# Adoption of small-scale aquaculture technologies by smallholder farmers in Myanmar; challenges and opportunities

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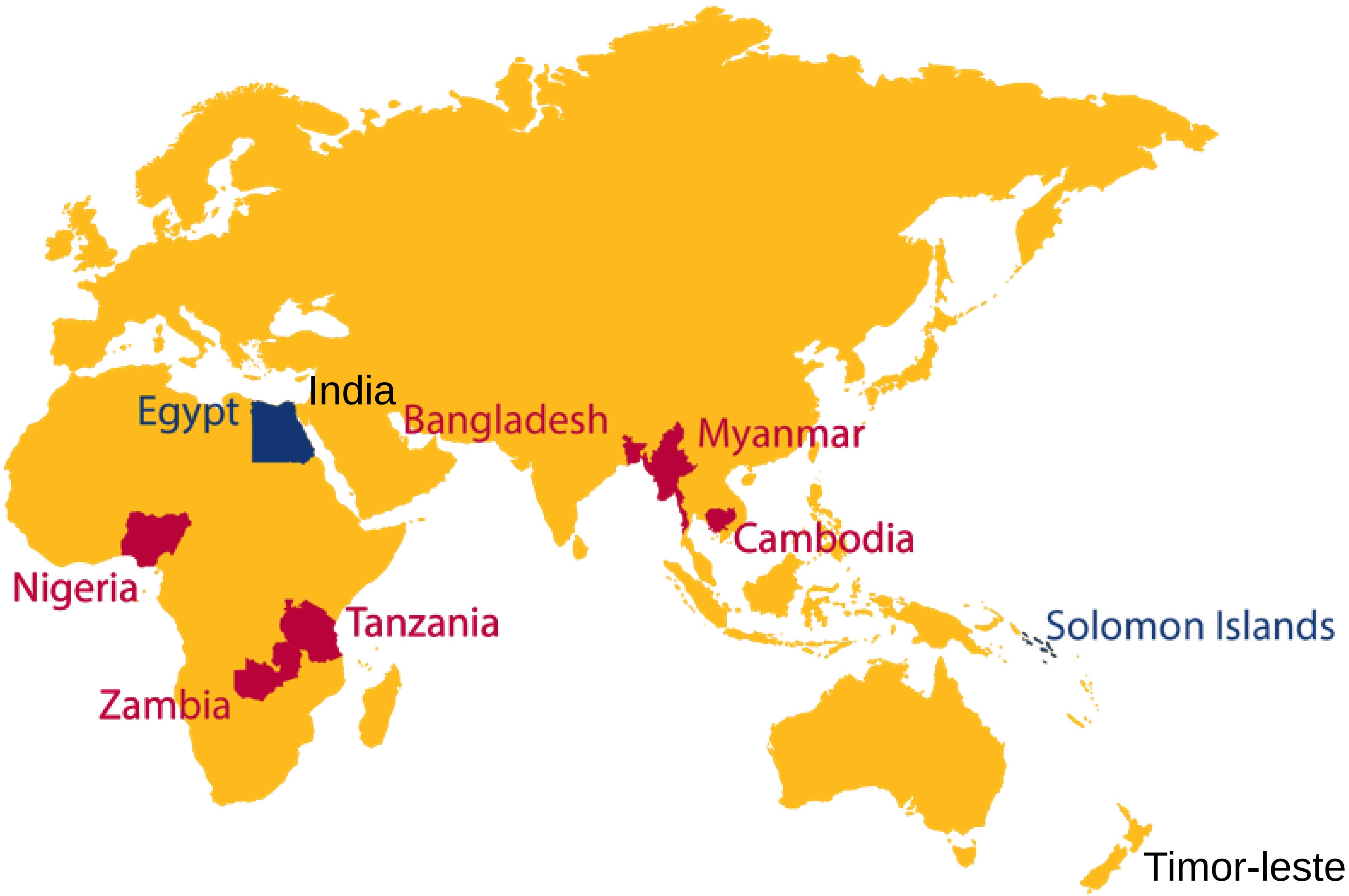
# PRESENTATION STRUCTURE

- WorldFish
- MYCulture project
- Geographical focus
- Key interventions
- Key findings from PAR and conclusion
- Shan Aquaculture
- Way forward

