Implementation of New Hatchery Technologies to Improve the Supply of Chambo (Oreochromis karongae) Fingerlings for Rural Farmer in Malawi

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Es ist nicht genug zu wollen, man muß es auch tun, es ist nicht genug zu wissen, man muß es auch anwenden - J.*W.v.G.*

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Agenda Presentation

- Project background and goals
- Introduction new fish hatchery technology
- Project status
- Conclusions and future aspects

Project Profile

Geographical focus	Malawi
Call reference	BLE: “Forschungskooperationen zur 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 partners	1. Fraunhofer Research Institution for Marine Biotechnology and Cell Technology (EMB) (Koordinator) 2. Gesellschaft für marine Aquakultur 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)
Project´s life time	March 2016 – September 2019
Budget	~1.3 Mill. €, Bundesministerium für Ernährung und Landwirtschaft (BLE)

Fish Production and -consumption in Malawi

Traditionally, fish is an important daily alimentary in Malawi. The consumption stands at about 9,5 kg/Capita and annum

However, overfishing of the lake Malawi since the 90s has resulted in a dramatic decrease in the yield of large Tilapia specimen, specifically of Chambo, the most desired Tilapia species which is not affordable anymore for most people in Malawi.

- **Fishery lake Malawi:** up to the 90s, 70% Chambo (large Tilapia), today only 3-5%, 70% of the catch is now Usipa (a small fresh water sardine, *Engraulicypris sardella*);
- **Aquaculture:** since about 100 years pond aquaculture in Malawi exists, with 60 ponds in 1958 and about 6000 small-scale farms at present;
- **2016 total yield of 150.000t fish** (Aquaculture & Fishery, mainly lake Malawi);
- **Annual production in aquaculture about 7500t fish**, about 50% produced from two large professional fish farms in Malawi (Maldeco & Chambo Fisheries Malawi);
- **Production capacity in rural fish farms by far not fully exploited**, mainly due to failure in fingerling supply, bad feed quality and failure in pond management.

Project Goals

The following list depicts the project goals of the project

"ICH LIEBE FISCH"

1. Set-up of a solar powered fish hatchery in order to improve the supply of fingerlings for rural aquculture farmer, specifically from the species O. karongae (Chambo)
2. Breeding selection and production of "all-male" fingerlings
3. Practical Training in the application of IAA und basic aquaponic systems
4. Monitoring of health, social & economic status of the families in the participating communities at the beginning and the end of the project
5. Training courses to facilitate the building of expert knowledge in auqaculture and adjacent areas in rural communities
6. Support of the establishment of a network and an expert system to facilitate the communication among the aquaculture communities

Set-up of a solar powered fish hatchery

- In Malawi, mainly 3 Tilapia species are produced: O. karongae, O. shiranus and Tilapia rendalli
- O. k., the "real Chambo" is the most favourable dish fish in Malawi and yield the highest price in the market
- Shortage in supply of fingerlings from O.K. is a roadblock
- At present, fingerling production take place in ponds under weakly controlled conditions (problems: cannibalism, feed competition, predation). Result (number of fingerlings) not predictable, mixed species…

