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01: KMFRI's Aquaculture Division: moving research from the laboratory to impacting and transforming communities with improved livelihoods

#AquaSmartTIMPs

Fish farmers set to reap big as KMFRI's aquaculture team translates research findings into smart ventures

BY DR KEVIN OBIERO & JANE KIGUTA



KMFRI's head of Aquaculture Division Dr Jonathan Munguti working with farmers under the World Bank-funded KCSAP project.

The Kenya Marine and Fisheries Research Institute (KMFRI) has partnered with like-minded organizations in a fish farming initiative under the Kenya Climate Smart Agriculture Project (KCSAP). KCSAP is a World-Bank funded project running in 24 counties in Kenya.

The programme is aimed at promoting fish farming across the country to increase fish production from the current 18,000 to 71,500 metric tons, and consumption levels from 4.5 kg to 10 kg per capita per year by 2022

through adoption of climate-smart aquaculture technologies, innovations and management practices (TIMPs).

“Aquaculture is a climate smart technology and Kenya Climate Smart Aquaculture Project (KCSAP) will go a long way in transforming livelihoods in a world where terrestrial agriculture is experiencing adverse effects of climate change,” said KMFRI's Deputy Director and head of Aquaculture Division Dr Jonathan Munguti. “Crop farmers who rely heavily on rain-fed agriculture to grow maize, beans and the like have been hard hit by the negative effects of climate. Well managed aquaculture systems will remain lucrative regardless of the prevailing climatic patterns,” the aquaculture expert added.



KCSAP has brought together local universities, research institutions and private enterprises where KMFRI is also working with Aquaculture Association of Kenya (A.A.K), Kamuthanga Fish farm and Egerton University to promote and validate fish health management practices through bio-security measures in the aquaculture value chain.

Maseno University will oversee the implementation of biofloc technology, fingerpond technology, cage culture and integrated aquaculture. On the other hand, University of Eldoret is promoting the application of HDPE cage culture technology, while Jomo Kenyatta University of Agriculture and Technology (JKUAT) oversees insect-based protein – rich feeds technology.



Other players in the KCSAP project include Kenya Fisheries Service, Kenya Fish Marketing Authority, and private enterprises that include Fish Carnivore Restaurant, Lake Agro Limited (formally Dominion Farms) and Treasure Industries.



Fish ponds at Bukani, Samia Sub-county/Photo Courtesy of Busia County

The Kenya Climate Smart Agriculture Project (KCSAP) is being implemented in 24 counties with fish value chain being promoted in Busia, Siaya, Kakamega, Lamu and Marsabit counties.

Component 2 of the project has already been launched in Siaya county where KMFRI's research centres: Sang'oro, Sagana and Mombasa are actively involved in the project. This component involves collaborative adaptive research grant aquaculture value chain.

More than 100 farmers and traders in Siaya County are expected to directly benefit from the project, a collaborative effort between the County Government of Siaya and the research institutions.

"Cost associated with fish feeds is key in determining whether farmers will stay in business. Fish feeds take over 50 per cent of the total operational costs and farmers must get it right," said Dr Munguti. "The choice of ingredients, their cost, nutritive content and availability impact on the final product."



Fisheries stakeholders during launch in Siaya County.

Successful implementation of these technological innovations and management practices is expected to increase agricultural productivity, build resilience to climate change, and reduce greenhouse gas emissions.

Speaking during the aquaculture value chain project launch in Siaya County on July 29, 2020, KMFRI's Sang'oro Centre Director Dr. Kevin Obiero underscored the important role the project will play in boosting fish production.



KMFRI's Sang'oro Centre Director Dr Kevin Obiero

Enhanced productivity is expected to ensure equal participation of both men and women in the fisheries sector, create more jobs and increase average incomes for households.



During the event, Siaya Agriculture Executive Dr. Elizabeth Odhiambo told farmers that the initiative will improve their livelihoods when implemented. Agriculture Chief Officer Mr. Charles Siso expressed confidence that the project will work, and all objectives will be fully met.

The project is being replicated in Busia county where the universities' researchers and county's top fisheries officials toured to establish challenges facing the fish value chain. On 3rd August 2020, Busia government launched the second component of the Kenya Climate Smart programme dubbed 'Seed Systems Research' in the county. Led by County Director of fisheries Mr. Timothy Odende, the officials visited Wakhungu fish hatchery which has a production capacity of 1.5 million fingerlings annually. In Busia, more than 150 farmers are set to benefit from the fish value chain.



Fisheries officials during their tour of Wakhungu fish hatchery

Dr. Obiero stated the project is geared toward achieving climate smart "triple wins" to increase fish production, enhance farmers' resilience and reduce greenhouse gas emission.

The Agriculture, Livestock and Fisheries CEC for Busia Dr. Moses Mwanje Osia said the aim of the collaboration is to solve challenges facing the fish value chain. He urged farmers to cooperate for the government to realize her objective of increasing fish production in the country. KMFRI will also spearhead fish culture technologies, fish marketing and value

addition, validate fish strains and health management practices, and enhanced production of protein rich fish feeds.

Chief Officer in charge of Livestock, Fisheries and Agribusiness Mr. Moses Weunda emphasized the important role research and collaborations play in the growth of the fisheries industry. He urged stakeholders to join hands in transforming Busia County into a regional leader in fish production and value addition. Mr. Weunda praised local universities for coming up with homegrown solutions to local challenges in the agriculture sector. The KCSAP County Project Coordinator Mr. Maurice Okisegere lauded the great support from the research and universities in supporting Busia County project coordination unit.