# WorldFish's mission and geographic focus

Our goal is to reduce poverty and hunger by improving fisheries and aquaculture



# MYCulture

# Project objectives

- Promoting SSA to increase income and improve nutrition in Myanmar

# Donors and Partners

## Donor

## PARTNERS

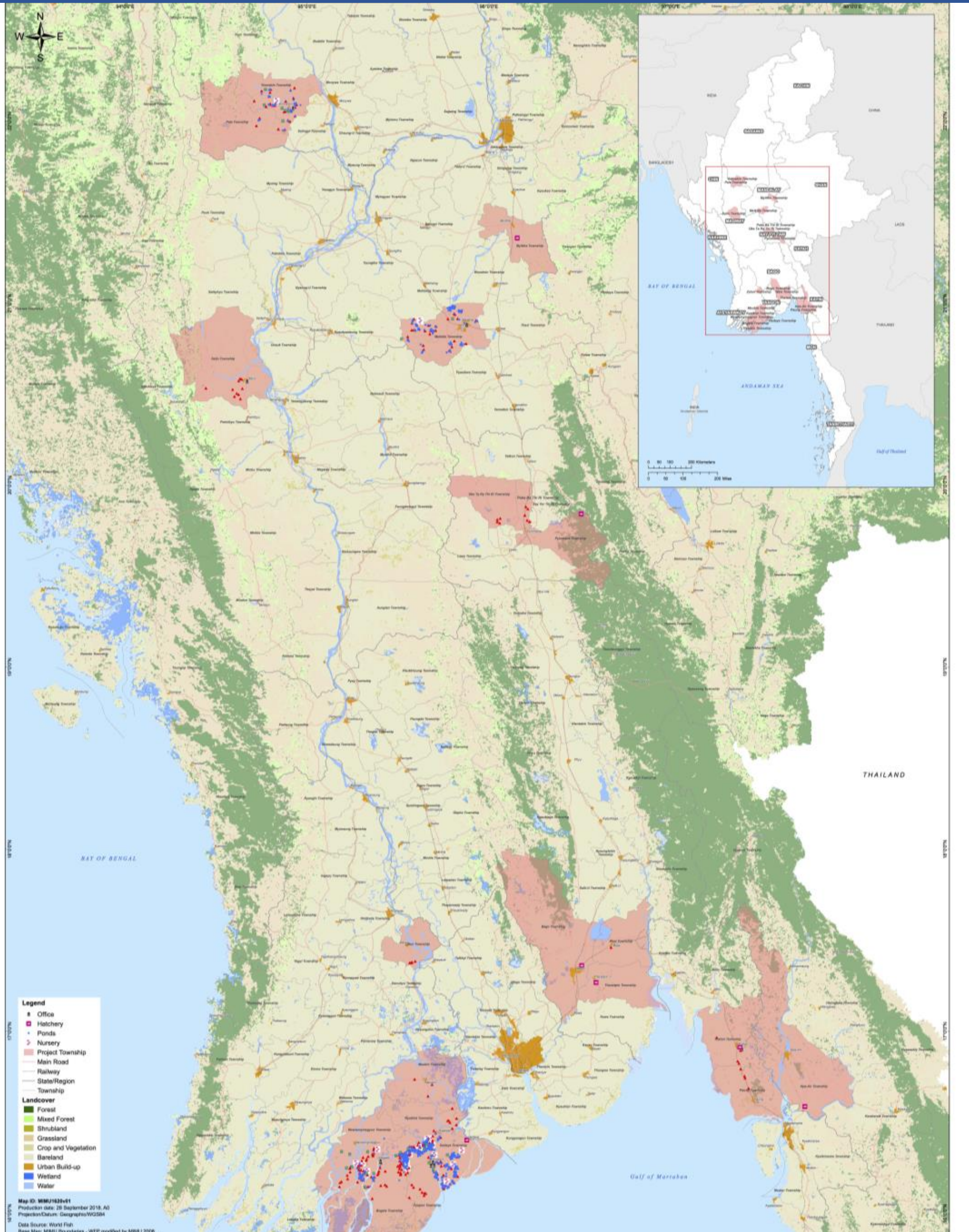
# Map of project areas

## Townships

- Bogalae
- Pyapon
- Mawgyun
- Dedaye
- Zalon
- Kyaiklat
- Yinmarbin
- Meiktila
- Pale
- Maubin
- Ottayathiri
- Poppathiri
- Thaton
- Paung
- Hpaan
- Waw

## State and region

- Kayin State
- Bago Region
- Mon State
- Nay Pyi Taw
- Central Dry Zone
- Ayeyarwady region



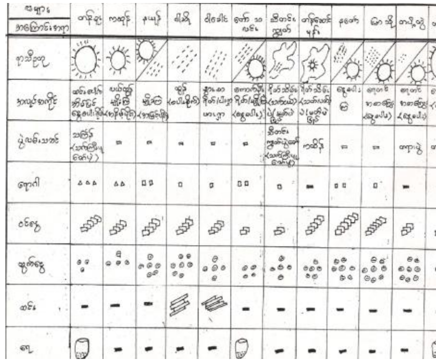
# Study objective and methods

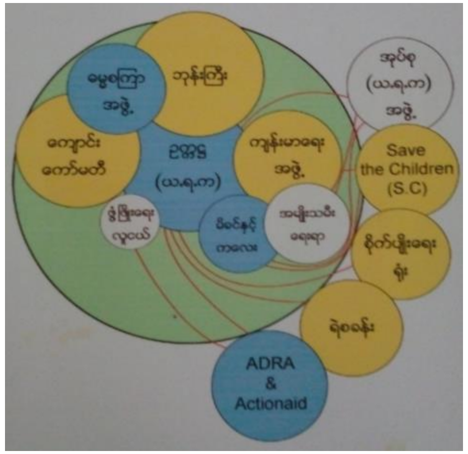
**- Assessing performance of aquaculture technologies promoted by the project**

