

Research Application Summary

**Africa Centre of Excellence in Aquaculture and Fisheries (AquaFish)**

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**Abstract**

The Aquaculture and Fisheries Science Centre of Excellence (AquaFish), based at Lilongwe University of Agriculture and Natural Resources (LUANAR), seeks to train a pool of skilled and innovative graduate students to contribute towards improved fish-based food and incomes from aquaculture and fisheries in Africa. The establishment of AquaFish is in line with, and will significantly contribute to the Comprehensive Africa Agriculture Development Programme (CAADP), the Science, Technology and Innovation Strategy for Africa (STISA), and the Malawi Growth and Development Strategy, to increase human capacity development for aquaculture and fisheries sector growth. These development frameworks recognize the need to increase fish production, to improve fish per capita consumption and subsequently reduce malnutrition and stunting that are prevalent in the region. AquaFish centre builds on LUANAR's track record of serving as a regional training centre in aquaculture and fisheries science for Africa. LUANAR hosts the regional PhD programmes in Aquaculture and Fisheries Science, and Agricultural and Resource Economics on behalf of 60 member universities of the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM). In addition LUANAR (the Aquaculture and Fisheries Science Department) is a designated Regional Fish Node responsible for advancing science and biodiversity research within the SADC region under the NEPAD Southern Africa Network on Biosciences (SANBio). AquaFish centre will facilitate and promote scaling-up graduate training in Aquaculture and Fisheries, community action research, and strengthen linkages with the private sector in the region while increasing females and youth participation. The centre will employ innovative, entrepreneurial and multidisciplinary approaches to training, research and outreach on production, value addition and fisheries management, through strategic south-south and north-south partnerships with advanced knowledge institutions and other higher education stakeholders. The main outcomes of the centre will include: (i) enhanced

capacity to produce graduates that are relevant to industrial needs in aquaculture and fisheries sector in the region, (ii) fit-for-purpose proactive graduates (338 MSc and 84 PhD) to support aquaculture, natural resource management and nutrition, and (iii) strengthened partnerships with industry, research and academia in the production of quality graduate students in the aquaculture and fisheries value chain, relevant for economic development.

Key words: ACE II, AquaFish, fish value chain, Malawi

## Résumé

Le Centre d'excellence en aquaculture et des sciences halieutiques (AquaFish), basé à l'Université de Lilongwe de l'agriculture et des ressources naturelles (LUANAR), vise à former un grand nombre d'étudiants diplômés qualifiés et innovants pour contribuer à l'amélioration de la nourriture à base de poisson et les revenus provenant de l'aquaculture et de la pêche en Afrique. L'établissement d'AquaFish est en ligne avec, et contribuera de manière significative au Programme détaillé de développement agricole (CAADP), la stratégie des sciences, de la technologie et de l'innovation pour l'Afrique (STISA) et la Stratégie de croissance et de développement du Malawi, pour accroître le développement des capacités humaines la croissance du secteur de l'aquaculture et de la pêche. Ces cadres de développement reconnaissent la nécessité d'augmenter la production de poissons, afin d'améliorer la leur consommation par habitant et ainsi réduire la malnutrition et le retard de croissance qui sont répandus dans la région. Le centre AquaFish s'inspire de la réputation de LUANAR de servir en tant que centre régional de formation en aquaculture et de la pêche scientifique pour l'Afrique. LUANAR accueille les programmes régionaux de doctorat en aquaculture et en sciences halieutiques, et l'agriculture et des ressources économiques au nom des 60 universités membres du Forum régional des universités pour le renforcement des capacités en agriculture (RUFORUM). En outre LUANAR (le Département d'Aquaculture et des sciences halieutiques) est un centre halieutique régional désigné responsable de l'avancement de la science et de la recherche de la biodiversité dans la région de la SADC dans le cadre du Réseau de l'Afrique australe du NEPAD sur les Biosciences (SANBio). Le centre AquaFish va faciliter et promouvoir la mise à l'échelle à formation de troisième cycle en aquaculture et de la pêche, la recherche de l'action communautaire, et renforcer les liens avec le secteur privé dans la région, tout en augmentant la participation des femmes et des jeunes. Le centre emploiera des approches novatrices, entrepreneuriales et multidisciplinaires dans la formation, la recherche et la sensibilisation sur la production, la valeur ajoutée et la gestion des pêches, grâce à des partenariats stratégiques sud-sud et nord-sud avec les institutions de connaissances avancées et d'autres parties prenantes de l'enseignement supérieur. Les principaux résultats du centre seront les suivants: (i) renforcement des capacités à produire des diplômés qui sont pertinents pour les besoins industriels en aquaculture et de la pêche dans la région, (ii) les diplômés proactifs et aptes (338 MSc et 84 doctorants) qui soutiendront l'aquaculture, la gestion des ressources naturelles et de la nutrition, et (iii) le renforcement des partenariats avec l'industrie, la

recherche et le milieu universitaire dans la production des étudiants des cycles supérieurs de qualité dans la chaîne de valeur de l'aquaculture et de la pêche, pertinentes pour le développement économique.

