions of management challenges facing the fishery sector in Lake Victoria. On meeting him, I was impressed by his wide knowledge of the challenges facing the Lake, and I advised him to apply for a job as a social scientist at the Institute. He agreed and became the first social scientist at TAFIRI under the Lake Victoria Environment Management Project (LVEMP). He was assigned to report at Sota Station under the supervision of Dr. Amon Shoko in 1998. This was the beginning of Paul's long and fruitful career.



Dr. Onyango at the Mvuvu House in Dar es Salaam.  
©Paul Onyango family

### Establishment of Socio-economic Department

After he joined TAFIRI, though posted to Sota, he was stationed at the Mwanza Centre, where he was assigned two main activities: first, to participate in the socio-economic activities of LVEMP and second, to establish a new department of dealing mainly with research on socio-economic issues. In addition to his research work, he was actively involved in the



## Dr. Paul Ochien'g Onyango: the person I found, mentored, and admired!

administration work, particularly in relation to the establishment of the new department. I was glad that Paul did well in administration and research. Over the years, he achieved quite a lot in his areas of expertise through research activities and consultancies undertaken nationally and regionally, as well as outside the region. He also established two working groups, a National Lake Victoria Socio-economic Working Group and a Regional Lake Victoria Socio-economic Working Group.

### Joining the University of Dar es Salaam

In 2005, he left TAFIRI and joined the then Department of Aquatic Science and Fisheries, University of Dar es Salaam. However, this move did not affect TAFIRI's socio-economic activities. He had already established a strong department with experienced social scientists, including Dr. Modesta Medard, Eliza Mlahagwa, and Joseph Onyango, and he had also developed close collaboration with fisheries institutions in the region. The foundation he laid was critical for sustaining activities initiated during his time and for the creation of new ones.

He completed his Master's at the University of Tromsø, Norway, in 2004 while still at TAFIRI. In 2007, he started his PhD at the same University. His PhD was on 'Poverty in small-scale Fisheries; Governance challenges in Lake Victoria Fishing Communities, Tanzania', and he did his fieldwork in two fishing communities, Nyakasenge and Kasheno, on the southern shores of Lake Victoria. He completed his PhD in 2011 and published several papers from it.

After I retired from TAFIRI in 2006, I returned to the University of Dar es Salaam, where I met Paul again

and started working together on several activities. For instance, we shared courses and also undertook joint consultancies. Since 2020, when SoAF was established, we shared an office. We had long and interesting discussions on different fisheries issues. Paul was more than a colleague to me, he was a special adopted 'son'! I was looking forward to our regular unplanned discussions in the office.

### Contribution to Fisheries and Social Sciences in Tanzania

Paul's remarkable contribution to capacity development and research on fisheries' social and governance issues in Tanzania, Eastern Africa, and Africa is well known. He conducted extensive studies and consultancies on different issues in different countries. He supervised postgraduate students (MSc and PhD) on the socio-economics of fisheries in Tanzania, covering freshwater and marine fisheries. He will also be remembered for several projects that he attracted to SoAF that not only supported several Master's and PhD students but were equally important in providing funds for research for other academics and securing equipment.

It has been over two years since he passed on, but I still vividly remember our interactions, discussions, and arguments, particularly in our office. I will always remember his laugh, his smile, and his positivity in life.

*Rest in Eternal Peace, my mentee, colleague, office mate, and 'adopted' son! I will always cherish our time together, Paul* ■



Dr. Onyango (extreme right) with Prof. Shilla (extreme left) followed by Mr. Lusana and Mr. Malesa at the Kunduchi Campus. ©SoAF

## Celebrating the life of our colleague, Dr. Paul Ochie'ng Onyango



**Blandina R. Lugendo, James Lusana and Julius F. Woiso**

**W**e were hit hard by his demise. We expressed profound sorrow for his loss. This is an appropriate moment to commemorate his life! Dr. Paul Ochie'ng Onyango, whom many used to call him Paul! who referred to himself as “the Original Onyango,” differentiating himself from the famous Kenyan TV personality, was a cherished member of SoAF at the University of Dar es Salaam. Joining the University of Dar es Salaam as an Assistant Lecturer in 2007, he rose to Lecturer in 2011 and became a Senior Lecturer in 2016, the position he held until his untimely passing. To us, he was not only a colleague, but also a friend, a role model, and a mentor.

### A journey of academic excellence

Born in Rorya, Mara, on 6<sup>th</sup> December 1970, Dr. Paul’s academic journey began at Kagunga High School (1984 – 1989), followed by a Bachelor's degree in Arts at Nairobi University, Kenya (1990 - 1993). He earned an MSc in International Fisheries Management from the University of Tromso, Norway, in 2004 and later a PhD in Fisheries Socioeconomics at the same university in 2011. Dr. Onyango’s expertise and dedication took him to numerous national, regional, and international meetings and conferences, earning him the playful nickname of a *frequent traveller*. He represented SoAF in several countries, including Uganda, Mauritius, Kenya, Sweden, Netherlands, Australia, Thailand, Norway, Canada, Germany, Bangladesh, and Chile.

He also served as a member of the Board of the International Institute of Fisheries Economics and Trade (IIFET), a professional organization for experts on marine resource economics and trade issues, the Fisheries Governance Working Group program at the African Union – Interafrican Bureau for Animal



Paul holding seaweed in Zanzibar.  
©Paul Onyango family



## Celebrating the life of our colleague, Dr. Paul Ochie'ng Onyango

Resources (AU-IBAR), specialized technical office of the AU focusing on the improved utilization of animals (livestock, fisheries, and wildlife) as a resource for human wellbeing, and regional coordinator of the Too Big To Ignore (TBTI) research network for Africa, which addressed the marginalization of small scale fisheries in national and international policies.

### A Dedicated Educator and Mentor

Dr. Onyango's teaching portfolio spanned undergraduate and postgraduate courses in socioeconomics and business within fisheries, both at the University of Dar es Salaam and beyond. He supervised around 25 undergraduate students, nine MSc students, and ten PhD students. His scholarly contributions include 19 journal articles, 11 book chapters, and 7 conference papers, demonstrating his prowess in fisheries economics and social sciences. Most of his publications were in collaboration with his students or with scientists from within and outside that he worked with. One of the notable PhD research he supervised was that of the then PhD student, Lilian Ibengwe, which yielded some interesting results with policy implications. The study addressed insufficient information about the magnitude of the informal cross border fish trade (ICBFT), which leads to underestimating the fisheries sector's importance to the national economy. The study proposed a methodological approach that integrates the insights of the grounded theory and social network analysis to form 'a Networked Grounded methodological approach'.

He also provided consultancy services in fisheries economics and social sciences and served on several academic and advisory bodies. At SoAF, Dr. Onyango served as the Planning and Consultancy Coordinator and Seminar Coordinator, roles he performed with skills and fairness. His lectures and seminars were marked by insightful critiques, constructive advice, fairness, and infectious smile or laughter. His absence leaves a void, but his legacy continues to inspire.

### Grants and awards

Dr. Onyango was instrumental in preparing several impactful research projects focused on improving the livelihoods of the small-scale fishers along Lake Victoria, Tanzania. His efforts attracted significant funding to SoAF from notable funders such as the Department for International Development (DFID), Tanzania Commission for Science and Technology (COSTECH), and the Food and Agriculture Organization (FAO). In recognition of his contributions, he received the second-place award in the 'Collaborative Projects' category during the University of Dar es Salaam's 2021 Research and Innovation Week. This accolade not only honoured him but also brought prestige to SoAF.

### His iconic contributions

We would be remiss if we did not mention two icons that SoAF is proud of and whose existence is both a testament to his dedication, expertise, and vision. The first is the HEET Building at Kunduchi Campus. Dr. Onyango from CoAF by then, participated in the development of the proposal for the Higher Education for Economic Transformation (HEET) Project, which has led to the ongoing construction of a building that will host new classrooms at the Kunduchi Campus. The second is the construction of the National Mariculture Resources Centre at Kunduchi Campus, a significant initiative supported by the Government through the Ministry of Livestock and Fisheries. This centre, also under construction, will serve as a hub for mariculture research, fostering the development of the mariculture sector in the country. Although he did not live to witness these, the results are visible, and his contribution will live on. Nationwide, Dr. Onyango is remembered for his substantial role in drafting the 'Agriculture and Fisheries Development Programme (AFDP)' project, funded by the International Fund for Agriculture Development (IFAD). Paul also led or participated in several initiatives relevant to developing the fisheries sector in the country and Africa as a whole. Some of these included the Blue Print for Africa's Blue Economy Strategy. He also participated in the research project 'Developing a self sustaining management and conservation mechanism for Lake Tanganyika' and the consultancies on the 'Assessment and developing an inland fisheries co management plan and a simple monitoring system in the Bengo, Kwanza Norte, and Luanda Provinces'; 'Assessment of the performance of Beach Management Units (BMUs) along the coast of Tanzania', that was funded by SMARTFish of the Indian Ocean Commission; and Kigoma Municipality Fisheries Cluster Value Chain Analysis in Lake Tanganyika.