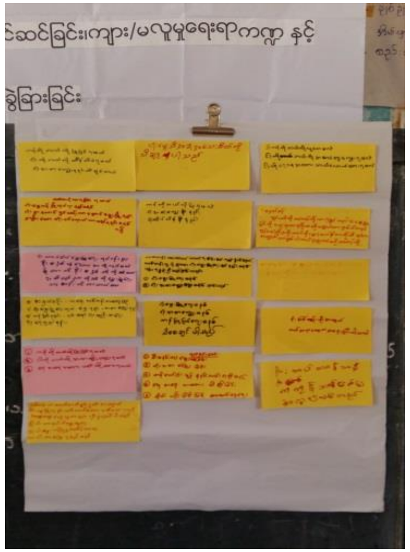
Tools used

Participatory Community Appraisal to learn about current situation and local preferences

Study participants : 649 farmers from 76 villages

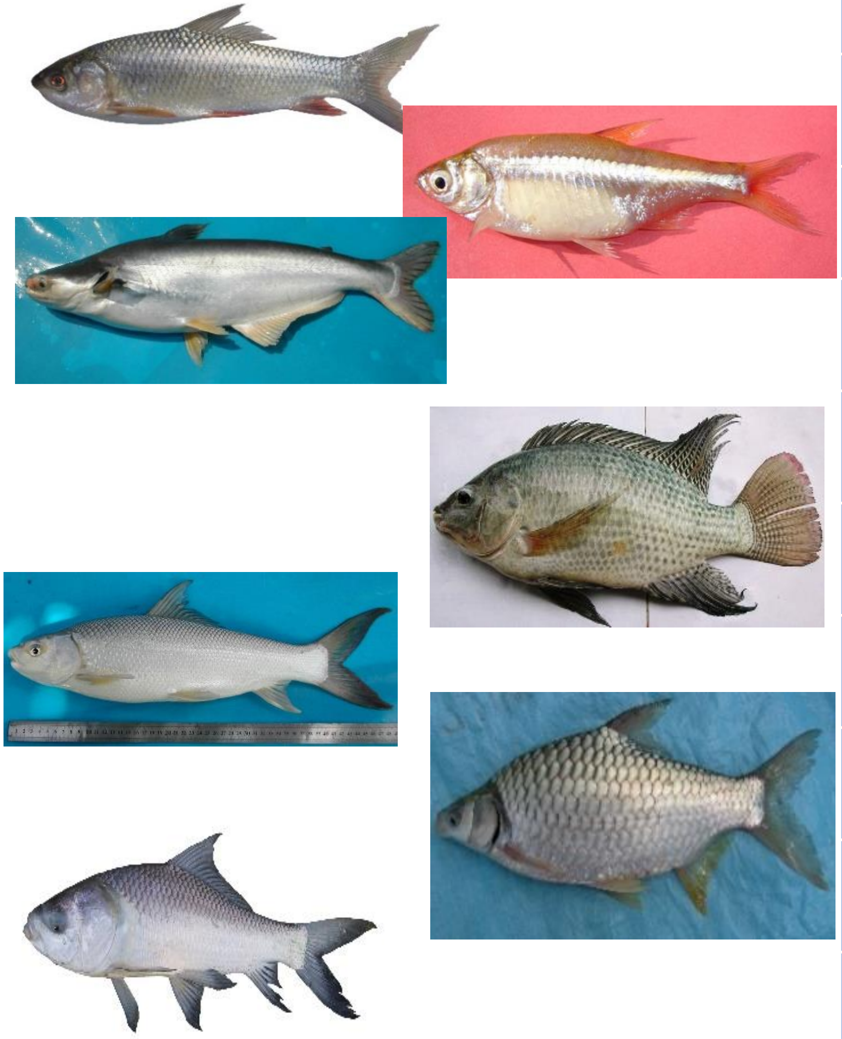




# Cultured species

No. of Treatments: 29
(mono and polyculture mixes)



| Treatment ID | Fish species |
|---|---|
| T1 (n=94) | **Tilapia** |
| T2 (n=44) | Rohu |
| T21 (n=37) | Rohu + (mrigal) + (catla) |
| T22 (n=63) | **Rohu + mrigal** |
| T3 (n=52) | **Pangasius** |
| T32 (n=26) | Pangasius + rohu |
| T4 (n=74) | **Mola + (tilapia) + (rohu) + mrigal** |
| T5 (n=22) | Silver Barb |
| T51 (n=21) | Silver Barb + rohu + mrigal |
| Total = 423 | |

