

Project Update 2018

Geographical Focus:	Malawi
Call Reference:	“Forschungskooperationen zu Welternährung” Research cooperation for global food security and diversified agriculture for a balanced nutrition in Sub-Saharan Africa.
Project title:	Improving Community Health-Nutrition Linkages through Solar Energy Based Fish and Crop Integrated Value Chains- ICH LIEBE FISCH
Cooperating Partner:	<ol style="list-style-type: none"> 1. Fraunhofer Research Institution for Marine Biotechnology and Cell Technology (EMB) 2. Association for marine aquaculture mbH (GMA) 3. Lilongwe University of Agriculture & Natural Resources, Aquaculture and Fisheries Science Department (LUANAR-AQF) 4. Lilongwe University of Agriculture & Natural Resources, Department of Human Nutrition and Health (LUANAR-HNH) 5. Lilongwe University of Agriculture & Natural Resources, Department of Food Science and Technology (LUANAR-FST) 6. Quantum for Urban Agriculture and Environmental Sanitation (QUALIVES) 7. Innovative Fish Farmers Network Trust (IFFNT)
Duration:	1 st March 2016 – 30 th September 2019
Budget:	1.265.641,50 €

Scope and aim of the project



Traditionally, Malawi is a fish-eating nation. However, what is left on the table is mainly maize porridge. Overfishing resulted in the collapse of the Tilapia fishery in the lake Malawi since the beginning of the 90ies. Tilapia, known locally as Chambo, is the country’s favourite fish but hardly affordable anymore to most Malawian people. Thus, the Project "Ich liebe Fisch" aims to improve the supply of this Tilapia species specifically in rural communities and to improve crop production by introducing small-scale Aquaponic facilities and enhancing pond-based integrated aquaculture-agriculture (IAA) approaches. Specifically, the goals of this project are (a) to enhance the production of endemic fish species by improved breeding conditions and the production of "all male" fingerlings, (b) to establish a solar powered hatchery and to optimize rearing protocols of *O. karongae*, in order to improve the sustainable supply of fingerlings for on-growing farms, (c) to use an IAA system approach to integrate nutrient fluxes between animal and crop production, (d) to implement training courses for local communities and smallholder farmers, thus ensuring capacity development and (e) to monitor the changes in health status and food habits of local families and especially children and elderly people after implementation of the IAA system to ensure a benefit for the whole community and (f) to facilitate establishment of a community agriculture-nutrition-health linkage innovation platform and networking with relevant institutions to ensure sustainability beyond the project’s life cycle.



Results and key statements

In 2018, the focus of the project was a) on the construction and commissioning of the Hatchery on the farm grounds of the Bunda Campus and the associated solar power plant (mainly responsible GMA, EMB, AQF), b) at the start of the production of fingerlings for the stocking of farmers ponds on the basis of controlled egg hatching and larval rearing in the hatchery (mainly responsible GMA, AQF) c) to conduct experiments in the hatchery to optimize the biotic and abiotic conditions in the rearing of Chambo (mainly responsible AQF, GMA) d) on the establishment of a technology platform with networking to support the exchange of practical knowledge (main responsibility IFFNT) e) on field trials on integrated aqua agriculture (IAA) including stocking of fish and plants, fattening and harvesting (main responsibility EMB, AQF), f) on the experiments about the technical and economic performance of the Barrelponics unit as part of the introduction of aquaponics technology (mainly responsible EMB, AQF), g) on the accomplishment of further training courses for farmers in both districts Nkhotakota and Mchinji on the implementation of IAA and aquaponics (mainly responsible IFFNT, AQF and QUALIVES).

Furthermore h) the progress in the implementation of the project measures was documented as publicly accessible information in the project's web repository and made available on the project website (mainly responsible GMA). In addition i) the German partners EMB and GMA visited the project in Malawi in March/April to construct the solar powered hatchery and again in November 2018 in order to solve problems with the solar plant and to establish a molecular biology laboratory as well as to conduct training courses on molecular biology and cryopreservation at the AQF (mainly responsible EMB, GMA) j) the project was presented at conferences, in articles and a documentary about the project was compiled of the ZDF for the series Planet-e k), two master students completed an internship at the EMB and GMA from the beginning of May to the beginning of August 2018 and the Malawian coordinators visited the EMB and GMA at the end of July to beginning of August.