### A Trusted Facilitator and Master of Ceremony

Dr. Onyango was a respected academic, adept facilitator, and Master of Ceremony at various events within our school and on national and international platforms. His competence in this role was frequently recognized and sought after by colleagues from the Ministry of Livestock and Fisheries, where he often facilitated national conferences. A notable example of his expertise was in March 2021, when he facilitated the Tanzania National Fisheries Conference at the Julius Nyerere International Conference Centre in Dar es Salaam.

### A Friend to Many

Dr. Onyango's infectious smile, love for jokes, and compassionate nature made him a friend to many. He interacted seamlessly with staff and students at all

### Celebrating the life of our colleague, Dr. Paul Ochie'ng Onyango

levels, always exhibiting happiness through his constant smile and iconic laughter. Known for his love of jokes, he was compassionate and approachable, making him a go-to person for advice. Hence, many staff, students, and people outside academia approached him for advice! These qualities led him to be appointed as one of the school's counseling committee members.

#### Conclusion

Dr. Paul Onyango departed prematurely and suddenly, leaving behind a legacy filled with many unfinished projects. *He radiated a light so bright to the world that*

*even after he is gone, the light remains.* It is our task not to let them fade away and cherish the memory of our dear friend Paul. Dr. Paul Onyango's contributions to his department, SoAF, the University of Dar es Salaam, and the community at large will never be forgotten. We will continue to cherish and live by the good teachings and legacy he left behind.

***Rest in peace, our beloved brother, friend, and colleague, Dr. Paul Ochie'ng Onyango, the Original Onyango!*** ■



Paul and Lydia in a dhow in Rufiji Delta.  
©Lydia Gaspare



Dr. Onyango in Rufiji Delta.  
©Lydia Gaspare



©Rashidi Bilali





## The things that matter: Remembering Paul Onyango<sup>1</sup>

Prof. Sven Jentoff

UiT The Arctic University of Norway

**I** first met Paul Onyango at the MARE Conference in Amsterdam in 2001. He later enrolled in my university's International Fisheries Management Master Program, graduating as scheduled after two years. He became a PhD student in the Poverty Alleviation and Sustainable Livelihoods in Small-Scale Fisheries (PovFish) project (2008–2011), which I coordinated, and again I was his supervisor. After completion, he returned home to Tanzania and obtained a faculty position at the University of Dar es Salaam, where he excelled. Paul was an important member and a regional coordinator of the Too Big To Ignore (TBTI) research network for Africa. When he tragically passed away on April 10, 2022, only fifty-two years old, I lost a dear friend and a great colleague.

Paul's PhD fieldwork took place in two small-scale fisheries communities, Nyakasenge and Kasheno, on the southern shores of Lake Victoria. When the PovFish team met in Tanzania, he brought us to Nyakasenge to visit the people he worked with and see how they lived. We talked to some of his informants and met with community members on the beach. We encountered nothing but friendliness and curiosity about our mission. They shared their ideas and aspirations for the community and fishery and what they thought the government could help with.

Poverty was easy to notice, such as in the housing conditions and the absence of infrastructure. The community had neither a school nor a health clinic. Artisanal fishing was the only source of income. People had food with the fish and a backyard garden to grow vegetables. When we were there, a vehicle showed up on the beach to transport the fish to the city.

### Happiness and well-being

Despite their poverty, and much to Paul's puzzlement, he did not find people in anguish: "I did not see certain characteristics which have been used to describe the poor such as misery, hopelessness, and powerlessness." He wondered how it could be that



Dr. Onyango holding fish in Lake Victoria.  
©Paul Onyango family

people with so little worldly goods and opportunities "can wake up every morning with a smile on their face?" as he phrased it. "Poverty was part of their life, but certainly not everything," he wrote. Thus, being poor is apparently not the same as being unhappy. People tend to adjust their expectations and preferences to what they can realistically attain.

Paul argued that poor people's self-perceived contentment should not be an excuse for government

1. Extracted with permission from Jentoff, S. 2022. The things that matter: Remembering Paul Onyango. *Maritime Studies* (2022) 21:389–392. <https://doi.org/10.1007/s40152-022-00277-y>

## The things that matter: Remembering Paul Onyango

indifference. They have legitimate concerns that governments and other governing actors can help with. At a minimum, fisheries need secure rights to access resources and markets. Otherwise, they cannot have a sustainable livelihood. Also, without human rights, which the Small-scale Fisheries (SSF) Guidelines say should underpin small-scale fisheries' governance, people cannot experience the full measure of well-being, happiness, and dignity. Likewise, poor small-scale fisheries communities have their customary institutions and practices, which the SSF Guidelines suggest should be respected and nurtured. Communities may be poor, but they are not without human and social resources. Paul's thesis describes what these are in the communities he studied.

### Invisible presences

We do not always find what we are looking for when in the field. Instead, we find something else. Paul's observations led him to redirect his research perspective from what poor communities are lacking to what they are having and what they do with it to cope with their poverty. Despite the "visible absences" that Paul called them, people may still have attributes that help them manage and retain their self-respect. He started searching for those attributes. People may not always know what they do not have, like the things that people in developed countries have come to take for granted. Neither may they be fully conscious of what they do have.

Despite their lack of material wealth, poor people have each other and their community. They have social networks that tie them together. Economists and sociologists call this 'social capital' and consider it a resource in times of need. Networks are a set of social relations that can be mobilized for individual and collective gain. Along with his PhD thesis, he submitted a documentary film he made from his communities. Here, he argues that efforts to alleviate poverty should not necessarily commence from "visible absences" but from "invisible presences." In other words, development initiatives should build on what communities possess to provide what they lack.

The community experience is not fully captured by economic or sociological concepts alone. There is more to explore than the community's structure and function. We need to look beyond what Paul calls the visible absences and systematically search for the invisible presences. Community is a living experience. People also have identities rooted in a sense of togetherness and belonging, which give them a base for building their lives. Community is a "social fact," which is the term that Durkheim (1964) introduced. We inherit it. It was there before we were born. We must learn its norms, rules, and terminologies to become

members. We internalize its values. A community also works at a psychological level. Social facts like community have a feel. Belonging has a feel. Dignity, or the lack of such, is deeply felt. The same goes for poverty. It is about a lack of material necessities and an emotional experience. Paul had reason to expect the people he met in the Lake Victoria small-scale fisheries communities to feel depressed about their situation. Instead, he met a functioning community, which, despite its visible absences, had important things to offer its members, like a home.

### Moral commitment

As we observe and seek to explain poverty, as Paul did, we may rightfully be upset by it. Poverty is a social injustice and a moral issue. Therefore, poverty is not just a social fact, a characteristic of a world that people are born into and learn to accept as reality. As researchers, our stance on the injustice of poverty should not be distanced and 'objective.' To help eradicate poverty is also a legitimate mission for an academic. We chose our research topics because they are intellectually intriguing, and we care about them because they matter. Paul was such a social scientist. To make social science matter, it must address things that matter to people. As social researchers, we should explore in detail what it is about the community that makes people in small-scale fisheries, regardless of their insufficient, material well-being, feel happy about themselves and their community. The cause may not be very different for the poor and the rich. We all yearn for the respect and dignity we receive from our 'significant others'. When we lack it, we do not wake up with a smile.

Without equity, people cannot have dignity, and without dignity, people cannot have the self-esteem needed to become proactive in building their community. And without community, they cannot have dignity. The causal arrow of poverty and well-being runs forward and backward in a potentially virtuous circle. This is also the topic for Paul's documentary film, where he shows how local people drew on their invisible presence to fill visible gaps. As they did that, they felt proud of their achievements and good about themselves. They discovered their latent individual and collective capabilities.

