



The 3rd Eastern African Regional Aquaculture Conference Mwanza, Tanzania, 13 - 15 August 2024

Programme, Abstracts and Guidelines to Speakers



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1. THE EASTERN AFRICAN REGIONAL AQUACULTURE CONFERENCE (EARAC III)

Aquaculture in Eastern Africa is advancing rapidly, especially for large-scale producers that are well-connected to technology, science, capital and opportunity. These large-scale producers are key to the growth of the sector, but in achieving the UN's Sustainable Development Goals, mainstream participation of subsistence, small and medium scale farmers, is also essential.

To mainstream these farmers, the value chain that makes aquaculture business possible and profitable, requires support. For this, farmers need access to quality feed, seed, goods, services, technology, research and capital in a competitive manner. This will not only allow farmers to contribute to household food security and local fish supply, but will also allow for greater profitability and expansion into fully-fledged commercial entities that are capable of creating jobs, supporting market demands and transforming Eastern African aquaculture into a vibrant private-sector led business sector.

Mainstreaming of subsistence, small and medium scale farmers, will require greater formalization. For this to happen, farmers will need to register their businesses, pay taxes and comply with other formal sector business conventions and regulations. This in turn, relies on better business planning, as well as production and financial record keeping. Adoption of these practices will allow for greater access to credit and capital, while opening up the potential for supply of fish into formal and export markets.

Traditionally, aquaculture conferences are predominantly attended by government officials, policy makers, academia and some large-scale producers. In the Third Eastern African Regional Aquaculture Conference (EARAC III) the aim will be to attract and cater also for smaller producers, by running farmer-dedicated sessions and discussions in parallel with academic and governance sessions.

The planning and hosting of the conference is a collaborative effort between the United Republic of Tanzania, its Ministry of Livestock and Fisheries, the EU-funded TRUEFISH

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Project hosted by the East African Community's Lake Victoria Fisheries Organization (LVFO), and African Chapter of the World Aquaculture Society (WAS), and the Aquaculture Association of Tanzania (AAT). A range of partners and supporters have made the event a reality, including the United Nations Development Programme (UNDP), Landell Mills as one of the implementers of TRUEFISH, Gatsby Africa, the World Initiative for Soy in Human Health (WISHH) and the Nature Conservancy.

Now in its third rendition, it can be said that EARAC offers a platform for information exchange, for the building of partnerships and networking among public and private sector stakeholders, and for fostering equitable and sustainable commercial aquaculture development. The 2024 conference in Mwanza, Tanzania, under the theme "***Mainstreaming Small-Scale Aquaculture***" aims to:

- Highlight the positive role smallholder aquaculture producers and enterprises have played in transforming the regions' aquaculture sector.
- Serve as an information dissemination point for practical aquaculture business development.
- Unify the aquaculture sector in Eastern Africa at all scales of production.
- Foster the gains the industry has achieved and promote sustainable commercial aquaculture development through whole value-chain support.

Welcome to Mwanza – Let's Rock Aquaculture in Rock City!

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2. OVERVIEW OF THE CONFERENCE PROGRAMME OVERVIEW

Time	Activity	Facilitator / Speaker
DAY 1	Tuesday 13 August 2024	
	SESSION 1	Main Hall
07:00 - 08:30	Arrival / Registration - Exhibition from 09:00 to 17h00	Secretariat
08:30 - 08:35	National Anthem / East Africa Song	Master of Ceremonies
08:35 - 08:40	Opening Prayer	Master of Ceremonies and Prayer Giver
08:40 - 08:50	Introductory Remarks	Regional Admin. Secretary (RAS), Permanent Secretary (PS)
08:50 - 08:55	Remarks - EARAC / World Conference	TRUEFISH / Landell Mills
08:55 - 09:10	Greetings from Stakeholders / Sponsors	FAO, LVFO, TNC, SADC, WISHH, GATSBY, LTA, WAS
09:10 - 09:20	Remarks - Country Representatives	Kenya, Uganda
09:20 - 09:25	Welcoming Remarks	Mwanza Regional Commissioner
09:25 - 09:50	Official Opening Session	Hon. Abdallah H. Ulega Minister of Livestock and Fisheries
09:50 - 10:00	Award Ceremony - Seaweed Initiative	World Aquaculture Society
10:00 - 10:10	Group photo	
10:10 - 10:40	Health Break / Morning Tea	
10:40 - 11:50	Keynote, Panel and Discussion <i>Promoting aquaculture investment in East Africa: A comprehensive value-chain approach</i>	Prof. Yunus Mgaya (Panel: Dr. Rashid Tamatamah, Dr. Paul Orina, Dr. Baraka Kalangahe, Dr. Nasser Kosozi, Mr. Joseph Jirabi) Rapporteur: Ms. Evelyn Kemunto
11:50 - 13:00	Keynote, Panel and Discussion <i>FAO Contribution to Aquaculture</i>	Dr. Nyabenyi Tipo (FAO) (Panel: Dr. Nazael Madalla, Dr. Mary Opiyo, Dr. Charles Mahika)
13:00 - 14:00	Health Break / Lunch	
14:00 - 16:00	SESSION 2 (Parallel - Main Hall)	SESSION 3 (Parallel - Breakaway Hall)
	Round-table discussion on Industry Business Experiences Moderator: Mr. Ambakisy Simtoe Rapporteur: J. Luomba	Maximizing Africa's Blue Economy Potential: Seaweed Chair: Dr. Victoria Tarus, Dr. Flower Msuya Rapporteur: Mr. Innocent Mwaka
16:00 - 16:30	Health Break / Afternoon Tea	
DAY 2	Wednesday 14th August 2024	
07:30 - 08:30	Arrival / Registration – Exhibition from 09:00 to 17h00	Secretariat
08:30 - 08:45	Recap of Day 1	Everyln Kemunto
08:45 - 10:00	SESSION 4 (Parallel - Main Hall)	SESSION 5 (Parallel - Breakaway Hall)
	Aquaculture Nutrition, Feeds & Physiology Chair: Dr. Nazael Madalla / Co-chair: Dr. Mary Opiyo Rapporteur: Ms. Mage Musiba	B2B Training for aquaculture farmers Trainer: Mr. Stephen Kasule Rapporteur: Mr. Fenant Mhagama
10:00 - 10:30	Health Break / Morning Tea	
10:30 - 13:00	SESSION 6 (Parallel - Main Hall)	SESSION 7 (Parallel - Breakaway Hall)
	Aquaculture Production Systems Chair: Dr. Victoria Tarus / Co-chair Dr. Nasser Kasozi Rapporteur: Mr. Joseph Luomba	Environmental Pollution, Biodiversity and Climate Change Chair: Prof. Mohamed Sheikh / Co-Chair: Dr. Baraka Sekadende Rapporteur: Mr. Charles Otienno Omollo
13:00 - 14:00	Health Break / Lunch	
	SESSION 8 (Main Hall)	SESSION 9 (Main Hall)
14:00 - 16:00	Aquaculture Genetics, Seed Production and Biotechnology Chair: Prof. Sebastian Chenyumba / Co-chair: Dr. Asllatu Sechonge Rapporteur: Mr. Joseph Luomba	Aquatic Animal Health, Welfare and Biosecurity Chair: Prof. Phillip Bwathondi / Co-chair: Dr. John Mapunda Rapporteur: Mr. Fenant Mhagama
16:00 - 16:30	Health Break / Afternoon Tea	
17:00	Event for World Aquaculture Society Members	
DAY 3	Thursday, 15th August 2024	
08:00 - 08:30	Arrival / Registration – Exhibition from 09:00 to 14h00	Secretariat
08:30 - 08:45	Recap day 2	Ms. Magreth Musiba & Mr. Fenant Mhagama
08:45 - 10:00	SESSION 10 (Main Hall)	SESSION 11 (Main Hall)
	Aquaculture Governance, Investment and Financing	Chair: Dr. Robert Kayanda / Co-Chair: Mr. Alphonse Mokoki Rapporteur: Mr. Charles Otienno Omollo
10:00 - 10:30	Health Break / Morning Tea	
10:30 - 13:00	SESSION 11 (Main Hall)	SESSION 12 (Main Hall)
	Aquaculture Trade, Economics and Policy	Chair: Dr. Nzohabonayo / Co-Chair: Dr. Modesta Medard Rapporteurs: Mr. Innocent Mwaka
13:00 - 14:00	Health Break / Lunch	
	SESSION 12 (Main Hall)	Secretariat
14:00 - 14:30	Summary of conference, communique & field visit arrangements	Secretariat and Rapporteurs
14:30 - 15:00	Closing Ceremony	Permanent Secretary (PS)

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3. DETAILED PROGRAMME SHOWING PRESENTATIONS

Time	Activity	Facilitator / Speaker
DAY 1	Tuesday 13 August 2024	
	SESSION 1 - Main Hall	
	Opening Session	
07:00 - 08:30	Arrival / Registration – Exhibition from 08:30 to 17h00	Secretariat
08:30 - 08:35	National Anthem / East Africa Song	Master of Ceremonies
08:35 - 08:40	Opening Prayer	Master of Ceremonies and Prayer Giver
08:40 - 08:50	Introductory Remarks	RAS, PS
08:50 - 08:55	Remarks – EARAC / World Conference	TRUEFISH
08:55 - 09:10	Greetings from stakeholders/sponsors	FAO, LVFO, TNC, SADC, WISHH, GATSBY, LTA, WAS
09:10 - 09:20	Remarks - Country Representatives	Kenya, Uganda,
09:20 – 09:25	Welcoming Remarks	Mwanza Regional Commissioner
09:25 - 09:50	Official Opening Session	Hon. Abdallah H. Ulega Minister of Livestock and Fisheries
09:50 - 10:00	Award Ceremony - Seaweed Initiative	World Aquaculture Society
10:00 – 10:10	Group photo	
10:10 - 10:40	Health Break / Morning Tea	
10:40 - 11:50	Keynote, Panel and Discussion <i>Promoting aquaculture investment in East Africa: A comprehensive value-chain approach</i>	Prof. Yunus Mgaya (Panel: Dr. Rashid Tamatamah, Dr. Nasser Kasozi, KMFRI, Mr. Joseph Jirabi) Rapporteur: Ms. Everlyn Kemunto
11:50 - 13:00	Keynote, Panel and Discussion <i>FAO Contribution to Aquaculture</i>	Nyabenyi Tipu (FAO) (Panel: Dr. Nazael Madalla, KMFRI, Dr. Charles Mahika)
13:00 - 14:00	Health Break / Lunch	

Time	Activity	Facilitator / Speaker
DAY 1	Tuesday 13 August 2024	
14:00 - 16:00	SESSION 2 (Parallel - Main Hall)	
	Round-table discussion on Industry Business Experiences	Moderator: Mr. Ambakisye Simtoe Rapporteur: Mr. Joseph Luomba
	Perspectives from the FAO	
	Perspectives from Farmers	
	Perspective from Service Providers	
	Perspectives of Finances and Investors	
16:00 - 16:30	Health Break / Afternoon Tea	

