

Research Application Summary

Harnessing public–private partnership to enhance practical-oriented graduate training in fisheries and aquaculture in Sub-Saharan Africa

Akoll, P.¹, Adamneh, A.D.², Drexler, S.³, Kaunda-Arara, B.⁴, Kubiriza, G.K.¹, Odong, R.¹, Waidbacher H.³, Winkler, G.³, Nampala, P.⁵, Nsibirano, R.⁶, Ntangaare, M.M.⁷, Liti, M.D.⁴, Yared, T.G.², Kibru, Z.T.², Abebe, B.C.² & Masembe, C.¹

¹ Department of Zoology, Entomology and Fisheries Sciences, College of Natural Sciences, Makerere University, P. O. Box, 7062, Kampala, Uganda

² National Fishery and other Aquatic Life Research Center (NFALRC), P. O. Box 64, Addis Ababa, Sebeta, Ethiopia

³ Institute of Hydrobiology and Aquatic Ecosystem Management Department of Water, Atmosphere and Environment, University of Natural Resources and Life Sciences, Max Emanuel Strasse 17 1180 Vienna, Austria

⁴ Department of Fisheries and Aquatic Sciences, School of Natural Resource Management, University of Eldoret, P. O. Box 1125 30100, Eldoret, Kenya

⁵ Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) P.O Box 16811, Wandegaya, Kampala, Uganda

⁶ School of Women and Gender Studies, College of Humanities and Social Sciences, Makerere University, P. O. Box, 7062, Kampala, Uganda

⁷ Department of Performing Arts and Film, College of Humanities and Social Sciences, Makerere University, P. O. Box, 7062, Kampala, Uganda

Corresponding author: pakoll@cns.mak.ac.ug

Abstract

Higher Education Institutions (HEIs) are hubs of knowledge generation and innovations to drive community development towards achieving African Aspirations laid down in the AU Agenda 2063. Student centered learning, supported with experiential learning and strong field hands-on training activities is a central approach for HEIs to impart the required skill and competence in graduates. However, most HEIs receive limited funding especially to fully support and equip themselves with the requisite infrastructure and expertise to guide trainees in knowledge generation. Indeed, several HEIs are stuck in the traditional teacher centered, classroom-based training. Yet, fisheries and aquatic based sciences are more practical oriented, hence require more dedicated time for hands-on activities. The Austrian Development Agency through Austrian Partnership Programme in Education and Research for Development (APPEAR), provided financial support to an academic partnership comprising of teams from Uganda, Kenya, Ethiopia and Austria coordinated by Department of Zoology, Entomology and Fisheries Sciences, Makerere University. This partnership has introduced a field-oriented stakeholder-facility-based training approach with the aims of: a) increasing the participation of private and public stakeholders' in the training of future employees and b) harnessing existing infrastructure and human resources within communities to leverage practical activities. It is anticipated that by establishing strong public private partnerships, there will be increased community appreciation of training process, hence high employability of graduates, enable development of community-focused technologies for rapid adoption, and allow for prompt identification of problems

and solutions.

Key words: Aquaculture, aquatic sciences, farmer-student-teacher interactions, field studies, food and nutrition security

Résumé

Les établissements d'enseignement supérieur (EES) sont des centres de production de connaissances et d'innovations qui permettent d'orienter le développement communautaire vers la réalisation des aspirations africaines définies dans l'Agenda 2063 de l'Union Africaine. L'apprentissage centré sur l'étudiant, soutenu par un apprentissage expérientiel et d'activités de formation pratique sur le terrain, est une approche centrale pour les EES afin de transmettre les aptitudes et les compétences requises aux diplômés. Cependant, la plupart des EES reçoivent un financement limité, notamment pour se doter des infrastructures et de l'expertise nécessaires pour guider les apprenants dans la production de connaissances. En effet, plusieurs EES sont contraints à la formation traditionnelle de classe et centrée sur l'enseignant. Pourtant, les sciences halieutiques et aquatiques sont davantage axées sur la pratique et nécessitent donc plus de temps pour les activités pratiques. L'Agence autrichienne de développement, par le biais du programme de partenariat autrichien pour l'éducation et la recherche pour le développement, a apporté son soutien financier à un partenariat universitaire composé d'équipes d'Ouganda, du Kenya, d'Éthiopie et d'Autriche, coordonné par le département de zoologie, d'entomologie et de sciences de la pêche de l'université de Makerere. Ce partenariat a introduit une approche de formation axée sur le terrain et basée sur les acteurs, dans le but : a) d'accroître la participation des acteurs privées et publiques à la formation des futurs employés et b) d'exploiter les infrastructures et les ressources humaines existantes au sein des communautés pour bénéficier des activités pratiques. Il est prévu qu'en établissant de solides partenariats public-privé, il y aura davantage de technologies axées sur les communautés pour une adoption rapide, et permettra une identification rapide des problèmes et des solutions.