### Optimism and social entrepreneurship

Paul noted that "in my assessment, I became an insider." He experienced that the community members perceived him as one of them despite initial uncertainty about who he was and what brought him there. Paul was a committed social scientist. He was not pretending to be a neutral observer. He was there with his moral self. He did not choose his research topic randomly but was upset about government



## The things that matter: Remembering Paul Onyango

failures and the visible problems in small-scale fisheries communities in his region. He was in it, not just with his knowledge and mind, but also with his heart because he cared. It did not blur his vision; it gave him a reason for looking and learning from what he saw.

Paul could see the communities not just from the outside, 'etic' perspective, as he was trained to do. His engagement with the people also allowed him to see the community from the inside and out, from what social scientists call an 'emic' perspective. Then, he could see what they saw and, by that, build on their ideas of what poverty eradication would involve in the communities he worked in. He could assume the perspective of those who experience poverty.

Paul writes in his thesis introduction: "I learned to appreciate how they (the fishers) relate to their fishing, not as an occupation of last resort, but something they value regardless of the income it provides". He argued that there is more to small-scale fisheries than work and livelihood; it is also a way of life and a source of personal satisfaction. Paul writes: "Being able to maneuver the winds and currents is a delight to fishers because besides receiving a favorable appraisal from fellow fishers at the beach. "I feel that I have some level of control," one fisher told him. Yet, fishers are fully aware that being on the water involves danger. Therefore, they look out for each other and offer help when needed.

By detecting the "invisible presences", he saw possibilities for economic and social development. This led him to be optimistic about the future of these communities and to talk about them with his smile,

which is one trait we remember him with. In Paul's observation, the invisible presence made community members take social responsibility to collectively carry out infrastructure projects that improved individual and community well-being. For "social entrepreneurship", one of his themes, optimism matters materially for building communities and, by that, a more dignified life. This is what his documentary film demonstrates.

### Governance interaction

Paul's work on poverty in small-scale fisheries communities convinced him that local people must be equal partners in governance processes. They are, after all, 'poverty experts' because they live it, he argued. They know what poverty is and feels like. They have ideas about what would make a positive difference in their community, many of them simple things. What you get when involving local people is not just their practical, experience-based knowledge.

Paul, therefore, concluded:

"The study shows inconsistency in how poor fishers, riparian to the Lake, and governing actors in Tanzania understand poverty in the fishing communities and how to confront it. This inconsistency exists at the meta-governance level, i.e., with regards to values, norms, and principles. The study proposes that to alleviate poverty, a solution to this difference should be sought from a governance mechanism that addresses the dissimilarity. This process must provide governing actors and the poor opportunities to interact to influence policy" ■



Paul consulting coastal communities. ©Paul Onyango family



## Celebrating the legacy of Dr. Paul Onyango: Nurturing fisheries socio-economic development in Tanzania

**Dr. Gideon Bulengela**

**Lecturer and Researcher, Mwalimu Nyerere Memorial Academy**

Between 2015 and 2022, the Tanzania Fisheries Research Institute (TAFIRI) and the Department of Aquatic Sciences and Fisheries Technology (DASFT) at the University of Dar es Salaam, now known as the School of Aquatic Sciences and Fisheries Technology (SoAF), were key partners in the Danish International Development Agency (DANIDA-funded project on the Projections of Climate Change Effects on Lake Tanganyika (CLEAT). The project aimed to enhance regional understanding of changes in water quality and fisheries in Lake Tanganyika, enabling sustainable fisheries management and ongoing climate change research. Among the project's significant contributors was the late Dr. Paul Onyango, a dedicated co-investigator and mentor.

My memorable journey with Dr. Onyango began in January 2015 when I received a PhD scholarship

through the CLEAT project. His first call to inform me of his appointment as my PhD supervisor marked the start of an unforgettable mentorship. Visiting his office at the University of Dar es Salaam the next day, I was greeted by his warm smile and welcoming demeanor, instantly assuring me of the excellent guidance and support that lay ahead.

Dr. Onyango's commitment to his students went beyond academic supervision. He was a father figure, a mentor, and a trusted confidant. His unique approach involved challenging us with probing questions and providing options, encouraging us to think critically and justify our decisions. This method not only prepared me well for my thesis defense but also instilled confidence and independence in my research journey.

My doctoral thesis, "*Unraveling socio-cultural drivers to fish catch dynamics of Lake Tanganyika*," greatly



Dr. Bulengela with his *viva* panelists, including his supervisor, Dr. Onyango. ©SoAF



Dr. Bulengela, when defending his PhD thesis. ©SoAF



## Celebrating the legacy of Dr. Paul Onyango: Nurturing fisheries socio-economic development in Tanzania

benefited from Dr. Onyango's extensive knowledge and anthropological expertise. His guidance was pivotal in developing a research methodology that explored the socio-cultural factors affecting fish catches. Collaborating with my co-supervisor, Prof. Joan Brehm from Illinois State University, I proudly became the first PhD graduate in 2021 from the newly established SoAF at the University of Dar es Salaam. Our work led to the co-authorship of four significant papers from the thesis focusing on local fisheries knowledge, climate-related changes, and fisheries resources management in Lake Tanganyika.

Dr. Onyango's dedication to his students' success extended beyond academic achievements. He treated us as friends, always available for discussions, even on

weekends. His patience and willingness to listen, whether about academic or personal issues, created an environment of trust and encouragement.

The legacy of Dr. Paul Onyango lives on through the many students he taught, mentored and the profound impact he had on fisheries socio-economic development in Tanzania. His contributions to the CLEAT project and the broader scientific community are deeply cherished and will be remembered for generations.

May his soul rest in peace, and may his legacy continue to inspire future generations of researchers and students in Tanzania and beyond ■



Paul briefing the Prime Minister of the United Republic of Tanzania, Hon. Kassim Majaliwa Majaliwa (MP) and the then Minister of Education, Science, Technology and Vocational Training, Hon. Prof. Joyce Lazaro Ndalichako when they visited SoAF exhibition during the Research and Innovation Week at the Main Campus on 21<sup>st</sup> May 2021 (top left) and Paul and other SoAF staff and students at the same event (bottom left) and Paul with Lydia in the field in Kibiti District. Left top and bottom ©SoAF and right ©Lydia Gaspare



## Leading the way in cage fish farming: The story of SAMEKI LTD

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**Hon. Said Meck Sadick**

**Managing Director, SAMEKI LTD**

**S**AMEKI LTD, based in Mwanza, has transformed from humble beginnings into a leader in cage fish farming in Tanzania, and possibly in Eastern Africa. Officially established in 2019, the company has achieved remarkable growth and expansion within just eight years. From increasing production exponentially to significantly expanding its workforce, SAMEKI's journey is one of hope, resilience, and seizing opportunities amid challenges.