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Time	Activity	Facilitator / Speaker
DAY 1		
Tuesday 13 August 2024		
14:00 - 16:00	SESSION 3 (Parallel - Breakaway Hall)	
	Maximizing Africa's Blue Economy Potential: Towards a program to strengthen Africa's Seaweed Value Chain	On Ground Chair: Dr Victoria Tarus, Dr Flower Msuya Online Chair: Dr. Bernice Mclean Secretary: Mr. Blessing Mapfumo Rapporteur: Mr. Innocent Mwaka
14:00 - 14:05	Opening Remark	Government of Tanzania Rep
14:05 - 14:15	Setting the Scene: Presentation of Session Objectives and Background	Dr. Bernice Mclean, AUDA-NEPAD
14:15 - 14:20	Dar-es-Salaam Seaweed Workshop (short video footage)	Dr. Bernice Mclean, AUDA-NEPAD
14:20 - 14:35	Keynote: Status of Seaweed aquaculture value chains in East Africa	Dr. Flower Msuya, Zanzibar Seaweed Cluster Initiative
14:35 - 14:45	Support to Seaweed Aquaculture Value Chain (the roadmap)	Dr. Alexander Kefi (SADC)
14:45 - 14:55	Review of proposed elements of a Programme to <i>Strengthen Africa's Seaweed Value Chains</i>	Dr. Bernice Mclean (AUDA-NEPAD)
14:55 - 15:05	Open discussion: A landscape profile of existing seaweed projects in East Africa (including cross-cutting)	All
	Open discussion	
15:05 - 15:25	Highlight of key lessons learnt from global seaweed programmes (Seaweed value chains)	Mr. Vincent Doumeizel / Ms. Melanie Cueff (Global Seaweed Coalition)
15:25 - 15:40	Next steps: Prospects for a Seaweed Session at AFRAQ24 (Tunisia) and global WAS 2025 (Uganda)	Mr. Blessing Mapfumo (WAS-AC)
15:40 - 16:00	Way forward and closing remarks	Dr. Bernice Mclean (AUDA)
16:00 - 16:30	Health Break / Afternoon Tea	

Time	Activity	Facilitator / Speaker
DAY 2		
Wednesday 14 August 2024		
08:30 - 10:00	SESSION 4 (Parallel – Main Hall)	
	Aquaculture Nutrition, Feeds & Physiology	Chair: Dr. Nazael Madalla / Co-chair: Dr. Mary Opiyo Rapporteur: Ms Mage Musiba
08:30 - 08:45	A1 Dr. Mary Opiyo	Use of black soldier fly larvae and freshwater shrimp to partly substitute commercial diet for Nile tilapia cultured in smallholder fish farms: A case study in Busia County, Kenya
08:45 - 09:00	A2 Ms Gilness Frank	The use of azolla to replace soybean meal in juvenile Nile tilapia (<i>Oreochromis niloticus</i>) diet
09:00 - 09:15	A3 Mr. Augustin Jacob	Characterization of Artemia cysts from Tanga salt pans
09:15 - 09:30	A4 Ms Winfred Tracy Nakawungu	Suitability of conventional ingredients used for aquafeed production in East Africa
09:30 - 09:45	A5 Dr. Renald Munubi	Effects of pelleted and mash feeds on Nile tilapia growth performance reared under farmers conditions in Kilombero District, Tanzania
09:45 - 10:00	Time for additional questions and open discussion facilitated by the chair.	
10:00 - 10:30	Health Break / Morning Tea	

Time	Activity	Facilitator / Speaker
DAY 2		
Wednesday 14 August 2024		
08:30 - 10:00	SESSION 5 (Parallel - Breakaway Hall)	
	B2B Training for Aquaculture Farmers	Trainer: Mr. Stephen Kasule Rapporteur: Mr. Fenant Mhagama
10:00 - 10:30	Health Break / Morning Tea	

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Time	Activity		Facilitator / Speaker
DAY 2	Wednesday 14 August 2024		
10:30 - 13:00	SESSION 6 (Parallel - Main Hall)		
	Aquaculture Production Systems		Chair: Dr. Victoria Tarus / Co-chair Dr. Nasser Kasozi Rapporteur: Mr. Joseph Luomba
10:30 - 10:45	A6	Dr. Deogratias Mulokozi	Towards the introduction of cage fish farming in Lake Tanganyika: A comparative growth performance, feed utilization and survival rate between local and imported <i>Oreochromis tanganyicae</i> strains in cages at Kigoma Bay, Tanzania
10:45 - 11:00	A7	Ms. Zipora Edwin	Effect of aeration intensity on growth and physiological responses of Nile tilapia (<i>Oreochromis niloticus</i>)
11:00 - 11:15	A8	Dr. Betina Lukwambe	Bio-Floc technology in aquaculture: Maximizing nutrient utilization with tilapia and filter feeders
11:15 - 11:30	A9	Dr. Seyram Amanie-Adjei	Could integrated multitrophic aquaculture (IMTA) make freshwater cage aquaculture cleaner? A review.
11:30 - 11:45	A10	Ms. Morine Mukami	Transforming aquaculture in Kenya with emerging innovation
11:45 - 12:00	A11	Dr. Betina Lukwambe	The past, present and future developments in mariculture in the coastal waters of Mainland Tanzania
12:00 - 12:15	A12	Mr. Lucka Paschal Mgwena	Production of monosex Nile tilapia (<i>Oreochromis niloticus</i> ; Linnaeus, 1856) fed diets containing varying inclusion levels of ram (<i>Ovis arius</i>) testis
12:15 - 12:30	A13	Dr. Cassius Aruho	Challenges and Opportunities for smaller holder aquaculture farmers' transition to agroecology in East Africa: A context of aquaponics models.
12:30 - 12:45	A14	Dr. Angelina Michael	Evaluating the growth performance of different tilapia sex groups as a sustainable approach towards aquaculture production: A case of tank culture in Dodoma, Tanzania
12:45 - 13:00	A15	Ms. Jenifa Mushi	Effect of dietary protein on reproductive performance of catfish (<i>Clarias gariepinus</i>) broodstocks and survival rate of its larvae at Morogoro region Tanzania.
13:00 - 14:00	Health Break / Lunch		

Time	Activity		Facilitator / Speaker
DAY 2	Wednesday 14 August 2024		
10:30 - 13:00	SESSION 7 (Parallel - Breakaway Hall)		
	Environmental Pollution, Biodiversity and Climate Change		Chair: Prof. Mohamed Sheikh / Co-Chair: Dr. Baraka Sekadende Rapporteur: Mr. Charles Otiieno Omollo
10:30 - 10:45	A16	Dr. Athanasius Ssekyanzi	A multifactor assessment of smallholder fish farm production in the varying climates of the Rwenzori Region, Uganda
10:45 - 11:00	A17	Dr. Athanasius Ssekyanzi	Decoding the enigma of recurrent fish kills in Lake Victoria: An age-old phenomenon magnified by aquaculture and climate change
11:00 - 11:15	A18	Dr. Addi Faki	Amplifying the silent voices: The impact of effective seaweed farmer producer organizations (FPOs) in Zanzibar
11:15 - 11:30	A19	Mr. Vincent Omega	Nursing Nile tilapia (<i>Oreochromis niloticus</i> , L) fry in cages improves their growth performance, feed utilization, and condition factor for stock enhancement
11:30 - 11:45	A20	Mr. Zaphania Maziku	Chemical composition of vermicompost from animal manure
11:45 - 12:00	A21	Mr. Charles Mashafi	Spatial Variation and Sources of Macroplastic Pollution in Lake Victoria: A Comparative Study of the Nyamagana, Sengerema, and Ilmela Districts.
12:00 - 13:00	Open / round-table discussion facilitated by the chair and captured by the rapporteur for proceedings. Emphasis should be on identifying major environmental, biodiversity and climate change related challenges in Eastern African aquaculture.		
13:00 - 14:00	Health Break / Lunch		

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Time	Activity	Facilitator / Speaker
DAY 2	Wednesday 14 August 2024	
14:00 - 15:00	SESSION 8 (Main Hall)	
	Aquaculture Genetics, Seed Production and Biotechnology	Chair: Prof. Sebastian Chenyambuga / Co-chair: Asilatu Sechonge Rapporteur: Mr. Joseph Luomba
14:00 - 14:15	A22 Dr. Papius Dias Tibihika	Unlocking Nile tilapia (<i>Oreochromis niloticus</i> , Linn. 1758) selective breeding programs in Uganda through geographical genetic structure mapping.
14:15 - 14:30	A23 Mr. Gerald Kwikiriza	Genetic diversity and hybridization levels of Tilapiines across Africa using microsatellite and mtDNA markers.
14:30 - 14:45	A24 Dr. Ivan Abaho	Selective breeding for genetic improvement of Nile tilapia (<i>Oreochromis niloticus</i> Linnaeus, 1758) in Uganda: Current status, challenges, and future perspectives.
14:45 - 15:00	A25 Dr. Asilatu Sechonge	Genetic Diversity and Hybridization Patterns of Tilapia Species in the Lake Victoria Basin: Implications for Sustainable Aquaculture and Biodiversity Conservation.

Time	Activity	Facilitator / Speaker
DAY 2	Wednesday 14 August 2024	
15:00 - 16:00	SESSION 9 (Main Hall)	
	Aquatic Animal Health, Welfare and Biosecurity	Chair: Prof. Philip Bwathondi / Co-chair: Dr John Mapunda Rapporteur: Mr. Fenant Mhagama
15:00 - 15:15	A26 Mr. Magoti Ndaro	Pathogenic bacteria causing infectious diseases in cage-farmed fish in the Lake Victoria
15:15 - 15:30	A27 Mr. Abdul Noor Luttagamuzi	Spatial risk estimation of parasitic infestations of pond and cage cultured Nile tilapia (<i>Oreochromis niloticus</i>) in the Lake Victoria Crescent, Uganda
15:30 - 15:45	A28 Ms Sophia Shaban	Phytoplankton status in Lake Victoria Tanzania
15:45 - 16:00	Time for additional questions and open discussion facilitated by the chair.	
16:00 - 16:30	Health Break / Afternoon Tea	

Time	Activity	Facilitator / Speaker
DAY 3	Thursday 15 August 2024	
08:30 - 10:00	SESSION 10 (Main Hall)	
	Aquaculture Governance, Investment and Financing	Chair: Dr. Robert Kayanda / Co-Chair: Mr. Alphonse Mokoki
08:45 - 09:00	A29 Dr. Robert Kayanda	Leveraging on the Provisions of the Aquaculture Investment Guide to attract investment in the East Africa Community.
09:00 - 09:15	A30 Mr. John Domozoro	Aquaculture in Ghana: The status and potential for meeting the fish needs of a growing population
09:15 - 09:30	A31 Mr. Blessing Mapfumo	Has the World Aquaculture Society African Chapter delivered to its mandate? Thoughts and perspectives
09:30 - 09:45	A32 Dr. Nasser Kasozi	Implementing zonal aquaculture innovation platforms in Uganda: Key lessons learned
09:45 - 10:00	A33 Dr. Elysee Nzohabonayo	EU-EAC- True Fish farming in Lake Victoria basin (TRUEFISH)
10:00 - 10:30	Health Break / Morning Tea	

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Time	Activity	Facilitator / Speaker
DAY 3	Thursday 15 August 2024	
10:30 - 13:00	SESSION 11 (Main Hall)	
	Aquaculture Trade, Economics and Policy	Chair: Dr Nzohabonayo / Co-Chair: Dr. Modesta Medard Rapporteurs: Mr. Innocent Mwaka
10:30 - 10:45	A34 Ms. Joyce Njenga	Aquaculture: A promising solution for food insecurity, poverty and malnutrition in Kenya.
10:45 - 11:00	A35 Mr. Samuel Marete (GATSBY)	Creating an Enabling Environment for Attracting Investment
11:00 - 11:15	A36 Ms. Lovin Kobusingye	Gender specific analysis and mapping of the African catfish value chain in Uganda: A focus on women's roles and opportunities
11:15 - 13:00	Open / round-table discussion facilitated by the chair and captured by the rapporteur for proceedings. Emphasis should be on identifying major trade, economic and policy related challenges in Eastern African aquaculture.	
13:00 - 13:30	Health Break / Lunch	

Time	Activity	Facilitator / Speaker
DAY 3	Thursday 15 August 2024	
14:00 - 15:30	SESSION 12 (Main Hall)	
	Closing Session	
14:00 - 14:30	Summary of conference, communique & field visit arrangements	Secretariat and Rapporteurs
14:30 - 15:00	Closing Ceremony	Permanent Secretary (PS)

4. BASIC GUIDELINES FOR SPEAKERS AND PRESENTERS

All speakers and presenters are to follow these guidelines:

- Electronic copies of your presentation must be handed to the IT technicians on a flash disk, in the respective venues, before the start of the session in which you are speaking. Presentations cannot be loaded during the session and this will result in your presentation being skipped.
- You have 10 minutes to present and 5 minutes to react to questions. The chair of each session will alert you when 10 minutes is reached and will stop your talk at 12 minutes. Please respect these timelines.
- If you would like to make changes to your abstract before it is published in the proceedings, kindly send an updated version to Ms Everlyn Kemunto on email koiruria@gmail.com before 20 August 2024.

