



AICCRA

Accelerating Impacts of CGIAR
Climate Research for Africa



AICCRA Zambia

Insights from the aquaculture bundle

Netsayi N Mudege | 19 September 2024

Bundle 2: Integrated Agriculture Aquaculture

The project aim is to implement and scale the integrated production of farmed fish and small livestock (chicken/goats) for **over 70,000** fish farmers in Zambia through capacity strengthening, market development and provision of quality inputs and extension services, and climate information for informed decision making to scale production.



Problem/ challenge

- Northern and Luapula provinces aquaculture affected by climate-related extreme weather events such as floods and unpredictable rainfall patterns
 - Climatic hazards 'have adversely impacted food and water security, water quality, and livelihoods of the people, especially in rural communities' dependent more on aquatic food systems
-



Dried fish-pond because of erratic rainfall

Problem/Challenge

The efforts to promote resilience to climate change among fish farmers have been hampered by the following:

- Lack of climate smart information for informed decision making
 - Lack of access to meteorological data
 - Poor management of water resources among farmers
 - Lack of knowledge of better management aquaculture practices that promote resilience to climate change
 - Lack of access to quality resilient seed
 - Lack of access to quality and locally available nutritious feeds
-

CLICK HERE TO VISIT THE BUNDLE 2 INTEGRATED AGRICULTURE AQUACULTURE: WHAT THE BUNDLE IS ABOUT

The CSA Bundle 2 aims to achieve:

- Increase resilience, production and income for smallholder fish farmers, especially among women
 - Increase resilience to climate change through adoption of climate-smart information and use of better management practices
 - Reducing environmental footprint through the implementation of sustainable climate-smart aquaculture practices
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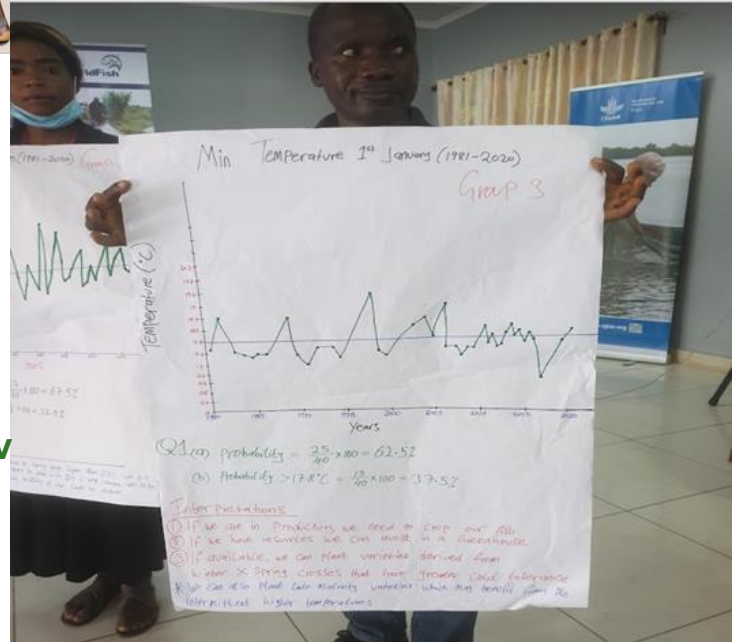


Achievements

Building capacity

- 2 sessions of capacity strengthening on **55 SMES** and extension officers
- Climate-Smart Agriculture Practices (CSA)
- Conduct Climate Information Systems (CIS) training
- Gender Equality and Social Inclusion in climate-smart agriculture and information systems

SMEs and extension agents who were trained on DACA committed to training at least 20 beneficiaries each in their respective districts on how to use this tool and how to read and interpret graphs