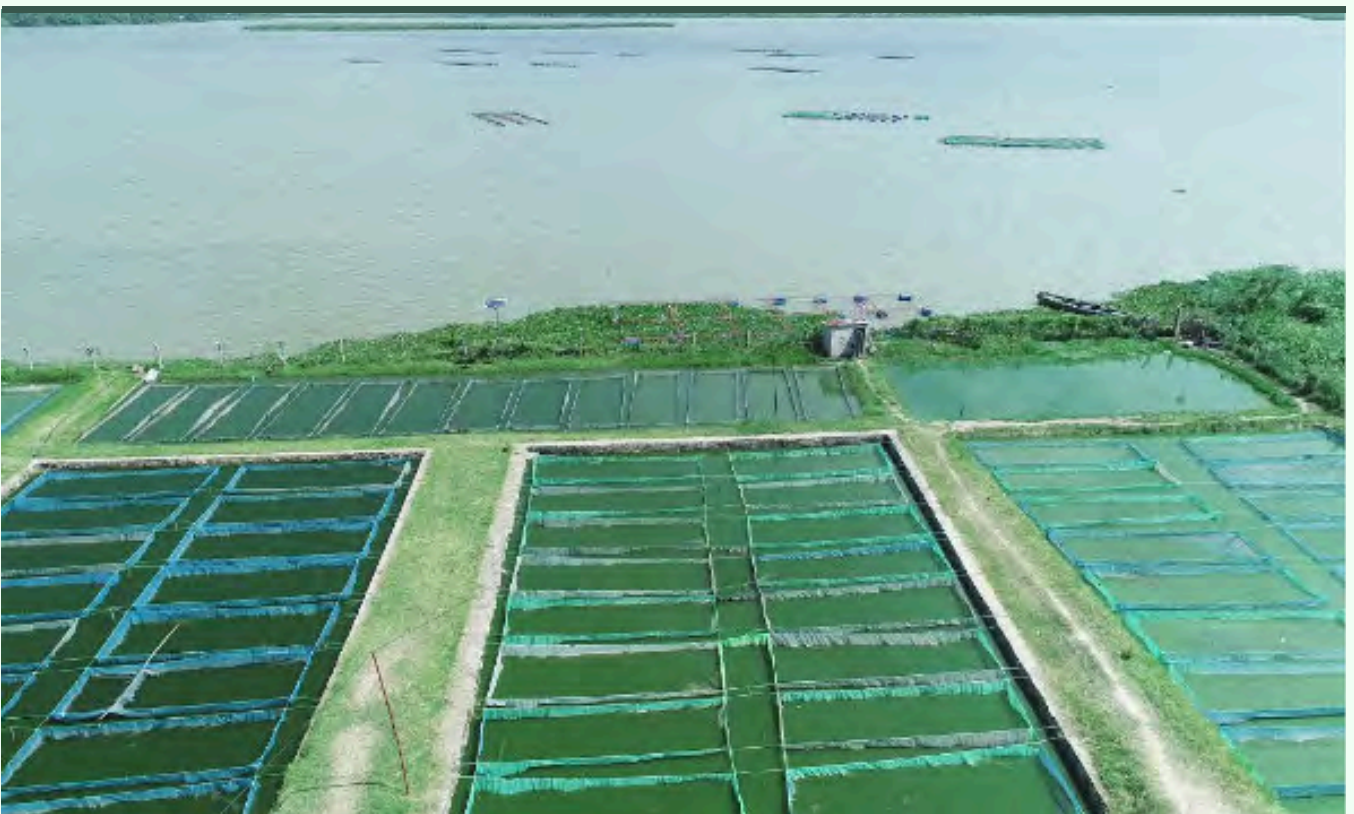
### **Birth of SAMEKI**

SAMEKI LTD started in 2016 with a focus on growing tilapia in earthen ponds. As demand and ambition grew, the company upgraded to durable concrete

ponds, which boosted production. In 2018, the company ventured into cage fish farming with four iron square cages. These grow-out ponds were converted into tilapia broodstock ponds to supply seeds for cages installed on the shores of Lake Victoria close to the company premises in Kamanga. Officially registered in 2019, SAMEKI LTD is the pioneer of cage fish farming and tilapia seed production in Tanzania, offering a scalable solution to ease the pressure on Tanzania's struggling wild-capture fisheries sector.

### **Challenges encountered**

SAMEKI's journey was not without obstacles. The company faced numerous challenges, especially in its early days. Obtaining the necessary permits for cage



SAMEKI Fish Farm at Kamanga site depicting Nile tilapia broodstock ponds, nursery and growout cages. ©SAMEKI LTD



## Leading the way in cage fish farming: The story of SAMEKI LTD

fish farming was a lengthy and costly process involving multiple governmental bodies. Sourcing quality fingerlings initially required importing from Uganda, leading to high mortality rates and logistical issues. The limited availability of quality fish feed in Tanzania caused delays and increased costs, impacting fish growth and health. Market instability, driven by consumer skepticism about farmed fish, resulted in inconsistent pricing and sales methods. Additionally, the unavailability of materials for cage construction locally necessitated expensive imports from Kenya. The company also had to navigate conflicts with local fishermen for fishing territories near the cages.

### Accomplishments

Despite these challenges, SAMEKI has made substantial strides. The farm has created over 30 jobs for both skilled and unskilled workers in aquaculture. It has become a hub for field practical training, welcoming students from various institutions for hands-on learning experiences. SAMEKI has diversified into selling fish feed, producing high-quality fingerlings, and offering out-grower services to new aquaculture ventures. The company supports aspiring fish farmers by providing technological know-how, operational guidance, and permitting assistance.

### Role of financial and academic institutions

Financial support and academic partnerships have been pivotal to SAMEKI's success. Tanzania Agricultural Development Bank (TADB) and Equity Bank provided crucial loans for establishment and expansion of fish farming activities. The company has been working with researchers from different academic and research institutions, such as Tanzania Fisheries Research Institute (TAFIRI), SoAF of the University of Dar es Salaam (UDSM), and the Sokoine University of Agriculture, who have helped in the breeding programs, disease control, and biosecurity measures.

### Looking ahead

SAMEKI LTD believes in the immense growth potential of the aquaculture industry in Tanzania and the broader region. Continued collaboration among industry players, government, financial institutions, research and academic institutions is essential to overcoming existing challenges and driving the sector forward.

Join us in celebrating SAMEKI's journey and envisioning a vibrant future for aquaculture in Tanzania ■



SAMEKI LTD hatching facility for Nile tilapia eggs at Kamanga site. ©SAMEKI LTD



## Securing the overlooked gardens under the sea - the seagrass meadows

**Dr. Blandina R. Lugendo**

Senior Lecturer, SoAF

**A**lthough not as well-known as coral reef and mangrove ecosystems, seagrass ecosystems have a rich and distinct biodiversity. They provide various ecosystem services directly linked to human well-being and environmental health. For instance, seagrass meadows provide breeding grounds for various species of fish and shellfish and protect shorelines against erosion by reducing wave energy. However, anthropogenic pressures threaten seagrass ecosystems, with sea level rise exacerbating the situation.

In 2018, a group of scientists from Tanzania, Mozambique, and Sweden, led by SoAF of the University of Dar es Salaam, received funding from the Western Indian Ocean Marine Science Association

(WIOMSA) under the Marine Science for Management (MASMA) programme to implement a four-year project titled 'Ecosystem-based protection of the coastal zone: the effectiveness of the seagrass meadows in coastal erosion management'.

The project focused on better understanding the status and conditions of the region's seagrass beds, the best methods for seagrass restoration, and how the presence of seagrass meadows can reduce hydrodynamic force and mitigate erosion. The project had six work packages (WPs). WP1 was designed to assess communities' perceptions of the value of seagrass meadows in terms of cultural, socioeconomic, and other immaterial benefits.



Dr. Lugendo with the then Kigamboni District Commissioner, Hon. Fatma Almas Nyangasa. ©Blandina Lugendo



## Securing the overlooked gardens under the sea - the seagrass meadows

Due to the widespread lack of knowledge about the extent of seagrass meadows in the WIO region, WP2 focused on the inventory and mapping of seagrass meadows in southern Mozambique (Maputo and Inhambane Provinces) and Tanzania's entire coast (including Mafia, Unguja, and Pemba Islands). This effort provided the basis information for the development of monitoring programmes as well as management strategies. WP3 was designed to examine the impacts of seagrass meadows on the adjacent terrestrial environments by analysing biodiversity (plants and macroinvertebrates) and environmental parameters (such as sediment organic matter and carbonate content, and sediment nutrients) in both the intertidal zone and the nearby terrestrial area. In addition, WP4 examined the influence of seagrass presence on shoreline profiles, topography, wave energies, sedimentation rates, and biodiversity in the intertidal zone. In WP5 a numerical model was developed to predict the amount of seagrass (in terms of density and coverage) required to reduce wave energy effectively. This model can also identify potential areas for seagrass restoration and determine the appropriate method for such restoration. The project also looked into best practices for seagrass restoration in high-energy coasts that characterizes most of Tanzania's coastlines (WP6)

The project's most significant impact is capacity building. The project supported five postgraduate students, including one PhD candidate (Manuela Amone-Mabuto) from Eduardo Mondlane University in Mozambique and four master's students, three (Maria Cuambe, Maria Americo, and Tsiaranto Fanoro) from Mozambique and one (January Wegoro) from Tanzania.

The second most significant output of the project is the production of seagrass maps showing seagrass coverage across the entire coast of the United Republic of Tanzania, which are the first comprehensive maps generated for the country. Another important product is a Seagrass Restoration manual developed based on this project's research findings. This manual will help raise awareness regarding seagrasses and promote community-led seagrass conservation and restoration in Tanzania, Mozambique, and the wider WIO region.

