# CGIAR Research Program on Fish Agri-Food Systems

## Annual Report 2020

CGIAR

RESEARCH PROGRAM ON Fish

Led by WorldFish

Led by

WorldFish

In partnership with

IWMI International Water Management Institute

JAMES COOK UNIVERSITY AUSTRALIA

UNIVERSITY of GREENWICH

WAGENINGEN UNIVERSITY & RESEARCH

# Contents

# List of abbreviations

| | |
|---|---|
| 2DI | Two Degree Initiative |
| A4NH | Agriculture for Nutrition and Health (CRP) |
| AAS | Aquatic Agricultural Systems (CRP) |
| ACIAR | Australian Centre for International Agricultural Research |
| AICCRA | Accelerating Impacts of CGIAR Climate Research in Africa |
| AMR | antimicrobial resistance |
| APART | Assam Agribusiness and Rural Transformation project |
| BAA | Bangladesh Aquaculture Activity |
| BMGF | Bill & Melinda Gates Foundation |
| BMPs | better management practices |
| CBRM | community-based resource management |
| CCAFS | Climate Change, Agriculture and Food Security (CRP) |
| CGIAR | Consultative Group for International Agricultural Research |
| CFR | community fish refuge |
| CIP | International Potato Center |
| CIRAD | French Agricultural Research Centre for International Development |
| CLARISA | CGIAR Level Agricultural Results Interoperable System Architecture |
| CRP | CGIAR Research Program |
| DOF | Department of Fisheries |
| ECOFISH | Enhanced Coastal Fisheries in Bangladesh |
| FAO | Food and Agriculture Organization |
| F&ARD | Fisheries and Animal Resources Development Department (State of Odisha) |
| FISH | CGIAR Research Program on Fish Agri-Food Systems |
| FP | flagship project |
| GHG | greenhouse gas |
| GIFT | genetically improved farmed tilapia |
| GLDC | Grains, Legumes and Dryland Cereals (CRP) |
| GTA | gender-transformative approach |
| HLPE | High Level Panel of Experts on Food Security and Nutrition |
| IBM | inclusive business model |
| ICARDA | International Center for Agricultural Research in the Dry Areas |
| ICT | information and communications technology |
| IDO | intermediate development outcome |
| IFAD | International Fund for Agriculture Development |
| IFPRI | International Food Policy Research Institute |
| IITA | International Institute for Tropical Agriculture |
| ILRI | International Livestock Research Institute |
| IRRI | International Rice Research Institute |

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|---|---|
| ISC | FISH Independent Steering Committee |
| ISI | Institute for Scientific Information |
| IWMI | International Water Management Institute |
| JCU | James Cook University |
| MARLO | Managing Agricultural Research for Learning and Outcomes |
| M&E | monitoring and evaluation |
| MC | FISH Management Committee |
| MEL | monitoring, evaluation and learning |
| MELIA | monitoring, evaluation, learning and impact assessment |
| MOU | memorandum of understanding |
| MPA | Nijhum Dwip Marine Protected Area |
| MYSAP | Myanmar Sustainable Aquaculture Project |
| NRI | Natural Resources Institute |
| OICR | outcome impact case report |
| OIE | World Organisation for Animal Health |
| PeskAAS | Automated Analytics System for Small Scale Fisheries in Timor-Leste |
| PIM | Policies, Institutions and Markets (CRP) |
| PMU | Project Management Unit |
| POWB | Plan of Work and Budget |
| RTB | Roots, Tubers and Bananas (CRP) |
| SDG | Sustainable Development Goal |
| SIS | small indigenous species |
| SLO | system-level outcome |
| SMO | System Management Office |
| SNP | supplementary nutrition program |
| SPC | The Pacific Community |
| SPIA | Standing Panel on Impact Assessment (CGIAR) |
| SRF | Strategy and Results Framework (CGIAR) |
| TAAT | Technologies for African Agricultural Transformation |
| TiLV | tilapia lake virus |
| TL | tail length |
| W1/W2 | CGIAR funding windows 1 and 2 |
| W3 | CGIAR funding window 3 |
| WEFI | Women's Empowerment in Fisheries Index |
| WFP | World Food Program |
| WLE | Water, Land and Ecosystems (CRP) |
| WUR | Wageningen University & Research |

# Executive summary

This annual report provides key achievements of the CGIAR Research Program (CRP) on Fish Agri-Food Systems (FISH) in 2020. During the year, FISH focused on further accelerating the transition from discovery to enabling the uptake of research and policy advances, assessing impacts and analyzing projected benefits, and seeking to understand and manage the multiple challenges of the COVID-19 pandemic across the FISH portfolio.

Highlights of the uptake of FISH innovations and associated impacts in 2020 include the following:

1. integrated advances in fish breeding, feeds, and health and production systems that are progressively enhancing the production efficiency and sustainability of fish farming enterprises in multiple focal and scaling countries;
2. water management innovations in multifunctional rice-dominated landscapes, and improvements in policies that are enabling more productive and equitable management of inland and coastal fisheries;
3. new insights into the role of fish in nutrition in the Pacific islands, including information on malnutrition in rural Solomon Islands; and
4. influential inputs in a number of national COVID-19 policies, such as recommendations on securing fish value chains in Bangladesh and India.

The independent review of FISH in 2020 highlighted the quality and effectiveness of science, and the impacts that the CRP's research is having on shaping policies on sustainable aquaculture, land and water management, and fisheries and nutrition in multiple focal and scaling countries. It also noted that FISH's gender research program has significantly increased recognition of the participation of women in fisheries and aquaculture, their empowerment in family contributions, their income and their access to nutritious foods.

During 2020, cooperation with the CGIAR COVID-19 Hub enmeshed fish agri-food systems into the collaborative effort to assess and develop solutions to the impacts of the pandemic on livelihoods and food systems. The FISH team conducted impact assessments across five focal and scaling countries. The results generated region-specific knowledge and have helped shape policy and management guidance, including a dedicated COVID-19 portal, recognizing the important role that fish and aquatic foods play in health, nutrition and livelihoods.

Overall, FISH continues to progressively deliver benefits and contributions to the transformation of fish agri-food systems—from securing fish supplies from sustainable aquaculture and small-scale fisheries through to value chain and products developed from fish and aquatic foods for poor and vulnerable consumers. In addition to informing government policy responses to the COVID-19 pandemic, FISH research teams and partners continued to shape the policy environment for uptake of fish agri-food innovations in 2020, accelerating the delivery of outcomes from the program.

# Part A: Narrative section

## 1. Key results

### 1.1 Progress toward SDGs and SLOs (sphere of interest, with research results frequently predating the CRP)

FISH contributes to CGIAR's Strategy and Results Framework (SRF) across all three system-level outcome (SLO) domains: reduced poverty (SLO 1), improved food and nutrition security for health (SLO 2) and improved natural resources and ecosystem services (SLO 3). FISH contributes through investments in research for development in two flagships, Sustainable Aquaculture (FP1) and Sustaining Small-Scale Fisheries (FP2), within the context of fish and aquatic foods in global food systems. Evidence supporting this section is provided in Table 1.

Sustainable aquaculture research delivers results through adoption of various innovations that enhance productivity and contribute to SDGs and SLOs. These innovations include improved tilapia and carp breeds, genomic tools, aquafeeds ingredients, feed management systems and tools, biosecurity and fish disease control measures, aquaculture farm management systems, value chain business models and digital tools. Dissemination and uptake of some of these innovations gathered pace during 2020 in FISH focal and scaling countries. Improved tilapia breeds, such as genetically improved farmed tilapia (GIFT), are being widely disseminated in Bangladesh, India, Myanmar and Timor Leste, with recent assessments in Bangladesh showing that GIFT has significantly penetrated private hatcheries and nurseries at scale. Uptake of carp-based fish polyculture systems, aquaculture feed and health innovations, and business models via public and private partners was also accelerated. New private sector partners also opened future pathways for scaling key innovations and impacts, with outcomes to be assessed in 2021. A special analysis of the contribution of FISH sustainable aquaculture innovations to the UN Sustainable Development Goals (SDGs) is under preparation and will be reported in 2021.

Research on sustaining small-scale fisheries delivers results through better management of fisheries, and partnerships operating at various scales, from community to regional levels. Innovations being scaled with partners include (1) inclusive co-management and governance models for small-scale fisheries, (2) water management in multifunctional rice-dominated landscapes and (3) policy improvements that can enable more productive and equitable management of inland and coastal fisheries. Research for the Illuminating Hidden Harvests study as well as research into region-oriented fish in food systems are also enabling policy and management changes to increase the visibility of fish and aquatic foods within food, health, water and policies and investments. During 2020, impact-oriented partnerships in fisheries continued to focus on the Pacific, Bangladesh, Cambodia and Myanmar, including the important hilsa (*Tenualosa ilisha*) fisheries within the Bay of Bengal region.

Evidence from evaluations of FISH's overall achievements in 2020 related to SLOs 1.2, 2.3 and 3.3[1] indicates the following:

- A total of 301,401 households have adopted improved fish breeds and/or aquaculture or fisheries management practices.
- More than 516,000 people were assisted to exit poverty.
- More than 487,973 vulnerable women, children and men have increased fish consumption and/or dietary diversification due to aquaculture and small-scale fisheries interventions.
- A total of 1,765,984 hectares of water were brought under improved fisheries co-management and aquaculture management.

[1] Ongoing quality control may result in some changes to final SLO target numbers.

In 2020, FISH increased its investment in impact assessments, including third-party evaluations, to capture the multiple outcomes and impacts of aquaculture and fisheries innovations and build a stronger evidence-based case on the critical role of fish and aquatic foods in food systems for the future. The goal is to ensure that key innovations emerging from FISH research provide the foundation for new fisheries and aquaculture investments that contribute at scale to transforming food systems.

## 1.2 CRP progress toward outputs and outcomes (spheres of control and influence)

### Overall CRP progress

FISH delivers benefits to fisheries and aquaculture productivity, livelihoods and nutrition in developing countries in Africa, Asia and the Pacific through advancing scientific and practical knowledge on sustainable aquaculture and small-scale fisheries, operating from local to global levels. Positive progress was made in 2020 through delivery of priority flagship outputs, outcomes and milestones in the 2020 Plan of Work and Budget (POWB), with 13 out of 18 planned milestones[2] (72%) met (Table 5). International public goods on fish agri-food systems in 2020 included 81 peer-reviewed publications (79 indexed by the Institute for Scientific Information (ISI)), including journal articles, books or book chapters. In addition, more than 200 policy and technical briefs and knowledge products were disseminated widely, in multiple languages, and data products were made available in open access formats.

FISH research teams pivoted operations in response to the COVID-19 pandemic and the resultant demand for support from our partners in the countries where we work. We conducted impact assessments across five FISH focal and scaling countries and contributed knowledge, policy and management guidance in various user-friendly forms, including a dedicated COVID-19 portal, all of which recognized the important role that fish and aquatic foods play in health, nutrition and livelihoods. FISH teams also shifted their ways of working, with a strong emphasis on developing and delivering knowledge in digital formats to diverse stakeholders. Strong examples of this new digital approach that have been actively used with and by partners include the Shwe Ngar App in Myanmar, the Mkisan portal in Odisha, India, The Right Fish Facebook page in Bangladesh, and extended use of mobile phones for data collection and messaging.

FISH reported 50 innovations during 2020, a further increase over previous years across all stages. These innovations range from discovery/proof of concept, to successful piloting, to ready for direct uptake, and uptake by next users. They also contribute to various fish agri-food system outcomes—from securing fish supplies via sustainable aquaculture and small-scale fisheries, through to value chain and product development for poor and vulnerable consumers. In addition to informing government policy responses to the COVID-19 pandemic, FISH research teams and partners continued to shape the policy environment for uptake of fish agri-food innovations in 2020, accelerating the emphasis on putting research into use and delivering substantive outcomes. FISH contributed to the development of at least 28 policies and investment decisions at various scales. Highlighted policy contributions include the following:

- shaping multiple investments by the Odisha government in India into sustainable fisheries and aquaculture within the state, including a major investment in women-led pond farming
- improvements to government policies and donor investment in Cambodia and Myanmar for scaling integrated fish-rice system and water management innovations in rice-dominated landscapes
- strengthening the capabilities of vocational colleges for aquaculture education in Zambia
- integrating fish and aquatic foods within nutrition and health policies in India and Cambodia
- creating policies for responding to the COVID-19 pandemic in Bangladesh and India.

[2] Includes two milestones carried over from earlier years.

Overall, in 2020, FISH research helped directly shape policies on sustainable aquaculture, land and water management, small-scale fisheries and nutrition in Bangladesh, Cambodia, India, Myanmar, Timor-Leste and Zambia.

Gender research contributed to wider awareness and adoption of gender-transformative approaches (GTAs) during the year, and the FISH youth research team successfully engaged in a working group of the High-Level Panel of Experts on Food Security and Nutrition (HLPE) to influence a report titled "Promoting youth engagement and employment in agriculture and food systems."