5. GUIDELINES FOR SESSION CHAIRS

- Session chairs should kindly facilitate the start and progression of their session in accordance with the programme.
- Session chairs may introduce speakers and papers, and must keep a time check (with the help of co-chairs if required). Speakers have 10 minutes to present, after which they need to be signalled. Once a presentation reaches 12 minutes, a speaker must be told to stop.
- Session chairs must facilitated questions to speakers in accordance with the allowed timeframes.
- At the end of some sessions, time has been allowed for general discussions in which more questions can be taken, and the topic or theme of the session can be unpacked in a facilitated discussion.

6. GUIDELINES FOR CONFERENCE PARTICIPANTS

- Be on time for the start of the sessions you wish to attend. In order to respect every person in attendance and the presenters, kindly ensure that you are seated at the scheduled start time of a session. Familiarise yourself with the 2 venues for the respective sessions.
- Ask questions!
- Enjoy the conference and use the opportunity to interact.

7. CONCEPT NOTE: SESSION 3

Maximizing Africa's Blue Economy Potential: Towards a program to strengthen Africa's Seaweed Value Chain.

Seaweeds are highly productive resources and hold vast potential for contributing to development aspirations in Africa, and particularly to the development of Africa's Blue Economy. Globally, seaweed is one of the fastest growing food production sectors in the world today. Seaweed has the potential to improve livelihoods, food security, preserve marine biodiversity, and empower value chains actors including some of the most vulnerable sectors of the population. Seaweeds also play a significant role in climate change adaptation. In East Africa, the majority of people working in the seaweed sector are women.

The AUDA-NEPAD is working to maximise the value of Africa's Blue Economy through implementation of key objectives of the Agency's Blue Economy Programme. The seaweed sector has been identified as a priority for development. While the sector in Africa is considered nascent in many respects, it offers significant opportunities for livelihood diversification and is one to watch for blue economy expansion in Africa.

The AUDA-NEPAD has embarked on a journey to develop a broader African Seaweed Programme to raise the profile of Africa's seaweed value chains. The programme will involve support for the coordination of efforts and stakeholders involved in the industry by strengthening the community of practice and facilitating dialogue among key stakeholders on improved seaweed production, processing and marketing while moving towards women's empowerment.

This awareness raising session, delivered in hybrid format is a product of previous workshops on *Strengthening Africa's Seaweed Value Chains*. Outcomes from this Session (and a series of other sessions) are expected to contribute to the development of a broader seaweed programme in Africa. The session is also well in line to EARAC3 Conference theme and objectives on "*Promoting Aquaculture Investment in East Africa*".

8. ABSTRACTS

A1 Use of black soldier fly larvae and freshwater shrimp to partly substitute commercial diet for Nile tilapia cultured in smallholder fish farms: A case study in Busia county, Kenya.

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Abstract

Fish-farming in Kenya is challenged by high cost of feed ingredients, especially protein sources. Using black soldier fly larvae (BSFL) (*Hermetia illucens*) directly or indirectly as a fish feed ingredient is interesting as they efficiently convert organic wastes into high-quality proteins. In addition, the freshwater shrimp (*Caridina nilotica*) (CN), an important by-catch of the silver

cyprinid (*Rastrineobola argentea*) fisheries in Lake Victoria, could be another alternative protein source. This study determined whether dried BSFL or dried CN could partly substitute the commercial diet when growing Nile tilapia (*Oreochromis niloticus*) in a smallholder farm aggregated in an aquapark. The nutritional values and cost-effectiveness of the alternative feeding strategies were compared to commercial diet (CD) only. During an 84-day experimental period, Nile tilapia were fed one of the three feeding strategies, including the use of only the commercial diet, to be compared with diets replacing 20% of the commercial diet with BSFL and CN. The fish were fed to apparent satiation twice a day. At the end of the trial, biomass, the number of fish, growth, survival rate, total fish production, and economic feed conversion rate were determined. Feeding the Nile tilapia with CD, BSFL and CN lead to statistically similar body weight of 63.2 ± 3.9 g, 68.0 ± 7.4 g and 68.0 ± 7.4 g for fish fed on CD, BSFL and CN, diets respectively. Hence, nutritionally and from a production point of view, the three feeding strategies used in this study performed equally well. Notably, the use of BSFL led to a significantly higher economic return ($P < 0.05$) compared to the use of CN and commercial diet alone. This study demonstrates that BSFL and CN can be used to supplement commercial diet. In addition, the use of BSFL to partly substitute the commercial diet can boost sustainable fish production in a smallholder farm set-up aggregated in an aquapark.

Keywords: Black Soldier Fly Larvae (BSFL), *Caridina niloticus*, alternative protein, feeding strategies, smallholder farmers.

A2 The use of azolla to replace soybean meal in juvenile Nile tilapia (*Oreochromis niloticus*) diet.

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Abstract

This study aimed to use hydrolyzed aquatic macrophyte *Azolla pinnata* meal to substitute soy bean meal (SBM) in the diet of Nile tilapia (*Oreochromis niloticus*). The nutrition composition of the local growing *Azolla pinnata* meal after hydrolysis with ruminant digestive fluid findings showed satisfactory increase of protein content 34.03%, Lipid 5.56%, and reduced Crude fiber up to 7.80%. Grinded *Azolla* meal was mixed by ruminant liquor digestive enzymes for hydrolysis process. For digestibility study both diets, reference diet (0% *Azolla* meal) and test diet (30% *Azolla* meal) contained 30% crude protein. While 0.5% chromic oxide was mixed as the diet inert markers. The fish fecal was collected from six aquariums (50×40×30cm) during 21 days. The reference diet showed high digestibility of dry matter, protein and energy including 88%, 92% and 91% respectively compared to test diet with 71% 77% and 74% respectively. Concerning the growth study, five test diets of 30% crude protein were formulated by different substitution level of soy bean meal by hydrolyzed *Azolla* meal including diets A, B, C, D, E (0%, 10%, 20%, 30% and 40% of *Azolla* meal respectively). The experiment was conducted during 57 days where 150 fish were stocked in 15 aquariums (50×40×30cm) with three replications. Fish were fed two times daily to apparent satiation. At the end of this study, findings showed that hydrolyzed *Azolla* meal can substitute soy bean meal up to 30% without affecting fish growth performance.

Keywords: Digestibility, Growth, *Oreochromis niloticus*, hydrolyzed *Azolla* meal.

A3 Characterization of Artemia Cysts from Tanga salt pans

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Abstract

The present study determined the size and hatching efficiency of *Artemia* cysts from salt farms in Tanga, Tanzania. The cysts were collected from salt pans using a 100-150 µm mesh net, processed and packed in air tight containers. In the laboratory, the cysts were incubated in beakers at 28 °C, 35 ppt and pH of 8. After 24 hours, newly hatched nauplii were transferred to the culturing tanks in triplicates and cultured for 15 days and fed with microalgae *Nannochloropsis oculata*. The Vinh Chau *Artemia* cyst strain was used as the control. Results indicated that *Artemia* cyst from Tanga had a higher value of capsulated cyst diameter (213.4 µm) and chorion thickness (9.7 µm) compared to Vinh Chau *Artemia* cysts (208.3 µm; 8.3 µm). Vinh Chau *Artemia* cyst recorded higher hatching percentage and hatching efficiency compared to Tanga *Artemia* cyst ($p < 0.05$). However, Tanga strain *Artemia* cyst had higher growth performance and survival percentage (74.56%) compared to Vinh Chau (53.85%). Moreover, Tanga *Artemia* cyst strain showed good quality, hence its prospects to pond production.

A4 Suitability of conventional ingredients used for aquafeed production in East Africa

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Abstract

The ambitious aquaculture production targets 1,000,000 targets aiming at producing 1,000,000 mt, 700,000 mt, 50,000 mt and 160,000 mt in Uganda, Kenya, Tanzania and Rwanda, respectively by 2030; calls for increased fish feed production. However, fish farmers are challenged by limited access to quality fish feeds that are commercially competitive and environmentally friendly. Small scale fish farmers are challenged by high feed cost and logistics associated with feed importation, that limit their access to quality feeds. Accordingly, there is growing interest to promote backyard aquafeed formulation. Traditionally, feed formulation focuses on nutrient composition (more so proximate composition) and cost of feed ingredients, and pays less attention to several factors that affect sustainability, including pollution potential, environmental/ecological impacts, competing uses, socio-cultural considerations, yield and fertilizer requirements among others.

We examined a broad range of factors that may affect the suitability of a feed ingredient (including those related to environment, nutrition content and utilization, unit nutrient cost, and socio-economics among others) for five commonly used protein ingredients (i.e., fishmeal, bone meal, soya bean meal, sunflower meal and cotton seed meal), and four conventional energy ingredients (i.e., maize bran, sorghum grain, wheat bran and rice bran) in East Africa. The results

indicated that soybean and cottonseed meals are the most viable plant-based protein ingredients with an average rank of 1.8 compared to sunflower meal average of 2.0. Among the animal-based protein ingredients, mukene fish meal out performed bone meal. However, continued use of fishmeal in feed formulation seems unsustainable because of the allied ecological and environmental impacts. Maize bran remains the most viable energy ingredient, outperforming wheat bran, rice bran and sorghum, respectively. Overall, animal ingredients are the most suitable protein sources for farmed fish species. However, their use is associated with ecological and environmental impacts that culminate into outstanding negative impacts to the aquatic ecosystem than plant proteins ingredients.

A5 Effects of Pelleted and Mash Feeds on Nile Tilapia Growth Performance Reared under Farmers Conditions in Kilombero District, Tanzania.