The Project's findings have been shared through journal articles, stakeholder workshops, and seagrass restoration demonstrations to promote awareness, community involvement, and informed decision-making. For more details about the project team, activities, and outputs, visit the project website at <https://marinescience2.wixsite.com/seagrassprotect>



Group photo with stakeholders after seagrass restoration demonstration at Puna, Kigamboni, Dar es Salaam. ©Blandina Lugendo

## Assessment of the ecological aspects of microplastic pollution in Dar es Salaam, Zanzibar and Mombasa coastal marine environments (MICROMARINE)



**Daniel Shilla, Dativa Shilla, John Mbugani, Asiya Nchimbi and Farhan Khan**

**P**lastic pollution has emerged as a pressing global environmental issue, particularly in marine ecosystems, where it poses significant threats to biodiversity and ecosystem health. Microplastics, defined as plastic particles smaller than 5mm in size, have gained attention due to their widespread distribution and potential adverse effects on marine organisms. The MICROMARINE project sought to comprehensively assess the ecological aspects of microplastic pollution in the coastal marine environments of Dar es Salaam, Zanzibar, and Mombasa. This short report presents the findings of field campaigns and ecotoxicological experiments conducted under the project, shedding light on the occurrence, distribution, and impacts of microplastics on marine organisms..



Manta net for collecting microplastics in surface waters.  
©Asiya Nchimbi

### Field campaigns

Field sampling efforts aimed to quantify the abundance and distribution of microplastics in surface water and seabed sediments across the study areas. Results revealed varying concentrations of microplastics, with fragments being the most prevalent type. Polypropylene (PP), high-density polyethylene (HDPE), and low-density polyethylene (LDPE) emerged as the predominant polymers. Moreover, microplastic ingestion was observed in fish samples, underscoring the potential for bioaccumulation within marine food webs.

### Ecotoxicological experiments

Laboratory experiments were conducted to assess the biological and ecotoxicological effects of microplastics on marine organisms, particularly fish. The histopathological impacts of microplastics on the gastrointestinal tracts of fish were investigated following long-term exposure and subsequent depuration periods. Significant damage to the small intestine was observed, compromising digestive function and potentially impacting growth and reproductive processes. While some recovery was observed post-depuration, the long-term implications of microplastic exposure warrant further investigation.

Furthermore, experiments explored the transfer of microplastics through marine food chains, highlighting the potential for bioaccumulation and trophic transfer of these particles. Microplastics were found to move from lower to higher trophic levels, raising concerns about their persistence and magnification within marine ecosystems. Additionally, the co-exposure of microplastics with chemical pollutants, such as Benzo(a)-pyrene (BaP), was examined, revealing histological effects on fish without detectable levels of BaP in the organisms studied.



## Assessment of the ecological aspects of microplastic pollution in Dar es Salaam, Zanzibar and Mombasa coastal marine environments (MICROMARINE)

### Experimental set up



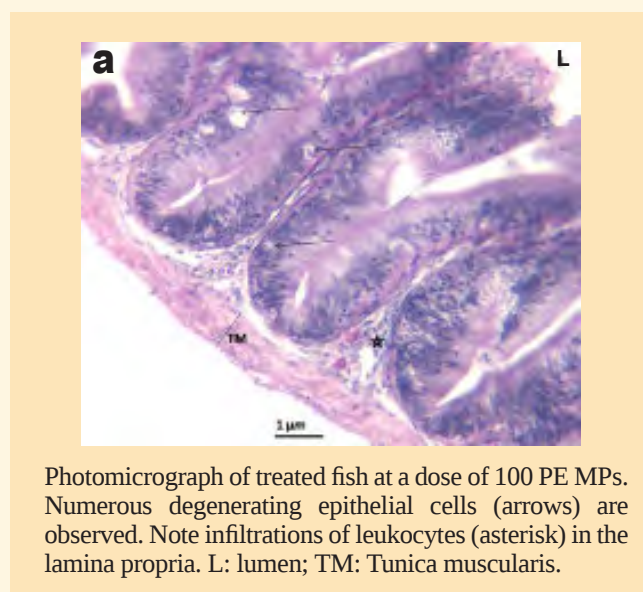
A higher magnification photomicrograph of treated fish at 100 PE MPs dose. Thin arrow: crypt gland cell; thick arrow: degenerating epithelial cell; Asterisks: leukocytic infiltration in the lamina propria; Bv: congested blood vessel. All photos ©John Mbugani

### Implications and future directions

The findings of the MICROMARINE project underscore the pervasive nature of microplastic pollution in coastal marine environments and its potential ecological ramifications. While acute

exposure to microplastics may not immediately impact organism survival, chronic exposure can lead to adverse effects on health and fitness. The complex interactions between microplastics, marine organisms, and chemical pollutants necessitate further research to fully elucidate their ecological impacts.

Moreover, the results emphasize the importance of implementing proactive measures to mitigate microplastic pollution and protect marine ecosystems. Strategies such as improved waste management, regulatory interventions, and public awareness campaigns are critical in addressing this growing environmental threat. Collaborative efforts between scientists, policymakers, industry stakeholders, and the public are essential to develop effective solutions and safeguard the health of our oceans for future generations.



Photomicrograph of treated fish at a dose of 100 PE MPs. Numerous degenerating epithelial cells (arrows) are observed. Note infiltrations of leukocytes (asterisk) in the lamina propria. L: lumen; TM: Tunica muscularis.

### Conclusion

The MICROMARINE project provides valuable insights into the ecological aspects of microplastic pollution in coastal marine environments. Through field campaigns and ecotoxicological experiments, the project has advanced our understanding of the occurrence, distribution, and impacts of microplastics on marine organisms. Moving forward, concerted action is needed to mitigate microplastic pollution and preserve the integrity of marine ecosystems for the benefit of both wildlife and human populations ■



## My insight into the Diploma in Fisheries Science program at Kunduchi

**Prof. Amelia Kajumulo Kivaisi**

Professor Emerita, University of Dar es Salaam

**I** graduated from Kunduchi Marine Fisheries Research and Training Institute (KMFRTI) in 1972. I was first employed as District Natural Resources Officer in Mtwara (1972-1973) and then as Research Assistant at Nyegezi Freshwater Fisheries Institute in Mwanza (1973-1975). Through an equivalent entry qualification, I joined the University of Dar es Salaam (UDSM) where I took a BSc degree majoring in Zoology and Marine Biology. After graduation in 1978, I returned to KMFRTI as tutor in Marine Sciences for two years. However, in the course of my degree studies, I developed a strong interest in microbiology and so decided to pursue the field to MSc and PhD levels. These qualifications opened a new chapter in my career at UDSM as lecturer and eventually promoted to Professor of Applied Microbiology. This article provides an overview of the Diploma in Fisheries Science program at KMFRTI and recounts my experience while undertaking it. The article further provides my view on the impact of the training institute on the fisheries sector.

### The Diploma in Fisheries Science program

Established in 1967, KMFRTI was a flagship institution that offered training in fisheries sciences at Diploma level in Tanzania. The Diploma program was comprehensive and provided students with appropriate knowledge in important aspects of the industry that was then in its infancy. Through hands-on training using practicals that complemented the theory, and engagement of fishing communities through field work, the program equipped the students with skills and competences required to serve as field fisheries managers, managers of projects, and for carrying out outreach programs. Since insights into program content, infrastructure and facilities for teaching were provided by a number of contributors to the first edition of this Newsletter, I will straight away continue to share my story about pursuing the diploma.

### Pursuing my Diploma

I was a member of the cohort of students who enrolled for the program in 1970 and one of the four female students. I got an impression that the program was tough after hearing stories from our senior colleagues. However, I was not discouraged and promised myself to carry on. Many of the courses were interesting but challenging thus required determination, hard work and resilience. For me, the most challenging courses were night fishing, swimming and boat handling. All students had to take turns in groups to go fishing in the company of technical staff. Staying at sea overnight was alright but the problem arose when it became stormy. It took me a while to overcome sea sickness. Furthermore, the thought of night fishing in the company of strangers was quite scary in the beginning. However, all night fishing trips were safe thanks to the high level of discipline demanded by the instructors from the fishing team. Many of our night fishing trips were a success and recorded big fish catches. Another challenging but memorable experience was going through extension work with the fishing community at Nyumba ya Mungu Dam. Here I experienced fishing from a dugout canoe and learnt a lot from the fishermen and women who did the processing.