### 1.2.2.a. Progress by flagships

## Sustainable Aquaculture (FP1)

Despite the challenging conditions of COVID-19 in 2020, FISH research continued on breeding new generations of tilapia and carp and identifying new resilience traits for tilapia. A third generation of rohu carp (*Labeo rohita*) was produced in Bangladesh and disseminated to selected private fish hatcheries and farmers for performance assessment. Biosecurity was enhanced around the core GIFT assets, and a 17th generation of GIFT was produced in new biosecure facilities. Improved tilapia strains continued to be disseminated with direct support to national partners provided in Bangladesh, India, Myanmar and Timor-Leste. Knowledge of the genetic basis for resilience traits in Nile tilapia increased with key papers published and/or submitted on resistance to tilapia lake virus (TiLV), feeding efficiencies and responses to low dissolved oxygen. Next steps are to assess and develop strategies to integrate these traits into future genetic improvement programs.

A novel digital tool for assessing on-farm performance was applied more widely. The tool was used across FISH scaling and focal countries to generate an increasingly rich dataset on farm performance of improved tilapia and carp strains. Increasing attention was given to enabling tilapia genetic improvement in Africa, with progress made on genetic improvement of three-spotted tilapia (*Oreochromis andersonii*) in Zambia and startup of shiranus tilapia (*Tilapia shiranus*) improvement in Malawi. Risk assessments were initiated following a request to transfer GIFT into Nigeria. A strain comparison between GIFT and a local Akasombo strain in Ghana was published, indicating the social and economic benefits that elite strains can deliver to tilapia productivity within the country.

Work on emerging pathogens (TiLV), diagnostics and epidemiology progressed in 2020, with the tilapia epidemiology and health economics online tool being applied in Egypt and Bangladesh. This enabled the public and private sectors to make management and policy recommendations to reduce risks to farmers in tilapia farming. Our work with partners made new advances in improving the sensitivity and specificity of polymerase chain reaction (PCR) diagnostics for TiLV and *Flavobacterium columnare*, which are key tilapia diseases. Progress was made in expanding the repositories of biological samples (biobank) and metadata on tilapia and carp health. In addition, the "*lab in a backpack*" was tested in Bangladesh. This portable sequencing technology successfully sequenced over 70 complete genomes of bacterial pathogens of fish, improving the diagnostic capabilities of health specialists and farmers to make timely and effective decisions for diagnosis and treatment of tilapia disease. Research on antimicrobial resistance (AMR) led to several landmark publications, with associated policy and management recommendations. Next steps will focus on integrating the findings into national policies and extension services.

New tilapia feed ingredients continued to be assessed at facilities in Egypt and Malaysia, expanding a database to assist fish feed producers in formulating sustainable fish diets. A novel digital feed formulation tool was developed with a private sector partner to support better fish feed formulation and is now being tested with partners in Africa. The "nutritious pond" concept has been expanded with private partners in Zambia and Bangladesh and has shown promise in increasing productivity and profitability in small-scale tilapia farms. A major effort during 2020 was to complete packaging of FISH knowledge into manuals, guidelines, factsheets, videos and other training tools and products about better management practices (BMPs). Over 20 resources were produced and made available in Asia and Africa, increasingly through digital channels.

## Sustaining Small-Scale Fisheries (FP2)

FISH research into resilient coastal fisheries aims to improve the adoption, inclusivity and sustainability of fisheries co-management models, with particular emphasis on securing nutrition and gender equitable outcomes. In 2020, the geographical focus was on the Pacific, Bangladesh and Myanmar, with key output assessments of a decade of a co-management in Solomon Islands and hilsa fishery management in Bangladesh and Myanmar. In Myanmar, research on the artisanal hilsa fishery indicated significant positive returns from investment in improved fisheries management. The emphasis on delivering gender equitable co-management continued with the piloting of an innovative methodology to understand and respond to gender inclusivity in management. This added to the package of innovations for analysis, facilitation, monitoring and evaluation (M&E) built over the course of FISH that are becoming the “go-to” resources for technical training and guidance. In 2022, we will partner with the Pacific Community (SPC) to make the innovation package available to 22 Pacific Island Countries and Territories. Progress in applying digital tools in small-scale fisheries was also accelerated. These included (1) further deployments of the Inspire Challenge-winning PeskAAS digital tool in Bangladesh, Malaysia and Malawi, (2) the publication of a global review of information and communication technology (ICT) for small-scale fisheries with the Food and Agriculture Organization (FAO) and (3) integration of the PeskAAS system into national government fisheries management systems and budgeting in Timor-Leste. The year also saw the completion of a decision support tool for improving sustainable livelihoods published with the SPC. Also, the FISH learning on livelihood innovations in small-scale fisheries was drawn together into a special review.

The benefits and major opportunities for integrating inland fisheries within water management systems are becoming increasingly apparent. In 2020, new guidelines were released on fish in water management with FAO and the CGIAR Research Program on Water, Land and Ecosystems (WLE), and collaboration was extended with the Government of Cambodia and the Asian Development Bank for applying the guidelines at scale within the country. FISH led a multi-CGIAR analysis and perspective on rice-fish systems, drawing together evidence of the value of rice-fish integration across four countries. Scaling rice-fish landscape innovations continued in Cambodia, now reaching 140 communities and increasing consumption of fish for about 150,000 people. Further progress was made on policy change in Myanmar and a new partnership with AfricaRice to extend learning to West Africa. Decision support tools on rice-fish systems made progress and will be launched in 2021. FISH also supported WorldFish to engage as a co-founder of the global Inland Fisheries Alliance, with the overall aim of increasing the policy influence and impact of inland fisheries research.

Research on fish in regional food systems continued to draw evidence of the role of fish and aquatic foods in food systems of the Pacific, the Mekong region and the African Great Lakes region. The year saw several key publications, but also a gathering of data and knowledge for the release of major policy recommendations in 2021 in time for the UN Food Systems Summit. The innovative model (reported 2019) of the nutrition potential of fisheries was applied in a global analysis of trade, an analysis of justice in “blue food” systems and inland fisheries. The IHH initiative with partners FAO and Duke University continued, with nutrition (SDG2) and gender (SDG5) analysis completed, with the report ready for release in 2021. A new publication highlighted the special role of inland fisheries as critical for the diet quality of young children in sub-Saharan Africa. Attention is being shifted to translating the IHH study into national policies, supported by policy dialogue and data. The first FISH country was Zambia, to be followed by Malawi, Nigeria and selected other countries in 2021.

### 1.2.2.b Relevance to COVID-19 by flagship

FISH and its partners faced significant challenges due to the COVID-19 pandemic during 2020. It required significant changes in operations and management, while ensuring the continuation of core lines of research and pivoting FISH research and innovations to support country and community partners to address the challenges. Early in the pandemic, FISH invested funds in coordinating a monthly survey with a panel of 768 respondents from aquaculture and fisheries value chains in five countries: Bangladesh, Egypt, India, Myanmar and Nigeria. The purpose was to track and better understand evolving impacts and challenges and to formulate appropriate responses. These insights were complemented by *ad hoc* demand-led research in several countries on fisheries, aquaculture and community responses as well as methodological guidance, using largely bilateral funded projects.

WorldFish established a dedicated COVID-19 portal to rapidly share content and disseminate relevant documents and material related to COVID-19. A strong emphasis in our approach to COVID-19 has been to work closely with national partners and to rapidly feedback results to users. This approach has provided benefits with influential inputs to a number of national COVID-19 policies, such as with recommendations on securing fish value chains in Bangladesh and the State of Odisha in India. A strong cooperation also emerged with the CGIAR COVID-19 Hub as a result of these efforts.

In FP1, a key challenge was maintaining the core breeding programs for tilapia and carps, and adjustments were made to workplans to accommodate restrictions in movements and staff health and safety. In Bangladesh, plans for carp breeding were scaled back, with a focus only on the new rohu generation. Field studies on fish feed ingredients, epidemiology research and field surveys were also adjusted in the light of the pandemic, and planned face-to-face meetings were shifted to virtual approaches. During the early part of the pandemic, special assessments were conducted on the impact on GIFT seed dissemination. Out of this, a close cooperation was maintained among genetic teams and dissemination partners to ensure continued dissemination of improved breeds in focal and scaling countries.

In FP2, field work in various countries was inhibited or halted entirely at various points in 2020 as a result of COVID-19 movement restrictions. Adjustments were made to research and delivery plans reflected in research outputs. While these adjustments included delays and postponements, the approach also included diverting time resources and attention to understanding the impacts of shocks, including COVID-19 and climate change. It also became clear early in the pandemic that small-scale fisheries were providing a critical source of nutrition and income for many rural communities in Africa, Asia and the Pacific as economies contracted, lockdowns proceeded and value chains and trade shifted. FISH FP2 research provided new understanding of such coping mechanisms, such as through key publications and/or policy briefs contributed in Solomon Islands and Vanuatu and through a regional Pacific food system resilience synthesis.

### 1.2.3 Variance from planned program for 2020

*(a) Have any promising research areas been significantly expanded?*

The work of FP1 proceeded broadly in line with the major themes in the FISH proposal and the POWB 2020 priorities, though some priorities were shifted to 2021 as a result of the pandemic. Key research areas that were given more focus in 2020 were the following:

- Fish health investments were expanded to focus more on AMR in cooperation with the CGIAR Antimicrobial Resistance Hub.
- Use of digital tools, such as the integrated farm performance assessment tools, was accelerated in part as a response to the pandemic.
- Investment was increased in biosecurity associated with fish breeding programs and the protection of core GIFT stocks, including an advanced disease testing protocol that was applied to secure these stocks.

In FP2, the following research areas were given more focus in 2020:

- Digital tools and approaches were used to assess and manage small-scale fisheries, building on the innovation grant from the 2019 Inspire Challenge of the CGIAR Platform on Big Data in Agriculture.
- Research with the International Water Management Institute (IWMI) and the International Rice Research Institute (IRRI) on rice-fish systems, with promising new avenues emerging for extending knowledge on Asian rice-fish systems into Africa, in partnership with AfricaRice.

Monitoring, evaluation and learning (MEL) investments were also increased across the portfolio, as well as policy outcomes and projected benefits analysis. However, this focus on evidence gathering had to be balanced against the COVID-19 restrictions as well as staff and partner health and safety.

*(b) Have any research lines been dropped or significantly cut?*

For FP1, TiLV outbreaks in Malaysia created major operational difficulties for the tilapia program in 2018–2020. These were overcome with great difficulty, and operations have ceased at the Jitra site, with fish now held only at WorldFish headquarters. Fish disease issues also severely delayed work in Zambia with the start of breeding three-spotted tilapia and led to a loss of fish in Malawi. Financial constraints and associated administrative issues severely affected the carp breeding program in Bangladesh and was compounded by COVID-19 effects. This led to a delay in producing the catla strain and only partial delivery of the rohu strain planned for 2020. Fish handling teams were severely stressed by the additional operations required. Ethnic violence in Ethiopia severely delayed the delivery of work from one PhD student.

For FP2, a continued low allocation of CGIAR funding windows 1 and 2 (W1/W2) to FP2 was partially made up by strong matching fund commitments from managing partners, bilateral funding and notably an Oak Foundation grant, particularly in the areas of collaborative governance, M&E and communications. A cooperation with FAO for policy-oriented research and policy influence also helped progress. Research on translating nutritional modeling to fisheries governance began in 2020, but policy translation and development of nutrition-sensitive fisheries models were postponed until 2021 due to COVID-19 and the immediate lack of sufficient resources.

*(c) Have any research areas taken new directions due to unexpected research results (positive or negative)?*

Research findings related to the genetic response of tilapia to TiLV continue to lead to major discoveries related to the genetics of disease resistance.

Research on micronutrients in coastal fisheries in 2019 opened substantial new awareness and opportunities to enhance the nutritional outcomes from small-scale fisheries. These opportunities are being pursued in various ways with partners, including replication of the research on inland systems in cooperation with FAO. Once complete, such analyses will provide the basis for well-targeted policy and investment guidance to enhance the nutrition and health outcomes from wild fisheries.

The shift to online working, including the proliferation of online dialogues, conferences and webinars, provided greater opportunity to share the FISH learning among some audiences, though outcomes from the virtual approach to working remain to be assessed.

### 1.2.4 Altmetric and publication highlights

During 2020, FISH produced peer-reviewed publications, briefs, manuals, reports and other documents for a diverse user group. A total of 81 peer-reviewed journal articles were published, of which 62 (77 percent) were open access and 79 (98 percent) were published in ISI venues (Table 6. Number of peer-reviewed publications from current reporting period). Five of these papers reached Altmetric scores greater than 100 across the small-scale fisheries and aquaculture flagship. The highest Altmetric score (506) was associated with a paper in *Science* titled “Meeting fisheries, ecosystem function, and biodiversity goals in a human-dominated world,” which explores the trade-offs and management solutions to sustain coral reefs and associated livelihoods. The other four papers publish advances in knowledge on adaptation to climate change, greenhouse gas (GHG) emissions from aquaculture and the role of freshwater and marine farming in meeting future fish demand.