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Abstract

An on-farm experiment was conducted to compare the growth performance and gross margin of Nile tilapia (*Oreochromis niloticus*) fed mash and pelleted feeds under farmers conditions in Kilombero district. Five fish farmers from three villages (Kiberege, Mang'ula B and Mkamba) were selected based on the capacity to construct two ponds, each measuring at least 300 m². The diet used comprised of fishmeal (10%), maize bran (38%), rice polishing (21%), sunflower seed cake (7.5%), *Moringa oleifera* leaf meal (22.5%) and mineral premix (1%) and contained approximately 30% crude protein. This formulation was previously determined in an on-station experiment and was found to promote fast growth of Nile tilapia. The diet was made into two forms (mash and pellet). For each farmer, one pond was randomly assigned to mash and the other pond to pelleted feed. Before the start of the experiment, all ponds were filled with water and fertilized with 50 g/m² of chicken manure. One week following fertilization, the ponds were stocked with Nile tilapia fingerlings (0.2 g/fingerling) at a stocking density of 5 fish/m². The fish were fed the respective diets and reared for eight months. Fish body weight was measured every two weeks throughout the experiment. At the end of the experiment, fish were harvested, measured to determined final weight and then sold to determine the revenue. The body weight and fish yield at harvest were compared between the fish fed mash and pelleted feeds. The results indicated that the fish fed pelleted diet grew faster and had a significantly higher average final body weight (364.3 ± 25.0 g) compared to those fed mash feed (302.1 ± 22.8 g). For an eight-month production cycle, fish fed with pelleted feed had a higher harvest output (14,035.1 kg/ha) than those fed mash feed (13,191.4 kg/ha). Furthermore, the gross margin was higher for pelleted (2,718,448.00 TZS) than mash feed (1,390,576.90 TZS). In conclusion, pelleted feed is better than mash feed.

A6 Towards the introduction of Cage Fish farming in Lake Tanganyika: A comparative growth performance, feed utilization and survival rate between local and imported *Oreochromis tanganicae* Strains in Cages at Kigoma Bay, Tanzania

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Abstract

Nile tilapia (*Oreochromis niloticus*) is one of the most farmed fish globally, with a significant contribution improving local livelihoods, especially in developing countries. However, only native species are allowed to be farmed in cage farming due environmental concerns. Thus, the indigenous Lake Tanganyika tilapia (*Oreochromis tanganicae*) is currently the most fish species recommended for cage farming in the lake. In this study, two strains of Tanganyika tilapia, involving a commercially imported strain from Zambia (ZAM) and locally produced strain (TAN) were tested for growth performance, feed utilization and survival rates. The fish with an average initial weight of 13.2g were stocked at 100 individual per m³ raised in cage installed in Kigoma bay, Tanzania. The fish were fed with a commercial diet (37% CP) at 3% body weight for 112 days in three replicate. Water dissolved oxygen, temperature and pH were monitored daily both during the morning and evening. It was observed that the final weight, 140.21 g; FCR, 1.7; and average daily weight gain 1.13 g/day from the ZAM strain were significantly higher ($p < 0.05$) than the final weight, 111.03 g; FCR, 1.9; and average daily weight gain 0.89 g/day from the TAN strain. There was no significant difference in fish survival rates. At the end of the trial, water physicochemical parameters were in acceptable range for tilapia growth with no significant differences between treatments. The poor growth performance displayed by TAN strain calls for a better performing *O. tanganicae* strain suitable for the foreseen cage farming activities in Lake Tanganyika, Tanzania side.

Key words: Lake Tanganyika, Tanganyika tilapia, Cage farming, *Oreochromis tanganicae*

A7 Effect of aeration intensity on growth and physiological responses of Nile Tilapia (*Oreochromis Niloticus*).

Zipora Edwin¹, Doctor Hieromin Lamtane, Doctor Muumin Idd Hamad

Abstract to be captured in the conference proceedings.

A8 Bio-Floc Technology in Aquaculture: Maximizing Nutrient Utilization with Tilapia and Filter Feeders.

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Abstract

Biofloc technology (BFT) represents a sustainable aquafeed and ecological farming technique aimed at reducing nitrogen levels, serving as an on-site feed source, and mitigating pollutants in aquaculture systems. This study investigated the nitrogen utilization dynamics of biofloc by Nile

tilapia (*Oreochromis niloticus*) integrated with freshwater mussels (*Coelatura cridlandi*) in a biofloc system. Biofloc was cultured using brown sugar as an additional carbon source (33% carbon) in a 25 m³ concrete fish pond, maintaining a C/N ratio of 20 and a total suspended solids concentration of 250 mg L⁻¹. The experiment was conducted in 400 L tanks, monitoring nutrient dynamics with biofloc as the sole feed over 30 days. Key water quality parameters including total ammonia nitrogen (TAN), nitrate (NO₃⁻-N), nitrite (NO₂⁻-N), pH, temperature, dissolved oxygen, and salinity were tracked. Results indicated TAN levels were significantly reduced in treatment tanks after 15 days ($P < 0.05$). Nitrate levels were notably higher in integrated tanks compared to single-species tanks ($P < 0.05$). The integrated system exhibited approximately five times higher total nitrogen excretion than nitrogen uptake, demonstrating superior removal efficiency compared to biofloc-free controls. A total of 47 microalgae species were identified, dominated by Bacillariophyta and Chlorophyta in BFT1, followed by BFT2 and BFT3 treatments. Moreover, biofloc treatments exhibited significantly lower concentrations of Vibrio-like bacteria (VLB) compared to controls ($P < 0.05$). The findings suggest significant water quality improvement due to extensive biofloc consumption by Nile tilapia, with higher nitrogen retention observed in the integrated treatment with both Nile tilapia and mussels. High nitrogen uptake values underscore Nile tilapia's efficient utilization of biofloc for growth, laying a solid foundation for future research into freshwater polyculture models.

Keywords: Biofloc; tilapia; freshwater mussel (*Coelatura cridlandi*); integrated system; water quality parameters.

A9 Could Integrated Multitrophic Aquaculture (IMTA) make freshwater Cage Aquaculture cleaner? A review.

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Abstract

Aquaculture production in Ghana continues to increase steadily, amounting to nearly 133,000 metric tons in 2022. The 2022 annual production is a multiple fold increase from 2008 when the country recorded only 5,590 metric tons of aquaculture production. The growth of the aquaculture sector is largely dependent on Nile tilapia (*Oreochromis niloticus*) cage culture in Ghana. These cage farms contribute more 80% to annual productions and are predominantly distributed along the volta lake. Future growth of the sector will largely dependent on the ability of the volta lake to support the expanding capacity of existing farms as well as accommodate new ones.

Rearing fish in floating cages requires specific aquatic ecological conditions. Despite better management practices, organic wastes such as uneaten feed, faeces and other inputs often end up at the cage bottoms as settled solid particles. Overtime, these solids together with other non-point source solid pollutants accumulate and are periodically triggered by an upset in the aquatic ecology by factors such as temperature and oxygen, leading to the challenge of upturning. Upturns occur on the Volta Lake and this leads to huge fish mortalities and financial losses in aquaculture operations.

The 3rd Eastern African Regional Aquaculture Conference Mwanza, Tanzania, 13 - 15 August 2024

Integrated multitrophic aquaculture (IMTA) is a farming approach that involves cultivation of species from different trophic levels and with complementary ecosystem functions in a way that allows one species' wastes, nutrients and by-products to be recaptured and converted into resources for the other crops, and to take advantage of synergistic interactions among species while protecting the aquatic environment. It combines fed aquaculture species (e.g., finfish like Nile tilapia) with organic extractive species (e.g., shellfish like clams) and inorganic extractive species (e.g., seaweed) into a single farm unit. The use of sessile non-invasive shellfishes like clams can serve as a natural filter that will breakdown solid waste particles in fish cage environments. Nations like Canada have adopted this type of culture as a means of ensuring environmental sustainability. IMTA is largely adopted and practised in marine fish farms and to some extent, earthen pond culture. Their applications in freshwater cage farms are very limited despite the fact that the technology potentially will enhance environmental health for fish culture. This circular economy approach stabilizes water quality and mitigates upturn events over time. Applying IMTA principles to the Volta Lake could enhance fish production, reduce environmental impact, and promote sustainable livelihoods for local communities.

A10 Tech Tides: Transforming Aquaculture in Kenya with Emerging Innovation

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Abstract

Aquaculture in Kenya has experienced significant growth, becoming a vital component of the country's food security and economic development. This review examines the integration and impact of emerging technologies in enhancing aquaculture practices in Kenya. Key technologies explored include Geographic Information Systems (GIS), Remote Sensing (RS), Internet of Things (IoT), and blockchain. These innovations are transforming various aspects of aquaculture, including site selection, water quality monitoring, disease management, and supply chain transparency. GIS and RS technologies facilitate the identification of optimal sites for aquaculture by analyzing environmental variables such as water temperature, salinity, and land use. This precision in site selection contributes to higher yields and sustainable practices. IoT devices, including sensors and automated feeders, offer real-time monitoring and control of aquaculture environments. These devices help maintain optimal conditions for fish growth, detect early signs of disease, and reduce resource wastage, leading to increased productivity and profitability. Blockchain technology is revolutionizing the traceability and transparency of aquaculture supply chains. By providing a secure and immutable record of transactions, blockchain ensures the authenticity of fish products from farm to fork, enhancing consumer trust and opening new market opportunities for Kenyan aquaculture products. Additionally, mobile applications and platforms are empowering farmers with access to critical information, such as weather forecasts, market prices, and best management practices, thereby improving decision-making and operational efficiency.

Despite the promising potential of these technologies, challenges remain, including high implementation costs, limited technical expertise, and inadequate infrastructure. Addressing these barriers requires concerted efforts from the government, private sector, and research institutions. Capacity-building initiatives, investment in infrastructure, and supportive policies are essential to harness the full potential of emerging technologies for aquaculture advancement in Kenya. This

review highlights the transformative impact of these technologies and underscores the need for a collaborative approach to drive sustainable growth in Kenya's aquaculture.

A11 The past, present and future developments in mariculture in the coastal waters of Mainland Tanzania.

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Abstract

Marine coastal resources are crucial to Tanzania's socio-economic development and are a lifeline for the livelihoods and incomes of coastal communities. This study provides an overview of the coastal development of mariculture in mainland Tanzania and suggests future development strategies. The review article covers extensive reports available through field interviews, government policy documents, library literature searches and field work. Despite the immense potential of mariculture to improve food security for local communities, its development has been uneven. Specifically, only seaweed farming has advanced to commercial-scale production. Other mariculture activities, such as finfish farming (e.g. milkfish and silver pompano), shellfish farming (e.g. prawn, mud crab and half-pearl) and sea cucumber farming, are underdeveloped and confined to small-scale operations. Locally consumed finfish, such as milkfish and pompano, have not attracted investors out of fear that the recovery of investment may not be achieved due to the low prices offered in the market. In this context, the sustainable use of coastal resources through mariculture becomes paramount to alleviating poverty and facilitating controlled migration from rural to urban. This comprehensive review explores the historical evolution and current status of mariculture initiatives in the coastal waters of mainland Tanzania, which presents a crucial aspect of the socio-economic development of the nation. With declining global capture fisheries production and a growing demand for fish protein, Tanzania has strategically embraced mariculture as a viable alternative. The article traced the development of mariculture since the 1970s, highlighting past and current initiatives managed by government agencies, non-government organizations (NGOs), and the private sector. Notable successes, such as seaweed culture, are highlighted along with the challenges that hinder the growth of various marine farming activities. The review integrates insights from a comprehensive survey in coastal Tanzania, focusing on mariculture activities and collecting information on people who have stopped such practices, elucidating reasons for quitting. By consolidating experiences from past and present mariculture initiatives, this review provides valuable guidance for decision-making toward promoting sustainable mariculture that supports coastal communities while preserving marine biodiversity.