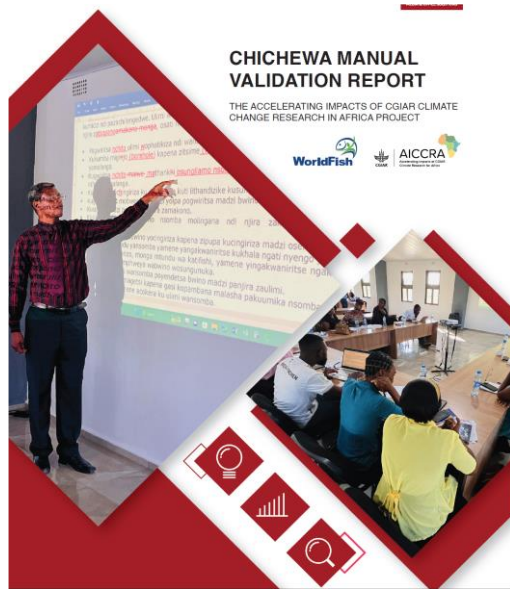


Capacity Building

- 45 SMEs and trainees conducted a participatory gender analysis and developed a **gender strategy** for scaling climate smart aquaculture strategies which guided implementation through out the project
- 36 % of beneficiaries reached by the project are women



Capacity building- Co-development of training materials (e.g. manual validation workshop)



Malimidwe okonzekera ndi olimba panyengo paulimi wansomba: Kugwirizanitsa ulimi wansomba ndi ulimi waziweto zing'onozing'ono



Mary Lundieba
Netsayi Noris Mudege
Victor Siamudaala



Manual in 3 languages– that are accessible to farmers – co-developed and validated by end users

Capacity Building – by 6 trained SMEs

SMEs have reached **45,154** farmers with CIS information through

- Demonstration ponds (**19 ponds set up**)
- Direct training
- Road shows (Northern and Muchinga Province)
- Radio Programs and radio drama
- Beam Shows

SMES used their own funds to set up demo ponds



CLICK TO EDIT SECTION HEADING



SMES Training farmers in CSA and CIS Information



PRESENTATION HEADING | DATE

C

Roadshows, and Agricultural shows



In Luapula EUNIMOS and in Northern Province Kasakalabwe won the provincial agricultural show prizes showcasing IAAS and climate smart aquaculture practices. (2022)

Radio programs and dramas

- Radio interviews on NAIS and Yangeni Radio to talk about Climate Smart Agriculture (CSA) and Climate Information Systems (CIS) (NAIS in national radio and Yangeni is in Luapula)
- Radio dramas on local radio by Kasama arts show casing climate smart information, climate smart aquaculture, and highlighting gender issues in aquaculture



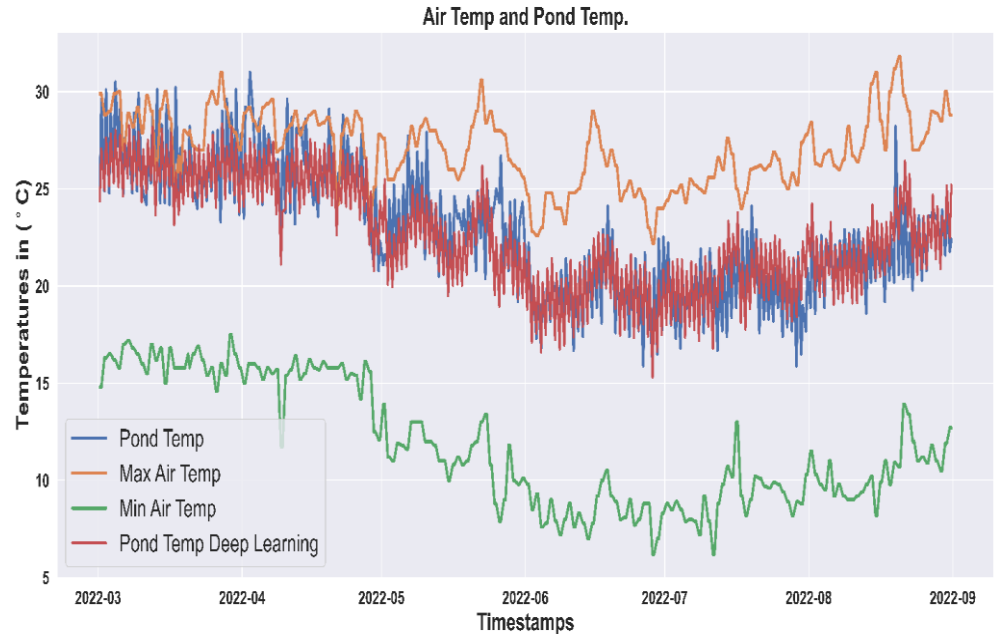
Capacity building and coaching financial literacy