About biofloc technology, fingerpond technology and integrated aquaculture

Biofloc technology (BFT) is an environmentally friendly method that relies on photosynthesis to convert uneaten feeds, faeces and excess nutrients into microbial proteins under optimal carbon-nitrogen ratio and zero water exchange. The microbial proteins are essential micronutrients with probiotic effects on the cultured fish. The BFT saves the cost of feeding by about 30%, hence ensures high profitability," said the aquaculture research scientist.

Fingerpond technology (FPT) involves constructing ponds in the wetlands which are then naturally stocked with water and fish through annual wetland floods. The technology promotes nutrient cycling, reduces fishing pressure in lakes, and increases the gross margin of an average household by 11%. FPT promotes the resilience of wetland production and sustainability, which enhances the absorption of atmospheric carbon, thus reduces global warming.

In integrated aquaculture, wastes from one subsystem are potentially valuable inputs to other subsystems thus enhance the efficiency of resource use. "For example, poultry reared for eggs or meat can be integrated with fish farming to reduce the cost of inputs such as fertilizer and feeds to maximize profits".



About collaborative adaptive research grant aquaculture

The Kenya Climate Smart Agriculture Project (KCSAP) is applying the 'Collaborative Research Model' (CRM) as its main vehicle for research project development and implementation. Dr. Obiero said the collaborative approach is aimed at promoting holistic, multi-disciplinary, multi-stakeholder and multi-institutional approach. 'Adaptive research' in the KCSAP context is aimed at enhancing productivity and, or, solving problems 'on-farm' conditions.

"In this regard, technologies, innovations and management practices (TIMPs) that exist within KALRO, KMFRI, agricultural universities and other NARS institutions, which have been developed by scientists in these institutions can respond to climate smart agriculture (CSA) needs of the country," said Dr. Obiero. A considerable number of these TIMPs will be fully tested, validated and upscaled for adoption by farmers. "However, some of these TIMPs require further testing, before their upscaling for adoption in the target counties. These TIMPs will first undergo validation trials via 'applied research'".

Trainers of Trainers Training for Busia County

KMFRI in collaboration with KALRO-KCSAP Component 2 organized a workshop to train ToTs on "Climate Smart Practices for Aquaculture Value Chain" for Busia County. About 20 participants from Busia County participated in a Trainers of Trainers training held at Ukweli Pastoral and Development Centre in Kisumu County.

The aquaculture TIMPs are grouped into 10 modules within five thematic areas representing sustainable fish farming practices, namely culture systems, fish breeding and genetics, feeds and fish nutrition, fish health and disease control, and value addition techniques, post-harvest management, and marketing information systems. During the workshop that ran from 24th to 2nd September 2020, the trainees learnt lessons about aquaculture value chain management techniques to help farmers adopt climate smart

aquaculture technologies and best management practices to boost fish production. Topics of discussion included fish breeding techniques, criteria for pond site selection, and many others.

KMFRI's facilitators included Dr Munguti who took the trainers through fish feed formulation processes; whereas Sang'oro Centre Director Dr Kevin Obiero and Sagana Centre Director Dr Domitilla Kyule led the participants through development of marketing strategies and analysis; and fish value-addition methods and recipes practical session respectively, while Ms Cecilia Muthoni trained participants on fish breeding and genetics improvement techniques and management.

Other facilitators were Maseno University's Dr Eric Ogello, University of Eldoret's Dr Geraldine Matolla, KALRO's Ms Scholastica Wambua, Ms Martha Opondo, among others.



A team of facilitators from KMFRI, KALRO, University of Eldoret and Maseno University.

Speaking during the training, KALRO Livestock Systems Director Dr Faustine Wandera (in suit) urged participants to focus on upscaling aquaculture technologies, innovations and management practices (TIMPS) and ensure they are implemented by farmers as guided by research scientists.



Busia County Director of fisheries Mr. Timothy Odende emphasized that it's time all stakeholders underscored aquaculture's contribution to GDP. "Focus should be on creating partnerships with smallholder fish farmers. Militarization of fisheries should be stopped," Mr Odende said. "The farmer must benefit in all fish value chain processes." He said creating a system that eliminates middlemen will create a system where the farmer will reap big in all value chain process levels right from fish production to distribution.

Speaking on behalf of the Busia County Government, Mr Odende commended the good work being done by the KCSAP collaborative research project team in the aquaculture value chain in Busia County.



KMFRI's head of aquaculture Dr Jonathan Munguti and Sang'oro Research Centre Director Dr Kevin Obiero during the ToT training in Kisumu. Dr Obiero is the team leader for the Kenya Climate Smart Agriculture Project's (KCSAP) aquaculture value chain.

About Dr. Kevin Obiero....

Dr. Kevin Obiero holds a BSc and MSc in Fisheries and Aquatic Sciences both from Moi University, Kenya and a PhD in Natural Resources and Life Sciences from the University of Natural Resources and Life Sciences (BOKU), Vienna, Austria. He is member of Aquaculture Regional Working Group (ARWG) for the Lake Victoria Fisheries Organization (LVFO), Aquaculture Thematic team leader for aquaculture value chain and a member of Training Selection Committee (TSC) for the Kenya Climate Smart Agriculture Project (KCSAP). He holds membership in six professional and academic bodies, and is the Board Chair for the African Center for Aquatic Research and Education (ACARE-<https://www.agl-acare.org/>) registered in New York, USA.



Busia County Director of Fisheries Mr. Timothy Odende makes a brief presentation during the ToT training.

This article was made possible through the contribution of Dr Kevin Obiero. Dr Obiero is the team leader for the Kenya Climate Smart Agriculture Project's (KCSAP) aquaculture value chain and facilitated the session on Development of Marketing Strategies and Marketing Analysis at the ToT Training.