Mots clés: CEA II, AquaFish, Chaîne de valeur du poisson, Malawi

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## **Background**

Most African rural populations often face hunger, malnutrition and low income levels due to low food production and limited access to diverse foods of high nutritional quality. In sub-Saharan Africa region, 40% of children under the age of five years are stunted (UNICEF, 2013) due to limited supply and consumption of animal-source foods. Prevalence of stunting (low height for weight) has long-term effects on the development of quality human capital. Additionally, research has shown that omega-3 fatty acids help reduce inflammation and boost immunity, in people infected with HIV or suffering from AIDS (Sahelian, 2015), a pandemic that is prevalent in Africa. Fish is a key source of multiple essential nutrients, including long chain omega-3 fatty acids, minerals and vitamins. Fish is amongst the most common food source, accounting for 20 to 60 percent of animal protein intake in the African region, compared to 17% globally (FAO, 2014). However, while fish consumption is increasing, particularly in rich countries and Asian countries, in Eastern and Southern Africa and Sub-Saharan region, there is a significant decrease in per capita fish consumption, from 16 - 18 kg/year in the 1980s down to 7 - 8.4 kg/year, in recent years (Allison *et al.*, 2009; Gordon *et al.*, 2013). This is much less than the FAO recommended intake of 15 kg/capita/year (FAO, 2012).

Notably, the region has enormous potential of inland aquaculture and capture fisheries from lakes and the Indian Ocean, which is largely unrealised. In some cases, fish breeding grounds have been over-exploited due to poor fisheries management. Due to declining stocks of major fish species, such as tilapia, from the wild, aquaculture is well-placed to meet the ever-increasing demand among fast-growing and larger urban populations. To recover and expand the wild fish stocks, there is need for employing sound, science-based management and production practices. Similarly, the aquaculture industry requires availability of affordable inputs such as quality fish feed, which accounts for over 60% of fish production costs, and fingerlings (Allison, 2011). Furthermore, and worse still, the already limited fish catch registers high post-harvest losses, for example 30% in Uganda and Zambia, 40% in Malawi and up to 60% in other African countries. This is due to poor infrastructure, processing, cold chain, limited knowledge and lack of adequate and properly trained human resource to support the industry. These challenges as well as the nutritive value of fish are also captured in the regional frameworks namely the Abuja New Partnership for Africa's Development (NEPAD) fish for all summit of 2005, which declared the need for ensuring supply and access to fish by all; Africa Union's vision 2063's Science, Technology and Innovation Strategy for Africa (STISA); The Forum for Agriculture Research in Africa (FARA), which calls for support to fisheries human resource development; the Comprehensive Africa Agriculture Development Programme (CAADP) pillars 3 and 4; and the Science Agenda for Africa (S3A), all of which identify aquaculture and fisheries as key development areas.

Nevertheless, there has been very little response to these calls for investment into fisheries and aquaculture by governments and key stakeholders, largely due to limited outreach and interaction between industry and the institutions of higher learning, sharing of resources and expertise, to complement each other's strengths within the region. At university level, there has been limited feedback from industry into the curriculum as a result of geographical and exchange barriers, resource limitations, and alignment to traditional teaching and learning mechanisms. Collaboration and partnerships need adequate investment to make them effective and sustainable. As a result, academic programmes and staff capacity remain compromised, which has been reflected in the traditional and more academic nature of graduates, that have often failed to effectively transform the industry and meet the dynamic and diverse entrepreneurial and production needs. Therefore, the industry continues to face challenges to sufficiently increase production of an adequate amount of safe and nutrient-rich fish and fish products to meet the increasing food and nutrition security and economic demands of communities in the region.

To address some of the above issues, Aquafish's goal is to foster innovation and entrepreneurship in the production of highly skilled fit-for-purpose critical mass of agricultural scientists for improved aquaculture and fisheries management in order to enhance food, nutrition and economic security in Eastern and Southern Africa. Specifically the centre will;

- a) train a critical mass of MSc and PhD graduates who are competent to create innovations that will revolutionize the aquaculture and fisheries sector in Africa.
- b) enhance capacity of the center of excellence to attract national and regional students and train world class scientists that are relevant to industrial and development needs in the aquaculture and fisheries sector in Africa.
- c) Improve innovations/technologies for increasing fish production, value addition and marketing, through partnerships with the private sector, academic and research institutions, and civil society organizations.