- Open Capital Advisories –financial literacy and investor readiness, strengthening our approach to business
- WF Monitored and mentored the SMEs on business management and attached an intern
- Results EUNIMOS ZMW900,000.00 loan from CEEC to construct a **recirculatory indoor hatchery** (one million fingerlings per year); USD100,000 by USADF for the smart production of quality soya beans and processing into HEPS and feed. Hopeway a grant of ZMW1,200,000.00 to improve its existing hatchery (2million per year)



Aquaculture Advisory tool

- An air-water temperature relationship algorithm
- When predicted temperatures approach their thresholds, this activates a color-coded alarm corresponding with a specific action protocol to regulate pond temperatures.



START

PREDICTED POND TEMPERATURE

IS THE POND TEMPERATURE $\geq 24^{\circ}\text{C}$?

NO

YES

IS THE POND TEMPERATURE $\geq 12^{\circ}\text{C}$?

NO

YES

NO

IS THE POND TEMPERATURE $\geq 32^{\circ}\text{C}$?

YES

NO

IS THE POND TEMPERATURE $\geq 41^{\circ}\text{C}$?

YES

Normal !!!
Pond temperature prediction is between 24°C and 32°C

Emergency!!!
Pond temperature prediction of less than 12°C over the next 8 hours

Monitor !!!
Monitoring water temperature, Dissolved Oxygen, pH, ammonia (and nitrite), and fish behaviour
Every 4 hours during the day and night (06h00, 10h00, 14h00, 18h00, 22h00, 02h00)

FLUSHING:
If any measurements exceed the below values
- Add fresh water from the water source.
- Continue to monitor the outlet.
Once parameter has decreased below the level below
- Stop adding water

FEEDING/FERTILISING:
If any measurements exceed the below values
- Reduce number of feeds by 1
- Feed slowly until fish stop feeding

Predicted pond temp less than 14°C
Dissolved Oxygen less than 6 mg/l
pH decreasing to 7 or less
pH increasing to 9 or more

BEHAVIOR:
If fish displays any stress-related behaviors shown below, prepare to harvest fish or move them to another pond with temperature, DO, pH, ammonia and nitrite in safe limits. Ensure you harvest or move fish before they die.
- Gaping for air at the surface
- Swimming or lying on the side
- Floating still at the surface but still moving regularly

High Risk !!!
Pond temperature prediction is approaching 24°C over the next 24 hours

Monitor !!!
Monitoring water temperature, Dissolved Oxygen, pH, ammonia (and nitrite), and fish behaviour
Every 6 hours during the day and night (06h00, 12h00, 18h00, 24h00)

FLUSHING:
If any measurements exceed the below values
- Add fresh water from the water source.
- Continue to monitor the outlet.
Once parameter has decreased below the level below
- Stop adding water

FEEDING/FERTILISING:
If any measurements exceed the below values
- Reduce number of feeds by 1
- Feed slowly until fish stop feeding

Predicted pond temp less than 14°C
Dissolved Oxygen less than 6 mg/l
pH decreasing to 7 or less
pH increasing to 9 or more