Other top FP1 peer-reviewed publications featured several key papers around genetics and genomics. These included the genetic parameters for resistance to TiLV in Nile tilapia (*Oreochromis niloticus*), the open access single nucleotide polymorphism array for Nile tilapia and a performance evaluation of Nile tilapia improved strains in Ghana. Papers on aquaculture production systems and the reduction of environmental impacts and nutrition security improvements in Bangladesh, along with a review of inclusive business models, provide important guidance for future scaling of FISH aquaculture innovations.

Other notable FP2 peer-review publications provide increasingly strong insights into the role of fish in nutrition in the Pacific islands, including papers on malnutrition in rural Solomon Islands and aquatic foods and nutrition in the Pacific. There was also an insightful analysis of livelihood diversification initiatives in the Pacific that was part of a special review called "Beyond social-ecological traps: Fostering transformations towards sustainability." The strong pipeline of research publications in inclusive management and governance of fisheries continued, including a key paper titled "Rights, equity and justice: A diagnostic for social meta-norm diffusion in environmental governance."

The FISH gender research team had another prominent year, making progress with new papers on GTAs and new research on gender integration within small-scale fisheries and aquaculture. These included a gendered assessment of post-harvest losses in the Barotse Floodplain fishery in Zambia and gender-based market constraints to informal fish retailing in Egypt.

## 1.3 Crosscutting dimensions (at CRP level)

### 1.3.1 Gender

*(a) CRP research findings, methods or tools, capacity development, policy changes or outcomes*

The following are key findings related to gender in FP1 Sustainable Aquaculture:

- Women fish retailers in Egypt face greater economic barriers and generate smaller financial returns than do men retailers. Notably, women's disproportionate burden of unpaid care work impedes their ability to generate higher revenues (the paper "Gender-based market constraints to informal fish retailing, with evidence" and a blog "Can Egypt's fish markets empower women and men retailers equally?").

- Filling a decade-long gap in gender data, FISH has identified that constraining gender norms and stereotypes continue to hinder women's full involvement and benefits from aquaculture in northwest Bangladesh. Reputations related to societal norms on masculinity and femininity were found to shape what men and women can and cannot do in aquaculture. This learning has led to policy recommendations that include establishing women fish farming groups (producer groups) that are registered with the government. (In response, WorldFish and partners are now establishing this as a pilot.) (the report: "Rapid assessment on gender dynamics: Barriers, opportunities and risks in aquaculture and agriculture sector in northwest Bangladesh."

- Models predicted that younger women consumers with children in Lower Egypt were more likely to consume smaller tilapia and prefer larger tilapia heads. This study offers the first evidence base of tilapia trait preferences of low-income consumers to genetic selection programs considering the adoption of pro-poor and gender-responsive breeding objectives (the blog: "Selective breeding trait preferences for farmed tilapia among low-income women and men consumers in Egypt: Implications for pro-poor and gender-responsive fish breeding programs."

The following are key findings related to gender in FP2 Sustaining Small-Scale Fisheries:

- A combination of different drivers and responses shape the spread of social principles—gender equality, human rights, equity and justice—and why in many cases they fail to trickle down and materialize in national through to local action. Analysis suggests that resistance may hinder the effective spread of gender principles if the principle is seen as foreign and imposed or out of step with established interests, ideas and practices. Alternatively, the principle can evolve, whereby individuals and groups are able to discuss and adapt what gender equality may look like and consist of at regional, national and local scales of environmental governance. The study provides a novel framework tool to explore the factors that may enable or hinder the spread of different social principles (the paper: "Rights, equity and justice: A diagnostic for social meta-norm diffusion in environmental governance").

- Gender shapes the ways we work and experience the world in all professions, be it in conservation, natural resource management or climate change. Yet, it is not uncommon for biodiversity conservation, climate strategies, and fisheries and aquaculture initiatives to take an overly simplistic view of gender, which has consequences for outcomes. Drawing on feminist political ecology, FISH provides three insights/recommendations. First, it is important that these efforts engage with the concept of gender, and not only with women. Second, it is critical to factor in how a person's gender identity intersects with other identities. (For example, in Tonle Sap, Cambodia, women with relationships to powerful men in the village are involved in fisheries management, but women in female-headed households are not.) Third, people's identities mean different things in different contexts and circumstances and thus so do their experiences and needs (the paper: "Three lessons for gender equity in biodiversity conservation").

The following are key methods/tools in relation to monitoring gender-sensitive facilitation in community-based fisheries management:

- Background: To help facilitators be more gender-inclusive in expanding community-based fisheries management, FISH developed gender-sensitive facilitation techniques in 2019. These techniques are designed to recognize barriers to gender equity in community meetings and suggest facilitation practices that can increase inclusivity. The techniques have been endorsed by the SPC, which is the principal scientific and technical organization in the Pacific region, and they continue to be scaled by WorldFish and FISH partners.
- 2020 method/tool: Through the Pathways project, which is funded by the Australian Centre for International Agricultural Research (ACIAR), FISH has been testing the use of field trip reports by project members as a form of self-monitoring in order to assess the use and effectiveness of these techniques. This guides and supports team members who are working with communities to observe and critically reflect on how gender-sensitive their own practices are in the field (the guide: "SPC Women In Fisheries Information Bulletin. Issue #32").

The following findings and policy recommendations arise from gender in the cross-flagship fish agri-food systems:

- Sustainable Ocean Economies. Background: In 2020, the High-Level Panel for Sustainable Ocean Economy (known as the Ocean Panel), consisting of 14 serving world leaders, commissioned a blue paper to examine the role of equity in securing a sustainable ocean economy. FISH contributed to ensuring that gender equality was a key theme in the blue paper, "Towards ocean equity", given the invisible inequities faced by women in small-scale fisheries. Findings included the following:
    - Despite their contributions, women receive little recognition in the sector and are often marginalized in the management of marine resources. This is due to gender-blind policies and too much focus on formal and paid fishing activities and the production segment of fisheries value chains. In several countries, women face barriers to profitable segments of supply chains and/or access to fishing grounds, boats, fishing gear, financial capital, credit, education and alternative livelihoods. Women and minority groups also face access barriers to governing institutions and are not accounted for in fisheries management.
    - Recommendations: The paper, based on the latest science and cutting-edge thinking, identifies 12 opportunities for action, including key areas to improve gender equality. This includes shifting away needs from "accommodative" approaches toward GTAs to encourage men and women to address harmful barriers and catalyze fair development outcomes. Additionally, governance processes at all scales should be developed to incorporate local voices and visions—focusing on marginalized groups such as women—into plans for the ocean economy.

New contributions on methodologies for gender integration, research quality and COVID-19 were also made during the year:

- Background: The COVID-19 pandemic and restrictions have created challenges for research and development organizations to collect data and conducting research. For instance, research teams are relying more on virtual data collection. Face time pressures can lead to disciplinary silos and

technical bias and can be biased toward “households” as the unit of analysis, which obscures differences between women and men, including women’s increased unpaid labor burdens. Given the gendered implications of COVID-19, it has never been more important to attend to the quality of science by fully addressing the gendered dimensions of research.

- Methodological contribution: A research guide was developed highlighting key strategies and tips for effective, inclusive and ethical research during COVID-19 social distancing. The guide consolidates good practices into guiding principles and strategies that (a) researchers can use to engage with gendered and intersectional impacts and vulnerabilities, (b) design studies that “do no harm,” and (c) inform COVID-19 responses that keep the well-being of women, girls and marginalized groups at their center. Framed around the elements of relevance, legitimacy, scientific credibility and effectiveness, the guide is based on and amplifies One CGIAR’s own framework for quality of research for development. The contributions are highlighted in a blogpost (FISH, PIM and ACIAR): “Safeguarding gender integration in research during the COVID-19 pandemic” and guideline on “Ten strategies for research quality in distance research during COVID-19 and future food system shocks”.

Gender transformative approach (GTA):

- In Africa, small-scale fish processors—an area in which women are heavily involved—face a combination of technical and social constraints. Technical constraints include suboptimal methods, resulting in post-harvest losses, while social constraints relate to gendered dynamics, such as women having to juggle fish processing with high unpaid care burdens while also having limited decision-making power over assets. Yet most extension and value chain development programs focus largely on technical constraints, with a limited “business as usual” approach to gender.
- Key finding: In a comparison of the business as usual approach to gender mainstreaming versus a GTA in Zambia, the results show that the use of a transformative approach led to significant changes in gender-equal attitudes and women’s empowerment outcomes compared to only using an accommodative approach (the journal article: “Gender accommodative versus transformative approaches: a comparative assessment within a post-harvest fish loss reduction intervention”).

Additionally, the following three-part blog series provides further highlights:

- http://blog.worldfishcenter.org/2021/03/bringing-a-change-in-womens-equitable-involvement-in-aquaculture/
- http://blog.worldfishcenter.org/2021/03/hearing-and-empowering-women-in-a-changing-world/
- http://blog.worldfishcenter.org/2021/03/towards-equity-and-inclusion-in-small-scale-fisheries/

### *(b) Important findings influencing the direction of the CRP’s work:*

Findings that have influenced the CRP’s work in terms of gender relate to COVID-19, the gendered impacts of the pandemic and the risk of gender-blindness and loss of rigor in research and response. FISH has responded with the guidelines on maintaining gender integration and research quality as noted above.

In addition, transdisciplinary research (continuing into 2021) was established with a pan-African women’s network, the African Women Fish Trader and Processors Network, to assess the impacts of COVID-19 and contribute to gender-inclusive policy responses in aquatic food systems among women fish traders within the African region.

### *(c) Problems in relation to gender issues or integrating gender into the CRP’s research:*

Gender staffing and capacity (research expertise) shortages hindered integration and delivery, especially where country offices and projects are entirely dependent on bilateral funding. Where W1/W2 was available and applied, there were improvements in both gender integration and gender strategic research.

### 1.3.2 Youth and other aspects of social inclusion/"leaving no one behind"[3]

*(a) CRP research findings, methods or tools, capacity development, policy changes or outcomes:*

2020 was an active year for FISH youth research. Building on a FISH working paper and blog titled "Youth participation in small-scale fisheries, aquaculture and value chains in Africa and the Asia-Pacific," the FISH youth team conducted two in-country assessments in Myanmar and Nigeria. Both studies identified opportunities and challenges for youth participation in fish agri-food systems. Findings will be published in 2021 as journal articles and policy and investment briefs.

- One member of the youth research team was appointed to the Committee on World Food Security High Level Panel of Experts on Food Security and Nutrition (HLPE) Working Group on "Promoting youth engagement and employment in agriculture and food systems," contributing to a high level policy document for release in 2021.
- A special collaboration with the CRP on Agriculture for Nutrition and Health (A4NH) is exploring the role of fish and aquatic foods in the diets of adolescents in Bangladesh. It seeks to better understand how nutrient-rich fish can contribute to healthier diets for young people.
- Capacity building of youths also continues to feature prominently in the aquaculture compact of the Technologies for African Agriculture Transformation (TAAT) project, with partners in both the project focal (Democratic Republic of the Congo (DRC), Ghana, Kenya, Nigeria and Zambia) and satellite (Burundi, Cameroon, Cote D'Ivoire, Republic of Benin and Tanzania) countries. FISH cooperation with TAAT has enabled tilapia hatchery and farm management to be scaled to a wider group of young farmers in Africa, creating new employment and business opportunities.
- FISH expanded cooperation with the International Institute of Tropical Agriculture (IITA) in 2020 to integrated aquaculture into the IITA Youth Agripreneurs program and African Development Bank investments into aquaculture and fish agri-food systems. An investment in fish farming in Lake Kivu, DRC with IITA has created youth employment and a new supply of fish for Bukavu town.
- Aquaculture growth and employment in Africa was the subject of a foresight study in 2020. The study concluded that sustainable growth of aquaculture and fisheries within Africa could create 20 million more full-time jobs, including for youth. The research and an associated youth investment strategy will be published in 2021.

FISH also continued to engage with partners to make knowledge and experience available to target vulnerable populations, including marginalized groups particularly at risk from the COVID-19 pandemic in FISH focal and scaling countries.

- In India, policy advice was extended to the government in the States of Assam and Odisha to expand carp polyculture innovations and supportive policy development, extending assistance to 4516 women self-help groups involving 45,160 women members in isolated regions of the States.
- In Bangladesh, WorldFish continued to provide technical knowledge on tilapia and carp polyculture systems to the Suchana project, which is funded by the European Union (EU) and the Department for International Development. The project targets stunting in children among 250,000 of the most nutritionally vulnerable households in northeastern Bangladesh.
- In Myanmar, a cooperation with the EU and the United States Agency for International Development (USAID) has also introduced aquaculture and small-scale fisheries innovations into remote communities, targeting better nutrition and incomes in highly marginalized communities.
- Collaboration with USAID, FAO and others is also piloting the inclusion of fish and fish-based products into school feeding programs and social protection investments in Bangladesh, Cambodia and India, with results to be reported in 2021.

