Implementation of up-to-date methods to produce fingerlings in Malawi – what was the approach?

Closing meeting, first leg, Sept. 2019

Fish production and supply in Malawi

Traditionally, fish is an important commoditie in Malawi. Per capita consumption from 14.3kg in 1970s to less than 8kg.

Overfishing of the lake Malawi in the beginning of the 90th has resulted in a dramatic decrease of the availability of large Tilapia from lake fishery. Specifically, the species O. karongea, the "real" Cambo is hardly affordable to most of the Malawien folks. The costs for fish has increased ~ about five-fold from 2010 – 2019.

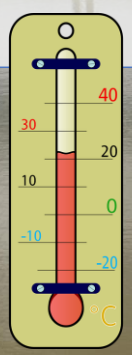
- Yield from lake Malawi: Up to the 90th 70% large Tilapia. Today only 3-5% large fish specimen, now 70% Usipa (freshwater sardine);
- Aquaculture established about since 100 years in Malawi, from about 60 ponds in 1958, today about 6000 small-scale farms.
- 2016 total yield 150.000t Fish in Malawi (Aquakulture & Fishery)
- 7500t Fish from Aquakulture/year, 50% produced from 2 large-scale fish proucing companies in Malawi (Maldeco & Chambo Fisheries Malawi)
- Produktion capacity by far not optimized. Main reasons are lack of sufficient fingelings and poor feed.

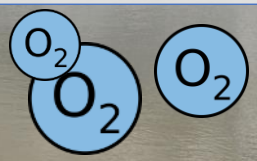
With this background, one of the major goals of the project "Ich liebe Fisch" was to improve the supply of fish for Malawian folks. An important condition: sufficient gingerlings.

Fingerling production "in the wild"

Pros	Cons
• Natural feed available for larvae • Few careness necessary • No grid power required	• Males and females mixed • Predation • Cannibalism • Feed competition • Water conditions not controlled (e.g. temperature, oxygen) • Number of fingerlings unknown • Mixed species (not just Chambo..)

