



FISH Hidden Gems

19th November 2021

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The CGIAR Research Program on Fish Agri-Food Systems (FISH) is a multi-partner research for development program during 2017-2021 designed to answer the overarching research question “How can we optimize the contributions of aquaculture and small-scale fisheries to reduce poverty and improve food and nutrition security, while enhancing environmental sustainability?”. FISH research teams were requested during November 2021 to identify areas of promising research and innovation that have emerged during the FISH program, beyond the major innovation packages already highlighted. The following provides these “hidden gems”, reproduced here as potential future research and innovation investments, within or outside the CGIAR. Contact points are provided to approach for further details.



Flagship 1: Sustainable Aquaculture

Contact Point: John Benzie, *Research Program Leader - Sustainable Aquaculture*, WorldFish (J.Benzie@cgiar.org)



Cluster 1: Fish breeds and genetics

1. Genomic tools to improve aquatic genetic resources management, with applications in speeding genetic improvement, identifying biodiversity and genetic exchange were developed (SNP markers for carps and tilapia).
2. GIFT and Abbassa strain high quality genome sequences were completed. These show mixing with other species and will aid mapping of useful genes in future.



Flagship 1: Sustainable Aquaculture

- Cluster 1: Fish breeds and genetics
- Cluster 2: Fish health, nutrition and feeds (Aquatic Animal Health)
- Cluster 3: Aquaculture systems



Flagship 2: Sustainable Small Scale Fisheries

- Cluster 1: Resilient coastal fisheries
- Cluster 2: Fish in multifunctional landscapes
- Cluster 3: Fish in regional food systems



Cross Cutting Themes

- Youth
- Capacity Development
- Climate Change
- Gender
- COVID-19



Cluster 2: Fish health, nutrition and feeds (Aquatic Animal Health)

Contact Point: Vishnumurthy Mohan Chadag, *Principal Scientist, Sustainable Aquaculture*, WorldFish (v.chadag@cgiar.org)

3. Significant findings on fish disease and genetic interactions can be applied to inform future fish breeding programs, including disease resistance traits, such as to TiLV.
4. Training modules on epidemiological survey and fish sampling developed on the learn.ink platform can become powerful self-learning tools and can be widely used by research/academic institutions
5. Prototype of a package for collection/processing/sequencing of disease samples for rapid genomic detection of aquaculture pathogens developed in a Lab-in-a-backpack format – could be a game changer for pond side diagnostics and designing alternate disease management strategies such as treatment and prevention through simple autogenous vaccines based on sequence information.
6. Fish/water microbiomes, AMU/AMR, autogenous vaccines, multiple pathogen detection systems (multipath) for tilapia, carp and catfish have promise for future impact by providing cost-effective local disease control solutions.



Cluster 2: Fish health, nutrition and feeds (Sustainable fish feed resources)

Contact Point: Rodrigue Yossa, *Scientist (Fish Feeds & Nutrition)*, WorldFish (r.yossa@cgiar.org)

7. Dietary methionine requirement (0.80% of the diet) of 15th & 17th generations of GIFT strain is 60% higher than that of juvenile conventional Nile tilapia reported by Nguyen and Allen Davis (2009). Results suggest that the improved GIFT strain might have a methionine or total sulfur amino acids requirement higher than the conventional strain – results indicate a need to update nutrient requirements data for GIFT through further research



Cluster 3: Aquaculture systems

Contact Point: Cristiano Rossignoli, *Monitoring, Evaluation and Learning (MEL) and Impact Assessment Research Leader*, WorldFish (c.rossignoli@cgiar.org)

8. Extension and financial service apps: 1. Smartphone apps for aquaculture extension (Myanmar); and 2. Digital finance services and marketing apps (Bangladesh).
9. Satellite image and other digital services integration.
10. Better Management Practices, with implications for the environment, and social and economic inclusion.
11. Data collection frameworks and analytic tools provide a strong foundation for policy/investment influence – including a strong relation with foresight modelling.



Flagship 2: Sustainable Small Scale Fisheries

Contact Point: Pip Cohen, *Research Program Leader - Resilient Small Scale Fisheries*, WorldFish (p.cohen@cgiar.org)



Cluster 1: Resilient coastal fisheries

Contact Point: Alexander Tilley, *Senior Scientist, Resilient Small Scale Fisheries*, WorldFish (a.tilley@cgiar.org)

12. Integrating fisheries and aquaculture open-source digital systems to approach food systems research.
13. Use of artificial intelligence and cybernetics to leverage catch and effort data to empirically test management success.
14. Assessing the outcomes of co-management investments in the Pacific, and distilling innovations for optimizing fisheries co-management through long time series data.