[3] Leaving no one behind is a key facet of the SDGs: https://unstats.un.org/sdgs/report/2016/leaving-no-one-behind.

*(b) Important findings influencing the direction of the CRP's work:*

Youth research findings are being widely shared, for example research on youth and small-scale fisheries in Myanmar was presented at the webinar on New Landscapes of Water Equality and Inclusion organized by the IWMI in June 2021. Training of country teams was provided in Nigeria and Myanmar during 2020 to assist with youth-oriented data collection, with the methods used to be collated and shared more widely during 2021.

*(c) Problems in relation to youth issues or integrating youth into the CRP's research:*

No particular problems or integration were faced during 2020. The tracking of youth-related outputs and outcomes in the FISH M&E system (noted in 2019) received attention. Engagement with country and bilateral projects for integrating youth training received increased attention during the year, with the overall aim of supporting and encouraging uptake of youth-oriented research findings into national-level policies and investments.

### 1.3.3 Capacity development

Capacity development is a key pathway through which FISH delivers quality outputs, outcomes and impact. FISH capacity development targets different users, that includes researchers, national extension agencies, private sector, civil society development partners, farmers, fishers, value chain actors and consumers, across the fish agri-food system. A total of 280 capacity development trainings and events were recorded during the year, involving a total of 406,136 people (of which 267,692 or 66 percent were women). Despite the constraints posed by COVID-19, an impressive number of people were engaged, mainly through FISH bilateral projects and partnerships (Table 7). Short-term training comprised 406,104, of which 267,673 (66 percent) were women. Bangladesh, Cambodia and India dominate in terms of numbers involved in short-term training, but FISH continues with wide-ranging capacity development across Africa, Asia and the Pacific. Long-term training was also provided for 32 researchers (including 27 PhDs), of which the majority 19 were women (Table 7). A special feature on young PhD scholars is available on the FISH website.

Key capacity development initiatives that progressed well in 2020 include the following:

- A shift was made to online training and use of virtual tools in several countries in response to the COVID-19 pandemic.
- In Africa, FISH the cooperation with the African Centre of Excellence in Aquaculture and Fisheries in Malawi for master's and PhD training in aquaculture was further extended with two new PhD students engaged in research on fish in food systems of the Great Lakes.
- Five new guidelines on BMPs for tilapia farming were released for integration into training of trainers' programs and bilateral projects across focal and scaling countries, including through the TAAT aquaculture compact, which is now operating in 12 African countries.
- The Aquaculture Research and Training Center in Egypt was a key FISH resource for aquaculture training in Africa, receiving 40 participants from 10 African countries during the year. Further planning work was also conducted on expanding the role of the center in support of African aquaculture enterpreneurs and business through a proposed "Fish for Africa Innovation Hub".
- There was an increase in partnerships with Zambian vocational training schools and online training for aquaculture.
- In small-scale fisheries, special training conducted with partners to strengthen scaling of co-management in the Pacific and Bangladesh, and support was provided to enable use in management of digital tools.
- In Bangladesh, a significant investment was made in "local service providers" as part of a project, funded by the Bill & Melinda Gates Foundation, to build a network of qualified local services for aquaculture.
- Finally, in response to the COVID-19 pandemic, a significant pivot of training activities at the community and farmer level was made toward the challenges of maintaining fisheries and aquaculture under COVID-19. Special training tools and courses were conducted with partners in the role of fish in healthy and nutritious diets in several countries.

### 1.3.4 Climate change

FISH significantly enhanced its work on climate change during 2020. It extended cooperation with the CRP on Climate Change, Agriculture and Food Security (CCAFS), contributing new knowledge, innovations and outcomes in support of climate adaptation, resilience and mitigation through fisheries, aquaculture and aquatic foods. More specifically, FISH accomplished the following:

- In partnership with James Cook University, the innovative framework for assessing and enhancing adaptive capacity was further refined to integrate social organization and social networks for both adaptive and transformative actions in communities experiencing climate change impacts.
- Progress was made with collation of knowledge on greenhouse gas (GHG) emissions from aquaculture, together with development of a new digital tool for assessing GHG emissions from aquaculture systems to be used for advising on low GHG growth and management options (to be released in 2021).
- FISH contributed to the development of the Two Degree Initiative's (2DI) Blue Challenge. The Blue Challenge's vision is "by 2030, aquatic food producers in the Great Lakes Region of Africa, South and Southeast Asia, and the Pacific have increased resilience to the impacts to climate change and variability; have put food systems on a low emissions development pathway; and are ensuring that investment and policy interventions in climate resilience benefit those who would otherwise be left furthest behind." Three regional dialogues were held with 157 stakeholders to identify key priorities for future policies and investments, with the results published in a report launched at the Climate Adaptation Summit in January 2021.
- FISH engaged in two virtual dialogues in Bangladesh during 2020 to enhance the visibility of aquaculture and fisheries in national policies and investments for climate change. This included a virtual workshop, titled "Enhancing climate information services for aquaculture at scale," and a virtual dialogue on nature-based solutions organized by the British High Commission in Dhaka.
- Building on collaborative work with the CCAFS in Bangladesh (climate information services) and Cambodia and Myanmar (fish-rice systems) funding was secured through the World Bank-funded Accelerating Impacts of CGIAR Research for Africa (AICRA) initiative to extend FISH innovations and training to Africa, in Zambia and Mali.
- Several joint publications and communications products were developed with the CCAFS in 2020 on climate information services and climate-smart aquatic food system innovations.

# 2. Effectiveness and efficiency

## 2.1 Management and governance

No changes were made to the management and governance structures detailed in the FISH proposal. FISH managing partners include two CGIAR centers (WorldFish and the IWMI) and advanced research institutes Wageningen University & Research (WUR), James Cook University (JCU) and the Natural Resources Institute (NRI) of the University of Greenwich. Those remain and continue to evolve into active and complementary partnerships.

The FISH Management Committee (MC), which includes all managing partners, met virtually four times during the year, while regular communications were held with members on overall progress between formal meetings. A quarterly performance review, provided through the MEL system, was developed during the year and provided to both the MC and the research teams to enhance management oversight of research performance and decision-making.

The FISH Independent Steering Committee (ISC) also met virtually during 2020. Reporting lines were well established to the WorldFish Board of Trustees for approval of the FISH POWB and its annual report.

## 2.2 Partnerships

### 2.2.1 Highlights of external partnerships

In 2020, FISH was engaged in 291 active external partnerships, of which 60 were new ones established during the year. Academic and research organizations made up about 19% of the partners, but 2020 was again notable for significant growth in partnerships with the private sector (29%) and national agriculture research systems and governments (15%). This reflects greater attention to delivering innovations and outcomes with partners at scale through policy contributions, commercialization and capacity building partners.

In FP1, we highlight the discovery research consortium with genetics and genomics institutions that made significant progress during 2020. New discoveries were made in resilience traits of tilapia, as well as tools that will enable future application of these discoveries. The consortium involves the Roslin Institute at the University of Edinburgh, the Earlham Institute, Wageningen University & Research, the Centre de Coopération Internationale en Recherche Agronomique pour le Développement, and the Swedish Agricultural University. Fish health, feeds and aquaculture systems technology development and delivery were also strengthened through partnerships. An increasingly strong network of private partners sought access to technologies and engagement in commercial scaling, particularly of feed and health solutions. Finally, the forum for discussion of issues and policies related to the development and management of aquatic genetic resources in Africa was strengthened through dialogue and policy development with FAO, the South African Development Community, East African Development Community and national departments of fisheries within East and Southern Africa.

In FP2, partnerships with national agencies in Solomon Islands, Kiribati, Vanuatu, Bangladesh and Myanmar enabled uptake and scaling of improved and inclusive fisheries co-management solutions. In collaboration with the The Pacific Community (SPC), FISH produced guides for inclusive and sustainable livelihood interventions and a handbook for gender and socially inclusive coastal fisheries and aquaculture. The partnership with the SPC extended to identifying challenges and addressing climate change within the Pacific region through the CCAFS's Blue Challenge component of its 2DI. Our work on shifting the policy and investment environment for integrating fisheries into water management investments, including water storage (e.g. reservoirs) and conveyance (e.g. irrigation) led to the launch of a joint guide for water planners, managers and engineers. Through the Inland Fisheries Alliance and the V2V Global Partnership, FISH also engaged with a diverse range of research and development partners to raise the profile of inland fisheries as components of sustainable global food systems and healthy aquatic ecosystems and multi-functional landscapes. The cooperation with FAO and Duke University on the Illuminating Hidden Harvest initiative is nearing completion, contributing to global policy and the FAO Committee on Fisheries Virtual Dialogues. Partnerships are now shifting to enable national agencies to put the novel insights and recommendations into policies and action, starting in 2020 with Zambia in partnership with the Zambian government.

FISH also worked in close collaboration with FAO to co-develop a novel participatory MEL process, system and indicators to support the transparent implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty. Last, global partnerships continued to be strengthened during the year both on research and policy development. WorldFish scientists worked on policy with FAO and in research progress with the Stanford Center for Ocean Solutions and the Stockholm Resilience Centre on the Blue Food Assessment. The latter partnership seeks to bring FISH research and innovations, such as nutrition modelling, to a new assessment of the role of aquatic foods (a.k.a. "blue food") for planetary health and human well-being, as part of the EAT-Lancet initiative. Nutrition modeling also led to a new level of partnership with the global database FishBase and the Minderoo Foundation as part of work on a new Global Fisheries Index. New partnerships in gender and climate change have also helped strengthen the messaging of FISH into wider influential policy and investment audiences. Further details are provided in Table 8.

### 2.2.2 Cross-CGIAR partnerships

FISH outputs and outcomes benefit from synergies and active partnerships with several CGIAR centers and CRPs, including agri-food system and global integrating CRPs and platforms. These partnerships largely focus on the discovery and proof-of-concept phase. The following are highlights of new areas of CGIAR partnerships in 2020:

- The cooperation with the CGIAR COVID-19 Hub brought fish agri-food systems into a collaborative effort to assess and develop solutions to the impacts of the pandemic on livelihoods and food systems.
- A partnership with the International Livestock Research Institute (ILRI), International Food Policy Research Institute (IFPRI) and the IWMI has become an increasingly productive cooperation in modeling, assessing and reducing AMR use in aquaculture as part of the CGIAR AMR Hub.
- New "futures" modeling research was done with the CRP on Policies, Institutions and Markets (PIM) and the IFPRI in Nigeria, while collaboration was strengthened with the CRP on Roots, Tubers and Bananas (RTB) on synergies between fish and roots, tubers and bananas in food systems, which are now being expanded to the Great Lakes region of Africa.
- Cooperation between FISH and the CRP on Water, Land and Ecosystems (WLE) crosses a range of areas of common interest between fish, aquatic foods and water systems in Myanmar, including gender integration in managing a Ramsar conservation area, and management tools for integration of fish within food systems and landscapes.
- Collaboration among IRRI, IWMI and WorldFish on the 2DI to transform Asian mega-deltas into climate-resilient and nature-inclusive agricultural landscapes and to extend FISH research into rice systems from the Mekong region to Liberia and Mali with AfricaRice. The latter is a component of the new CCAFS-led World Bank project Accelerating Impacts of CGIAR Climate Research in Africa (AICCRA).

FISH also retained close cooperation in 2020 with CGIAR's Generating Evidence and New Directions for Equitable Results (GENDER) platform and Big Data. The latter falls under the Inspire Challenge for rapid genomic detection of aquaculture pathogens and for scaling digital small-scale fisheries innovations. Table 9 provides further highlights of the growth in CGIAR partnerships pursued in 2020.

## 2.3 Intellectual assets

(a) *Intellectual asset management*: Most of the intellectual assets that FISH generated are maintained in scientific publications (journal articles, books, conference presentations, reports), data and new technologies and innovations.

FISH research into sustainable aquaculture is generating new innovations, including breeds and health products that might be of commercial significance. In 2020, a commercial consultancy was conducted on the intellectual assets associated with the tilapia and carp genetic improvement and breeding programs and potential commercialization for the associated technologies.

(b) *Patents and/or plant variety right applications*: No applications were made for patents during 2020, but preparation was made for submission of a patent in early 2021, covering genetics and TiLV resistance. Therefore, no tracking or strategic management of intellectual property rights is reported in 2020, though updates will be provided in 2021.

(c) *Critical issues and challenges in managing intellectual assets in the context of the CRP*: Genetics research is showing strong potential for commercialization and is raising increasing questions of commercialization of innovations and assets from work on tilapia and carp genetic improvement. A company experienced in commercial development of animal genetics was engaged to advise WorldFish on commercial applications and opportunities with tilapia and carp assets.

No critical challenges were encountered in 2020 with regards to managing intellectual assets in the context of FISH. The consultancies planned for 2021 will provide further guidance on commercialization of innovations emerging from FISH research, particularly within the genomics and genetics research cluster.