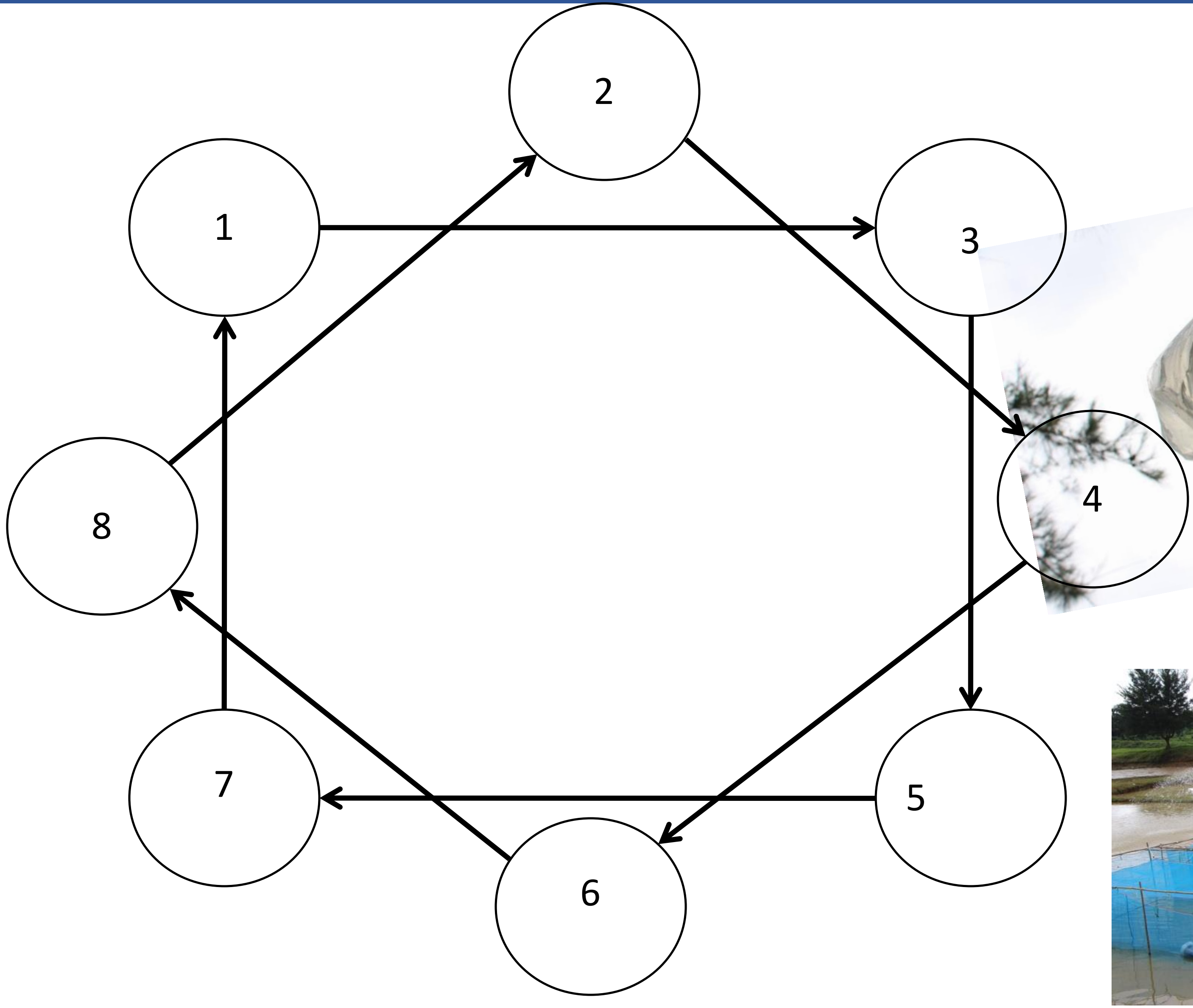
# Resources identified for SSA

*Chan Myaung*

**Ponds**

**WISH ponds**

# Introduction of Genetically Improved Farmed Tilapia (GIFT)




# Breeding native fish species

# Fish seed supply network

**220,300 fingerlings produced from 20 nurseries**

# Feed production and supply network

**90,105 kg feed in 2017 used by 1,420 farmers**

# Economic performance of small-scale feed mill

| Component (USD) | Region | | Total (n=25) |
|---|---|---|---|
| | Ayeyarwaddy Delta (n= 18) | Central Dry Zone (n= 7) | |
| Cost per Kg feed produced (USD feed $kg^{-1}$) | 0.36±0.06 | 0.47±0.05 | 0.39±0.07 |
| Sales price (USD feed $kg^{-1}$) | 0.45±0.00 | 0.45-0.54 (0.54) | 0.47±0.04 |
| **Margin per Kg feed sold (USD $kg^{-1}$ feed)** | **0.09±0.06** | **0.04±0.04** | **0.08±0.05** |
| Sales volume (kg) | 2975±1801 | 945±891 | 2406±1833 |
| Average income | 1339±811 | 425±401 | 1103±821 |
| **Average gross margin (USD)** | **344±327** | **77±92** | **269±305** |
| Average net margin (USD) | 302±332 | 60±80 | 234±303 |
| **Revenue cost ratio** | **1.27±0.20** | **1.10±0.10** | **1.22±.19** |

*Cost $kg^{-1}$ (USD) : 1 USD = 1,360 MMK (average exchange rate during 2017).