Despite their challenging nature, I found boat handling and swimming enjoyable. My first rewarding experience was when I passed a boat handling test which was to drive from the institute to Mbudya Island that lies 4 km away. At the beginning, I was scared of the sea hence managing to float and swim at sea for the first time marked an important milestone. I am proud to say that I managed to go through the program successfully and so did the rest of my classmates including the rest of the female students Mwajuma, Maria and Janeth. My determination, the encouraging tutors, and the strength I drew from sisterhood made it possible. I wrap-up my story by saying that while at Kunduchi, I learnt two important things that actually guided me through my career journey: 1) To trust myself and never to be afraid



## My insight into the Diploma in Fisheries Science program at Kunduchi

to try new things and 2) That teamwork leads to greater achievements.

### Impact of KMFRTI

Although not based on a particular study, my view is that KMFRTI had a remarkable impact on the development of the fisheries sector in the country. By producing graduates with a Diploma in Fisheries, the institute contributed towards increasing a critical mass of well trained personnel needed for managing the fisheries resources in the country and for providing the required technical support for the fisheries industry at large. For example, a number of my classmates from the institute held positions as District Fisheries Officers, District Natural Resources Officers, and Research Assistants. Moreover, numerous holders of the Diploma from KMFRTI qualified for admission into a BSc degree in Zoology and Marine Biology at UDSM. On graduation, they served in various positions in the Fisheries Department under the Ministry and in academic institutions including UDSM and KMFRTI. Furthermore, KMFRTI contributed towards changing

the social norms that prevented women from going fishing. By enrolling women to undertake training under a program that required all students regardless of gender to go fishing at sea, the institute indirectly addressed the negative society mindset. I am convinced that some of the female graduates from KMFRTI who became fisheries managers at district level inspired young women to venture into mainstream fisheries. An exploratory study to document success stories of earlier graduates would enrich the history of Kunduchi.

KMFRTI campus was integrated into UDSM in 2002 and its signature program, the Diploma in Fisheries continued to be offered by FAST. I have however, learnt that the program no longer features among those currently offered. The question is, did the program lose its relevance? If not, then I call upon SoAF to build a case to reinstate it. I conclude by saying that being the first institute to produce skilled personnel who served as middle level fisheries managers at district level, KMFRTI pioneered and championed the development of the fisheries industry in Tanzania ■



Intertidal zone off the Kunduchi Campus. ©Rashidi Bilali



## ‘Kunduchi Marine Biological Station’ Revisited

**Prof. Kamazima M. Lwiza**

Associate Professor, Stony Brook University, USA

**I**n 1979, I graduated from the University of Dar es Salaam with a Bachelor of Science degree in Mathematics and Physics (with Education). I was a top student in both majors. Professor Nikundiwe, who was the dean at the time, strongly encouraged me to join the Zoology and Marine Biology Department. However, I couldn't join the department because I majored in Mathematics and Physics (with Education), which meant I was supposed to teach in a secondary school after graduation. It was a good system, but it meant one's career was at the mercy of the Ministry of Education. The officer in charge of teacher appointments in the Ministry of Education wasn't sympathetic to Dr. Nikundiwe's pleas, even though he had already secured a British Council scholarship for me. I tried to talk to the gentleman several times, but he wasn't moved. In fact, he got annoyed with me and said, "I have given you a Mtwara appointment." Being young and brash, I responded, "Thank you, but no thank you. No offense to Mtwara. I am not going to Mtwara. If I'm not allowed to join the University of Dar es Salaam, I don't need any appointment." I got up and left, but by the time I reached downstairs, someone came running and told me, "Mr. Yohana told me to tell you that he has given you an appointment at Kahororo Secondary School in Kagera." I politely thanked the gentleman and continued walking out of the building. I went to the University, told Dr. Nikundiwe what happened, and said I needed to go home. He agreed, but unbeknownst to me, he went to talk to ministry people the next day.

### Joining University of Dar es Salaam as an academician

To cut a long story short, Dr. Alfeo Nikundiwe struck a deal with the ministry that I teach for one year and then would get a release to join the University. I taught at Kahororo Secondary School, and perhaps my happiest memories as an educator are with that place. A year

came and went, but the ministry did not send a release letter. I wrote reminders and called on the phone to no avail. One day in August 1980, I got up and told my parents that I was going to Dar to fight for my rights. They were nervous but didn't know what to do with me. I bought the airline ticket the same day and flew to Dar. When I landed, something told me to go to the University before I went to the ministry. I went to the faculty appointment/employment office of the Chief Academic Officer. I found a lady there who knew me from church, and she said, "At long last, Lwiza, you are here. We got your release letter a long time ago, but we didn't know how to reach you." The next day, I got my appointment letter. I was officially an employee of the University of Dar es Salaam. I know that Dr. Nikundiwe was happier than I was. God bless his soul!

Things moved fast. By mid-September, I was on a flight to the United Kingdom to study Physical Oceanography at the University College of North Wales (now Bangor University) at Bangor. One year later, I came back with a Master's degree. Most faculty members working at Kunduchi Marine Biological Station, as it was known then, specialized in marine biology and fisheries biology, e.g., Prof. Philip Bwathondi and Dr. Ian Bryceson (he later became a professor when he moved to the Norwegian University of Life Sciences), and the late Dr. Boniface Mwaiseje. However, Dr. William Kudoja was the first chemical oceanographer in the country, and I was the first physical oceanographer. Then the late Prof. John Machiwa followed as the second chemical oceanographer.

### Conducting research on physical oceanography

At Kunduchi, there was excitement and challenges. We didn't have a seaworthy research boat, and the Institute of Marine Sciences in Zanzibar had a boat donated by West Germany, but didn't have funds for maintenance, let alone doing research work. We taught classes on the main campus at the Hill and had a few fieldwork trips for students at Kunduchi, plus the mandatory sea survival class, which students erroneously called



## ‘Kunduchi Marine Biological Station’ Revisited

swimming class. I was blessed with a great talent for my first class at UDSM. It included students like Prof. Yunus Mgaya, the late Mwelecela Malecela, James Jihulya, the late Anna Millanzi, Sifuni Mnzava, and the late Florence Mtoka. I taught the introduction to physical oceanography, but for those interested in research, I also taught them programming in BASIC because the department had a Sinclair computer (with 128 kb of memory!). I preferred FORTRAN, but we had to deal with what was available to us.

Most of the research work in oceanography was not funded primarily because people weren't used to oceanographers. Therefore, one had to find work that could be done locally at Kunduchi. I studied tides using do-it-yourself (DIY) wooden tide poles. I examined circulation using oranges and chasing them around with a boat and using a compass and landmarks on the shore to obtain their position fixes. The method is crude, but it did produce sensible results. In addition, it opened new doors for me when the Ministry of Natural Resources came looking for someone to solve the beach erosion problem. This scared me because I didn't study beach erosion because it is not part of marine physics.

### Tackling beach erosion problem in Dar es Salaam

We, meaning myself and the Ministry of Natural Resources, had a bit of a rocky start. They first invited me to listen to an expert from Italy who didn't know much about beach erosion in the tropics. He kept talking about sand dunes in winter versus summer. I was young and confident at the time, so I eventually raised my hand and asked him if he knew the difference between temperate and tropical climates. Needless to say, I wasn't very popular that day. After a month, even the ministry realized he was clueless. I ended up combing through the library to read any papers I could find on beach erosion. That's when I stumbled upon Kosro's thesis abstract from Scripps Institute of Oceanography, the University of California, San Diego. I wrote to him asking for a copy of his thesis, and he graciously sent it to me. I learned a lot about beach erosion and how to conduct measurements.

After three months, the ministry invited another expert from Norway. I've forgotten his name, but he was a real gentleman. He did a lot of groundwork, surveying the area by land, water, and air. He asked a lot of questions about the area. Since I had learned the language of beach erosion, he thought I was an expert even when I told him I wasn't. After he summarized his report, he said, "You're not going to solve this problem by hiring external experts. You need to grow your own and trust them. Mr. Lwiza can help you more than me."

The ministry listened to his advice. I was tasked with designing the groynes, which are piles of rocks lined perpendicular to the coastline. The technical term is permeable groynes, which is designed to allow some sand to filter through to the next section. Otherwise, if they're not permeable, they'll block all the sand and starve the next section, resulting in erosion. Contractors would sometimes cheat and put them too close to each other to make more money. I would come and take measurements and tell them to remove the extra groynes. Some would try to argue and say that they were following what Dr. Lwiza said. I would reply, "Go tell Dr. Lwiza that he is wrong. He should come to see me!"