Numbers of larvae & fingerlings

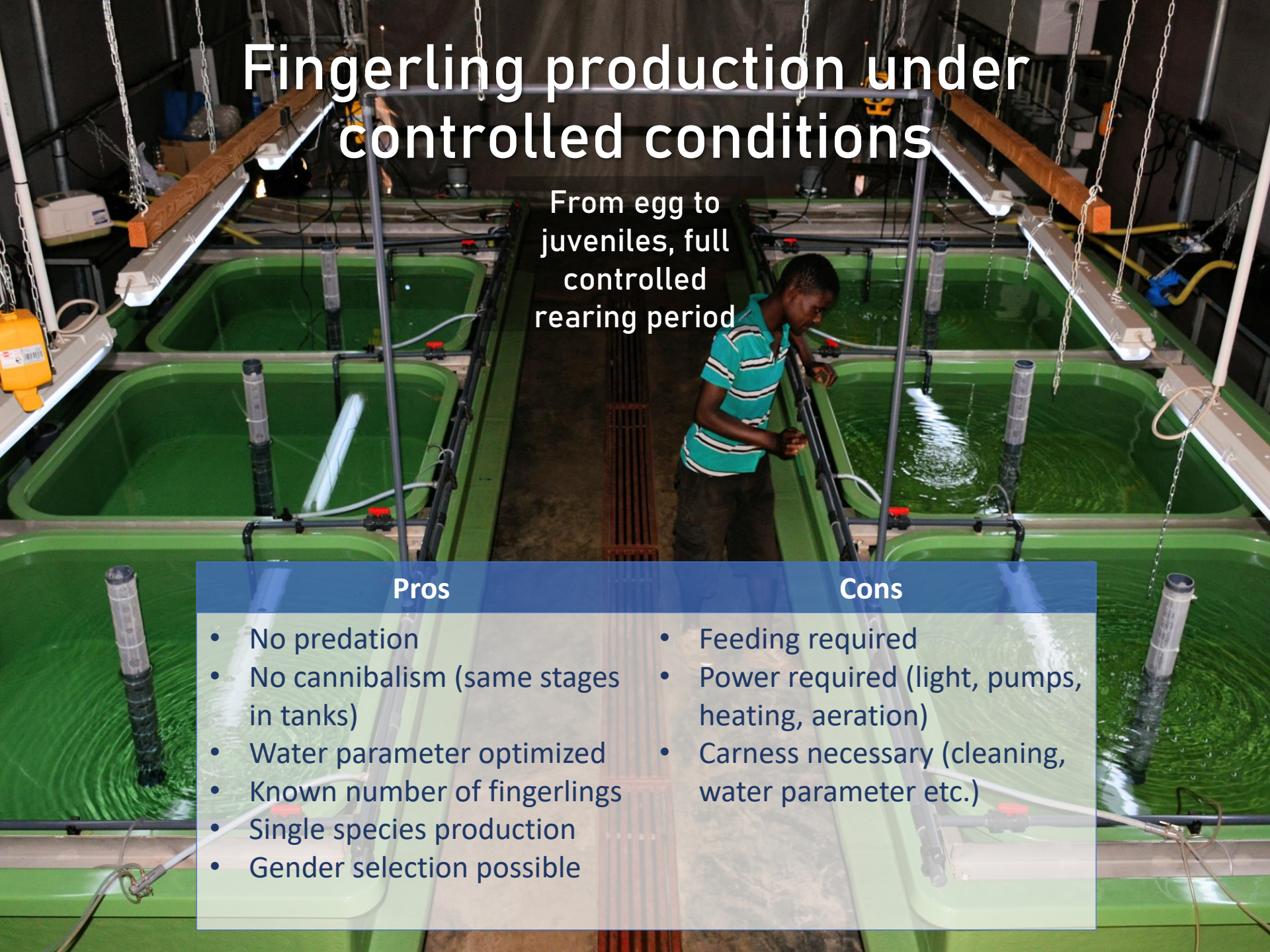




Sex of parents/off-springs

Fingerling production under controlled conditions

From egg to juveniles, full controlled rearing period



Pros	Cons
• No predation • No cannibalism (same stages in tanks) • Water parameter optimized • Known number of fingerlings • Single species production • Gender selection possible	• Feeding required • Power required (light, pumps, heating, aeration) • Carness necessary (cleaning, water parameter etc.)

WP 3: Working towards a continuous supply of O. karongae fingerlings for aquaculture production:

Optimization of rearing conditions for Chambo that can support standardization of survival and growth performance with a higher predictability.

Few knowledge about the optimal rearing conditions from Chambo, such as:

- temperature
- water conditions
- photoperiod
- feed types & quality
- feeding regimes

WP 3 b:

Fry production: Optimized biotic and abiotic rearing conditions, all male-production

WP 3 c:

Improve larval feed

Rationale and Background

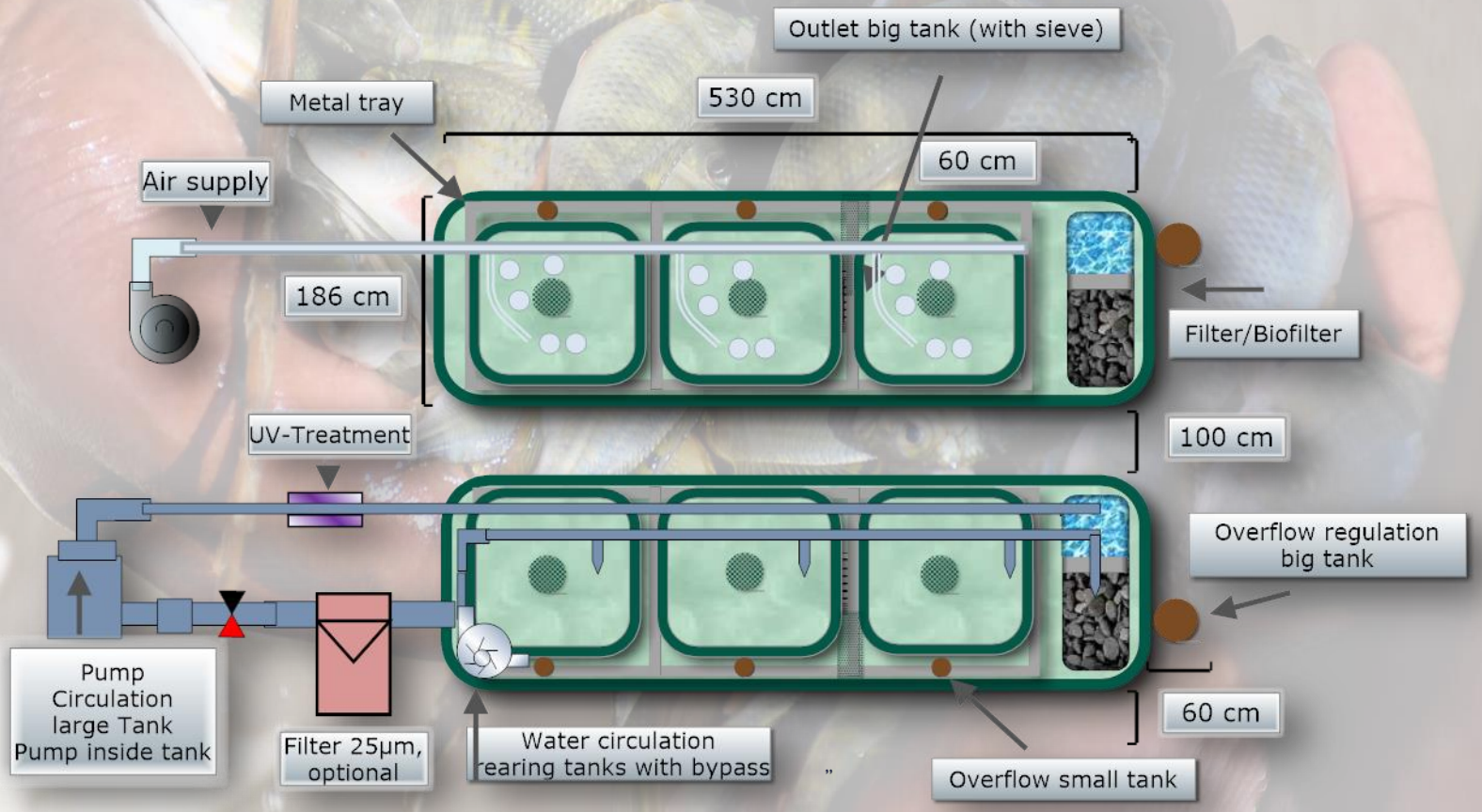
- Thus, one of the major goals of the project ¨Ich liebe Fisch" was to establish technologies which improve significantly the stable supply of viable fingerlings to farmers which want to grow fish for food and for the market.

- To achieve this goal, the project has provided a solar powered indoor hatchery which is designed to support intensive production of tilapia fingerlings, specifically from Chambo.

- Once the farm is under full operation, farmer can purchase viable Chambo fingerlings from the Bunda College (in the ideal case only males)