Cluster 2: Fish in multifunctional landscapes

Contact Point: Matthew McCartney, *Research Group Leader - Sustainable Water Infrastructure and Ecosystems*, IWMI (M.McCartney@cgiar.org); Mark Dubois, *Officer in Charge (Cambodia)*, WorldFish (m.dubois@cgiar.org); Sarah Freed,

Scientist, Resilient Small Scale Fisheries, WorldFish (s.freed@cgiar.org)

15. Water and carbon footprints as a way to demonstrate relative impact of fisheries in a landscape/agri-food system context
16. EAT Lancet recommendations to be applied to multifunctional landscape design, management and governance, connecting landscapes to healthy and nutritious diets
17. Decision Support System tool for rice-fish systems
18. An inventory of innovations, and pathway forward, in integrated rice-fish systems (ACIAR / OneCGIAR)



Cluster 3: Fish in regional food systems

Contact Point: Fiona Simmance, *Scientist, Resilient Small Scale Fisheries*, WorldFish (f.simmance@cgiar.org)

19. Nutrition module for FishBase can now be widely used to assess nutrient contributions of fisheries and applied to new nutrition sensitive policy development.

Cross Cutting



Cross Cutting 1: Youth

Contact Point: Indika Arulingam, *Research Officer, IWMI* (I.Arulingam@cgiar.org); Likimyelesh Nigussie, *Research Officer, IWMI* (L.Nigussie@cgiar.org)

20. FISH research on youth has highlighted the importance of engaging with youth as equal actors in the fish agri-food system. Other research areas that need more attention in future: (i) arrangements that allow young people to access productive resources, including land and water rights, processing resources, financial support and markets; and (ii) arrangements for inter-generational and intra-generational learning: curricula development, apprenticeships, peer-peer networks.



Cross Cutting 2: Capacity Development

Contact Point: Anton Immink, *ThinkAqua (Consultant)* (anton.immink@thinkaqua.org)

21. Over 200 outputs in the FISH repository of specific value in vocational training programs – manuals, videos, practical tools, BMP leaflets – are now collated and can be put into use.
22. 20 capacity development partners have been actively using the outputs to support training with small-scale producers and young people entering the sector, giving FISH outputs a strong future purpose.



Cross Cutting 3: Climate Change

Contact Point: Essam Mohammed, *Global Lead, Climate and Environmental Sustainability*, WorldFish (e.mohammed@cgiar.org)

23. Beyond diagnostics, there are several 'opportunities' to accelerate climate resilience of fisheries and aquaculture dependent communities, such as seaweed farming in Bangladesh [growing seaweed is simpler, the equipment is less expensive, and the seaweed species require no feed, they grow fast, absorb carbon and are easy to harvest.] B:C = 11 and 12
24. Using the data from FISH to strengthen an inventory of GHG mitigation opportunities and put aquatic food systems on the right trajectory towards a more sustainable and equitable future. This will include exploring GHG mitigation opportunities through reducing waste and loss.



Cross Cutting 4: Gender

Contact Point: Cynthia McDougall, *Gender Lead, SEI* (cynthia.mcdougall@sei.org)

25. 'Participatory exclusions': Assessing inclusion beyond 'participation in'
26. 'Pathways to empowerment': Beyond quantitative and narrow to intersectional, endogenous-exogenous assessment.
27. 'Gendered Value Chain Framework': Systematizing gender analysis within value chain studies
28. 'Understanding clients of aquatic food innovations': Risk, needs and opportunity assessment (feeds +).



Cross Cutting 5: COVID-19

Contact Point: Benjamin Belton, *Interim Global Lead, Social and Economic Inclusion, Value Chains & Nutrition, WorldFish* (B.Belton@cgiar.org)

29. FISH CRP investments in the COVID-19 crosscutting theme helped leverage an additional \$325,000 in funding to WorldFish from the CGIAR COVID hub and PIM.
30. Collaboration with CIP (through COVID hub) has expanded COVID-19 research into Kenya and facilitated collaboration with Maseno University that provides solid foundations for future work.

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