BEHAVIOR:
If fish displays any stress-related behaviors shown below, prepare to harvest fish or move them to another pond with temperature, DO, pH, ammonia and nitrite in safe limits. Ensure you harvest or move fish before they die.
- Gaping for air at the surface
- Swimming or lying on the side
- Floating still at the surface but still moving regularly

High Risk !!!
Pond temperature prediction is approaching 32°C over the next 24 hours

Monitor !!!
Monitoring water temperature, Dissolved Oxygen, pH, ammonia (and nitrite), and fish behaviour
Every 4 hours during the day (06h00, 10h00, 14h00, 18h00)
Once during the night (24h 00)

FLUSHING:
If any measurements exceed the below values
- Add fresh water from the water source.
- Continue to monitor the outlet.
Once parameter has decreased below the level below
- Stop adding water

FEEDING/FERTILISING:
If any measurements exceed the below values
- Reduce number of feeds by 1
- Feed slowly until fish stop feeding

Predicted pond temp greater than 35°C
Dissolved Oxygen less than 6 mg/l
pH decreasing to 7 or less
pH increasing to 9 or more

BEHAVIOR:
If fish displays any stress-related behaviors shown below, prepare to harvest fish or move them to another pond with temperature, DO, pH, ammonia and nitrite in safe limits. Ensure you harvest or move fish before they die.
- Gaping for air at the surface
- Swimming or lying on the side
- Floating still at the surface but still moving regularly

Emergency !!!
Pond temperature prediction is approaching 41°C over the next 8 hours

Monitor !!!
Monitoring water temperature, Dissolved Oxygen, pH, ammonia (and nitrite), and fish behaviour
Every 2 hours during the day (between 06h00 and 18h00)
Every 4 hours during the night (between 18h00 and 06h00)

FLUSHING:
If any measurements exceed the below values
- Add fresh water from the water source.
- Continue to monitor the outlet.
Once parameter has decreased below the level below
- Stop adding water

FEEDING/FERTILISING:
If any measurements exceed the below values
- Reduce number of feeds by 1
- Feed slowly until fish stop feeding

Predicted pond temp greater than 35°C
Dissolved Oxygen less than 6 mg/l
pH decreasing to 7 or less
pH increasing to 9 or more

BEHAVIOR:
If fish displays any stress-related behaviors shown below, prepare to harvest fish or move them to another pond with temperature, DO, pH, ammonia and nitrite in safe limits. Ensure you harvest or move fish before they die.
- Gaping for air at the surface
- Swimming or lying on the side
- Floating still at the surface but still moving regularly

END

Aquaculture Advisory tool

- Presented at the Fisheries Information System Dialogue in Zambia (February 2024)
- Presented at the Africa Aquaculture Conference 2023
- Picked up by the Profishblue project funded by SADC for further refinement and scaling in Zambia and Malawi also for other fish species



Republic of Zambia
Ministry of Green Economy and Environment
Zambia Meteorological Department

Weather Alert and advisory

TIME ISSUED: 14:00 CAT
DATE PREPARED: 29th August, 2024
VALIDITY PERIOD: 30th August to 3rd September, 2024

A strong high pressure system located over the south eastern coast of South Africa will induce a **strong, cool and moist airflow** over Zambia from **30th August to 3rd September, 2024**.

This will result in partly **cloudy** weather conditions, an **increase in winds** and a **reduction in temperature**. Isolated **rainfall** is anticipated in some parts of Lusaka, Central, Eastern and Muchinga Provinces during the forecast period.

Farmers are therefore advised to **secure harvested crops** to avoid damage due to the rains expected during this period and the general public to **keep warm and avoid open areas** due to dusty conditions as this weather may lead to increased cases of flu and other health related conditions.

Users of **water transport and fishers** are advised to take precautionary measures to **avoid accidents** due to windy weather conditions anticipated.