Mots clés : Aquaculture, sciences aquatiques, interactions entre agriculteurs, étudiants et enseignants, études de terrain, sécurité alimentaire et nutritionnelle

Introduction

Fisheries and aquaculture sectors are major contributors to securing food and nutrition, as well as poverty alleviation, rural livelihoods, employment and income generation for developing countries. Capture fisheries, the major source of fish food is experiencing enormous and rapidly changing challenges including ever-increasing fish demand, environmental degradation and climate variability. As such, fish production in most lakes have either stagnated or declined. Despite effort to sustainably manage fisheries resources, most problems associated with its decline are far from being addressed. Sustainable management of capture fisheries is hampered by limited and scattered infrastructure and expertise, yet, institutional networks to share the limited resources in the region are weak. Meanwhile, aquaculture is expanding rapidly to fill the gap created in capture fisheries. Consequently, technological advancement tailored to increase productivity in culture systems are also evolving very fast though significant quantities of fish produced from fish farms in Eastern Africa (Dalsgaard *et al.*, 2012). Unfortunately, the sector's development is hampered by low numbers of fit-for-the-demand human capacity responding to fast-moving technological advancements to bolster adoption and up-scaling of technologies. Higher Education Institutions (HEIs) are hubs of generation and advancement of knowledge into

innovations required for communities' socio-economic development (Brennan *et al.*, 2004). Indeed, HEIs hold a crucial position in academia-stakeholders collaboration to promote entrepreneurship by providing an environment which encourages learning and guides self-reflections towards discovery (Wadee and Padayachee, 2017). Therefore, HEIs should adopt experiential learning as opposed to lecture and classroom learning. To uphold experiential learning, training processes with a large part on practical, hands-on activities is critical in gaining direct experience, focused reflection and authentic assessment (Kolb and Kolb 2005; Schutte and Wetmore, 2012). However, most universities lack best instructional methods and venues to deliver the materials; have weak participation of stakeholders in programmes and curricula development that are conducive to promoting entrepreneurship. In addition, universities lack information on entrepreneurial activities in the informal sector due to limited interaction with stakeholders. The above obstacles hindering several African Universities from performing their central role in promoting learning for transformation are aggravated by decreasing state-funding relative to student enrollment, lack of, or poor invest in infrastructure and human capacity development (Sawyer, 2004). Fortunately, quite a number of public and private stakeholders have invested heavily in related facilities, which can be shared to enhance graduate training.