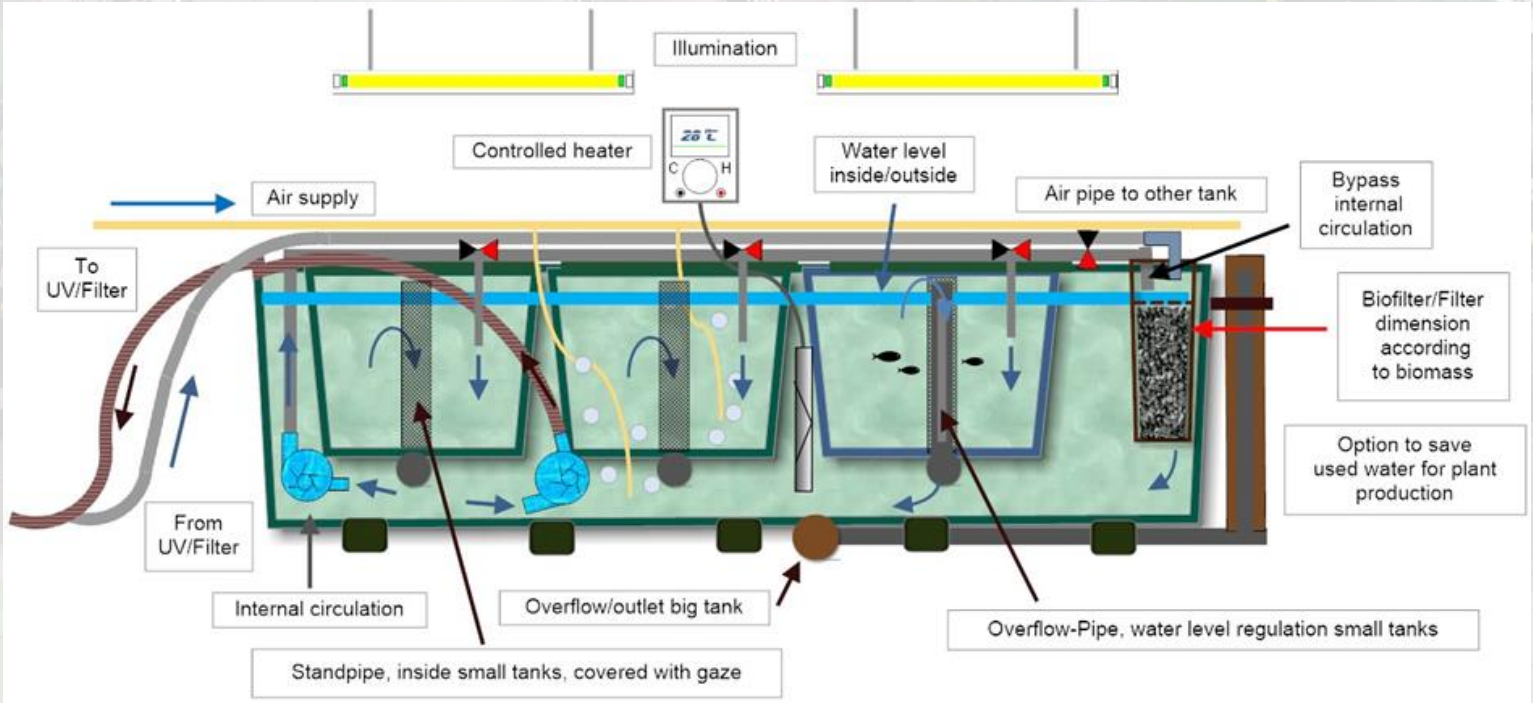
Project goal: Set-up of a solar-powered hatchery including a McDonald unit (egg incubation unit)

Hatchery Design Malawi



Hatchery Design

The design of the hatchery is based on a design which has proven it´s usefulness in fish larval rearing since more than 25 years. The design was adapted to the specific needs under the conditions in Malawian and the kind of species which will be reared in this facility. The main elements of the hatchery are two large fiberglass tanks with smaller tanks hanging inside of the big tanks