# Human nutrition interventions

- Introduction of improved polyculture method of large and small indigenous fish species (SIS) in the homestead ponds

  ***>270 farmers adopted; average consumption of 6 kg (Pyapon) and 9 kg (Bogalay)***

- Integration of vegetable along pond embankments or dikes with **517 farmers reported consuming** in Ayeyarwaddy Delta; surplus for additional income

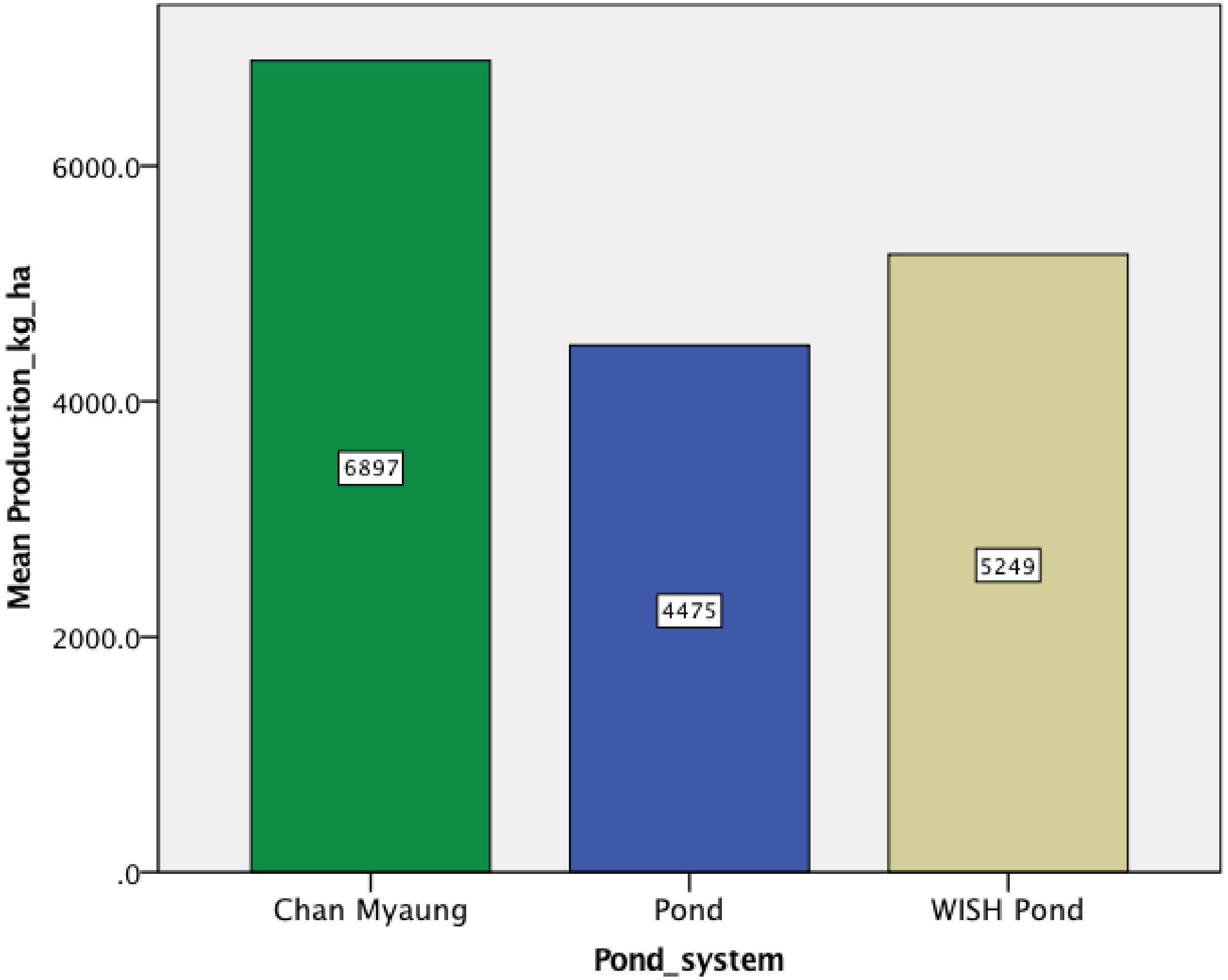
- Participation in nutrition platforms at the national level,

  (SUN movement through SUN CSA, MSNPAN contribution, National Nutrition Month celebration)

- Creation of **IEC materials** that is usable and support in raising awareness on the importance of fish in achieving good nutrition at the community level
- Nutrition education and **B**ehavior Change **C**ommunication activities