### After completion of the PhD

In September 1987, I went back to Wales for the PhD, completed in December 1990. When I returned home, this was the period when the University Students "Walikuwa wamemtukana Rais matusi ya nguoni". For days on end, faculty staff would sit idle doing nothing. I started applying to several places for work. I got a postdoctoral position in Wales and an assistant professorship in the US. I asked Stony Brook University to wait for six months while I did the postdoctoral work in Bangor because I liked the research they were doing.

After 33 years at Stony Brook University, I have mellowed out. Looking back, I have no regrets but pride for what has been achieved. I have researched the South China Sea, Caribbean Sea, Bay of Bengal, and several other places. I still enjoy going out to sea. I enjoy writing programming codes for lakes, estuaries, and oceans, but lately, I enjoy writing machine learning codes more. Most of all, I enjoy working in East African lakes, such as Lake Victoria and Lake Turkana in Kenya.

I wrote this essay mainly with students in mind. You should learn to work with what you have ■



Beach at the Kunduchi campus. ©Rashidi Bilali



## Molecular revelation: Unveiling the hidden secrets of Tanzania's seagrasses

**James Leonard Lusana**

Assistant Lecturer, SoAF

The coastal waters of Tanzania are home to a hidden botanical bounty, one that thrives beneath the waves and holds secrets to both the complexity and the diversity of marine life. Our recent molecular voyage into this submerged world has charted a course through the complex taxonomy of twelve seagrass species, shedding light on their morphological and genetic questions while also expanding our understanding of the coastal ecosystem's diversity, providing insights that may be critical for conservation and environmental management efforts.

Seagrasses are the unsung heroes of the coastline, vital to the health of our oceans. They are not merely plants but sentinels and sustainers of marine biodiversity, acting as carbon sinks and nurturing grounds for countless marine species. Yet, these oceanic plants are often enigmatic, with species displaying a range of morphological adaptations that reflect the dynamic environment they inhabit. One genus that showcases this adaptability is *Halophila*. We observed two morphotypes of *Halophila ovalis* - smaller leaves in areas exposed during low tide, which could easily be mistaken for *Halophila minor*, and larger leaves found in deeper waters or areas with continuous submergence. Similarly, *Halodule uninervis* presented itself in two forms: narrow-leaved in shallow areas and broad-leaved in deeper zones. This kind of morphological plasticity can complicate taxonomy but is a testament to the resilience and adaptability of seagrasses.

The study rectified a longstanding seagrass species misidentification. The species *Halodule wrightii*, previously reported in Tanzanian waters, is notably absent. Instead, we discovered that what was thought to be *H. wrightii* is in fact, a narrow-leaved form of *Halodule uninervis*. Adding to the list of firsts, the study recorded the presence of *Halodule pinifolia* for the first time in Tanzania. Furthermore, among the 12 seagrass species identified were *Halophila stipulacea*, *Thalassia hemprichii*, *Cymodocea rotundata*, *Syringodium isoetifolium*, *Thalassodendron ciliatum*

and *Enhalus acoroides*. Notably, *Zostera capensis*, which is listed in the International Union for Conservation of Nature (IUCN) Red List as Vulnerable, is reported for the first time on mainland Tanzania, a significant finding that adds a new page to the country's marine biodiversity records. Our analysis also advocates for a taxonomic reexamination in the genus *Cymodocea*. The study provided compelling evidence to a recent reclassification of *Cymodocea serrulata* into a new genus and species, *Oceana serrulata*, based on its closer genetic tie to *Syringodium* species rather than to other *Cymodocea* species.

These revelations highlight the importance of molecular tools in unraveling the complexities of marine biodiversity. Understanding the true diversity and distribution of seagrasses is essential for the effective conservation of these vital ecosystems. Such knowledge empowers not only the scientific community but also local stakeholders, enabling better stewardship of Tanzania's rich marine heritage. This work serves as a beacon, guiding future research and conservation efforts. Our exploration of Tanzania's underwater meadows is more than a scientific triumph; it is a story of discovery and connection. As we continue to explore the depths of these lush seagrass beds, we are reminded of the complex web of life that we are a part of—a web that thrives beneath the waves, as essential to our existence as the air we breathe.

**Funding:** This study was funded by the Western Indian Ocean Marine Science Association (WIOMSA) under Marine Research Grant (MARG) – I programme.

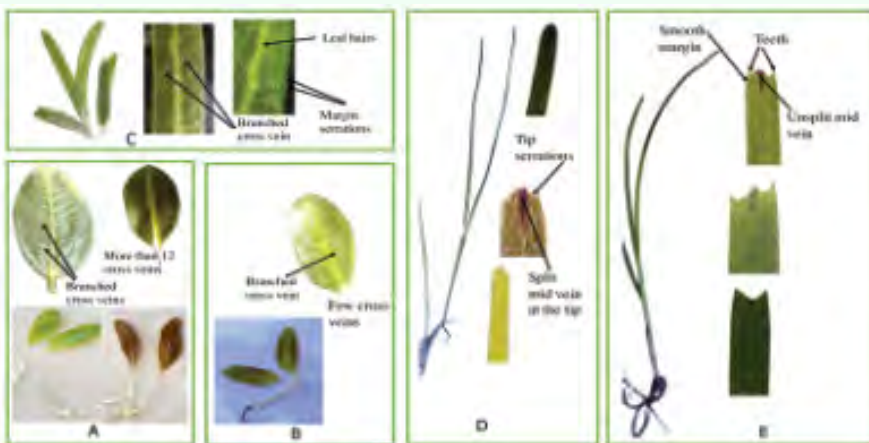
**Citation:** Lusana JL, and Lugendo BR. (2023). Delineating seagrass species in the genera *Halodule* and *Halophila* from Tanzanian coastal waters using ITS and rbcL DNA barcoding. *Nordic Journal of Botany*. <https://doi.org/10.1111/njb.03823>



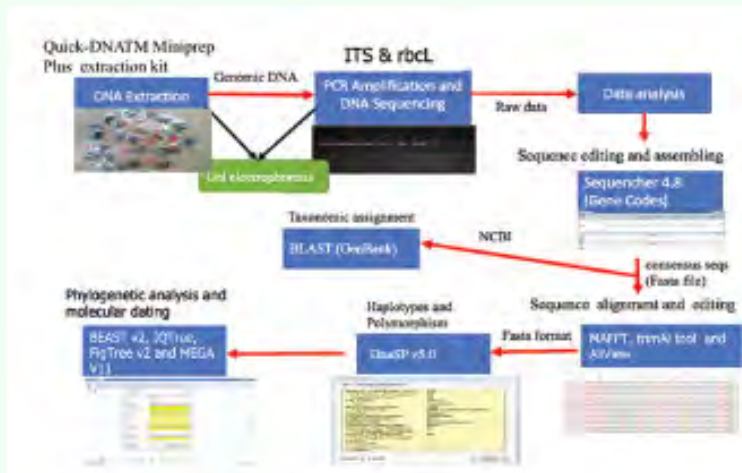
Molecular revelation: Unveiling the hidden secrets of Tanzania’s seagrasses



Seagrass meadows. ©January Wegoro



Leaf morphological characteristics of *Halodule* and *Halophila*. (A) Leaf morphology of *Halophila ovalis* with many cross veins, often branched. (B) Leaf morphology of *Halophila minor* with fewer cross veins, occasionally branched. (C) Leaf margin and surface characteristics of *Halophila stipulacea*. (D) Leaf tip morphological variation of *Halodule pinifolia*. (E) Leaf tip morphological variation of *Halodule uninervis*.



Molecular analysis workflow



Fieldwork pictures. Left ©Blandina Lugendo; middle and right photos ©Humphery Mahudi



## Revealing the invisible blue economy: Contribution of milkfish (*Chanos chanos*) mariculture to socio-economics and livelihoods of coastal communities in Tanzania

**Dr. Samwel M. Limbu**

Senior Lecturer, SoAF

Capture fisheries have for long been recognized as key contributors to the supply of fish for human consumption and as a source of income generation and employment. However, catches from capture fisheries have stagnated over the years while the human population continues to grow. Aquaculture production has emerged as an alternative source of fish protein and is expected to bridge the gap created by declining wild fish production. Broadly, aquaculture activities are conducted in freshwater and marine waters, with the latter referred to as mariculture. Currently, mariculture contributes 35 million tonnes to the total global finfish production.