- a) After the arrival of the container with the materials for the Hatchery and the solar plant, the German partners of the GMA and EMB travelled to Malawi in March/April for about 3 weeks in order to set up the hatchery and the solar plant together with the Malawian partners under the leadership of the GMA. The construction was realized in the 3 available weeks and the plant could be handed over ready for operation.
- b) With the beginning of the breeding season 2018/2019 and after some problems with the solar power plant had been solved at the beginning of November 2018, the production of fingerlings in the solar powered hatchery could be started. From egg incubation to the late post larval stage, part of the production of the fingerlings at the Bunda Campus Farm is now based on the fish larvae reared in the hatchery.
- c) In connection with the first breeding of Tilapia fingerlings on the basis of the new hatchery technologies, experiments to determine the optimal abiotic and biotic parameters in the larval phase of the species *O. karongae* (Chambo) were successfully conducted as part of a master thesis funded by the project. The results are currently being summarized in the thesis, but are already being taken into account in ongoing breeding projects.
- d) Most fish farmers in Malawi suffer from low productivity in fish production, often due to a lack of knowledge about optimal pond management. The project has therefore set up a technology platform with its partner IFFNT to support the establishment of networks between farmers and the exchange of practical knowledge. The second phase of the implantation of this platform has been completed and provides knowledge in the areas of IAA, business management and marketing, pond management as well as the use of efficient technologies for the production of fingerlings.
- e) The initial results of the IAA and aquaponics field trials are basically very positive, although there are still challenges such as a lack of protection measures against predators of the fish in the ponds, unwanted weed vegetation in the ponds and some weak leadership and management in the fish clubs. Nevertheless, the total yields could already be significantly increased in the second run, for fish e.g. a tenfold increase was achieved compared to the last production period. The final results are to be documented in a master thesis in 2019, but it is already clear that the measures implemented are effective.
- f) Another master student involved in the "Ich liebe Fisch" project was concerned with the design and applicability of a simple aquaponics system ("Barrelponics"). The student adapted the system to the conditions and available



materials in Malawi and carried out first investigations on the performance of the system with *O. karongae* and lettuce. The student is currently summarizing the results of his work, the complete master thesis will be available in 2019. The results and a corresponding construction manual will then be forwarded to the rural farmers from the project.

- g) In both communities further training on IAA took place in 2018, with a total of 224 participants. The training was conducted to build the project's related skills and capacity and to ensure that farmers acquire the much-needed technical expertise in the critical areas of integrated agriculture, aquaculture, fish and vegetable management, entrepreneurship and marketing. It turned out that the needs in the communities were very different and that this was due to the very different basic knowledge of fish production.
- h) In order to keep all partners in the project informed about the planning and progress of the project, it is important to maintain a central repository from which all partners can access documentation and information on the progress of the project at any time. For this purpose, the partner GMA has set up a website with a repository for public and internal documentation; this site is always kept up to date (www.fish-for-life.org). With its repository for documents and presentations and general information on the project topic, the site has proven to be a "one-stop-shop" for the project partners.
- i) The German project partners EMB and GMA visited the project again in Malawi in November 2018. This visit had become necessary because problems with the battery block of the solar system had to be clarified. These problems were solved; since November 2018 the solar power system ensures a trouble-free operation of the Hatchery in case of failure of the public power grid. During this visit, substantial material was also collected for the documentation and creation of a "Hatchery operation Manual" (photos, videos, interviews). In addition, the partner EMB used the visit to set up a molecular biology laboratory and to conduct courses on DNA analysis and cryopreservation of fish gametes for students and project staff.
- j) The project was presented at several conferences in 2018, among others the indoor hatchery technology was presented at the "Tropentag" in Gent/Belgium and an article on the project was published in a relevant journal. In addition, a documentary about the project was filmed, contracted from the ZDF. Details on this point j) are described in Appendix IV of the interim report.
- k) From the beginning of May to the beginning of August, two of the Master students supported by the project visited the EMB and GMA to complete an internship. On one hand it was about learning molecular working techniques and the evaluation of Finclips (EMB), on the other hand it was about learning how to raise fish larvae in the hatchery of the GMA, which is very similar to the indoor hatchery built in Malawi. In addition, the two Malawian coordinators visited the EMB and GMA at the beginning of July to the beginning of August to discuss project-related matters and to get an idea of the educational environment of the Malawian students at the EMB and GMA.

Policy advice

The project "Ich liebe Fisch" is active in important areas where considerable shortfalls prevent more efficient aquaculture production. These are above all the lack of sufficient tilapia fingerlings for the ponds of rural communities (especially of the species *O. karongae*, "Chambo") and the lack of knowledge on best practices in pond and fish stock management as well as the problem of the permanent failure of the public power grid with the result that intensive fingerling rearing in easily controllable indoor hatcheries has not been possible so far. Furthermore, the project is involved in the practical transfer of knowledge about IAA and the technology of aquaponics systems and organizes courses for the preparation of "child-friendly" meals with fish and for the preparation of dishes with a longer shelf life made from fish. However, the project has identified as another significant problem area the lack of food quality for juvenile and adult fish. Farmers in rural communities are not able to buy imported fish feed (industrial pelleted feed) for fish feeding and therefore mainly use remnants from maize processing (maize bran). This makes the step from pure (rather inefficient) self-sufficiency to small-scale commercial production very difficult, as the full growth potential of the fish is not optimally exploited. For this reason, the project sees a considerable need for action in the development of protein sources in Malawi for the production of full-fledged but affordable fish feed for rural



aquaculture farmers. This task will be addressed in a follow-up project, in which the production of high-quality proteins from insect larvae will be established in Malawi. In Malawi, too, the rural population has sufficient organic residues at their disposal to be able to use them for the permanent breeding of fly maggots. The initial aim is to establish a pilot plant on the farm of the Bunda Campus, which will then be used as a training facility for the farmers.

Following, some impressions from the project activities in 2018



Hatchery in operation mode



Solar panels



McDonald unit for egg incubation



Team November 2018



Eggs from Chambo



Hapas for fingerlings



IAA in in practice



Harvesting fish in a fish club



Training course Cryopreservation



www.fish-for-life.org