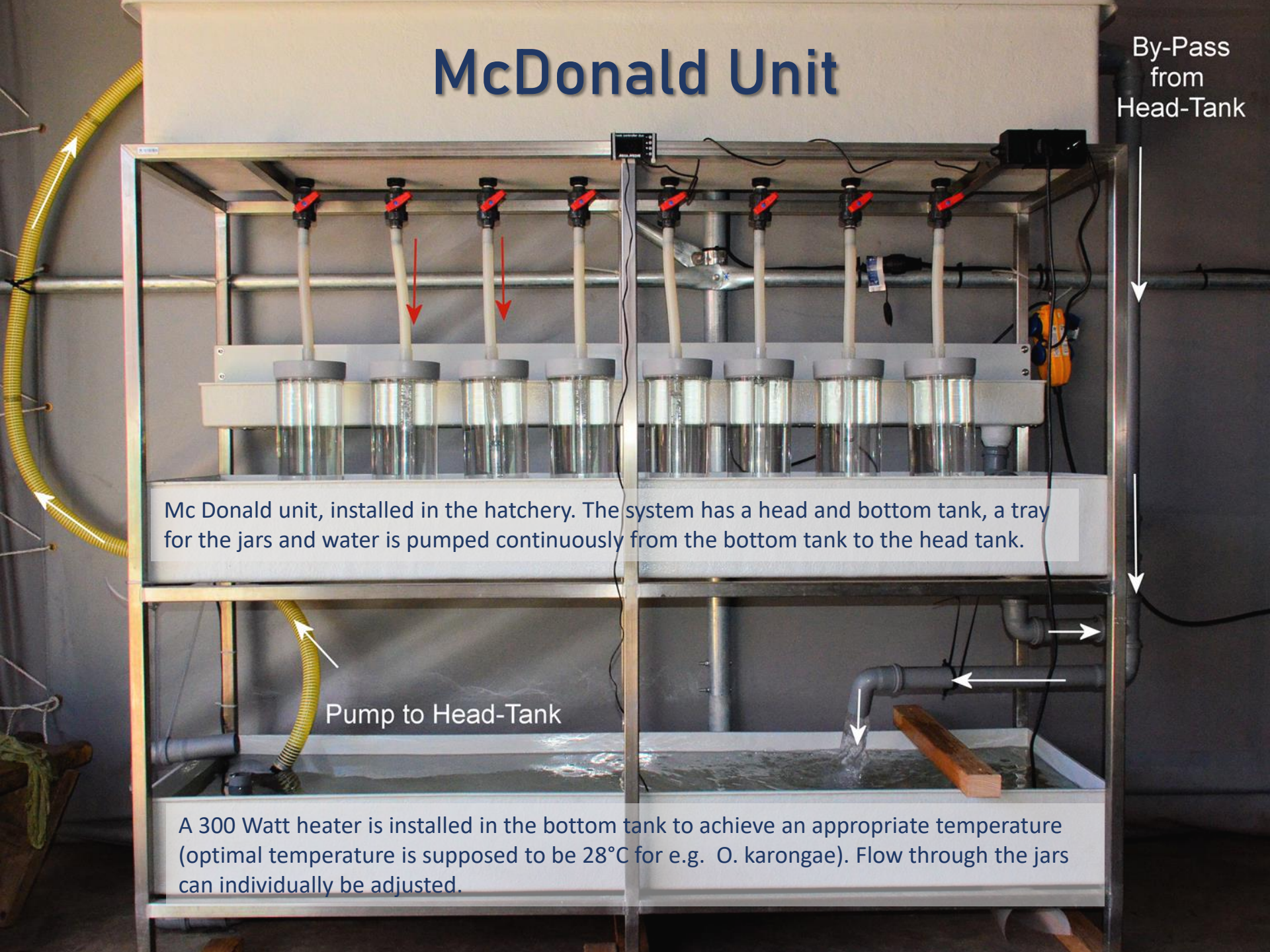
Hatchery Design with adapted technology

Hatchery ready to operate. The circular tanks in the background can be used as store tanks for water exchange.

Capacity

- Production: 0.8 Mill. fingerlings/spawning season (about 6 month, each trial takes about 3 weeks, about 50.000 juveniles per tank unit). This capacity is good for stocking the ponds of about 10-15 fish clubs per season.

McDonald Unit



Mc Donald unit, installed in the hatchery. The system has a head and bottom tank, a tray for the jars and water is pumped continuously from the bottom tank to the head tank.

A 300 Watt heater is installed in the bottom tank to achieve an appropriate temperature (optimal temperature is supposed to be 28°C for e.g. O. karongae). Flow through the jars can individually be adjusted.