Keywords: Mariculture; Aquatic resources; Seaweed farming; Fish farming; Socio-economic development.

A12 Production of Monosex Tilapia (*O. niloticus*; Linnaeus, 1856) fed diets containing varying inclusion levels of Ram (*Ovis arius*) Testis.

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Abstract

The study investigated sex inversion of Nile tilapia (*Oreochromis niloticus*) by using varying crude natural hormone levels from ram (*Ovis arius*) testis. Six treatments were prepared, including two controls (without hormone 'C1' and with 17 α -Methyl testosterone hormone "C2") and four test diets incorporating varying levels of testosterone hormone (100 mg, 200 mg, 300 mg and 400mg labeled as RAM1, RAM2, RAM3 and RAM4, respectively) each per kg of feed. The results showed significant sex ratio deviations from the expected 1:1 male to female ratio, with Nile tilapia fed on RAM3 indicating higher male percentages than the other diets. Fish gonads of unreversed sex (female) Nile tilapia in treated with C1, C2, RAM1, RAM2 and RAM3 had ovary with an evident nucleus indicating they were female except those fed the RAM4 diet. No significant variations in weight gain and apparent feed conversion ratio among the varying levels of ram testis. However, the Nile tilapia treated with RAM1 increased significantly specific growth rate than those fed on the other diets. Taken together, incorporating 300 mg/kg of feed can be used as an ideal sex reversal dietary level for all male Nile tilapia production.

A13 Challenges and Opportunities for smaller holder aquaculture farmers' transition to agroecology in East Africa: A context of aquaponics models.

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Abstract

Aquaculture has the potential to make a significant contribution to food security, employment, and income in East Africa. However, attaining sufficiency in food supply to support a growing population without compromising ecosystem functioning remains a top agenda of researchers in East Africa. In this context, efficient and sustainable food production systems such as aquaponics are viewed as an important and environmentally friendly technology for adaptation under resource-limited environments. This review critically examines the status of the different aquaponic systems with varying innovations as part of efficient -water-energy-circular systems for adoption by East African farmers. Opportunities for enhancing aquaponic farming are discussed, and based on the current information, suggested strategies, models, and designs are being developed for adoption. Available information shows that producing food in soilless systems is a promising strategy, as this method utilizes significantly less water than traditional agriculture and takes advantage of the abundant solar energy critical in aquaponics innovation. However, in spite of the fact that aquaponics has the potential to change the phase of conventional agricultural practices, adoption of these technologies by farmers across East Africa is still very low, and is greatly attributed to very limited knowledge of aquaponics relating to suitable systems designs

and lack of appropriate inputs hence leading to break-even for profits failure. Furthermore. There is limited expertise to customize the highly sophisticated models and designs used in the developed world. This is coupled with challenges related to changing social customary practices thus undermining the diffusion and adoption of aquaponics innovations. Also lack of policy guidelines on aquaponics aspects complicates the situation. Basic modular aquaponic systems that incorporate desirable agroecological aspects that efficiently balances the growth of plants and fish to enhance nutrient utilisation are being proposed. To guide small-scale farmers, three different modular aquaponic systems are being established at Kajjansi Aquaculture Research and Development Centre for optimisation. These include media-based culture (MBC), nutrient film technique (NFT), and deep-water culture (DWC). The developed modular systems will use low-tech installations and making them suitable for use in East African countries.

Key words: Circular energy, nutrients, designs, aquaponics.

A14 Evaluating the growth performance of different tilapia sex groups as a sustainable approach towards aquaculture production: A case of tank culture in Dodoma, Tanzania.

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Abstract

Aquaculture is critical for food security in a rapidly growing global population. Tilapia, a popular farmed species due to its rapid growth and adaptability, is often farmed using monosex male populations due to their superior growth rates. However, the use of hormonal sex reversal to produce all-male populations poses health and environmental risks. This study addresses the gap in knowledge regarding the growth performance of monosex female and mixed-sex tilapia groups in comparison to monosex males, particularly in Dodoma, a semi-arid region in Tanzania. Nile tilapia (*Oreochromis niloticus*) were manually separated into monosex male, monosex female, and mixed-sex groups and reared in tanks for six weeks. Initial and final body weights and morphometric parameters (total length, fork length, standard length, head length, and anal fin length) were measured to evaluate growth performance. Results showed that monosex males achieved the highest growth, with an average final weight of 56.5 g, followed by females at 53.3 g, and mixed-sex groups at 43.3 g. Significant differences in weight gain and specific growth rates were observed. Males also exhibited the largest morphometric measurements across all parameters. In conclusion, monosex male tilapia demonstrated superior growth performance, highlighting their potential for optimizing aquaculture production. Monosex female groups, while less productive than males, still outperformed mixed-sex groups. Further research and development of techniques to enhance the growth rates of monosex female tilapia could provide a viable, hormone-free alternative for sustainable aquaculture.

Keywords: Growth performance, tilapia sex groups, non-hormonal sex separation, sustainable aquaculture, semi-arid regions.

A15 Effect of dietary protein on reproductive performance of catfish (*Clarias gariepinus*) broodstocks and survival rate of its larvae at Morogoro region Tanzania.

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Abstract

Two experiments of feeding trial for catfish broodstock (*Clarias gariepinus*) and its larvae were conducted in randomizing block design. In both experiment ANOVA were used to measure the significance differences at $P= 0.05$ and Bonferroni Multiple range test were used to determine the differences. In first experiment 12 experimental concrete roud tank 19000 litres with 5 diameters were stocked 84 brood stock 7each was selected at randomly with ratio of 3 + 4 which divided in to 4 treatment named (D1, D2, D3, D4) in 3 replicate for 3 month 90 days to assess growth and reproduction performance by fed 40% protein feed named Earth worm (D1) Fish meal (D2) Bloodmeal (D3) Sesame seedcake (D4) twice daily at 1% body weight. Mean initial weight was 899.4 ± 0.31 also chemical analysis of feeds, ovary, testes and fillet were investigated. Least value of FCR of 0.3 and highest final body weight of 2149.5 ± 2.7 were observed in treatment (D2) fed fish meal. Values of reproduction performance differ significantly at $P= 0.05$ but (D2) with gonadosomatic index 0.25 milt volume of 3ml and ovary (eggs) 30,000 performed better than those fed other diets. Larvae from highly performed treatment in experiment 1 were subjected in experiment 2 after artificial propagation where 900 larvae distributed to 9 plastic with 20 litres, 100 larvae each were selected at randomly and divided into 3 treatment named T1, T2, T3 with 3 replicate each for 1 month (30days) to evaluate growth and survival rate by fed 20 individual twice a daily live feeds namely (T1)artemia, (T2) artemia and moina(T3) moina 4th day after egg yolk. In growth (T3) attain 9.06 ± 0.07 Milgram fed moina differ significantly higher at $P= 0.05$ than T2 and T3 while in survival of 82 ± 1.3 (T1) differ significantly higher at $P = 0.05$ with T2 and T3.

Keywords: *Clarias gariepinus*, broodstock, larvae, performance, reproduction, growth, survival, diet, live feeds.

A16 A multifactor assessment of smallholder fish farm production in the varying climates of the Rwenzori Region, Uganda.

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Abstract

The impact of climatic variations on the aquaculture yield of tropical mountainous regions is an understudied phenomenon. These regions are subdivided into microclimatic zones that range from polar, through temperate to tropical climate types. The low species richness and diversity of the aquaculture sector in most Sub-Saharan African (SSA) countries limits the efficient utilization

of abundant water resources in mountainous regions for improved food security and poverty alleviation. This study used survey data from smallholder fish farms in five districts of the Rwenzori region in Uganda, along with gridded rainfall, temperature data, and a 0.0083° resolution Köppen-Geiger climate classification map to assess the barriers hindering the production of aquaculture. The research investigated the influence of climatic variations together with production methods, and socio-demographic factors on aquaculture yields. Most of the fish farmers perceived access to technical support services, good quality fish feeds, and fingerlings as major challenges to production. On the other hand, fish farms that were located in the tropical savanna climate (Aw) yielded three times more fish than those in the tropical rainforest climate (Af) (reference group) ($p < 0.05$). Interestingly, fish yields decreased by half in farms that practiced polyculture as compared to those that practiced monoculture ($p < 0.01$). Fish farms that practiced substitute feeding when commercial pellets were not available, had a 3-fold higher fish yield than the ones that rely only on commercial pellets and accept periods of starvation ($p < 0.05$). The findings further highlighted that fish yields from earthen pond aquaculture in the study region were low. Microclimates could be an overlooked major hindrance to the sector's growth in addition to the commonly discussed challenges of aquaculture. Hence, we pose the question on the overall suitability of the cultured fish species amidst the various climate types in the Rwenzori region.

A17 Decoding the Enigma of Recurrent Fish Kills in Lake Victoria: An Age-Old Phenomenon Magnified by Aquaculture and Climate Change.

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Abstract

Mass fish mortalities associated with water quality deterioration have been observed at cage fish farming sites and in the wild of Lake Victoria. This phenomenon of mass fish mortalities is not a recent development. It has long been known among the capture fisheries communities of Uganda, where it is commonly called "Kaliro". Kaliro is characterized by a mass floating of dead fish that have milky eyes and a white (dull) skin colour. The flesh of dead fish appears half burnt, hence the name "Kaliro", which translates as "small fire". The dead fish are known to spoil quickly with a characteristic rancid smell in just a very short time after floating. The significant losses observed in the aquaculture industry over the past decade, especially in the last five years (Figure 1), due to this phenomenon have brought this issue to the forefront.

Unlike closed aquaculture systems, where water quality can be managed, fish farming in open systems, such as cages depends entirely on the inherent conditions of the waterbody. Therefore, mass fish mortalities will definitely occur in cages if the water quality deteriorates beyond the optimum levels for the cultured fish species. Mass mortalities have recurrently occurred even in some properly sited and managed cage fish farms on Lake Victoria.

This perspective discussion stresses that such mortalities have long occurred naturally among the wild fish stocks, and that aquaculture could be suffering from the same phenomenon given the frequency and extent of these incidents all over the lake. The discussion unravels the major causes and highlights a potential way forward for sustainable cage aquaculture on Lake Victoria.

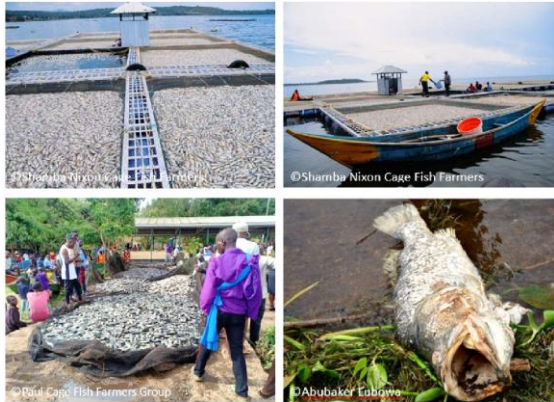


Figure 1. Observed mass fish mortalities in aquaculture and wild.