### **Operationalization of the AquaFish**

Lilongwe University of Agriculture and Natural Resources (LUANAR) was established by an Act of Parliament in 2012. The provisions of the Act empowers LUANAR to award or withdraw certificates, diplomas and degrees. The Aquaculture and Fisheries Science (AquaFish) Centre of Excellence, which seeks to train a pool of skilled and innovative graduate students, to contribute towards improved fish-based food and incomes from aquaculture and fisheries in Africa, will be guided by the provisions of the Act of Parliament. In addition to the Act, LUANAR has a strategic plan whose aim is to enable the university to take advantage of the opportunities present from an expanding demand for higher education, research and consultancies to become a world class university. The aspirations of the AquaFish Center of Excellence are in-line with the university's strategic pillars of teaching and learning; research, consultancy and outreach; infrastructure development; staff capacity building; and governance, management and resource mobilization. As a result, the university is committed to oversee the management of the AquaFish Center of Excellence and facilitate the smooth planning of its operations.

The AquaFish center will adhere to the LUANAR's Admission Policy for its postgraduate students that involves open advertisement of academic programs. Application documents from applicants will be scrutinized by the departments, who will recommend to the University Selection Committee for final selection. In recruitment of staff and students, the Center will follow the necessary policies that promote fair practices and avoid discrimination.

The AquaFish Center will ensure that its academic programs meet the highest standards. The University Quality Assurance Policy will guide implementation of activities within the Centre. Programmes in the Centre will be subjected to regular reviews by internal and external reviewers. The departments hosting academic programmes will engage external examiners in the review of undergraduate and graduate programmes. The office of the Dean of Postgraduate Studies will coordinate the external reviews in liaison with the Deans of the Faculties but will mostly engage external examiners. The departments will work with the Directorate of Quality Assurance in monitoring the performance of quality management systems.

The AquaFish center will work with the office of the Director of Research and Outreach to ensure strict adherence to the Research, Consultancy and Outreach Policy in offering research grants. Through the AquaFish centre, research proposals from faculty members and graduate students will be assessed and supported through the Directorate of Research and Outreach. The following activities will be undertaken: advertising call for proposals, reviewing proposals, funding proposals, monitoring project implementation, and developing proposals for funding. All proposals will undergo a review by the University's Research Ethics Committee, and all the staff and students in the Centre will undergo orientation in Research Ethics and Intellectual

### **Property rights**

The AquaFish Center will adhere to the university's policies on finances and procurement, and the World Bank's regulations on finances and procurement will be adhered to. The Centre will also be subjected to both internal audit by LUANAR and external audit by the World Bank.

The expected outputs of AquaFish by the end of the project period are:

- (i) Eighty four (84) PhDs and 303 MSc students trained, of whom about 70% will be national and 30% from the region. Overall, effort will be made to ensure that at least 40% of the students will be females to ensure gender inclusivity.
- (ii) A total of 150 members of staff will have access to internship fellowships with the privates sector, 28 will be supported to participate in collaborative research projects in the region and 100 in academic exchange programmes.
- (iii) Three Hundred and Seven (307) students will have access to internship fellowships with the privates sector, while 300 will be supported to participate in short courses.

- (iv) At least 65 papers will be published in peer-reviewed Journals by the end of the project period.

### Partnerships for AquaFish

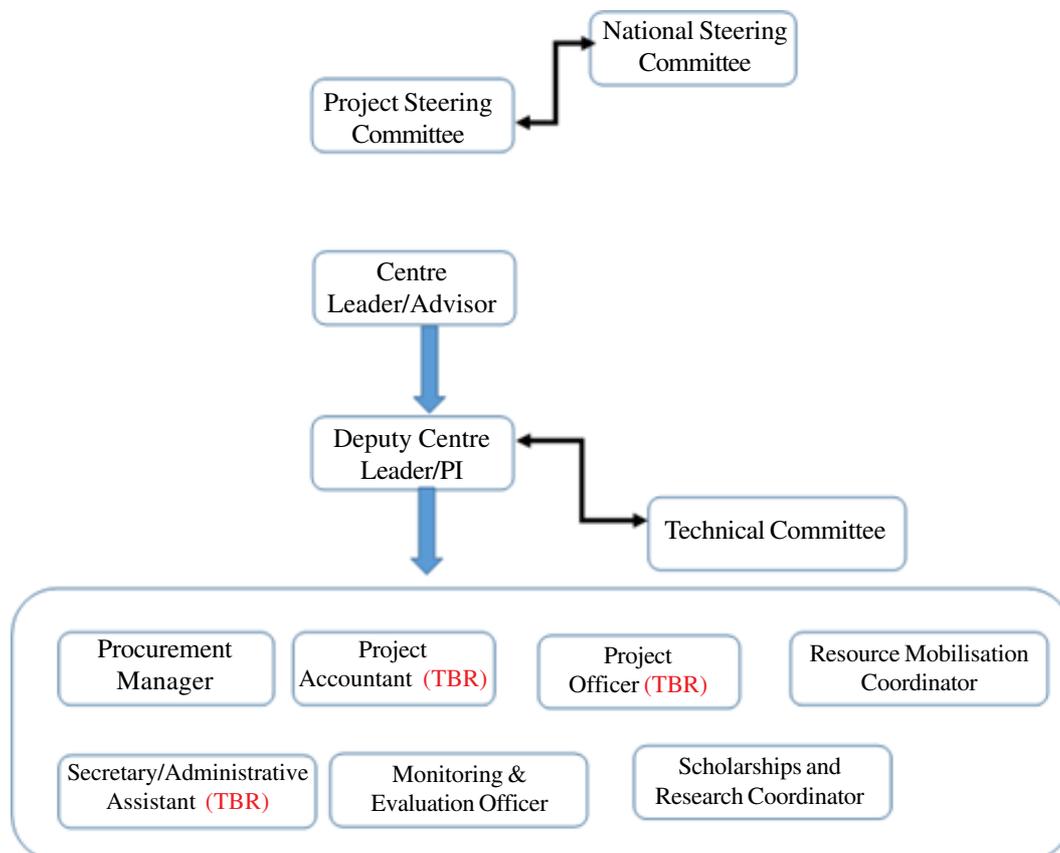
The project will be implemented by the Lilongwe University of Agriculture and Natural Resources (LUANAR) (Applicant) in collaboration with national, regional and international partners as outlined in Table 1.