McDonald Unit

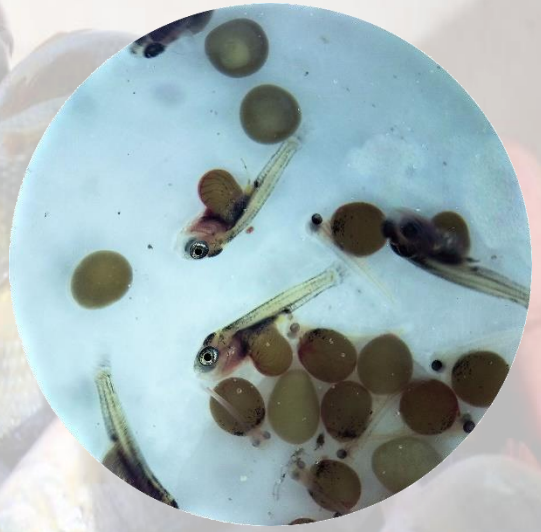
By-Pass from Head-Tank

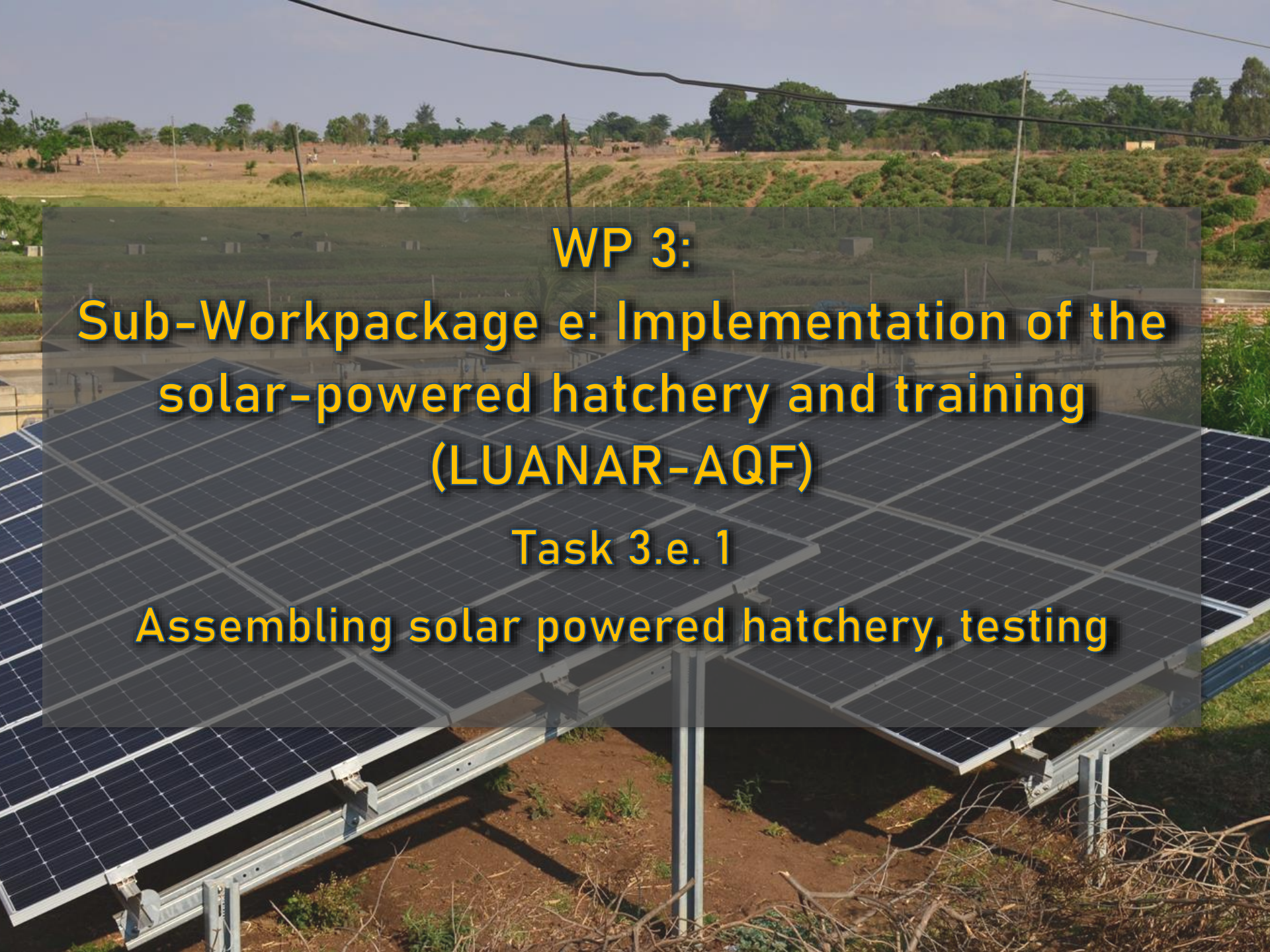
Box with fish and eggs on bottom. The eggs are retrieved out of the parent buccal cavity, collected on a piece of gauze and then put into clean water-filled beakers.

The collected eggs are then cleaned by sieving out all the debris using fine mesh mini-hand nets.

Setzlingsproduktion

Nach dem Schlupf werden die Larven auf die Tanks der Indoor-Hatchery verteilt. Die Verteilung kann entsprechend dem Schlupftermin in verschiedenen Tanks erfolgen.