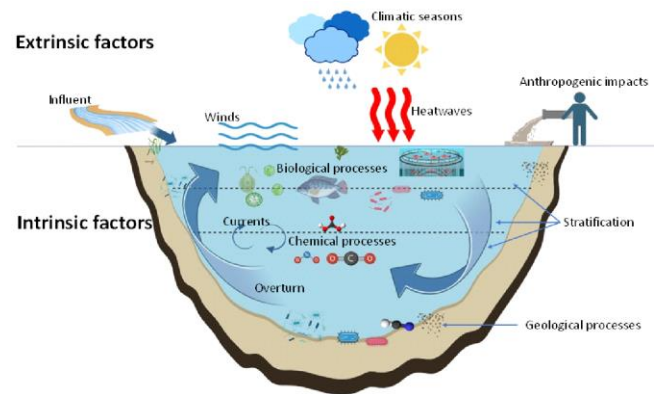


Figure 2. Factors that influence water quality in a lacustrine system.

A18 Amplifying the silent voices: The impact of effective seaweed farmer producer organizations (FPOS) in Zanzibar.

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Abstract

Seaweed farming is a vital economic activity for the coastal communities of Zanzibar, particularly benefiting women. Despite its significant contribution to livelihoods, the sector is plagued by numerous challenges. The absence of a minimum selling price policy, limited buyers, the inability to set prices, and logistical constraints have been identified as key issues (Burra & Devi, 2022). Additionally, there are limitations in value addition, promotional skills, market planning, and access to market information, all of which hinder the development of the seaweed sector.

Farmers also face practical challenges, such as the lack of modern farming tools, which forces them to farm in low-depth areas susceptible to disease and seaweed death, resulting in low yields and income (Ripanda & Mtenga, 2024). Frequent seaweed die-offs, diseases, and broader economic and institutional constraints further inhibit the sector's growth (Charisiadou et al., 2022; Shimba, Magombola, & Ibrahim, 2021). Health issues such as back pain, eye problems, and respiratory issues due to the labour-intensive nature of seaweed farming also impact farmers (Fröcklin, 2012).

The papers aims to investigate the critical role that seaweed producers' associations can play in addressing these challenges. By enhancing bargaining power, improving market access, facilitating financial support, and promoting sustainable practices, these associations can significantly improve the socio-economic status of seaweed farmers, especially women. This study seeks to fill the existing literature gap by exploring how these associations can empower farmers and transform the seaweed farming landscape in Zanzibar. The research aligns with several Sustainable Development Goals and Zanzibar's policy frameworks, making its outcomes beneficial for community livelihoods, national development, and the global arena.

The paper is directly relevant to the conference on Sustainable Aquaculture Development. It addresses the challenges faced by the seaweed farming sector in Zanzibar, a crucial component of sustainable aquaculture. By exploring the role of seaweed producers' associations in overcoming these challenges, the paper contributes valuable insights into enhancing sustainability within aquaculture practices. It highlights how these associations can improve socio-economic outcomes, support environmental sustainability, and empower women in coastal communities. The research aligns with the conference's focus on advancing sustainable and inclusive aquaculture practices that support both community development and environmental stewardship.

Key words: Sustainable Aquaculture, Seaweed Farming, Producers' Associations.

A19 Nursing Nile tilapia (*Oreochromis niloticus*, L) fry in cages improves their growth performance, feed utilization, and condition factor for stock enhancement.

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Abstract

Nile tilapia (*Oreochromis niloticus*) is the third most commercially important fish in Lake Victoria, contributing to food security and socio-economic development. However, its stock has been steadily declining due to intensive fishing pressure and unregulated fishing, leading to recruitment overfishing. Conventional management approaches have proven ineffective in restoring its stock, prompting the search for alternative strategies. The potential for stock enhancement to replenish recruitment-overexploited fisheries is recognized worldwide. However, its application in developing countries is limited by scanty information and culture technology. This study compared the growth performance, feed utilization, relative percentage survival, and condition factor of Nile tilapia fry nursed in plastic tanks, hapas-in-pond, and lake-based cages for stock enhancement. Moreover, the study assessed phytoplankton abundance in the three systems. Each system was stocked with mixed-sex fry weighing 0.63 ± 0.12 g at a density of 250 m^{-3} in triplicates and fed a commercial diet for 10 weeks. The results showed that the fry nursed in cages had significantly higher final weight ($p < 0.001$), daily weight gain ($p < 0.001$), specific growth rate ($p < 0.001$), condition factor ($p < 0.001$), and feed efficiency ($p < 0.001$), but had lower feed conversion ratio ($p = 0.002$) compared to those reared in hapas-in-ponds and tanks. The fry in all systems did not differ significantly in the percentage survival ($p = 0.264$) and hepatosomatic index ($p = 0.532$). Hapas-in pond had significantly higher phytoplankton abundance than tanks and cages ($p < 0.001$). Taken together, nursing Nile tilapia fry in cages improves their growth performance, feed utilisation, and condition factor. Therefore, we recommend nursing Nile tilapia fry in cages for stock enhancement to reduce recruitment overfishing.

A20 Chemical composition of Vermicompost from animal manure.

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Abstract

This study was conducted to assess the quality of vermicompost produced from different combination of animal manure. The experiment comprises of six treatments as follows; T1 (20% Chicken manure, 20% Cow dung manure, 40% Rabbit manure and 20% Soil), T2 (20% Chicken manure, 40% Cow dung manure, 20% Rabbit manure, 20% Soil), T3 (40% Chicken manure, 20% Cow dung manure, 20% Rabbit manure and 20% Soil), T4 (60% Chicken manure, 20% Cow dung manure, 20% Rabbit manure and 20% Soil), T5 (20% Chicken manure, 0% Cow dung manure, 60% Rabbit manure and 20% Soil), T6 (0% Chicken manure, 60% Cow dung manure, 20% Rabbit manure and 20% Soil) and evaluated in comparison to the control (TC) (0% Chicken manure, 0% Cow dung manure, 0% Rabbit manure and 100% Soil). *Eisenia fetida* worms were used for vermicomposting the manure in the different treatments over 60 days. The physiochemical parameters namely organic carbon, total nitrogen, phosphorus, potassium, electrical conductivity and pH were assessed in vermicompost samples at day 1, 30 and 60. Overall results shows that all physiochemical parameters assessed increased with time in all treatments except organic carbon which decreased with time except for treatment TC. The results also showed that T6 had the highest total nitrogen (2.26 ± 0.30 g/kg), and the highest pH value of 7.73 ± 0.01 . In addition, T2 had the highest total phosphorus (3.83 ± 0.7 g/kg) and potassium (1.00 ± 0.01 g/kg), but lowest values in organic carbon contents ($0.69 \pm 0.13\%$). Furthermore, T1 had a significantly higher electrical conductivity (6.48 ± 0.08 ms/cm), than other treatments. The TC showed a significantly higher values for organic carbon ($2.61 \pm 0.07\%$), and the lowest total phosphorus (0.90 ± 0.01 g/kg), total nitrogen (0.06 ± 0.02 g/kg), potassium (0.72 ± 0.02 g/kg), and electrical conductivity (1.18 ± 0.01 ms/cm). In addition, T2 had the highest biomass of *Eisenia fetida* (24.9 ± 1.1 g) compared to other treatments. In conclusion, T2 which contain the mixture of 20% Chicken manure, 40% Cow dung manure, 20% Rabbit manure, 20% Soil has the potential to be vermicompost due to the high biomass of *Eisenia fetida*, and high contents of Phosphorus and Potassium.

Keywords: Redworms, *Eisenia fetida*, Manures, Vermicompost, Physiochemical parameters.

A21 Spatial variation and sources of macroplastics pollution in Lake Victoria: A comparative study of the Nyamagana, Sengerema, and Ilemela Districts.

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Abstract

Lake Victoria, one of Africa's largest freshwater bodies, faces a significant threat from macroplastics pollution, which impacts its biodiversity and local communities. This study investigated macroplastics contamination in three Tanzanian districts bordering the lake:

Nyamagana, Sengerema, and Ilemela. We identify pollution sources using descriptive statistics and regression analysis through assessing macroplastics density and analysing debris composition to establish relationships between pollution sources and macroplastic density. Results showed higher macroplastics with 4.15 items per square meter in Nyamagana District. Most of these debris were plastic bottles and bags (54.7%), followed by fishing gears (19.8%), and other types of debris (25.0%). The main sources of pollution in Nyamagana were improper waste disposal (44.9%), littering (30.2%), and fishing activities (24.9%). Sengerema District had a lower density of macroplastics of 1.68 items per square meter; mostly being contributed by plastic bottles and bags (49.5%), fishing gears (10.2%), and others (40.3%). The primary pollution sources in Sengerema District were improper waste disposal (34.7%), littering (39.8%), and fishing activities (25.0%). The results further showed that macroplastic density was 3.05 items per square meter in Ilemela District. The debris was mostly plastic bottles and bags (64.8%), with fishing gear (15.1%) and other debris (20.1%). The major sources of pollution were fishing activities (45.0%) and improper waste disposal (29.6%), and littering (25.1%). Our analysis revealed a strong link between improper waste disposal and high macroplastics density. This suggests that improving waste management and fishing practices could greatly reduce pollution. These findings underscore the differences in macroplastic pollution across different areas and show the need for specific management strategies.

Keywords: Macroplastics pollution, Lake Victoria, Waste management and freshwater ecosystems.

A22 Unlocking Nile tilapia (*Oreochromis niloticus*, Linn. 1758) selective breeding programs in Uganda through geographical genetic structure mapping.

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Abstract

Nile tilapia (*Oreochromis niloticus*), native to Africa and the Levant, is an important species for both aquaculture and capture fisheries. Despite these attributes, Nile tilapia has been negatively impacted by anthropogenic activities ranging from overfishing and habitat destruction to translocations. These human-mediated activities have threatened the genetic evolutionary integrity of native populations of Nile tilapia and congeneric species through admixture, demographic bottlenecks and introgressive hybridization. In this context, the genetic contrast between farmed/bred strains and wild Nile tilapia populations in the major lakes of Uganda remains understudied. Understanding the genetic structure of Nile tilapia populations in the major water bodies of Uganda (lakes Victoria, Kyoga, Edward, George, Albert and Nile River) is a key resource to guide selective breeding programmes, thus minimizing the effects of maladaptation under both aquaculture and natural stocks. Although the population genetics of Nile tilapia in Uganda's major lakes have been studied, this was based on limited sampling scope, especially in the wild, and the key information on the species could have been overlooked. We fill this knowledge gap by genotyping 756 Nile tilapia individuals from multiple populations for each major water body of Uganda using a panel of 34 microsatellite loci based on the microsatellite genotyping-by-sequencing (SSR-GBS) technique. The results indicate two discrete gene pools/stocks: the Edward-George system and the Albert-Kyoga system-Victoria. Evidence of loss of genetic diversity and admixture of some Nile tilapia stocks was found, most likely resulting from anthropogenic perturbations. This study contributes useful information key for

understanding the potential Nile tilapia broodstock sources for selective breeding programmes, aimed at improving aquaculture production in Uganda.

A23 Genetic diversity and hybridization levels of *Tilapiines* across Africa using Microsatellite and mtDNA markers.