## 2.4 Monitoring, evaluation, learning and impact assessment

The focus during 2020 was to evaluate adoption and impacts of innovations related to major aquaculture and fisheries, such as the identification of GIFT adoption in Bangladesh and a set of case studies around fisheries co-management. Despite the delay in field activities resulting from COVID-19, progress was also made on characterization studies in Bangladesh, Egypt, Myanmar and Zambia. This information is being used to design technology dissemination strategies and to form baselines for assessing future impacts of aquaculture improvements. In addition to these, a crucial step forward for showing adoption of major FISH innovations was achieved in collaboration with the CGIAR's Standing Panel of Impact Assessment (SPIA) to evaluate the diffusion of GIFT in Bangladesh. Here we described and documented the dissemination process for GIFT via hatcheries to farmers and the implications for how a hatchery “catchment area” could be defined conceptually and empirically in the context of an impact assessment study. The results have important scientific, commercial and methodological implications. FISH researchers were invited to present their results in a plenary session organized by SPIA.

A number of outcome impact case reports (OICR) were completed, using W1/W2 and bilateral project resources across the two flagships and cross-cutting themes (Table 10).

During 2020, the MEL platform continued to facilitate the results-based management system adopted by FISH. Important developments were achieved in partnership with other centers (the International Center for Agricultural Research in the Dry Areas (ICARDA), the International Potato Center (CIP) and IITA), RTB and the CRP on Grain Legumes and Dryland Cereals (GLDC) to support the sustainability of the platform beyond the period of the CRPs. More than 300 scientists across the different CRPs and centers were trained through webinars organized jointly by the three CRPs.

Regular meetings of the MC and ISC were held during the year to monitor and assess performance. Tables 10 and 11 provide details.

Finally, during 2020, the CGIAR Advisory Services (CAS) Secretariat conducted independent reviews of 12 CRPs, including FISH. FISH management and scientists were actively involved in the process, which concluded in December 2020 with the publication of a review report. The review recognized that FISH delivered high-quality science and effectiveness along its theory of change, with important results in influencing the policy framework and in achieving impacts. Shortcomings in resources and inputs were also identified, but the review team found that those challenges had been well managed and overcome thanks to FISH’s high-quality, hard-working, and dedicated scientific team.

## 2.5 Efficiency

The efficiency of FISH is enhanced by the CRP not setting up new management structures and systems but relying on existing ones within WorldFish. As indicated in the FISH proposal, this support includes program management services to the CRP director, MC and ISC meetings, research support, finance, communications and administrative functions. This approach continued to be adopted in 2020. The move to remote and online working in 2020, a consequence of the COVID-19 pandemic, has also resulted in further efficiencies, such as through reduced travel costs and shifts to virtual meetings.

Efficiencies were also gained in several other areas:

- Placements and co-funding PhD students with partners, including JCU, NRI, WUR, Lancaster, Charles Darwin University and the French Agricultural Research Centre for International Development
- Co-funding and co-location of research staff with partners, including the WUR, JCU, the Stockholm Resilience Centre and the NRI
- Significant levels of co-funding FISH research activities by partners, including coastal fisheries research (JCU and WUR), genetics and genomics (Roslin and Earlham institutes), fish nutrition (Skretting and WUR), fish in African Great Lakes food systems (NRI)
- Co-funding research facilities with partners, including the fish nutrition laboratory in Abbassa (Egypt) with Skretting, fish health research facilities and genetic programs with national partners, and the GIFT research facility at Jitra with the Department of Fisheries (DOF) in Malaysia.

The increasing use and efficiency of the MEL platform and its adoption for results-based management is also leading to greater management efficiencies through an adaptive decision-making process based on the performance and allocation of resources to areas of the program with greater output and outcome.

## 2.6 Managing risks to your CRP

The FISH proposal provides a framework for the MC to monitor key risks and to recommend and assess mitigation strategies. As in 2019, a managing partner (NRI) took the lead in conducting a risk assessment of FISH during each MC meeting.

Key *external* risk factors in 2020 remain similar to 2019: (1) funding and uncertainty over W1/W2 and W3/bilateral funding and the associated impacts on research operations and development outcomes, (2) instability in focal/scaling countries, and (3) communications. MC members considered that funding risk had increased, but that the other two risks had decreased.

Funding risk increased as a result of the COVID-19 pandemic. Remedial action included that risks be managed through continuing to gather early intelligence on budgets and W3/bilateral funding opportunities, adjusting workplans, and prioritizing and managing expectations. A regular dialogue with the CGIAR System Management Office, a regular review of expenditure and funding risks and proactive fundraising activities were also conducted. The impact of instability in focal/scaling countries could be significant, but this risk has been mitigated to date through intelligence gathering via partners and in-country networks.[4] Communication risks were reduced in 2020 through implementation of a communications plan for the year, as well as enhanced investment in external communications.

Key *internal* risk factors in 2020 were also similar to 2019, again with additional risks in some areas related to COVID-19. Key risk factors are (1) planning and reporting systems, (2) retention and continuity of key staff, (3) research quality, and (4) not meeting donor expectations. The MC noted improvements during 2020 in managing these risks, with planning and reporting systems enhanced through MEL, increasing integration with CGIAR reporting processes and the CGIAR Results Dashboard. Retention of key staff is recognized as a continuing risk for FISH as the CRP moves into its final year and transition into One CGIAR. Research quality is recognized to have improved, as indicated with the positive FISH evaluation, including through targeted investments in 2020 aligned the CGIAR Independent Science for Development Council research quality guidelines, including ethical approval processes. Risks related to COVID-19 increased uncertainty during the year, but have been managed at field and office level by implementing relevant health and safety measures, changes in management practices (e.g. virtual meetings) and re-orienting priorities within W1/W2 and bilateral project planning and operations.

[4] The MC at its most recent meeting on March 2–3, 2021, noted that instability in Myanmar posed a significant risk to achievement of objectives in 2021 in that one focal country.

## 2.7 Use of W1/W2 funding

Investments by W1/W2 made significant contributions to FISH's progress, contributing about 20% of FISH's overall funding. W1/W2 was invested as principal funding into selected priority activities within the two flagships, cross-cutting themes and program management.

In the Sustainable Aquaculture FP1, W1/W2 was invested in key areas of discovery research related to tilapia genomics, assessing on-farm performance of improved carps, developing improved feeds and health management practices for farmers, and assessing impacts of improved strains. Due to the continued threat posed by the emerging TiLV, W1/W2 investments were increased into biosecurity measures and epidemiological assessments of tilapia diseases in FISH focal countries and tilapia breeding programs.

In the Sustaining Small-Scale Fisheries FP2, W1/W2 was primarily used to strategically support co-management research and evaluation, as well as investment in nutrition-sensitive and gender-inclusive research. This was done to conduct research on improving fisheries yields and water productivity in constructed water bodies and foundational activities (workshop, science capacity, systematic reviews). The purpose was to progress the fish in food systems research agenda, including data collection, synthesis and a write-up for the IHH initiative.

Funds were also invested into cross-cutting themes of strategic gender research, enhancing youth, COVID-19 assessments and policy guidance, and the emerging climate change agenda. W1/W2 funds were also used to support an expanded MEL function to strengthen performance-based management and impact assessments of FISH innovations, covering both aquaculture and small-scale fisheries, in order to strengthen selection of innovations and pathways for scaling and impact.

Further details are provided in Table 12.

# 3. Financial summary

The 2020 financial plan provided USD 5.56 million of W1/W2 funding, which combined with a 2019 carryover provided FISH with USD 6.21 million of W1/W2 funding for the year (Table 13). The expenditure of W1/W2 funds for 2020 was USD 6.04 million (97 percent), and the W3/bilateral expenditure was USD 18.22 million. A total of USD 170,466 W1/W2 funds were carried over to 2020. The sourcing of bilateral funds increased in 2020, providing a planned budget of USD 23.10 million, of which about 79 percent was spent during the year. The allocation of bilateral funding represents an increase beyond that predicted in the FISH proposal. A significant proportion of these bilateral funds were oriented toward "development" investment, allowing in particular enhanced investment in outcomes and impacts across FISH.

Further details are provided in Table 13.

# Part B: Tables

Evidence associated with these tables is provided directly in the tables, with further links in Part C.

## Table 1. Evidence on progress toward SRF targets (sphere of interest)

| SLO target (2022) | Brief summary of new evidence of CGIAR contribution | Expected additional contribution before end of 2022 | Geographical scope (with location) |
|---|---|---|---|
| **SLO1: Reduce Poverty** | | | |
| **1.1. ADOPTION:** 100 million more farm households have adopted improved varieties, breeds, trees, and/or management practices | **206,807 households** have adopted best aquaculture and fisheries management practices and technologies in Bangladesh, as per the cases presented:<br>*Case 1:* 19,507 households have adopted improved polyculture practices<br>*References:*<br>- Suchana: Ending the Cycle of Undernutrition in Bangladesh. Project Brief April 2020-March 2021.<br>- MELOICR446<br>*Case 2:* 111,470 households have applied improved pond management practices<br>*References:*<br>- USAID Feed the Future Bangladesh Aquaculture and Nutrition Activity Annual Progress Report (October 2019– September 2020).<br>- Feed the Future Bangladesh Aquaculture Activity. Project Brief Oct 2019- Sept 2020.<br>- MELOICR448<br>*Case 3:* 74,922 farmers have adopted GIFT Tilapia/are using GIFT tilapia seeds, as documented in the GIFT adoption study in Bangladesh.<br>*References:*<br>- Gift Adoption at scale, dataset<br>- Evaluating impacts of Genetically Improved Farmed Tilapia: Challenges and strategy<br>*Case 4:* 908 fishing households have adopted better fisheries practices for more sustainable fisheries.<br>*References:* | Contribution by 2022: Up to 5.0 million households, as indicated in the FISH proposal. | Bangladesh |

| | | | |
|---|---|---|---|
| | - Enhanced Coastal Fisheries in Bangladesh II Annual Report (December 1, 2019 –December 31, 2020)<br>- Enhanced Coastal Fisheries in Bangladesh II: Project Brief: December 1, 2019 – December 31, 2020 | | |
| **1.1. ADOPTION:** 100 million more farm households have adopted improved varieties, breeds, trees, and/or management practices | **31,612 beneficiary households** across eight countries in sub-Saharan Africa have adopted aquaculture technology products and services through the implementation of the Technologies for African Agricultural Transformation (TAAT) - Aquaculture compact project . Some of the technologies include: raised pond technology , tilapia fingerlings production in Hapas, smoking kiln technologies, low cost fish feed production, Better Management Practices, etc.<br>*References:*<br>- Technologies for African Agricultural Transformation (TAAT) Progress Report October to December 2020<br>- Technologies for African Agricultural Transformation (TAAT). Project Brief: January-December 2020. | Contribution by 2022: Up to 5.0 million households, as indicated in the FISH proposal. | Nigeria, Kenya, Zambia, Cameroon, Benin, Ghana, Burundi, DR Congo |
| **1.1. ADOPTION:** 100 million more farm households have adopted improved varieties, breeds, trees, and/or management practices | **6,032 smallholder farmer households** applied improved technologies and management practices (rice field fisheries management, fish processing, rice farming practices, CFR water management, home gardening) through community fish refuge activities.<br>*References:*<br>- Feed the Future Cambodia-Rice Field Fisheries II. Semi-Annual Report #8: October 1st 2019 - March 31st 2020<br>- Feed the Future Cambodia-Rice Field Fisheries II. Semi-Annual Report #9: April 1st to September 30th 2020<br>- Feed the Future Cambodia Rice Field Fisheries (RFF II).Project brief October 2019-September 2020<br>- MELOICR451 | Contribution by 2022: Up to 5.0 million households, as indicated in the FISH proposal. | Cambodia |

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| **1.1. ADOPTION:** 100 million more farm households have adopted improved varieties, breeds, trees, and/or management practices | **1,919 households** in Myanmar have applied improved management practices related to aquaculture thanks to the implementation of two projects - Fish for Livelihoods (FIL) and Myanmar Sustainable Aquaculture Programme (INLAND MYSAP).<br>*Case 1*: 743 small-scale farmers have applied improved aquaculture best practices and technologies.<br>*References:*<br>- Fish for Livelihoods. Annual Report October 2019 - September 2020<br>- Fish for Livelihoods. Project Brief:October 2019 - September 2020<br>- MELOICR442<br>*Case 1*: 1,176 households have applied improved aquaculture best practices and technologies.<br>*References:*<br>- Seventh MYSAP Inland Technical Progress Report, 01 April to 30 September 2020<br>- Improving the production, nutrition and market values of small-scale aquaculture in Myanmar's Shan State and Sagaing Region. Project Brief October 2019-September 2020<br>- MELOICR434 | Contribution by 2022: Up to 5.0 million households, as indicated in the FISH proposal. | Myanmar |
| **1.1. ADOPTION:** 100 million more farm households have adopted improved varieties, breeds, trees, and/or management practices | **54,200 households** in Eastern India - of which 83% women-led, have adopted various aquaculture management best practices and technologies thanks to successful alliances with State governments.<br>*Case 1:* 45,610 women led households adopted BMPs in fish farming and 8,350 households have implemented fish reservoir stocking<br>*References:*<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2019-March 2020.<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2020-March 2021<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha: Project Brief: April 2020 -March 2021<br>- MELOICR440<br>*Case 2:* 34 households practicing *carp-mola* SIS polyculture<br>*References:*<br>- Scaling nutrition-sensitive fisheries technologies and integrated approaches through partnership in Odisha Annual Report Oct 2019-Sept 2020. | Contribution by 2022: Up to 5.0 million households, as indicated in the FISH proposal. | India |