Set-up of a solar powered fish hatchery

Fishing for fingerlings

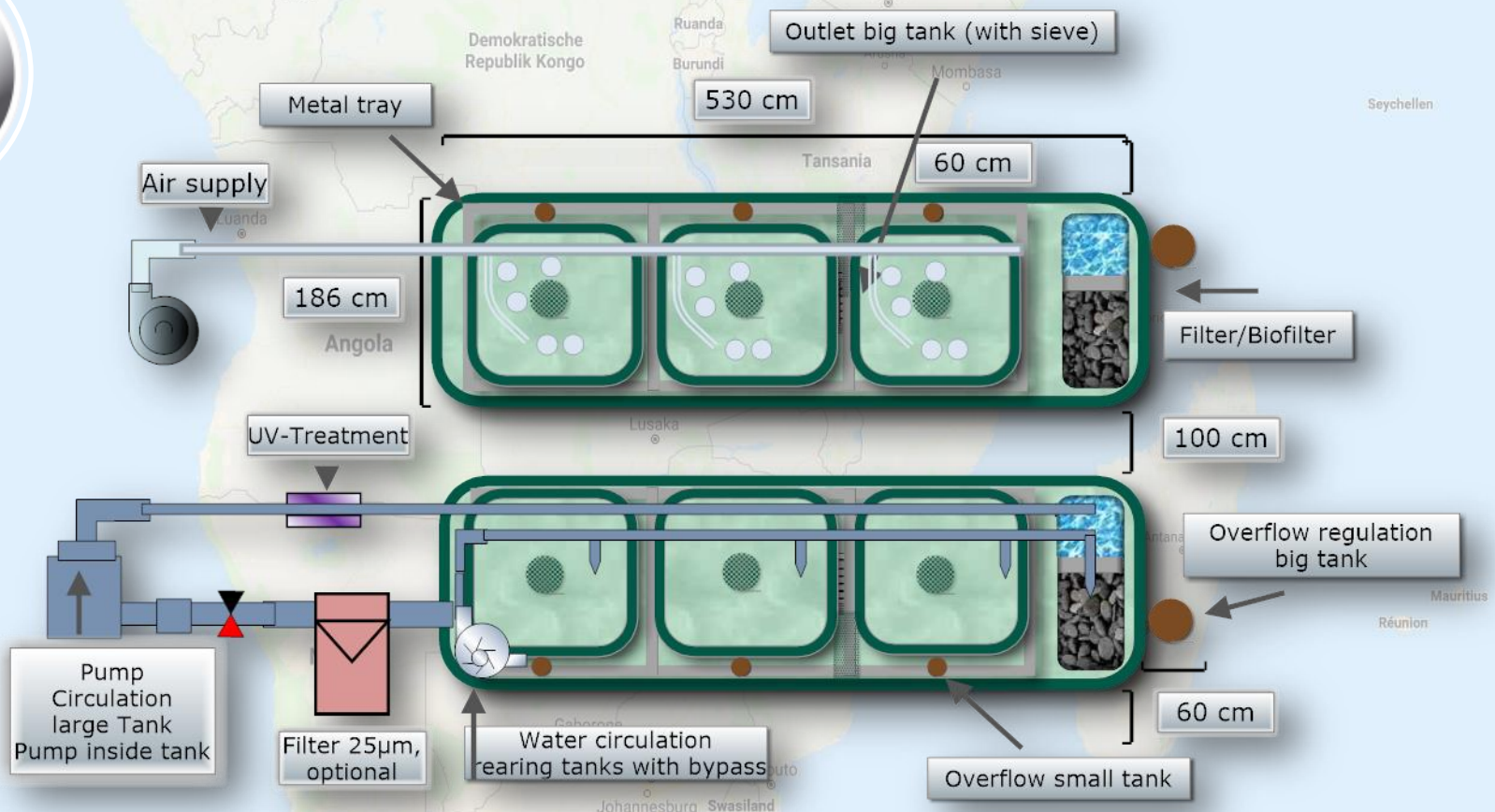
Set-up of a solar powered fish hatchery

Rice instead of fish production…consequences of failure in fingerling supply

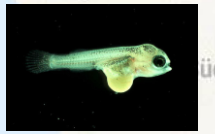
Rice production in fish ponds…

Set-up of a solar powered fish hatchery

Hatchery Design Malawi **Capacity per Trial:** ~ 50.000 Tilapia Larvae




Egg-incubation


Yolc-sac stage


Late larval stage


Hapas


Fingerlings

Set-up of a solar powered fish hatchery

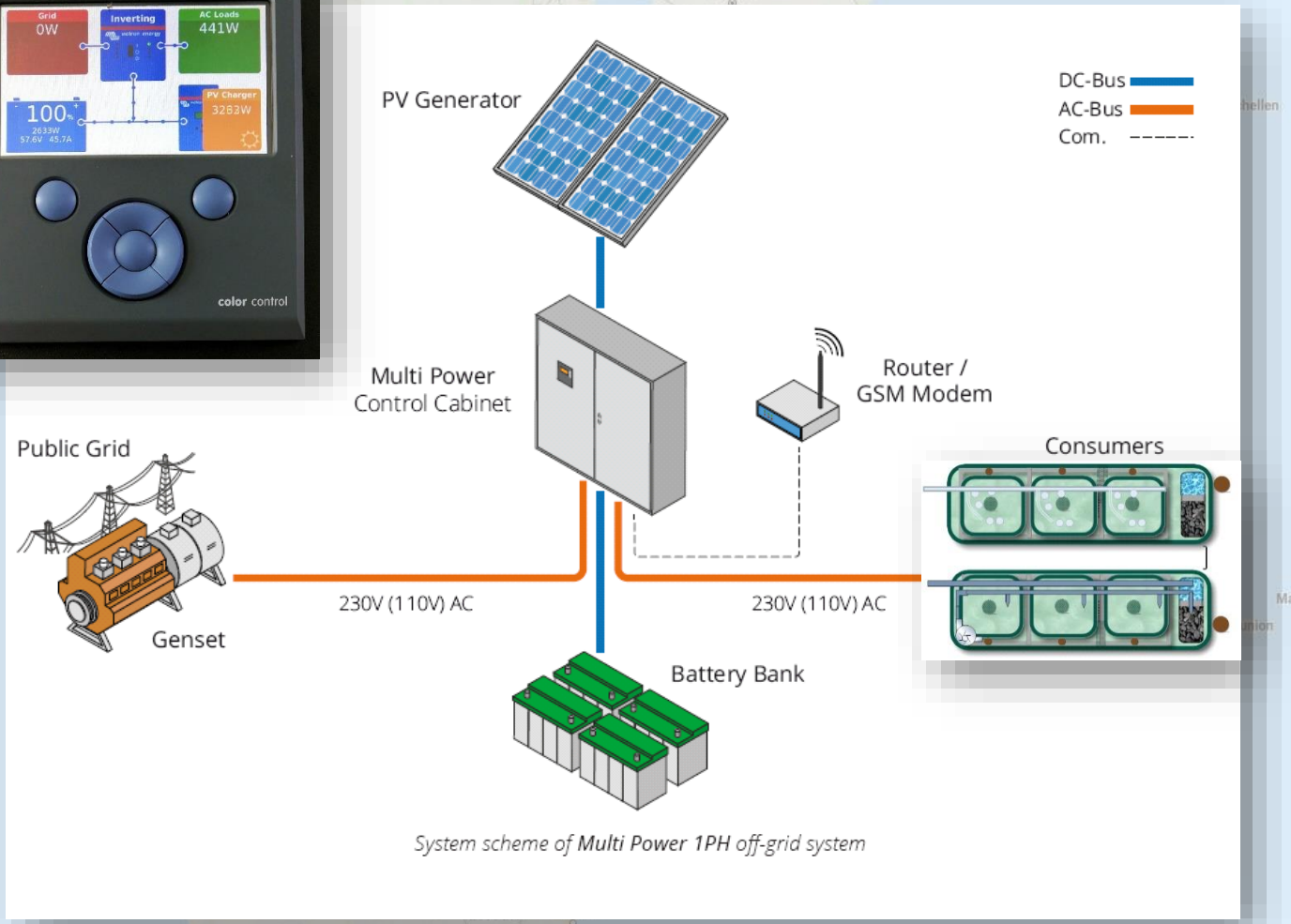
Set-up of the indoor-hatchery at the farm area of the Bunda College of the University Lilongwe finished. The hatchery includes a facility for egg incubation (Mc Donald jars).

Complete control of all parameter in the rearing period (e.g. species, temperature, water quality, light, feed, oxygen..). Support of optimization trials with larvae from O.K.

Set-up of a solar powered fish hatchery

The hatchery is built in a modular mode and protected by an industrial tent. The construction is variable and allows flexibility in the placement of the complete hatchery

Set-up of a solar powered fish hatchery



*System scheme of **Multi Power 1PH** off-grid system*

Since failure in the supply of electricity from public grid is frequent, a PV facility was attached to the hatchery to allow continous operation

Set-up of a solar powered fish hatchery

Goal: PV-facility with about 1,7 kW Power, available 24h - 7 days a week

Set-up of a solar powered fish hatchery

Aerial view of the aquacalture farm of the Bunda College, the present location of the solar powered hatchery for testing, exercises, research and training.