# Key findings

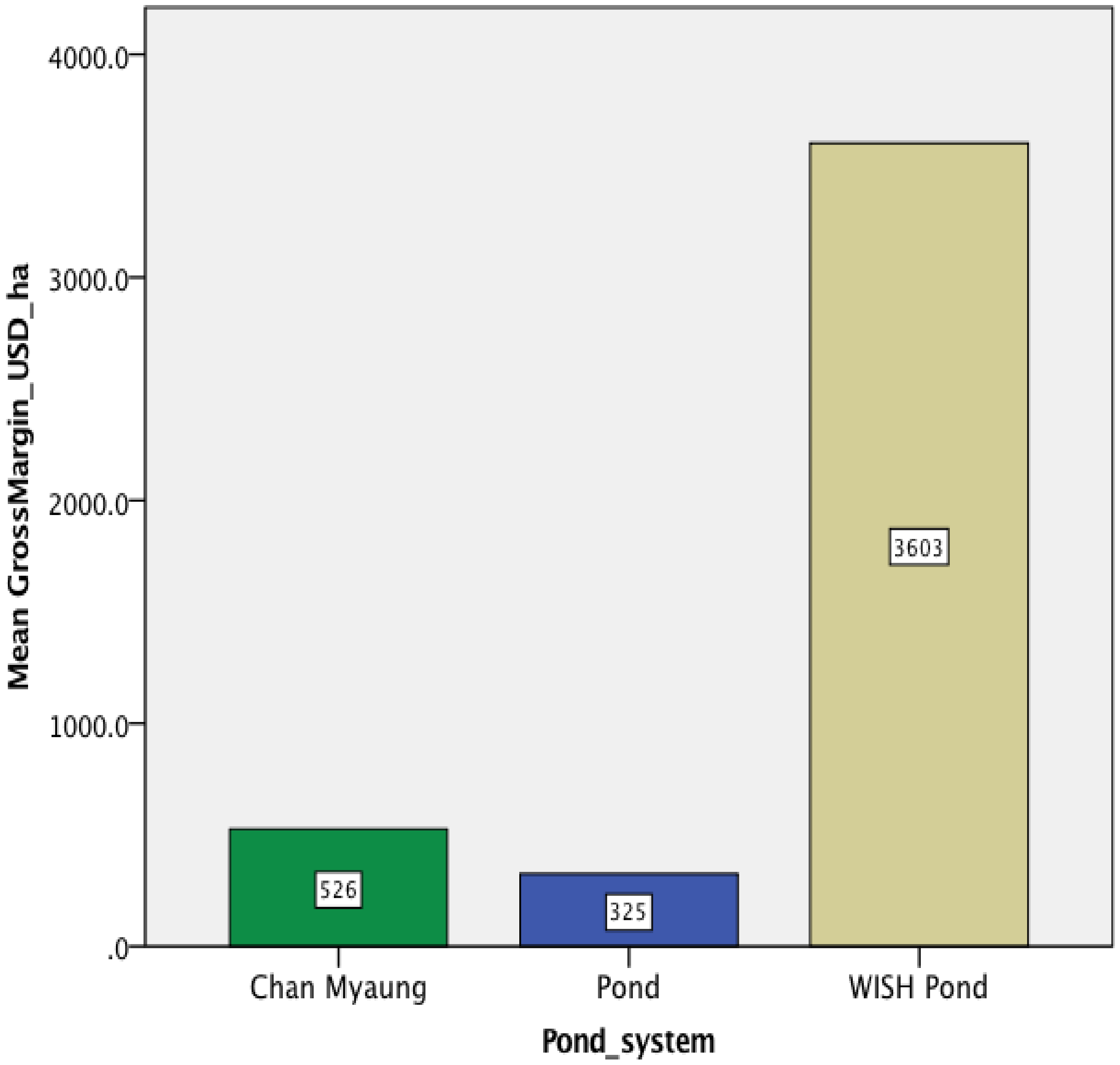
# Fish production and usage by systems




Chan myaung: n=112 Pond: n=271 WISH pond: n=92

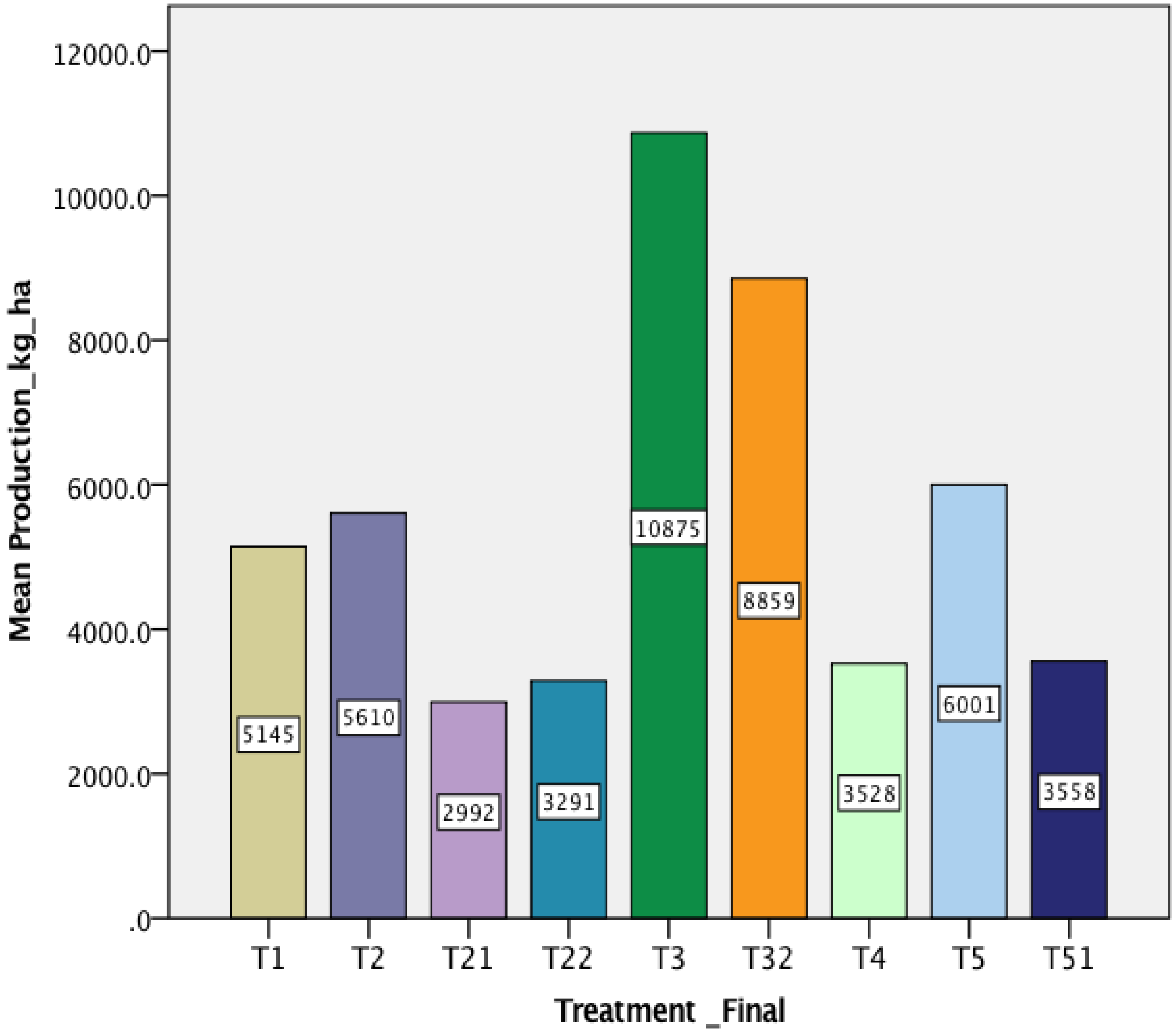
- Pond farmers located in AD had higher overall production levels ($p<0.05$) than in CDZ
- *Chan myaung* showed similar production levels to earthen ponds and WISH ponds ($p>0.05$)
- Pond farmers in CDZ used a higher proportion of their harvest for household consumption or as gift for neighbours and family members ($p<0.05$)