### Governance structure

The AquaFish centre is operated as a semi- autonomous unit in LUANAR. There is a project management team that is tasked with the day-to-day management of the Centre. To ensure that the programs under the Center are regional in nature, the AquaFish Center is establishing an International Academic Advisory Board whose membership will be drawn

**Table 1. Partnership for the AquaFish Project**

Category/type of partnership	Key partner	Partner
Advanced knowledge institution	University of Pretoria (RSA)	
Private sector national	MALDECO (Malawi)	IFFNT (Malawi)
Peer universities national		Mzuzu University (Malawi)
Peer universities regional	University of Eldoret (Kenya)	Catholic University of Mozambique, Makerere University (Uganda)
Peer universities International		Stellenbosch University (RSA)
Research institutions national		Department of Fisheries (Malawi)
Research institutions regional		National Aquaculture Research and Development Centre (NARDC, Zambia),
Research institutions International	WorldFish (Zambia), Soyabean Innovation Lab (USAID Feed the Future Innovation Lab, USA)	
Others	RUFORUM (Uganda)	Ministry of Agriculture, Irrigation and Water Development (Malawi)



**Figure 1. The governing structure of the AquaFish Center of Excellence**

from the region and at international level. Figure 1 shows the governing structure of the AquaFish Center of Excellence.

### **Concluding remarks**

Vibrant networking and collaboration will drive the AquaFish implementation to achieve the desired outcomes and impact. The internationally accredited programs and cutting-edge research will enable the centre to attract world-class faculty as well quality postgraduate students. Such a pool of fit-for-purpose graduates will revolutionize the fisheries sector and contribute significantly to food, nutrition and economic security of the Eastern and Southern Africa region.

### **Acknowledgement**

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## References

- Allison, E.H., Perry, A., Badjeck, M.C., Neil Adger, W., Brown, K., Conway, D., Halls, A.S., Pilling, G.M., Reynolds, J.D. and Andrew, N.L. 2009. Vulnerability of national economies to potential impacts of climate change on fisheries. *Fish and Fisheries* 10: 173-196.
- Allison, E.H., Béné, C. and Andrew, N.L. 2011. Poverty reduction as a means to enhance resilience in small-scale fisheries. In Pomeroy, R. and Andrew, N.L. (Eds.). *Managing Small Scale Fisheries: Frameworks and Approaches*. CABI. London. pp. 206-238.
- Food and Agriculture Organisation (FAO). 2012. *The State of World Fisheries and Aquaculture 2012*. [www.fao.org/docrep/016/i2727e/i2727e00](http://www.fao.org/docrep/016/i2727e/i2727e00).
- Food and Agriculture Organisation (FAO). 2014. *The State of World Fisheries and Aquaculture 2014*. <http://www.fao.org/3/a-i3720e.pdf>
- Gordon, A., Finfgold, C., Crissman, C.C. and Pulis, A. 2013. Fish production, consumption, and trade in Sub-Saharan Africa: A review analysis. WorldFish report prepared for World Bank Fish to 2030.
- Sahelian, R. 2015. Fish oils supplements, health benefits, side effects, omega-3 epa and dha, Use for depression, heart disease, vision and eyesight, menopause, weight loss, blood pressure and cancer. <http://www.raysahelian.com/fishoils.html>
- UNICEF, 2013. *Improving child nutrition: The achievable imperative for global progress*. UNICEF, 124pp. ISBN: 978-92-806-4686-3