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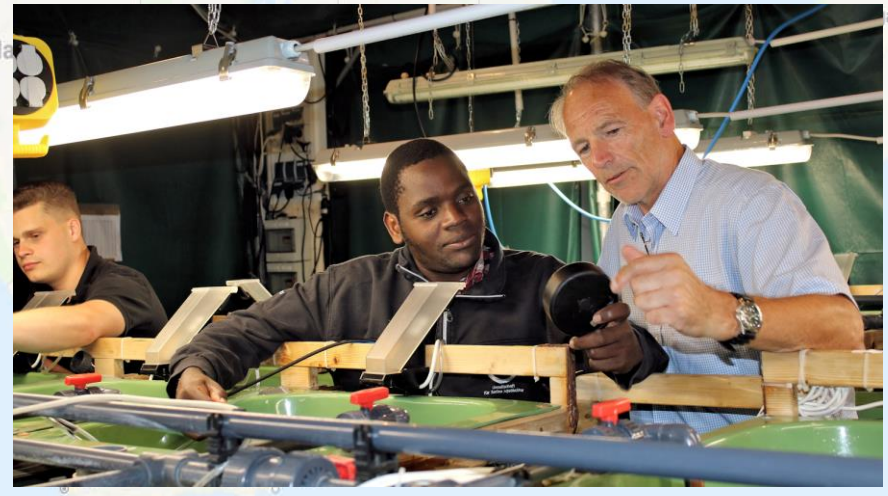
Status of the hatchery operation

- Set-up of the hatchery and PV-facility finished in spring 2018.
- Some test runs accomplished concerning the technology
- Personal (master students) trained in hatchery operation in a similiar facility at the GMA in Büsum
- The facility is ready for operation and waiting for the next spawning season of O.K. (from September/ October…)
- Some technical issues to be solved (next visit scheduled for November 2018)



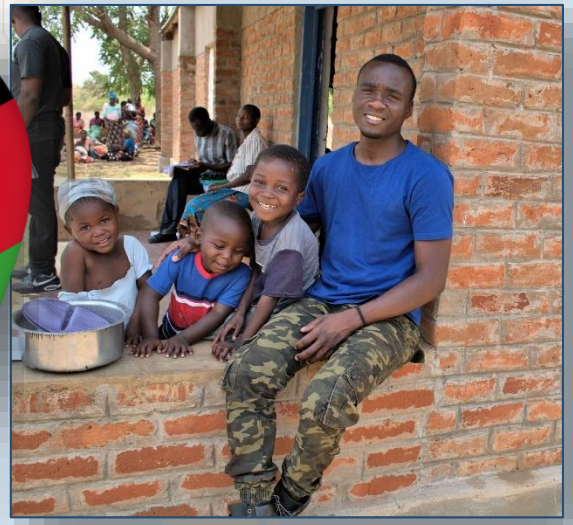
Conclusions and Future Needs

- The "Ich liebe Fisch"-Project addresses in general significant obstacles in the supply of fish and vegetables for rural communities in Malawi
- Specifically, the project has provided some new and innovative technology for Malawian conditions with the goal to improve the production of Tilapia fingerlings significantly
- The hatchery technology is kept at a simple and sustainable level, with just the need of two small water pumps per unit, some heaters, aeration and light and low water consumption with re-use options
- The frequent failure in grid electricity in Malawi has prevented so far the intensive indoor larval rearing, this was solved with the attachment of a solar power plant to the hatchery

Future Needs: quality of the feed which is used in Malawi for raising Tilapia larvae, juveniles and adults is very weak. This situation can jeopardizes the approach to provide significantly more fingerlings

Solution: the production of high quality fish-feed ingredients (mainly protein) has to be established inside of Malawi to assure affordability for farmer (Insect proteins…)

More infos: www.fish-for-life.org



Thank you for your attention!

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Team Malawi and Team Germany after finishing the construction together. …☺