As such, the Department of Zoology, Entomology and Fisheries Sciences, together with the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), School of Women and Gender Studies and Department of Performing Arts and Film, as Makerere University associate partners, and in partnership with University of Natural Resources and Life Sciences, Austria, University of Eldoret, Kenya and Ethiopian Institute of Agricultural Research, Ethiopia received funds from Austrian Development Cooperation (ADC) through Austrian Partnership Programme in Higher Education and Research for Development (APPEAR) to test field-oriented stakeholder-facility-based training approach in Uganda, Ethiopia and Kenya. The project, “*Strengthening regional capacity in research and training in fisheries and aquaculture for improved food security and livelihoods in Eastern Africa*”, or “STRECAFISH” aimed at building capacity of HEIs to respond to the fast moving developments in fisheries and aquaculture industry in the region. The goal of STRECAFISH was to increase the participation of public-private stakeholders in HEIs training in field oriented hands-on training approach in fisheries and aquaculture for enhanced quality of graduates. It focused on i) creating a vibrant network among private, public and academic institutions to increase quality of graduates and response of academia to the fast-moving changes in fisheries and aquaculture, ii) creating a platform for effective sharing of the limited and scattered infrastructure and human resources in HEIs, whilst reducing classroom-oriented training approaches with limited practical sessions, iii) increasing access to teaching aids/tools, field studies, farmer-student-teacher interactions and case studies by University students and staff. Among other activities, the project aimed at a) increasing interaction, involvement and participation of all stakeholders in training processes to achieve fit-for-the-demand skilled human resource for stakeholders; b) establishing platform for sharing limited and scattered human and infrastructure resources to address the lack of vibrant institutional and regional networking in training and research in fisheries and aquaculture, and c) adopting field-oriented modular training approaches at stakeholders' facilities.

Approach

The project commenced with an inception meeting aimed at developing strategies to streamline the implementation for timely accomplishment of activities and overall success of the project. This meeting was attended by all project partners and some invited stakeholders along the fisheries and aquaculture value chain. Further during this meeting, lists of the stakeholders either fully or partially involved in fisheries and aquaculture were generated.

Stakeholder identification and engagement. The listed stakeholders were analyzed and ranked using,

stakeholders' power-influence matrix analysis based on their respective importance and influence on 14 different topics and criteria. These criteria topics included: 1) Mobilizing networks of expertise, 2) Facilitating dialogue with policymakers, 3) Joint research with other universities, 4) Joint research with private partners, 5) Research dissemination among stakeholders, 6) Redesigning better fish farming systems, 7) Redesigning better marketing, 8) Service provision for farmers, 9) Education and extension for farmers, 10) poverty eradication, 11) Model aquaculture villages, 12) Analyze and realign curricula, 13) Capacity building activities that are fit for the demand of the stakeholders and 14) Training of fishery officers, development agents and farmers. The results of the ranking exercise were visualized in power influence grid. The resultant matrices were clustered and concentrated more precisely by use of "weights" on visibility of the respective stakeholders. "Key" stakeholders, based on the overall importance and influence were selected for subsequent activities including participation in the project and adopt demand driven approaches. Selection of the stakeholder to engage in hosting students and staff during training activities was based on the current mandate and/or business orientation of the stakeholder. After preliminary selection, surveys were conducted to assess the stakeholders' expertise and infrastructure.

Curricula review and alignment. In stakeholders' participatory approach, the existing fisheries and aquaculture curricula of Makerere University and University of Eldoret were reviewed and aligned to stakeholders needs. During review, various course units, identified to have overlapping subjects were revised and merged into distinct modules.

Training process. At the respective stakeholders' facilities, students were taught by a well thought out team comprising of university academic staff, private and public sector personnel, including farm employees. The public-private partners included fisheries and aquaculture resources research institutes, fish farms and fish feed manufacturing firms. The on-site hands on experiential training sessions ranged from one to two weeks, and comprised of lectures on principles and concepts in fisheries and aquaculture, followed by hands-on practical.

Results and discussion

A total of 158 stakeholders representing farmers, farmer-groups, service providers, local and international non-government organizations, government line ministries, regional and international organizations, and research institutions were identified during the consultative meeting. The final choice of stakeholders selected to participate in student training activities included Aquaculture Research and Development Centre, Kajjansi (ARDC); Source of the Nile Fish farm (SON), Women Fish Network, Uganda and National Fisheries Resources Research Institute (NaFIRRI), Jinja. The Memoranda of Understanding where necessary, Letters of Agreement were developed and signed with selected stakeholders. Henceforth, representatives of the identified stakeholders were invited for engagement activities, including curricula review and other planning activities. During the process of engagement, constant interaction were held to ensure the institution and the contact persons understood and guided the direction and focus of the planned activities. With regard to curricula review and alignment, 14 course units were grouped into 2 modules for trials: Module 1= Aquaculture: Fish Nutrition and Feed Technology, Aquaculture Systems, Fish Post-harvest technology and Entrepreneurship as well as Fish Health and Diseases Management; Module 2 = Aquatic Ecology and Management consisting of Stock Assessment and Fisheries Mgt., Environmental Toxicology and Biomonitoring; Hydrology and Hydraulics and Fisheries Socio economics and Extension. Module 1 was hosted by Aquaculture Research and Development Centre, Kajjansi (ARDC) and Source of the Nile Fish farm (SON), while