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| | - Scaling nutrition-sensitive fisheries technologies and integrated approaches through partnership in Odisha. Project Brief: Oct 2019-Sept 2020.<br><br>*Case 3:* 206 farmers practicing rice-fish farming<br>*References:*<br>- Assam Agribusiness and Rural Transformation Project (APART): Fisheries Sub-Component. Six Month Report-5 (October 2020 to March 2021)<br>- Assam Agribusiness & Rural Transformation (APART). Project Brief 2020 | | |
| **1.1. ADOPTION:** 100 million more farm households have adopted improved varieties, breeds, trees, and/or management practices | **831 farmers in** Zambia practicing aquaculture best management practices integrated into the private sector business models<br>*References:*<br>- The Aquaculture Technical, Vocational, and Entrepreneurship Training for Improved Private Sector and Smallholder Skills Project in Zambia. January - December 2020 Annual Technical Progress Report<br>- The Aquaculture Technical, Vocational, and Entrepreneurship Training for Improved Private Sector and Smallholder Skills Project in Zambia. Project Brief: January - December 2020<br>- MELOICR447 | Contribution by 2022: Up to 5.0 million households, as indicated in the FISH proposal. | Zambia |
| **1.2. EXIT POVERTY:** 30 million people, of which 50% are women, assisted to exit poverty | **186,543 people** in Eastern India received profit from the sale of farmed fish as evidenced in 2 cases:<br>*Case1:* 183,586 people assisted to exit poverty through women engaged in fish farming activities in Odisha, India<br>*References:*<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2019-March 2020.<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2020-March 2021<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha: Project Brief: April 2020 -March 2021<br>- MELOICR440<br>*Case 2:* 2,957 people received income from selling fish produced thanks to the carp-based polyculture approach**.**<br>*References:* | Contribution by 2022: Up to 3.5 million people, as indicated in the FISH proposal. | India |

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| | - Scaling nutrition-sensitive fisheries technologies and integrated approaches through partnership in Odisha Annual Report Oct 2019-Sept 2020.<br>- Scaling nutrition-sensitive fisheries technologies and integrated approaches through partnership in Odisha. Project Brief: Oct 2019-Sept 2020. | | |
| **1.2. EXIT POVERTY:** 30 million people, of which 50% are women, assisted to exit poverty | **325,717 people** in Bangladesh were assisted to exit poverty through engagement in aquaculture activities and diversified livelihoods options as evidenced in these cases:<br>*Case 1:* 74,922 Farmers assisted to exit poverty through GIFT adoption<br>*References:*<br>- Gift Adoption at scale, dataset<br>- Evaluating impacts of Genetically Improved Farmed Tilapia: Challenges and strategy<br>*Case 2:* 107,290 people assisted to exit poverty through polyculture<br>*References:*<br>- Suchana: Ending the Cycle of Undernutrition in Bangladesh. Project Brief April 2020-March 2021.<br>- MELOICR446<br>*Case3:* 108,829 people assisted to exit poverty thanks to fish sales<br>*References:*<br>- USAID Feed the Future Bangladesh Aquaculture and Nutrition Activity Annual Progress Report (October 2019– September 2020).<br>- Feed the Future Bangladesh Aquaculture Activity. Project Brief Oct 2019- Sept 2020.<br>- MELOICR448<br>*Case 4:* 34,676 people received alternative income generating activities.<br>*References:*<br>- Enhanced Coastal Fisheries in Bangladesh II Annual Report (December 1, 2019 –December 31, 2020)<br>- Enhanced Coastal Fisheries in Bangladesh II: Project Brief: December 1, 2019 – December 31, 2020<br>- MELOICR320<br>- MELOICR450 | Contribution by 2022: Up to 3.5 million people, as indicated in the FISH proposal. | Bangladesh |

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| **1.2. EXIT POVERTY:** 30 million people, of which 50% are women, assisted to exit poverty | **3,740 people** in Zambia were assisted to exit poverty through integration into the private sector business model and linkage to output markets for selling of the produce as well as supply of inputs-feed/seed**.**<br>*References:*<br>- The Aquaculture Technical, Vocational, and Entrepreneurship Training for Improved Private Sector and Smallholder Skills Project in Zambia. January - December 2020 Annual Technical Progress Report<br>- The Aquaculture Technical, Vocational, and Entrepreneurship Training for Improved Private Sector and Smallholder Skills Project in Zambia. Project Brief: January - December 2020<br>- MELOICR447 | Contribution by 2022: Up to 3.5 million people, as indicated in the FISH proposal. | Zambia |
| **SLO2: Improve Food and Nutrition Security for Health** | | | |
| **2.1. YIELD INCREASE:** Improve the rate of yield increase for major food staples from current <1% to 1.2-1.5% per year | N/A for FISH | | |
| **2.2. MINIMUM DIETARY REQUIREMENTS:** 30 million more people, of which 50% are women, meeting minimum dietary energy requirements | N/A for FISH | | |
| **2.3. MICRONUTRIENT DEFICIENCIES:** 150 million more people, of which 50% are women, without deficiencies in one or more essential micronutrients | **121,172 people** in Bangladesh have improved their nutrition diversity through increased fish consumption, in particular small indigenous species (SIS), as evidenced in various cases:<br>Case 1:107,290 people consuming more fish, thanks to fish polyculture<br>*References:*<br>- Suchana: Ending the Cycle of Undernutrition in Bangladesh. Project Brief April 2020-March 2021.<br>- MELOICR446<br>*Case 2:* 4,592 beneficiaries increased consumption of small fish and 3,443 of female from beneficiaries' households are consuming a diet of minimum diversity.<br>*References:* | Contribution by 2022: Up to 2.4 million people, as indicated in the FISH proposal. | Bangladesh |

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| | - USAID Feed the Future Bangladesh Aquaculture and Nutrition Activity Annual Progress Report (October 2019– September 2020).<br>- Feed the Future Bangladesh Aquaculture Activity. Project Brief Oct 2019- Sept 2020.<br>- MELOICR448<br>*Case 3:* 5,847 people improved nutrition through input provision<br>*References:*<br>- Enhanced Coastal Fisheries in Bangladesh II Annual Report (December 1, 2019 –December 31, 2020)<br>- Enhanced Coastal Fisheries in Bangladesh II: Project Brief: December 1, 2019 – December 31, 2020 | | |
| **2.3. MICRONUTRIENT DEFICIENCIES:** 150 million more people, of which 50% are women, without deficiencies in one or more essential micronutrients | **149,416 people** in Cambodia are consuming more fish at home (small indigenous fish) thanks to increased fish availability and Social and Behaviour Change Communication (SBCC) activities.<br>*References:*<br>- Feed the Future Cambodia-Rice Field Fisheries II. Semi-Annual Report #8: October 1st 2019 - March 31st 2020<br>- Feed the Future Cambodia-Rice Field Fisheries II. Semi-Annual Report #9: April 1st to September 30th 2020<br>- Feed the Future Cambodia Rice Field Fisheries (RFF II).Project brief October 2019-September 2020<br>- MELOICR451 | Contribution by 2022: Up to 2.4 million people, as indicated in the FISH proposal. | Cambodia |
| **2.3. MICRONUTRIENT DEFICIENCIES**: 150 million more people, of which 50% are women, without deficiencies in one or more essential micronutrients | **217,385 vulnerable women, men and children** fish consumption by 30% thanks to the engagement of 41,500 women in fish farming activities as evidenced in two cases:<br>*Case 1:* 212,142 people consuming more fish trough fish farming activities<br>*References:*<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2019-March 2020.<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2020-March 2021<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha: Project Brief: April 2020 -March 2021<br>- MELOICR440<br>*Case 2:* 5,243 people consuming more fish thanks to carp-based polyculture | Contribution by 2022: Up to 2.4 million people, as indicated in the FISH proposal. | India |

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| | *References:*<br>- Scaling nutrition-sensitive fisheries technologies and integrated approaches through partnership in Odisha Annual Report Oct 2019-Sept 2020.<br>- Scaling nutrition-sensitive fisheries technologies and integrated approaches through partnership in Odisha. Project Brief: Oct 2019-Sept 2020. | | |
| **SLO3: Improve Natural Resources and Ecosystem Services** | | | |
| **3.1. WATER AND NUTRIENT EFFICIENCY**:<br>5% increase in water and nutrient efficiency in agroecosystems | **94,723 MT** fish was produced by ponds under better management practices (BMPs) for carp and tilapia seed production at hatchery level and carp-mola polyculture. The adoption of various BMPs have shown to improve the efficiency of water and inputs. Evidences are documented in two cases in Bangladesh:<br>*Case 1:* 93,910 MT of fish was produced increasing water efficiency as a result of the adoption of the better management practices and technologies<br>*References:*<br>- USAID Feed the Future Bangladesh Aquaculture and Nutrition Activity Annual Progress Report (October 2019– September 2020).<br>- Feed the Future Bangladesh Aquaculture Activity. Project Brief Oct 2019- Sept 2020.<br>- MELOICR448<br>*Case 2:* 813 MT of fish produced through the better management practices for fish polyculture production<br>*References:*<br>- Suchana: Ending the Cycle of Undernutrition in Bangladesh. Project Brief April 2020-March 2021.<br>- MELOICR446 | Contribution by 2022: Up to 4.8 million metric tons, as indicated in the FISH proposal. | Bangladesh |

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| **3.1. WATER AND NUTRIENT EFFICIENCY**:<br>5% increase in water and nutrient efficiency in agroecosystems | **6,877 MT fish** produced in the fish tanks leased to WSHGs practicing various aquaculture best management practices BMPs (carp - mola, small indigenous fish species), which have shown an increase in the fish harvested.<br>*References:*<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2019-March 2020.<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2020-March 2021<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha: Project Brief: April 2020 -March 2021<br>- MELOICR440 | Contribution by 2022: Up to 4.8 million metric tons, as indicated in the FISH proposal. | India |
| **3.2. REDUCED GREENHOUSE GAS EMISSION:** Reduction in 'agriculturally'-related greenhouse gas emissions by 5% | **338,857 MT** of fish in Bangladesh was produced reducing the Green House Gases (GHG) emissions because of the adoption of the better aquaculture management practices and technologies . As evidenced by Henriksson P.J.G. et al. (2018), improved aquaculture practices can significantly reduce GHG emissions and increase water and nutrient use efficiency. Case 1: 93,910 MT of fish produced under the adoption of the better management practices and technologies.<br>*Case 1:* 93,910 MT of fish produced under the adoption of the better management practices and technologies**.**<br>*References:*<br>- USAID Feed the Future Bangladesh Aquaculture and Nutrition Activity Annual Progress Report (October 2019– September 2020).<br>- Feed the Future Bangladesh Aquaculture Activity. Project Brief Oct 2019- Sept 2020.<br>- MELOICR448<br>*Case 2:* 244,134 MT of GIFT tilapia production yearly average<br>*References:*<br>- Gift Adoption at scale, dataset<br>- Evaluating impacts of Genetically Improved Farmed Tilapia: Challenges and strategy<br>*Case 3:* 813 MT of fish produced through the fish polyculture<br>*References:*<br>- Suchana: Ending the Cycle of Undernutrition in Bangladesh. Project Brief April 2020-March 2021.<br>- MELOICR446 | Contribution by 2022: Up to 4.8 million metric tons, as indicated in the FISH proposal. | Bangladesh |