# Gross Margin by systems



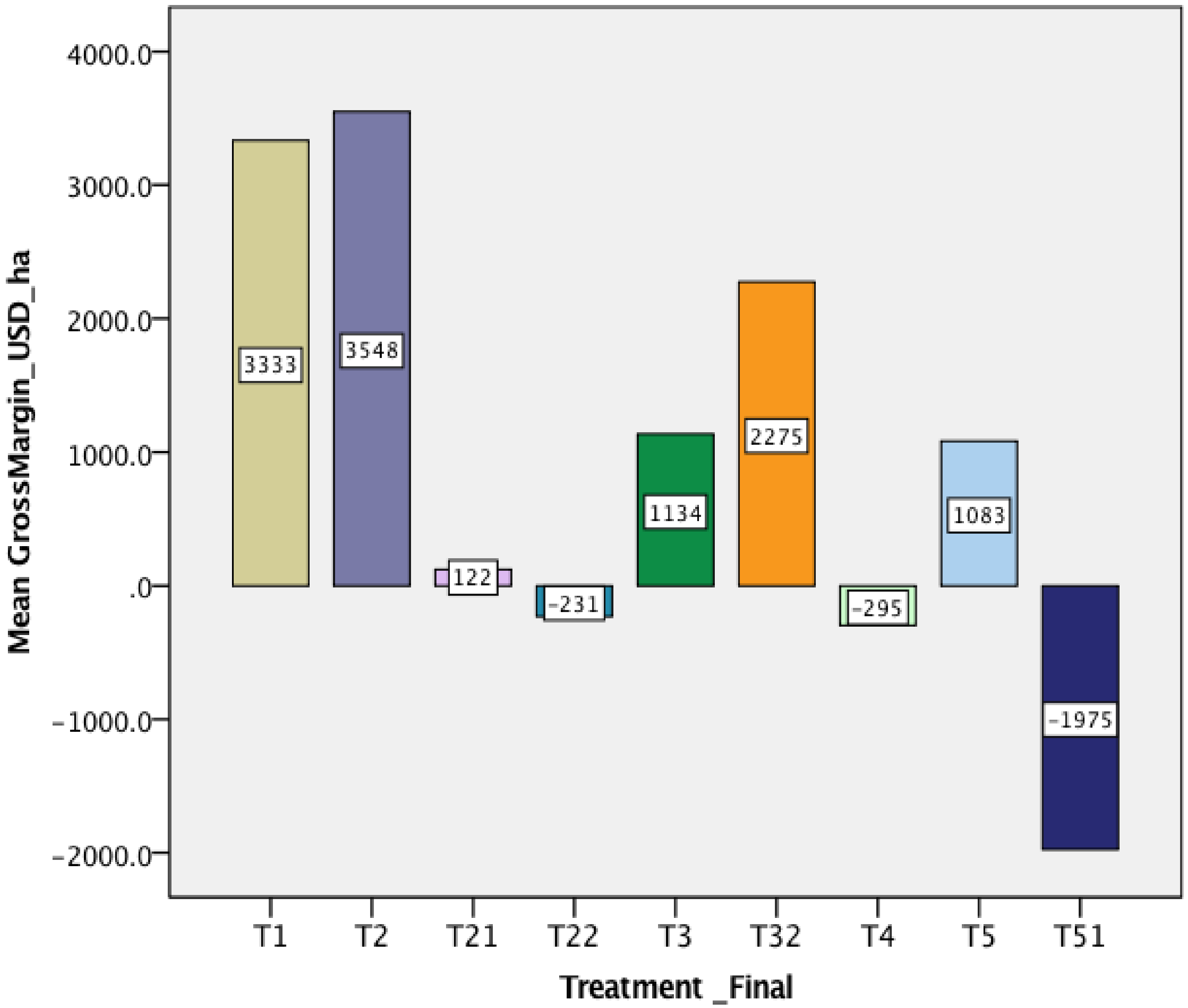

- WISH ponds achieved the highest **gross margins (3,603 USD/ha),** followed by chan myaung (526 USD/ha), and earthen ponds (325 USD/ha) ($p<0.05$ between all groups)
- However, in *chan myaung* only **39%** achieved positive gross margins. It is around **55%** and **78%** for ponds and WISH ponds respectively
- Highest BCR in WISH ponds (**2.2** ± 1.4) ($p<0.05$) while it was lowest in *chan myaung* (**1.18** ± 1.2) ($p<0.05$)

# Fish production by treatments and usage




- Highest production levels were observed in **pangasius (T3) and pangasius-rohu** culture (T32)
- Production of **Rohu-Indian major carps** (T21), and **Pangasius-rohu** (T32) was significantly higher ($p<0.05$) in AD
- No significant differences found in pattern of fish usage between zones ($p>0.05$)

# Gross margin by treatments




- **Tilapia** (T1) (3,333 ± 5,525), **Rohu** (T2) (3,548 ± 5,952) and **Pangasius-rohu** (T32) (2,055 ± 4,548) were better ($p<0.05$)
- The lowest gross margins were observed in **silver barb-Indian carps** (T51)

# Linear regression

- In *chan myaung*, variation in production ($R^2$=0.83) was positively linked with ***survival rate*** and the amount of ***supplementary feeding***
- Earthen ponds showed a similar result, variation in production was positively linked with **survival rate**, ***feeding amount***, and ***initial stocking density*** ($R^2$=0.84)
- The variance in production in WISH ponds was positively linked with ***culture period***, ***survival rate*** and negatively linked with *pre-stocking fertiliser use* ($R^2$=0.96)

# Conclusion

- ***Chan myaung*** is a viable option for fish culture in AD, a closer look at feeding strategies might be warranted
- **WISH pond** based aquaculture needed to be further tested in CDZ
  - Using fast-growing species, proper feeding and fertilizer regimes
- A higher proportion of **fish used for consumption** in CDZ (both WISH pond and earthen pond), as compared to AD
  - Explains higher demand and preferences in CDZ

- **Larger size (overwintered) quality seed** is crucial for better production and profitability explaining the variance in production
- Efficiency of fish culture in *chan myaung* and earthen pond systems could be improved significantly through **quality feed** and following proper **feeding regimes**

# Aquaculture in Shan State: challenges & opportunities

- **Challenges**
  - **Declining water quality** in Inle Lake (eutrophication, domestic effluent discharge, pollution, sedimentation)
  - **Limited water availability** and low water retention rates in some areas
  - Lack of high quality **fingerlings**
  - **Displacement of endemic species** by introduced aquaculture species (tilapia, African catfish)
  - Constraint on aquaculture development due to **government policies**
- **Opportunities**
  - Relatively **high market price** for fish around Inle Lake
  - Local market preference for **smaller-sized fish**
  - **Declining catch rates** for wild fish can create demand for fish from aquaculture
  - **Public and private hatcheries** located around Inle Lake (mainly major carp seed production)
  - Well-established links with hatcheries in Yunan Province
  - **Good connections to China and Thailand** in Keng Tung township (seed and feed)

# Key recommendation

- Influence **public and private investment in applied research on** a) disease problems at the hatchery b) technology development on aquaculture c) feed and seed production
- **Monitoring feed mills and hatchery operation** based on compliance with best practices
- **Diversity of species produced** and range of technologies very limited (constrained range of opportunities for producers)
- **Environmental assessment** before promoting certain exotic aquaculture species, that might affect and disrupt the local ecosystem around Inle Lake
- **Policy to legally reclassify land** for aquaculture
- Establishment of a system for **granting access to public waterbodies** for aquaculture

# Thanks for listening!