WP 3:
Sub-Workpackage e: Implementation of the solar-powered hatchery and training (LUANAR-AQF)

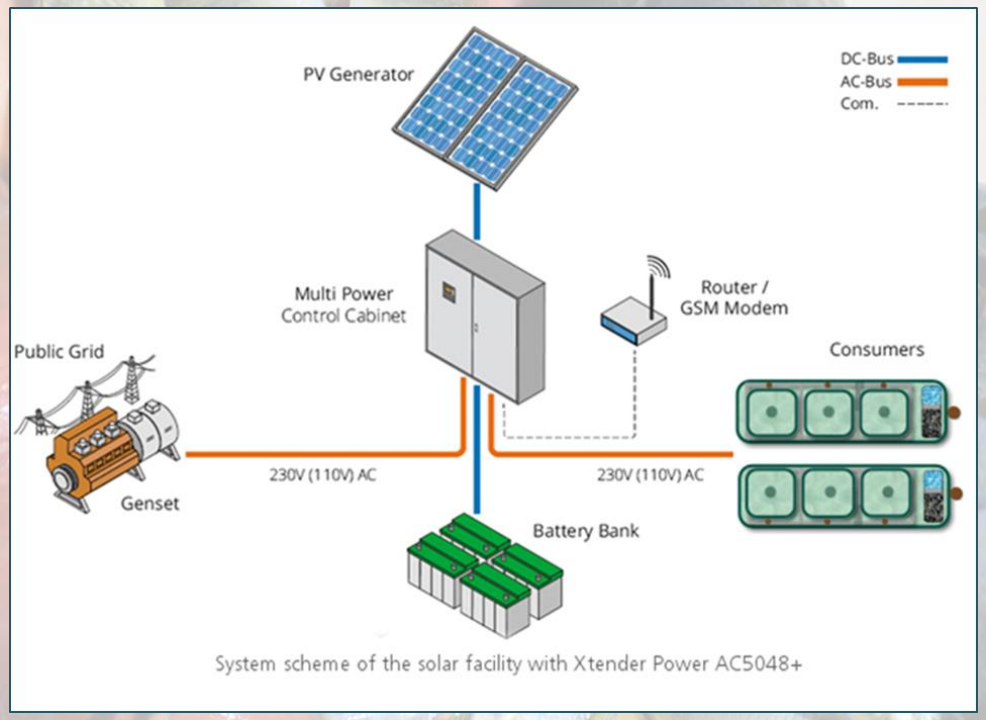
Task 3.e. 1

Assembling solar powered hatchery, testing

Why solar power for the hatchery?

- Grid power in Malawi fails frequently.
- Since such a hatchery set-up needs constant power supply in order to run pumps, aeration, illumination and heaters without a break, a solar power unit was attached to the hatchery.
- Gensets as a continues provider for power are not an option, since fuel and gasoline are very expensive in Malawi. The solar power unit was designed as an island solution and provides sufficient power for the equipment in the hatchery 24h/7days a week.
- The solar facility provides about 1.7kW in the night which is sufficient to run the most important equipment without a break.
- The solar power can automatically switch to grid power when available.
- A diesel genset which automatically starts is being installed as an emergency back-up when both other sources for electricity fail.

Solar powered hatchery



System scheme of the solar facility with Xtender Power AC5048+

PV-facility with about 1,7 kW 24h – 7 days

WP 4, d.3:

Training Course On Solar Powered Hatchery Operation

INVITATION

Training Course On Solar Powered Hatchery Operation

When?
12 - 14th of March 2019

Where?
Bunda Campus aquaculture and fisheries department farm, LUANAR

Organized from the "Ich liebe Fisch" project

Course content

- Introductory presentations
- Guided tour to Bunda Campus aquaculture and fisheries department and farm operation
- Introduction into the solar power facility
- Broodfish management at the farm and present production methods for fingerlings
- Quality of feed for juveniles and adults
- Hatchery operation: explaining the technology, hands-on training, including maintenance, monitoring water parameter, feed and feeding technology

Who should attend

- Advanced fish farmer, those who are interested specifically in propagation of fish
- Instructors in aquaculture ("train the trainers")
- Advanced students in aquaculture