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| **3.2. REDUCED GREENHOUSE GAS EMISSION:** Reduction in 'agriculturally'-related greenhouse gas emissions by 5% | **6,877 MT** of fish in India was produced reducing the Green House Gases (GHG) emissions thanks to the adoption of the better management practices (BMPs) in aquaculture. As observed by Henriksson P.J.G. et al. (2018) , BMPs interventions are key for significantly reducing GHG emissions and increasing water and nutrient use efficiency from aquaculture activities<br>*References:*<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2019-March 2020.<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2020-March 2021<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha: Project Brief: April 2020 -March 2021<br>- MELOICR440 | Contribution by 2022: Up to 4.8 million metric tons, as indicated in the FISH proposal. | India |
| **3.3. ECOSYSTEM RESTORED:** 55 M ha degraded land area restored | **192,970 hectares** under improved natural resource management as a result of the adoption of aquaculture best management practices and of co-management of fisheries in Bangladesh as evidenced in 2 cases:<br>*Case 1:* 34,875 hectares of pond area in Bangladesh restored as a result of the application of best management aquaculture practices**.**<br>*References:*<br>- USAID Feed the Future Bangladesh Aquaculture and Nutrition Activity Annual Progress Report (October 2019– September 2020).<br>- Feed the Future Bangladesh Aquaculture Activity. Project Brief Oct 2019- Sept 2020.<br>- MELOICR448<br>*Case 2:* 158,095 hectares of biologically significant areas under improved natural resource management**.**<br>*References:*<br>- Enhanced Coastal Fisheries in Bangladesh II Annual Report (December 1, 2019 –December 31, 2020)<br>Enhanced Coastal Fisheries in Bangladesh II: Project Brief: December 1, 2019 – December 31, 2020 | Contribution by 2022: Up to 3.3 million ha, as indicated in the FISH proposal. | Bangladesh |
| **3.3. ECOSYSTEM RESTORED:** 55 M ha degraded land area restored | **4,014 hectares** of pond area under improved best management practices such as rice-fish integrated systems and *carp-mola* polyculture are documented in 3 cases from India:<br>*Case 1:*3,516 hectares of fish farming using BMPs<br>*References:* | Contribution by 2022: Up to 3.3 million ha, as indicated in the FISH proposal. | India |

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| | - Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2019-March 2020.<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha project Annual Report April 2020-March 2021<br>- Fisheries and Animal Resources Development Department (F&ARD), Odisha: Project Brief: April 2020 -March 2021<br>- MELOICR440<br>Case 2: 70 hectares of pond area under carp-mola polyculture<br>*References:*<br>- Scaling nutrition-sensitive fisheries technologies and integrated approaches through partnership in Odisha Annual Report Oct 2019-Sept 2020.<br>- Scaling nutrition-sensitive fisheries technologies and integrated approaches through partnership in Odisha. Project Brief: Oct 2019-Sept 2020.<br>Case 3:428 hectares of area under improved BMPs (*beel,* rice-fish integrated systems and *carp-mola* polyculture)<br>*References:*<br>- Assam Agribusiness and Rural Transformation Project (APART): Fisheries Sub-Component. Six Month Report-5 (October 2020 to March 2021)<br>- Assam Agribusiness & Rural Transformation (APART). Project Brief 2020 | | |
| **3.3. ECOSYSTEM RESTORED:**<br>55 M ha degraded land area restored | **1,569,000 hectares** (15,690 km2) of marine area under improved fisheries management thanks to the national adoption of the innovative real-time monitoring of fishing activities and catch.<br>- *References:*<br>Fisheries Sector Support Program, Phase 2 Annual Progress Report Nov 2019 – Oct 2020.<br>- Fisheries Sector Support Program, Phase 2. Project Brief: Nov 2019 – Oct 2020.<br>- PeskAAS: A near-real-time, open-source monitoring and analytics system for small-scale fisheries. PLoS ONE, 15(11)<br>- MELOICR452 | Contribution by 2022: Up to 3.3 million ha, as indicated in the FISH proposal. | Timor-Leste |
| **3.4. PREVENTION OF DEFORESTATION:** 2.5 M ha forest saved from deforestation | N/A for FISH | | |

## Table 2. Condensed list of policy contributions in this reporting year (sphere of influence).

The following table provides key FISH policy contributions during 2020.

| Title of policy, legal instrument, investment or curriculum to which CGIAR contributed | Description of policy, legal instrument, investment or curriculum to which CGIAR contributed | Level of Maturity: 1,2 or 3 | Link to sub-IDOs | CGIAR cross-cutting marker score | | | | Link to OICR |
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| | | | | gender | youth | capdev | climate change | |
| Allowable mesh size for hilsa gillnets recommendations now officialised by the Government of Bangladesh through a gazette notification MELPOL422 | Allowable mesh size determined to be 6.5 cm for all types of hilsa gillnets. The Government of Bangladesh has now officially enacted the recommendation through a gazette notification. | Level 2 - Policy/Law etc. Enacted | 3.2.1 - More productive and equitable management of natural resources | 0 | 0 | 1 | 1 | MELOICR450 |
| FISH and partners avert COVID-19 risks to food systems through policy advice to the Government of Bangladesh MELPOL421 | WorldFish scientists collaborated with CIMMYT, IRRI and IFPRI to provide value chain and policy analysis to inform the policy response to COVID-19 by the Government of Bangladesh. | Level 1 - Research taken up by next user (decision maker or intermediary) | C.1.4 - Conducive environment for managing shocks and vulnerability, as evidenced in rapid response mechanisms.<br><br>D.1.4 - Increased capacity for innovation in partner development organizations and in poor and vulnerable communities | 1 | 0 | 0 | 1 | N/A |
| Operationalization of the Hilsa Conservation and Development Fund (HCDF) in Bangladesh MELPOL423 | To assist sustainable financing for hilsa conservation, WorldFish in coordination with DoF Bangladesh, established a sustainable financial structure for hilsa | Level 2 - Policy/Law etc. Enacted | 1.3.2 - Increased livelihood opportunities<br><br>3.2.1 - More productive and equitable management of natural resources | 0 | 0 | 0 | 0 | MELOICR449 MELOICR450 |

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| | fisheries development. In 2020, the fund has been rolled out. | | | | | | | |
| WorldFish supports the Government of Bangladesh Enhanced Coastal Fisheries in Bangladesh phase 2 (EcoFish II) to develop a national management plan as a legal instrument for the management of Nijhum Dwip Marine Protected Area<br>MELPOL322 | Once approved, the policy will help to provide a sustainable, practical and accountable framework for protecting marine biodiversity, sustaining productive fisheries and improving local livelihoods. | Level 1 - Research taken up by next user (decision maker or intermediary) | 3.2.1 - More productive and equitable management of natural resources | 0 | 0 | 1 | 1 | N/A |
| Community Fish Refuge best practice taken up into Cambodia's 10 year Strategic Plan; scaling up of increased fish production and improved food security<br>MELPOL365 | The Government of Cambodia and donors dedicate funds to fulfill policy commitments to scale up Community Fish Refuges best practice, following evidence of improvements to species protection, livelihoods, food security. | Level 2 - Policy/Law etc. Enacted | 3.1.2 - Enhanced conservation of habitats and resources.<br><br>3.2.1 - More productive and equitable management of natural resources | 0 | 0 | 1 | 1 | MELOICR451 |
| FISH reports on COVID-19 impacts and recommendations contribute to the World Bank India's post-COVID fisheries sector recovery program under Ministry of Fisheries, India<br>MELPOL399 | WorldFish's reports on COVID-19 impacts and recommendations were requested by the World Bank, as inputs to large World Bank loan program to the Government of India. | Level 1 - Research taken up by next user (decision maker or intermediary) | 1.3.2 - Increased livelihood opportunities<br><br>D.1.4 - Increased capacity for innovation in partner development organizations and in poor and vulnerable communities | 1 | 0 | 1 | 0 | N/A |
| FISH research helps the Government of Odisha (India) in securing funding for transforming the | WorldFish provided technical inputs to the Government of Odisha to obtain funding from the Odisha Mineral Bearing | Level 1 - Research taken up by next user | C.1.2 - Increased capacity of partner organizations, as evidenced by rates of | 0 | 0 | 1 | 1 | MELOICR440 |

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| livelihoods of Tribal communities dwelling in mineral bearing districts through fisheries<br>MELPOL335 | Areas Development Corporation (OMBADC) to support the fishery development in seven mineral districts. | (decision maker or intermediary) | investment in agricultural research<br><br>D.1.3 - Increased capacity for innovation in partner research organizations | | | | | |
| FISH research activities in India provide robust foundations for the Government of Odisha in securing a funding of USD 25.41million towards unlea shing the Blue Revolution<br>MELPOL334 | The successful FISH research and activities in India have been providing strong evidence to the Department of Fisheries in Odisha, significantly expanding the investment portfolio in the aquaculture and fisheries. | Level 1 - Research taken up by next user (decision maker or intermediary) | 1.3.2 - Increased livelihood opportunities | 1 | 1 | 1 | 0 | N/A |
| FISH research in aquaculture systems and continuous technical inputs support the Government of Odisha to obtain funding to promote the aquaculture development in the State<br>MELPOL337 | The awarded grant of USD 7.92 Million will support the activities under the Aquaculture Production Component of the World Bank assisted Odisha Integrated Irrigation Project for Climate Resilient Agriculture (OIIPCRA). | Level 1 - Research taken up by next user (decision maker or intermediary) | 1.3.2 - Increased livelihood opportunities<br><br>3.3.1 - Increased resilience of agro-ecosystems and communities, especially those including smallholders | 0 | 0 | 1 | 0 | N/A |
| FISH supports the digitalisation in the government of Odisha (India) to facilitate real-time information for decision making in the implementation of several schemes<br>MELPOL412 | WorldFish provided technical guidance in developing and integrating Management Information System (MIS) with various information on fisheries. 15 online services were launched to support decision making while also connecting beneficiaries. | Level 1 - Research taken up by next user (decision maker or intermediary) | D.1.3 - Increased capacity for innovation in partner research organizations | 0 | 0 | 2 | 0 | N/A |
| Technical collaboration of WorldFish with the Government of Odisha (India) has unveiling of a | The Master Plan focuses on self-sufficiency quality fish seed production in the State, providing a sound strategy and | Level 1 - Research taken up by next user | 1.3.4 - More efficient use of inputs | 0 | 0 | 1 | 0 | N/A |

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| “Master Plan for Fish Seed Production in Odisha” MELPOL340 | action plan towards achieving self-sufficiency in quality fish seed production by 2025. | (decision maker or intermediary) | 1.4.2 - Closed yield gaps through improved agronomic and animal husbandry practices | | | | | |
| The successful nutrition results in Odisha, India, attract additional funding from the Ministry of Micro, Small & Medium Enterprises (MSME) to promote hygienic fish products MELPOL336 | WorldFish provided technical inputs to the Government of Odisha in obtaining funding on two proposals on fish processing under Prime Minister’s Formalization of Micro Food Processing Enterprises (PMFME). | Level 1 - Research taken up by next user (decision maker or intermediary) | 1.3.2 - Increased livelihood opportunities<br><br>2.1.2 - Increased access to diverse nutrient-rich foods | 1 | 0 | 1 | 0 | MELOICR440 |
| WorldFish assisted the Government of Odisha in preparing the policy guidelines for the taking up of Fish Cage Cultures in Reservoirs by private sector actors MELPOL338 | The investor friendly, environmentally sound, and socially equitable policy guidelines aimed at boosting the fish production in the State were consolidated with an MoU signing ceremony with various entrepreneurs. | Level 1 - Research taken up by next user (decision maker or intermediary) | 1.3.2 - Increased livelihood opportunities<br><br>C.1.3 - Conducive agricultural policy environment | 0 | 0 | 1 | 0 | N/A |
| WorldFish technical inputs to the Government on supplementary nutrition contribute to the inclusion of fish in the newly launched State Nutrition Strategy in Odisha, India MELPOL333 | Worldfish signs an MoU with Women and Child Development & Mission Shakti Department of Government of Odisha to include fish and fish-based products in Supplementary Nutrition Program. | Level 2 - Policy/Law etc. Enacted | 2.1.2 - Increased access to diverse nutrient-rich foods | 2 | 0 | 0 | 0 | MELOICR440 |
| Odisha Government Orders on emergency responses during and after India’s COVID-19 lockdown, based on the co-designed | The Government of Odisha requested COVID -19 policy inputs from WorldFish on regular basis. These were translated into several favourable policy decisions for | Level 1 - Research taken up by next user (decision | 1.1.1 - Increased household coping capacity to cope with shocks<br><br>C.1.4 - Conducive environment for managing | 0 | 0 | 1 | 0 | N/A |