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Abstract

The taxonomical complexities consistently challenge the continued use of the Tilapia as an aquaculture candidate. These complexities have been fuelled by fish translocations leading to hybridization and admixture which complicate taxonomy and sound units for management and sustainability. Amidst these challenges, less information is available that is useful to fully understand the African *Tilapiines* at the continental level. This study characterized 10 *tilapiine* species collected from different water bodies in Africa, using microsatellites and mitochondrial markers. Three and two lineages of *Oreochromis niloticus* and *Oreochromis esculentus* respectively are defined. Among the 50 populations, comparisons among the East African water bodies showed extremely lower genetic differentiation. For example, Kyoga and Victoria (0.03), and Mulehe and Kayumbu (0.19). Multivariate analysis like principal coordinate analysis (PCoA) showed higher levels of admixtures between the natural and translocated populations. The high level of introgression was recorded between *Oreochromis machochir* and *Oreochromis mweruensis*. These results provide valuable insights for biodiversity conservation, fisheries management, and the development of genetically sustainable Tilapia breeding programs, ensuring the long-term viability of these species in their natural habitats and aquaculture settings.

A24 Selective breeding for genetic improvement of Nile tilapia (*Oreochromis niloticus linnaeus, 1758*) in Uganda: current status, challenges, and future perspectives.

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Abstract

Nile tilapia (*Oreochromis niloticus*) aquaculture continues to significantly contribute to the growth of the aquaculture sector in Uganda. However, its production is beset by erratic and unreliable seed supply. Also, most hatcheries practice inbreeding of broodstock, resulting in inferior seed characterized by low growth rates. As such, a selective breeding program is necessary to readily avail fast-growing seed that respond to farmers' needs. The present review consolidates available

information on developing a Nile tilapia breeding program in Uganda. The article discusses the significance of genetic improvement, drawing lessons from successful Nile tilapia selective breeding programs in other countries. The results indicate no systematic Nile tilapia selective breeding program was traceable in Uganda. Scanty information on the selective breeding efforts of the species was available, with little evidence of selection for improved performance. Overall, the national capacity for aquaculture research and development, including fish breeding and strain improvement, was weak and poorly funded. The review recommends purposive support for developing a systematic strain improvement breeding program, which will be a source of improved broodstock and seed for hatcheries and farmers, respectively. The program would guide the formulation of standard operating procedures for quality seed production towards ensuring sustainable aquaculture growth in Uganda.

A25 Genetic Diversity and Hybridization Patterns of Tilapia Species in the Lake Victoria Basin: Implications for Sustainable Aquaculture and Biodiversity Conservation

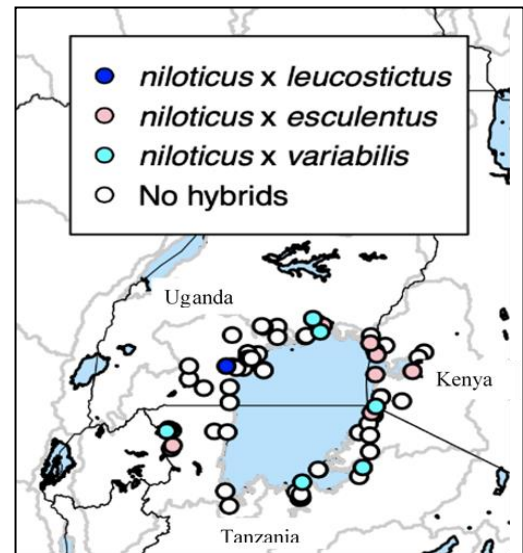
Asilatu Hamisi Shechonge^{1*}, Cassius Aruho², Kevin O. Obiero³, Jacob Abwao⁴, Richard Ddungu¹, Papius Dias Tibihika¹, John Benzie⁵, Ben Wismen⁵, Rose Komugisha Basiita⁶, Adam Ciezarek⁷, Wilfried Haerty⁷
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Abstract

Nile tilapia (*Oreochromis niloticus*) plays a vital economic role in capture fisheries and aquaculture across East African Region. However, the region boasts additional wild tilapia species and strains that hold promise for aquaculture, potentially offering genes for disease resistance, accelerated growth, or environmental resilience. Nevertheless, the uncontrolled movement of genetic materials between these species could lead to a decline in biodiversity. While selective breeding campaigns in aquaculture could potentially benefit from these genetic resources without compromising sustainability, the rapid expansion of aquaculture in the East African Community (EAC) raises concerns about its impact on aquatic biodiversity. Currently, there is insufficient information about the status of wild tilapia strains, the distribution and introduction of non-native strains, and their potential effects on biodiversity, especially in the Lake Victoria basin.

To address these knowledge gaps, we conducted genetic sequencing of 380 samples of tilapia species from the Lake Victoria basin in Uganda, Kenya and United Republic of Tanzania using an Illumina NovaSeq X technology and LITE library preparation. This allowed us to identify 32,125,84 informative Single nucleotide polymorphisms (SNPs). Our results revealed 33 individuals classified as hybrids, all involving *O. niloticus*. Among these hybrids, 19 involved crosses with *O. esculentus* (from seven sites), 11 with *O. variabilis* (from six sites) and 3 with *O. leucostictus* (from one site). Notably, each hybrid type occurred exclusively at its respective site. Furthermore, our results indicated that *Oreochromis niloticus* from Lake Albert had one distinct ancestry group, while those from Lakes Kakyera and Kijanibarola were from another group, with fish from Lake Victoria had a mix of the two groups. In addition, we observed weak population structure within *O. niloticus*, with ongoing but minimal differentiation. These results will assist in making informed decisions regarding the management of these genetic resources to preserve biodiversity while promoting their sustainable use in selective breeding programs for commercial aquaculture in the EAC.

Figure 1 illustrates a map of the Lake Victoria basin, highlighting all the sampling sites. The map is color-coded to indicate the locations where different combinations of hybrid species are found.



Keywords: *Oreochromis niloticus*, hybrids, admixtures, commercial aquaculture, EA region.

A26 Pathogenic bacteria causing infectious diseases in cage-farmed fish in the Lake Victoria.

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Abstract

Cage fish farming has been on a steady rise in the Lake Victoria Basin (LVB) since its introduction in 2005. The region has witnessed an increased number of cages, with over 8,024 installed. However, the growth of the industry is constrained by fish diseases that result in fish mortalities and economic losses. Unfortunately, efforts to identify the root causes of these diseases have been limited, and the specific causative agents remain unidentified. Thus, the current study aimed to isolate, identify, and characterize the pathogenic bacteria and assess knowledge on the bacterial diseases and management practices in cage fish farming in the LVB. A total of thirty-three swab samples from morbid fish were collected from twenty-six cage fish farms in six districts of the LVB Tanzania: Nyamagana, Sengerema, Musoma rural, Musoma urban, Rorya and Busega.

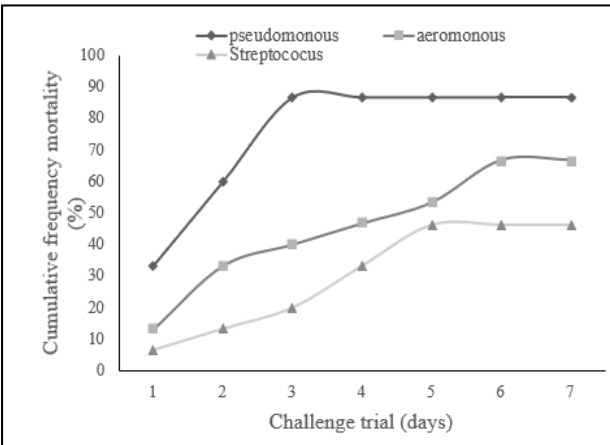
Microbiological and biochemical analysis of these samples revealed the presence of only 3 bacterial genera *Aeromonas* spp. (42.86 %), *Pseudomonas* spp. (28.57 %), and *streptococcus* spp. (28.57 %). Pathogenicity (Challenge trial) test was conducted for seven days, where 60 healthy Nile tilapia weighing 50-200 g were inoculated intraperitoneally with 0.5mls of the overnight culture of virulent *Aeromonas* spp., *Pseudomonas* spp., and *Streptococcus* spp., at a concentration of 3×10^7 cfu ml⁻¹. The results showed a maximum mortality rate of 86.7% in *Pseudomonas* spp. within three days, followed by *Aeromonas* spp. (66.7%) and *Streptococcus* spp., (40%) over six days.

The clinical signs observed during challenging tests were similar to those observed during sampling. Molecular characterization of the above mentioned bacterial pathogens are underway and it will be completed by November 2024. These preliminary findings call for urgent action to enhance biosecurity and disease prevention and management practices in the LVB to prevent further spread of the above-mentioned fish pathogens.

Figure 1: Cumulative mortality of *O. niloticus* inoculated intraperitoneally with 0.5 ml of isolated bacteria at a concentration of 3×10^7 cfu ml⁻¹

Table 1. Distribution of bacteria isolated from fish farms in six districts of Lake Victoria Basin, Tanzania.

DISTRICT	isolated bacteria
Nyamagan a	<i>Pseudomonas</i> spp., <i>Aeromonas</i> spp., <i>streptococcus</i> spp.
Sengerema	<i>Aeromonas</i> spp.
Rorya	<i>Aeromonas</i> spp.
Musoma mc	<i>Aeromonas</i> spp., <i>streptococcus</i> spp.



Keywords: Cage fish farming, Lake Victoria Basin (LVB), fish diseases, mortality rates, clinical signs, molecular characterization.

A27 Spatial risk estimation of parasitic infestations of pond and cage cultured Nile Tilapia (*Oreochromis niloticus*) in the Lake Victoria Crescent, Uganda.

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Abstract:

Parasites are part of the fish culture systems and live co-currently with fish under normal conditions. However, parasitic infestation arises when this relationship is interfered with. This occurs when there is poor water quality and farm management practices, which exacerbate the parasite proliferation. In the end, misfortunes such as mortality, increased costs associated with mortality, morbidity and treatment, reduced growth and rejection of products occur. The study included active Nile tilapia pond and cage fish farming sites located in 10 districts in the Lake Victoria Crescent. Using Spatial Areal Unit Modelling with Conditional Autoregressive Priors, without a spatial component, out of 16 risk factors (water quality and farm management

practices), only intermediate hosts had a significant effect on parasitic infestation. Therefore, only intermediate hosts were included in the final model. Furthermore, there was no spatial clustering in parasitic infestation among fish farms since there was no spatial autocorrelation in the residuals from the final model. Based on the fitted values from the final model, a map presenting the estimated parasitic infestation in fish farms in the Lake Victoria Crescent was produced, and 71% (23 of 32) of fish farms had high estimated parasitic infestation. In conclusion, the parasitic infestation risk map produced provides a very informative visual summary of the extent of parasitic infestation. The best farm management practices and good water quality identified may not only be utilized by fish farmers as a preventive measure but also used by policy makers in coming up with contingent plans to prevent the emergence of parasitic infestations.

A28 Phytoplankton Status in Lake Victoria Tanzania.