Module 2 was hosted at NaFIRRI. One training session was held in 2017 at the respective stakeholder facilities. During the training, 90% of the total facilitators were stakeholder based staff. However, students were first introduced to general principles and concepts at the University prior to field-oriented training sessions.

Anticipated Public-private stakeholders' benefits

- i. Availability of highly skilled fit-for-the-purpose graduates trained to the satisfaction of employers'. Indeed, the first cohort of students have been recruited to national research institutions. Through the field-oriented stakeholder-facility-based training approach, participating stakeholders instilled skills and knowledge expected of fit-for-the-purpose graduate. It is anticipated that adoption of this training approach in fisheries and aquaculture sectors, the highly needed technologically skilled human resource will be available to bolster adoption and up-scaling of technologies and guide sector development.
- ii. The farmer-student-teacher interactions actively engage students to gain experience. While reflecting on the activities, students were able to demonstrate the application of perceived concepts and principles to solve problems. Currently, three students are working farmer-identified and demands challenges. First student is focusing on biosecurity aspects of caged fish, the second on increasing availability of zooplankton as starter feed through optimizing packing and the third on improving handling and quality assurance of Lung fish, new cultivable fish species. Therefore, it is envisaged that close interaction of academia and farmers will lead to rapid and timely identification of emerging challenges and designing appropriate research agenda. The experiential learning will help in students develop novel solutions to identified challenges and subsequently contribute to increased fish productivity
- iii. Although in infancy, joint public-private research under STRECAFISH will lead to generation of critical innovations, followed by effective dissemination of findings and uptake. Usually technologies developed with limited stakeholder participation are often poorly adopted despite their performance because the technology does not fully address the complex community setting including gender, socio-economic, cultural and political needs. Therefore, the current initiative that encourages constant interaction among farmers, students and staff during training and research session will enable in-depth understanding of the societal needs to guide the development of appropriate technologies.
- iv. The participation of "key" stakeholders with vast experience in the sector practices, especially farmers and personnel of research institutions in training activities will enhance quality of graduates, increase the rate of problem identification and prompt innovative research by academia. With improved quality in training, the number of fit-for-the-demand human capacity responding to fast-moving changes in the sector will increase. Besides, stakeholders will appreciate the role of University in driving community and national development, thus improving institutional reputation.
- v. Utilizing the existing infrastructure and expertise available at stakeholders will leverage the cost of acquiring new equipment and/or addition of expertise. As such, the university will enjoy reduced expense of fit-for-the-demand graduate training. However, to cost-effectiveness of this approach will be evaluated upon undertaking subsequent training sessions.

In conclusion, strong engagement of public and private actors along the fisheries and aquaculture

value chains in academic affairs can enhance graduate training and producing skilled fit-for-the-purpose professionals to spur sustainable developments in the sectors. Therefore, academic institutions should endeavor to initiate and develop strategies to establish public-private networking platforms, which embrace mutual benefits, and fully engage them to participate in training activities. Overall, participation of actors along the fish value chain will culminate in increased fish production from aquaculture systems, and a reduced fishing pressure on capture fisheries. Increased fish production will contribute to food and nutritional security and increased income as enshrined in ASPIRATION 1. A prosperous Africa based on inclusive growth and sustainable development of the AU Agenda 2063 and Sustainable Development Goal 1: End poverty in all its forms everywhere; Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture and Goal 3: Ensure healthy lives and promote well-being for all at all ages.

Acknowledgements

This paper is a contribution to the Sixth Higher Education Week and RUFORUM Biennial Conference held from 22 – 26th October 2018 at the Kenya International Conference Centre (KICC), Nairobi, Kenya.

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