*Produced by the Zambia Meteorological Department,
Ministry of Green Economy and Environment.*

Aquaculture-Advisory tool

- Develop interventions to support farmers in establishing reliable water sources for flow-through, such as upstream storage (scaled to operational and emergency needs) and/or drilling and equipping boreholes with solar (and battery) pumps.
- Develop feasibility models that consider farming inputs and outputs and assist with understanding minimum scales to achieve minimum viable production.

Multistakeholder workshops

MSD 1 theme – Knowledge sharing on climate smart aquaculture practices

MSD2 Aquaculture markets (input and output) and financial access and inclusion. 78 (24 women) participants

MSD3: Lessons learnt

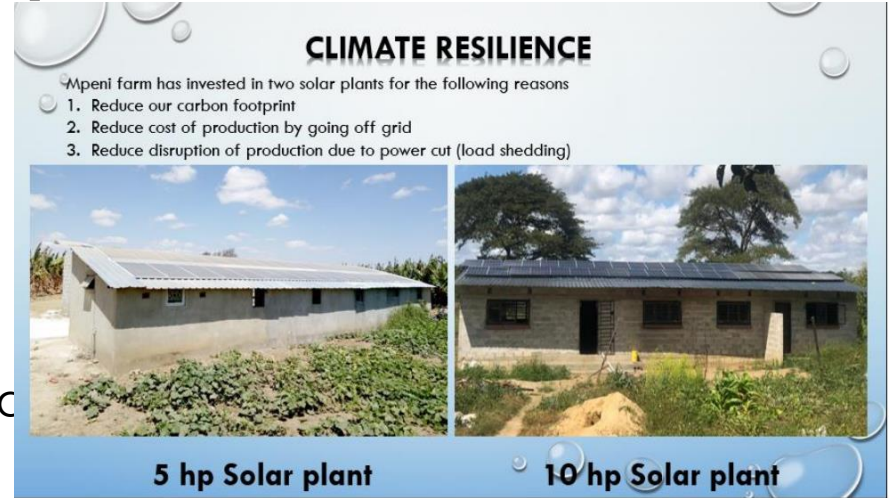


Figure 2: Offgrid solar plant at Mpeni integrated fish farm; an extract from Mpeni farm presentation

Multistakeholder workshops and private sector engagement

Issues discussed

- Financing and marketing for small holder fish farmers by Major Kaluba rtd ADAZ National Coordinator
- Finance in the Agricultural Sector by NATSAVE
- Bench-marking for smallholder fish farmers in Luapula Province by Amon Foloweza Acting Principal Fisheries Officer

Results

- Aller Aqua now promoting catfish feeds to support IAAS efforts
- WorldFish signed an MoU with Natsave a financial institution
- WorldFish negotiating a memorandum of understanding with Madison insurance to develop a climate insurance product for smallholder fish farmers

Resilient seed and feed

SMES: Increased quality fingerlings availability and are supplying fingerlings beyond immediate catchment areas

- Broodstock for *Oreochromis macrochir* increased from 2,250 in 2021 to 12,315.
- However, the SMEs only produced 28% (1.39 million) fingerlings against a target of 5 million.
- Some challenges experienced



Market linkages

Linkages to off-takers



*I get many calls, even from the government through the farmers under the CEEC, ... so I have to strategize to make sure I meet my customers' needs. I didn't see this coming when I first started with you because my business focused on the restaurant, assorted groceries and food items, but now I see a huge demand for local fish". – **supplies 2.8 tones of fish per month***

- *Tripple Blessings set up 7 demo ponds to teach smallholders*
- *Funded Kachila village farmers (10 women and ten men) to produce fish*
- ***"I want them to keep producing because the business cannot afford to have fish in the shop today and nothing tomorrow".***



Trained SMEs and others adopting green technologies



Students

- Our submission was one of 10 selected for inclusion in the Gender, Race and Diversities Track 2023 of the Applied research project (ARP) by the Geneva Graduate Institute
 - 3 students
- 2 of the interns trained under AICCRA have successfully been employed – one as a manager of an aquaculture start-up and another as a government extension officer