Mariculture has a significant history in Tanzania, with scientific studies indicating that it began in the early 1980s when attempts were made to culture rabbitfish (*Siganus canalicullatus*) in the coastal waters. Since then, various efforts have been undertaken to develop the mariculture industry as we know it today. These

efforts include the establishment and operationalization of the Korea - Zanzibar Friendship Mariculture Centre, developed by the Revolutionary Government of Zanzibar (RGoZ) with funding from the Korea International Cooperation Agency (KOICA) under the supervision of the Food and Agriculture Organization (FAO) of the United Nations. Currently, mariculture production is an important subsector in Tanzania, contributing to blue economy development by enhancing socio-economic conditions and livelihoods for coastal communities.

Milkfish (*Chanos chanos*) is one of the most crucial mariculture species cultured by these communities. Milkfish farming started in the late 1990s in Zanzibar, beginning with experiments and pilot projects in ponds at Makoba. It is deemed a suitable mariculture species due to its herbivorous feeding habits and ability to withstand significant fluctuations in salinity and temperature. Consequently, it is cultured in various



Milkfish (*Chanos chanos*) farmers harvesting from their pond. ©Naima Naibu Mohamedi



## Revealing the invisible blue economy: Contribution of milkfish (*Chanos chanos*) mariculture to socio-economics and livelihoods of coastal communities in Tanzania

mariculture production systems, including cages, pens, and earthen ponds.

To date, milkfish farming in Tanzania primarily occurs in earthen ponds located in coastal waters behind mangrove stands. However, current production levels of milkfish are low compared to other freshwater species, such as Nile tilapia (*Oreochromis niloticus*). This low production is attributed to a limited understanding of milkfish's socio-economic contributions and its impact on the livelihoods of coastal communities in Tanzania. This study assessed the contribution of milkfish pond farming to the socio-economics and livelihoods along the Tanzanian coastline. Sixty-three milkfish farms were interviewed using a semi-structured questionnaire.

The results indicated that low production levels characterized milkfish pond farming. Production was positively influenced by farmers' experience, the number of fingerlings stocked, and pond fertilization. Conversely, milkfish pond farming was significantly negatively affected by the duration of culture and age of the farmers. The results further indicated that milkfish pond farming is a source of income for owners who sell their fish through retail, wholesale, and on-farm sales using mobile phone

communications. However, the milkfish pond farms in the studied areas experienced negative profit margins considering all financial factors. Interestingly, milkfish pond farming provides food, income, and employment for the community. Despite these benefits, the industry faces constraints such as inadequate feed, limited seed availability, insufficient funds, lack of technical support, and issues with theft and predators. Therefore, addressing these challenges is crucial for enhancing the contribution of milkfish pond farming to the socio-economic well-being and livelihoods of coastal communities, particularly in the context of blue economy development for sustainable community sustenance.

**Funding:** The Western Indian Ocean Marine Science Association (WIOMSA) funded this study through the MASMA Project.

Citation: Shalli, M.S., Mmochi, A.J., Rubekie, A.P., Yona, G.K., Shoko, A.P., Limbu, S.M., Mwita, C.J., Lamtane, H.A., Hamed, S.S., Jiddawi, N.S. and Mapenzi, L.L. (2024) The contribution of milkfish (*Chanos chanos*) pond farming to socio-economics and coastal community livelihoods for a sustainable blue economy in Tanzania. *Aquacult Int.* <https://doi.org/10.1007/s10499-024-01408-4> ■



A typical yield of milkfish (*Chanos chanos*) from the one of the ponds visited. ©Samwel Mchele Limbu



# SoAF Leadership



**Dr. Blandina Robert Lugendo**  
Dean



**Dr. Siajali Pamba Zegge**  
Head, Department of Aquatic  
Sciences and Fisheries Technology



**Dr. Samwel Mchele Limbu**  
Head, Department of Aquaculture  
Technology



# Staff News

## NEW STAFF



**Mr. Emmanuel Shimwenda**  
Laboratory Scientist II



**Ms. Esther Gasper Kaole**  
Laboratory Scientist II



**Mr. Francis Momburi**  
Driver II



**Mr. Kassimu Mnonji**  
Human Resource Officer I

## PROMOTIONS



**Dr. Betina M. Lukwambe**  
Lecturer to Senior Lecturer



**Dr. Nyamisi Peter**  
Assistant Lecturer to Lecturer



**Mr. Cornel A. Saleco**  
Accountant II to Accountant I



**Ms. Verynice H. Temu**  
Lab Scientist II to Lab Scientist I



**Ms. Millen Elvis Minja**  
Senior Record Management  
Assistant I to Principal Records  
Management Assistant II



**Ms. Herieth J. Mwamboza**  
Personal Secretary II to  
Office Management Secretary I



**Mr. Deogratius Mzukila**  
Driver II to Driver I

## TRANSFERRED



**Mr. Iddy Siraju Munis**  
Driver II  
Transferred to CoAF

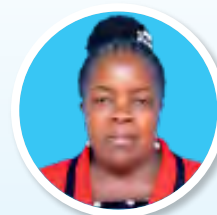
## RETIRED STAFF



**Mr. Yukundus Mhonda**  
Retired Principal Laboratory Scientist II



**Dr. Pazi Mwinyimvua**  
Retired Principal Laboratory Scientist I

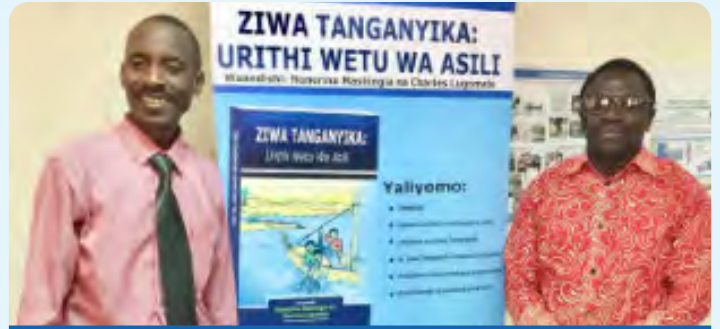


**Mrs. Simphorosa Mchallo**  
Retired Principal Administrative Officer

# Photo Gallery



Prof. Machiwa, with colleagues visiting one of the potential sites for the Lindi Campus. ©CoAF



Dr. Onyango, with his last PhD student, Dr. Gideon Bulengela.



Commemorating International Women's Day 2024 at SoAF.



The visit by Pukyong National University (PKNU) delegation at SoAF.



Visit by Prof. Rizick Shemdoo, Permanent Secretary Ministry of Livestock and Fisheries on SoAF Exhibition Booth during the Africa Small Scale Fisheries Summit 2024 at Mlimani City, DSM.



Participants of the Seagrass Workshop organized by SoAF in Tanga – February 2024.



Dr. Samwel Mchele Limbu (at the center) was recognized and honored with a Scholarly Distinction Award for his contribution to publishing articles in high impact journals during the Ninth UDSM Research and Innovation Week (RIW) 2024. ©UDSM



Dr. Betina Lukwambe and Prof. Daniel Shilla were honored with the Scholarly Distinction Award for their contribution to publishing articles in high-impact journals during the Ninth UDSM Research and Innovation Week (RIW) 2024. ©UDSM

All photos ©SoAF except for those individually marked



# Photo Gallery



Launch of the State of the Coast Report for Mainland Tanzania in May 2024. ©NEMC



MSc student Mr. Denice Fredrick during his pre-viva presentation at SoAF Board Room.



Exhibitions during the UDSM Research Week at SoAF in May 2024.



SoAF exhibitors during the Third Blue Economy Conference organised by DMI in Dar es Salaam in July 2024.



Visitors at the SoAF Booth during the Third Blue Economy Conference organised by DMI in DSM in July 2024.



Participants to the WIOBATHY Stakeholders Workshop in Dar es Salaam organised by SoAF and KMFRI.



A critically endangered fish, the Coelacanth, was accidentally caught by fishermen and is currently preserved at SoAF.



SoAF staff Dr. Rashid Tamatamah received an award as the Champion of Aquaculture Development in Tanzania during the 3<sup>rd</sup> East Africa Regional Aquaculture Conference held in Mwanza in 15<sup>th</sup> August 2024. ©Samwel Mchele Limbu

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