Details

- No course fee
- Max. 25 participants
- Accommodation and subsistence provided from the "Ich liebe Fisch" project
- Free course material

How to register

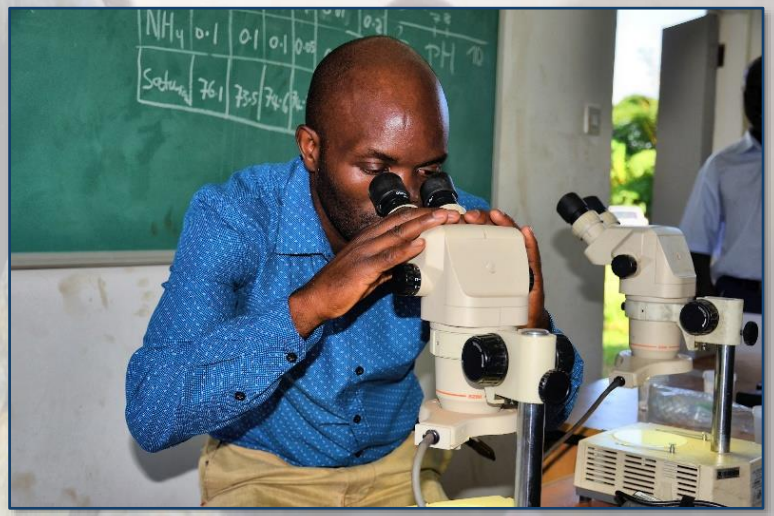
- Registration opens now, please send an e-mail to Prof. Daud Kassam (dkassam@luanar.ac.mw), providing a short statement of your background and your motivation to participate and a contact. Deadline 6th of March, 2019

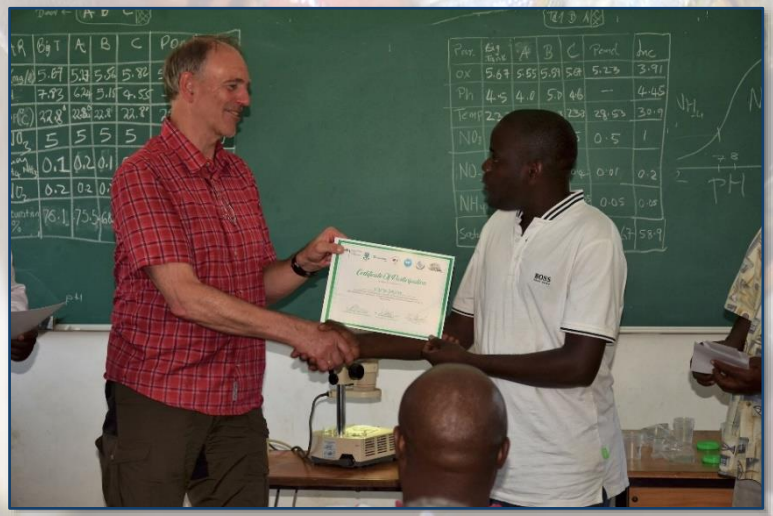
Trainingskurse

Präsentationen und "Hands-on"-Training

Trainingskurse

Präsentationen und "Hands-on"-Training





Closing meeting, first leg, Sept. 2019

Solar Powered Hatchery Operation Manual

50 pages of detailled instructions (Chichewa Version available soon)

Closing meeting, first leg, Sept. 2019

Impact vom "Ich liebe Fisch"-Projekt in Malawi...;-)

Closing meeting, first leg, Sept. 2019

Conclusions

- **Intensive indoor rearing of tilapia larvae is the next level of fingerling production** (Hatchery operation 2.0…) and allows the full control over all factors which promote e.g. the growth rate and output in numbers.

- **However this approach requires set-up of special technology and, under conditions in Malawi**, also a grid-independent supply of power to be able to run the hatchery devices without a break.

- **Feed is required until the advanced larvae are introduced into ponds**, and even then, given with the high numbers produced, further add-on feeding in hapas is required.

- **Part of the technological, strategical and operational background can nevertheless be "translated" into more simple approaches** which may already facilitate to increase the output of more fingerlings on the farmers level.

Thank you for your Cooperation..

was great fun to work with all of you..