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Abstract

This study aimed at projecting the status of phytoplankton species abundance, composition and biomass in Lake Victoria, Tanzania. The study was carried out for three years 2019, 2020 and 2021 consecutively. Samples were collected from different sites along Mwanza region; specifically, Mwanza Gulf, Ukerewe Island, and Magu; Kagera region, Simiyu and Mara region in Lake Victoria. About 105 water samples triplicate were collected in 35 sites collectively in three years. Samples were collected using 1L water sampler and plankton net by towing the equipment at the water surface, in mid water depending on water depth and near bottom to collect samples for plankton abundance, composition and biomass. Sampling sites were categorized in three sampling point, inshore, mid water and offshore to maximize accuracy and plankton count. Three major taxa were identified, *Cynophyceae*, *Bacillariophyceae* and *Chlorophyceae* respectively. *Cynophyceae* were the dominant group occupying 39.35% to 98.35% in range in all sites except Lwela site that had 89.35% *Bacillariophyceae* in 2021 and Nyamnyange site with 53.38% *Bacillariophyceae* group. *Bacillariophyceae* had 0.25% to 89.35% while *Chlorophyceae* had the lowest percentage composition ranging from 0.19% to 18.79% respectively. *Microcystis flos aquae* and *Merismopedia tenuissima* were the dominant species in *Cynophyceae* group while *Nitzschia acicularis* and *Closterium navicular* dominated the *Bacillariophyceae* group. Highest species abundance was recorded in Senga (53), Mnyara (46), Kisoko (37) and Mihama (33) for year 2019. Year 2020 and 2021 number of species were recorded below 30 species.

A29 Leveraging on the provision of the Aquaculture Investment Guide to attract investment in the East African Community.

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Abstract

With dwindling of fish catch from capture fisheries and increased demand for food as a result of increased population, aquaculture has been looked as a viable option to bridge the gap. However,

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aquaculture is facing several challenges including limited access to bank loans and inadequate investment into the sector among others. Many countries have failed to utilize fully their full potential to develop aquaculture because there has been a failure to attract large-scale commercial farms. Furthermore, the problems are of a technical, financial and governance nature. Failed operations have further dampened investment in aquaculture. Therefore, to address these challenges large scale investment into the aquaculture is urgently required to move forward the development of the sector. Therefore, LVFO and FAO have worked together to develop investment guide with a view of attracting large investment into the sector. The guide provides the roles of governments, entrepreneurs and financial institutions on attracting investment in aquaculture sector. With the domestication and implementation of these guide, the sector should be able to attract the required investment to be able to produce enough fish to bridge the demand gap of fish in the EAC.

A30 Aquaculture in Ghana: The status and potential for meeting the fish needs of a growing population.

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Abstract

Food insecurity remains one of the most evident aspects of poverty. The growing population and the competition for resources such as land and water imply that global food demand is burgeoning. In Kenya, food insecurity trends are worrying as the population, predicted to hit 55 million by 2030 as the per capita annual growth rate of arable land and the increase in food prices. Increased challenges in food production, such as competition for resources, dwindling capture fisheries, and impacts of climate change, are becoming more eminent. Therefore, steady solutions to food insecurity and malnutrition in Kenya need addressing. This study will aim to increase awareness of the contribution of aquaculture to nutritional security through direct consumption of fish, and the income stability among vulnerable groups who are involved in the aquaculture value chain sector. Prospective study design will be used and data will be collected using questionnaires. The target population will be aquaculture farmers, households, Kenya Marine and Fisheries Research Institute (KMFRI), state department of fisheries in Kakamega, and Kiambu counties, respectively. The expected outcomes of this study will be establishment of clear and sustainable policies for aquaculture development to address food insecurity including malnutrition and poverty alleviation through improved income (employment), and fish consumption levels within the poor households.

Keywords: Aquaculture, malnutrition, food fish, climate change.

A31 Has the World Aquaculture Society African Chapter delivered to its mandate? Thoughts and perspectives.

Blessing Mapfumo.

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Abstract

Celebrating its Fifth-Year Anniversary: Has the WAS-AC Delivered to its Mandate? Thoughts and Perspectives.

The African Chapter of the World Aquaculture Society (WAS-AC) was established in November 2018 as a platform to address the needs and aspirations of the African aquaculture sector. The annual meetings of WAS are recognized as the "premier" aquaculture conferences and exhibitions - bringing together a wide variety of aquaculturists from the commercial, academic, governmental, developmental partners and other actors in the field – in line with WAS's vision and strategic plan. In addition to conferencing, the WAS and its partners regularly collaborate on some educational, technological, knowledge building and information exchange initiatives through joint research programmes, seminars/webinars, dialogues, special training courses, general networking, honours and awards programmes, expositions and student development programmes. In celebrating its fifth-year anniversary and looking ahead, the WAS AC recently conducted a survey through its members and partners - to gain some perspectives on how the organisation can step up efforts, improve its service delivery in contributing to advancing aquaculture development in Africa.

A32 Implementing zonal aquaculture innovation platforms in Uganda: Key lessons learned.

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Abstract

Uganda's aquaculture sub-sector is rapidly developing, contributing up to 22% of all fish produced in the country. However, the sub-sector still faces challenges related to limited access to extension services and value-addition skills, production inputs, post-harvest handling facilities, disease incidences, and weak market linkages. Although there have been isolated interventions at different aquaculture value-chain nodes, the registered challenges continue to recur. To address prioritized issues in Uganda's aquaculture sub-sector, nine zonal aquaculture innovation platforms were established based on the country's nine agroecological zones. These platforms brought together different stakeholders to identify solutions to common problems in each aquaculture value-chain node. Each innovation platform consisted of fish farmers, hatchery operators, traders, extension workers, researchers, input dealers, local leaders, and financial institutions. During a series of zonal workshops, participants identified constraints to the aquaculture sub-sector in their

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respective zones. The findings showed existence technical knowledge gaps across the entire aquaculture value chain mainly affecting hatchery operators, input suppliers, and farmers. Therefore, there is need for coordinated interventions to enhance access to production technologies, innovations, knowledge, and skill transfer to promote gender-cantered aquaculture development.

Keywords: Agro-ecological zones; aquaculture; innovation systems; innovation platforms.

A33 EU-EAC - True Fish farming in Lake Victoria Basin (TRUEFISH).

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Abstract

The Lake Victoria Fisheries Organization (LVFO), of the East African Community (EAC), in partnership with Landell Mills, Food and Agriculture Organization (FAO) of the United Nations and WorldFish is implementing the EU EAC True Fish Farming Story in the Lake Victoria Basin (TRUEFISH) Project. The TRUEFISH project is a significant initiative funded by the European Commission with €10.15 million under the 11th EDF. It benefits the East African community in Kenya, Uganda, and Tanzania over five years, with additional benefits for Burundi and Rwanda in the area of Aquatic Animal Health. The project's goal is to foster competitive, gender-equitable, and sustainable commercial aquaculture in the Lake Victoria basin. It aims to overcome key challenges faced by investors, such as a lack of technically skilled operators, insufficient investment finance, and incomplete networks, while addressing potential threats to sustainable aquaculture development.

Currently, the project is in the implementation phase. It has facilitated farmers from Burundi, Kenya, Rwanda, Uganda, and Tanzania to conduct study tours to Egypt and China where they were exposed them to new ideas, technologies, and best practices in aquaculture. The project has organized conferences both online and physical in Bondo, Kenya, and developed a standardized business plan for Tilapia and Catfish to help fish farmers present credible, bankable business plans and interact more effectively with financial institutions. The project has also worked towards unifying the aquaculture sector by creating a regional aquaculture association. Furthermore, short and long courses have been developed to train for aquaculture farmers, students and training institutions teachers. The Lake Victoria Regional Aquatic Animal Health Strategy has been developed, and spatial planning for Lake Victoria Zoning for Cage Aquaculture development is underway. A study was conducted to assess the genetic diversity of tilapia populations across the Lake Victoria Basin, identifying risks to biodiversity potentially posed by aquaculture. Officials and private sector representatives from Uganda, Kenya, and Tanzania have been trained in fish biodiversity protection in Malaysia. The project is also supporting the development of national aquatic animal health strategies and organizing the World Aquaculture Conference in Uganda in June 2025.

As the project is in the implementation phase, it is expected that the end of the project access to commercial networks for aquaculture-related businesses will have improved, the availability and quality of skilled local workers will have increased, and the sustainability and biosecurity of regional aquaculture production systems will have been enhanced.

A34 Aquaculture: A favourable recommendation for food insecurity, poverty and undernutrition in Kenya.

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Abstract

Food insecurity remains one of the most evident aspects of poverty. The growing population and the competition for resources such as land and water imply that global food demand is burgeoning. In Kenya, food insecurity trends are worrying as the population, predicted to hit 55 million by 2030 as the per capita annual growth rate of arable land and the increase in food prices. Increased challenges in food production, such as competition for resources, dwindling capture fisheries, and impacts of climate change, are becoming more eminent. Therefore, steady solutions to food insecurity and malnutrition in Kenya need addressing. This study will aim to increase awareness of the contribution of aquaculture to nutritional security through direct consumption of fish, and the income stability among vulnerable groups who are involved in the aquaculture value chain sector. Prospective study design will be used and data will be collected using questionnaires. The target population will be aquaculture farmers, households, Kenya Marine and Fisheries Research Institute (KMFRI), state department of fisheries in Kakamega, and Kiambu counties, respectively. The expected outcomes of this study will be establishment of clear and sustainable policies for aquaculture development to address food insecurity including malnutrition and poverty alleviation through improved income (employment), and fish consumption levels within the poor households.

Keywords: Aquaculture, malnutrition, food fish, climate change.

A35 Creating an enabling environment in order to attract investment into the East African aquaculture sector.

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Abstract

East Africa's aquaculture potential is sizeable and significant. To begin with, there exists a "supply gap", i.e. in most East African countries the per capita consumption of fish has gone down as a result of the juxtaposition of rapidly rising populations with stagnant or declining wild catch. The region has abundant natural resources capable - if well-harnessed - of meeting this gap. Further, the sector provides opportunities across the aquaculture value chain, from inputs to distribution and processing. In order for East African aquaculture to grow as it needs to, a commercial approach to production is necessary. It is likely that a mix of local and foreign investment will be required to meet the need. In order to support and/ or attract this investment - hundreds of millions of dollars - it is necessary to understand what investors are looking for, and for governments and development partners to work deliberately towards delivering this enabling

environment. These investors' needs and what can be done to meet them are the substance of this submission.

A36 Gender-Specific Analysis and Mapping of the African Catfish Value Chain in Uganda: A Focus on Women's Roles and Opportunities.

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Abstract

Catfish farming in Uganda presents an opportunity for women to get employment, make a living and obtain nutritious food for their families. There is limited specific information on the women roles and opportunities in literature regarding catfish farming. This study services as an initial investigation on gender specific analysis in the catfish value chain in Uganda to get a better understanding about the involvement of women, their specific roles and opportunities for business and self-employment. The study was conducted in eight districts in the four regions in Uganda with participation of 164 persons in seed and feed producers, catfish farmers, processors, traders and consumers. The data collection method used was face-to-face interviews with the respondents. Results indicated low participation of women in most sectors apart from fish processing. The participation of women as owners or players in seed and feed production was almost negligible. The women involved in processing are very active but with very low economic returns about half of that realized by fish farmers and a third of that obtained by traders and thus economically vulnerable. Many women find barriers to financial resources and most of them utilized more of family savings unlike men who mostly utilized their own personal savings. Their major challenge was high interest rates and a lack of collateral security. More women were involved in groups (45) compared to men (36). Findings call for targeted interventions to enhance women's economic empowerment to effectively contribute to the catfish value chain in Uganda.

9. LIST OF EXHIBITORS

- My Fish TAN Limited
- Sameki LTD
- Kasengenya
- Lake Fresh
- Tizeba Fish Farm
- Fisheries Education Training Agency (FETA)
- Tanzania Women Fisheries Worker's Association (TAWFA)
- World Initiative for Soy In Human Health (WISHH)
- Maximum Fishing Supplies / MAIMUN
- Uganda Women's Association
- World Aquaculture Society (WAS)