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| recommendations by WorldFish MELPOL339 | Fisheries and Aquaculture sector through Government Orders. | maker or intermediary) | shocks and vulnerability, as evidenced in rapid response mechanisms. | | | | | |
| Malawi Department of Fisheries incorporates solar tent dryers technology into an African Development Bank investment in Malawi MELPOL424 | WorldFish-developed solar-tent drying technology, a novel technique for producing dried fish safe for human consumption, is included in a new African Development Bank investment in Malawi. | Level 1 - Research taken up by next user (decision maker or intermediary) | 2.2.1 - Reduced biological and chemical hazards in the food system<br><br>2.2.2 - Appropriate regulatory environment for food safety | 1 | 1 | 1 | 1 | N/A |
| WorldFish strengthens its support to the Government of Myanmar in the design and implementation of an incentive-based hilsa management in the Ayeyarwady Region MELPOL408 | FISH research on fishery co-management continues to provide further evidence and engage with the government and other key stakeholders to support the amendment of the Ayeyarwady Freshwater Fisheries Law. | Level 1 - Research taken up by next user (decision maker or intermediary) | 3.1.2 - Enhanced conservation of habitats and resources.<br><br>3.2.1 - More productive and equitable management of natural resources | 1 | 1 | 1 | 1 | MLEOICR437 |
| FAO-WorldFish collaboration to formulate recommendations and policies on the impacts of COVID-19 on aquatic food supply chains MELPOL400 | WorldFish's reports on COVID-19 impacts have drawn requests from FAO's Fisheries Division to collaborate on COVID-19 impacts on aquatic food supply chains. | Level 1 - Research taken up by next user (decision maker or intermediary) | C.1.3 - Conducive agricultural policy environment | 1 | 0 | 0 | 0 | N/A |
| Illuminating Hidden Harvests study led by FAO, Duke University and WorldFish, in the spotlight at Committee on Fisheries (COFI) virtual dialogues | A spotlight on the emerging findings of the Illuminating Hidden Harvests (IHH) study at the FAO Committee on Fisheries provides the basis for new policies and investments in small-scale fisheries | Level 1 - Research taken up by next user (decision maker or intermediary) | 3.2.1 - More productive and equitable management of natural resources<br><br>3.3.1 - Increased resilience of agro-ecosystems and communities, especially | 1 | 1 | 2 | 1 | N/A |

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| MELPOL427 | | | those including smallholders | | | | | |
| IWMI-WorldFish research on youth to be presented in the UN Committee on World Food Security (CFS)<br>MELPOL406 | Research on Youth conducted by WorldFish and IWMI to be included in "Promoting youth engagement and employment in agriculture and food system" under Food Security and Nutrition (HLPE) initiative. | Level 1 - Research taken up by next user (decision maker or intermediary) | C.1.3 - Conducive agricultural policy environment<br><br>D.1.1 - Enhanced institutional capacity of partner research organizations | 0 | 2 | 0 | 0 | N/A |
| Research on gender transformative approaches (GTA) integrated into European Commission and Rome-based Agencies (FAO, WFP, IFAD) policy and practice documents<br>MELPOL387 | WorldFish scientists contributed FISH (and AAS CRP) research to a Compendium on Gender Transformative Approaches through a joint European Union funded program with FAO, IFAD and WFP. | Level 1 - Research taken up by next user (decision maker or intermediary) | B.1.1 - Gender-equitable control of productive assets and resources<br><br>B.1.3 - Improved capacity of women and young people to participate in decision-making | 2 | 1 | 1 | 0 | N/A |
| Policies for development and management of aquatic genetic resources in Africa and Asia strengthened by FISH genetics research<br>MELPOL413 | FISH genetics research contributes to the development of policies for aquatic genetic resources management through the FAO Intergovernmental Technical Working on Aquatic Genetic Resources | Level 1 - Research taken up by next user (decision maker or intermediary) | 1.3.4 - More efficient use of inputs<br><br>1.4.3 - Enhanced genetic gain | 0 | 0 | 0 | 0 | N/A |
| Increased recognition and support for sustainable national and sub-national Community Based Fisheries Management (CBFM) programs by the governments of Kiribati, vanuatu and Solomon Islands | FISH research and innovations on fisheries co-management has been guiding the governments in the Pacific towards implementing Community Based Fisheries Management (CBFM) programs for improved livelihoods and natural resource management. | Level 1 - Research taken up by next user (decision maker or intermediary) | C.1.3 - Conducive agricultural policy environment | 1 | 0 | 1 | 0 | N/A |

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| MELPOL418 | | | | | | | | |
| Contribution to the development of an inclusive, evidence-based National Fisheries Strategy for Timor-Leste that sets the direction for future fisheries and food security investments<br>MELPOL372 | Reviews of recent research and a deeply consultative process led to the co-development of a National Fisheries Strategy. WorldFish has also facilitated revised translations of the Strategy into Portuguese. | Level 1 - Research taken up by next user (decision maker or intermediary) | 3.2.1 - More productive and equitable management of natural resources<br><br>C.1.3 - Conducive agricultural policy environment | 1 | 0 | 0 | 0 | N/A |
| Revision of the legal regime for the management and regulation of fisheries in Timor-Leste<br>MELPOL371 | The legal framework for fisheries was revised built on a deeply participatory stakeholder consultation process supported by FISH research. FISH also facilitated revised translations of the legal documents into Portuguese. | Level 1 - Research taken up by next user (decision maker or intermediary) | 3.2.1 - More productive and equitable management of natural resources<br><br>D.1.3 - Increased capacity for innovation in partner research organizations | 1 | 0 | 0 | 0 | N/A |
| World-first monitoring system for small-scale fisheries adopted by the Timor-Leste government at a national scale<br>MELPOL363 | PeskAAS Small-scale fisheries monitoring system, designed and established through a number of WorldFish led project, has now been fully adopted by government as their national fisheries monitoring platform. | Level 3 - Evidence of impact on people and/or natural environment of the changed policy or investment | 1.3.2 - Increased livelihood opportunities<br><br>D.1.4 - Increased capacity for innovation in partner development organizations and in poor and vulnerable communities | 0 | 0 | 1 | 0 | MELOICR452 |
| More universities are adopting the upgraded fisheries and aquaculture curriculum in Zambia and across borders<br>MELPOL377 | The University of Zambia endorsed the upgraded fisheries and aquaculture curriculum on 10th December 2019 to authorise its implementation in January 2020. The curriculum is | Level 2 - Policy/Law etc. Enacted | B.1.3 - Improved capacity of women and young people to participate in decision-making | 1 | 1 | 2 | 0 | MELOICR447 |

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| | being scaled to different institutes. | | D.1.1 - Enhanced institutional capacity of partner research organizations | | | | | |
| Fish research helps catalysing changes in technical vocational and entrepreneurship training in Zambia and Zimbabwe through a tilapia-based e-learning platform MELPOL445 | WorldFish and partners have de veloped a Tilapia-based Aquaculture online training platform for students and commercial smallholder farmers to enhance the delivery of aquaculture technical and entrepreneurship trainings in Zambia. | Level 1 - Research taken up by next user (decision maker or intermediary) | D.1.4 - Increased capacity for innovation in partner development organizations and in poor and vulnerable communities | 0 | 2 | 2 | 0 | N/A |

## Table 3. List of outcome/impact case reports from this reporting year (sphere of influence).

The following table lists OICRs generated in 2020. The report covers both new outcome/impact cases or those that have either progressed to a new level of maturity or updated at the same level of maturity.

| Title of OICR | Link to full OICR | Maturity level: 1, 2, 3 |
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| More than 300 households living in coastal fisheries communities are improving their livelihoods conditions thanks to complementary participatory aquatic foods farming in Bangladesh | MELOICR320 | Stage 1 |
| Delivering climate information services for climate smart fish pond and disease management to more than 1 million fish farmers in the State of Odisha, India | MELOICR360 | Stage 1 |
| Enhancing the capacity of fish-farmers and their support agents in understanding and using climate risk information at scale in Bangladesh | MELOICR359 | Stage 1 |
| Establishment of hatcheries and feed mills locally produced are creating employment opportunities for more than 600 youths in the Democratic Republic of Congo | MELOICR425 | Stage 1 |
| FISH research and capacity building translates into inclusive business models for over 800 smallholder aquaculture farmers in Zambia | MELOICR447 | Stage 1 |
| FAO-IFAD-WFP awarded GENNOVATE among the 15 best practices for gender transformative approaches for food security, nutrition and sustainable agriculture following its validation with 7,500 participants | MELOICR319 | Stage 1 |
| Monitoring, Evaluation and Learning platform adopted within and outside CGIAR | MELOICR386 | Stage 1 |
| More than 111,470 fish producers in Bangladesh adopt improved pond management practices | MELOICR448 | Stage 1 |
| Nutrition-sensitive polyculture intervention is providing livelihood opportunities and nutrition gains for over 107,290 people in North-Eastern Bangladesh | MELOICR446 | Stage 2 |
| The promotion of integrated farming systems increased rice yields by 18% and nutritious fish for farmers in Myanmar | MELOICR435 | Stage 1 |
| Research and application of co-management strategies enhance the contribution to sustainable increase in hilsa production while providing socio-economic resilience for over 34,676 fishers in Bangladesh | MELOICR450 | Stage 3 |
| Research on hilsa conservation incentives provides strong evidence to the government of Myanmar in designing a fisheries management mechanism that promotes livelihood diversification and resilience | MELOICR437 | Stage 1 |

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| Significant nutrition gains on nearly 150,000 people in Cambodia strengthen the validation of community-managed rice field fisheries attracting more investments for scaling | MELOICR451 | Stage 2 |
| Supporting small-scale aquaculture farmers to improve nutrition and income for nearly 800 households in Myanmar's vulnerable communities | MELOICR442 | Stage 1 |
| The adoption of Aquaculture Best Management Practices by fisherwomen is contributing to livelihoods and nutrition improvements for nearly 200,000 people in Odisha, India | MELOICR440 | Stage 2 |
| The adoption of innovative aquaculture technologies and sustainable practices is improving nutrition and livelihoods for over 1,000 poor families in Myanmar | MELOICR434 | Stage 1 |
| The Fisherwomen Community Savings Groups (CSGs) in Bangladesh empower 6,000 poor women by providing visible economic and social benefits while conserving the biodiversity | MELOICR449 | Stage 2 |
| The Genetically Improved Farmed Tilapia (GIFT) has been disseminated to nearly 6,000 farmers in India thanks to the Satellite Breeding Program, established in collaboration with the Rajiv Gandhi Center for Aquaculture (RGCA) | MELOICR454 | Stage 1 |
| Worldfish, the Government and other key partners come together to strengthen their commitment to reducing malnutrition across the State of Odisha, India | MELOICR193 | Stage 1 |
| 15,690 km2 marine area under improved fisheries management through the real-time monitoring of fishing activities and catch in Timor-Leste | MELOICR452 | Stage 2 |

## Table 4. Condensed list of innovations by stage for this reporting year.

The following table provides a list of FISH innovations from 2020.

| Title of innovation with link | Innovation type | Stage of innovation | Geographic scope (with location) |
|---|---|---|---|
| A formal financial package facilitated by Digital Financial Service (DFS) channels to improve access to credit for small aquaculture farmers and small and medium enterprises in Bangladesh MELINN374 | Social science | Stage 1: discovery/proof of concept | National (Bangladesh) |
| A novel mixed-method approach to climate change vulnerability assessments for fish production systems in Myanmar MELINN658 | Social science | Stage 3: available/ready for uptake | National (Myanmar) |
| Better management practices (BMPs) for beel (wetland) fisheries in Assam, India MELINN673 | Production systems and management practices | Stage 1: discovery/proof of concept | National (India) |
| Better management practices (BMPs) for climate resilient paddy-cum-fish integrated farming in Assam, India MELINN671 | Production systems and management practices | Stage 1: discovery/proof of concept | National (India) |
| Better management practices (BMPs) for Indian Major Carp hatcheries in India MELINN593 | Production systems and management practices | Stage 1: discovery/proof of concept | National (India) |
| Big data technology and system (PeskAAS) to improve small-scale fisheries management in Timor-Leste MELINN659 | Research and communication methodologies and tools | Stage 4: uptake by next user | National (Timor-Leste) |
| Community-based green mussel production system in Cox's Bazar (Bangladesh) MELINN479 | Production systems and management practices | Stage 2: successful piloting | National (Bangladesh) |
| Contextualized biosecurity practices and protocols for tilapia hatchery technicians in Bangladesh MELINN691 | Production systems and management practices | Stage 3: available/ready for uptake | National (Bangladesh) |

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| Contextualized better management practices (BMPs) for monosex tilapia seed production in Timor-Leste MELINN685 | Production systems and management practices | Stage 3: available/ready for uptake | National (Timor-Leste) |
| Contextualized better management practices (BMPs) for smallholders farming tilapia (GIFT) in pond-based systems in Zambia MELINN690 | Production systems and management practices | Stage 4: uptake by next user | National (Zambia) |
| Contextualized better management practices (BMPs) for tilapia broodstock conditioning and mass spawning in hapas in ponds in the Democratic Republic of Congo (DRC) MELINN680 | Production systems and management practices | Stage 3: available/ready for uptake | National (Democratic Republic of the Congo) |
| Contextualized better management practices (BMPs) for tilapia hatcheries in Myanmar MELINN651 | Production systems and management practices | Stage 3: available/ready for uptake | National (Myanmar) |
| Contextualized better management practices (BMPs) for small-scale tilapia pond farming in Ghana MELINN686 | Production systems and Management practices | Stage 3: available/ ready for uptake | National (Ghana) |
| Contextualized better management practices (BMPs) for tilapia hatchery operation in Ghana MELINN675 | Production systems and Management practices | Stage 3: available/ ready for uptake | National (Ghana) |
| DArTseq genetic marker developed for Catla MELINN575 | Research and communication methodologies and tools | Stage 1: discovery/proof of concept | Global |
| Database of the nutrient composition of ingredients locally available for low-cost feed formulation in Africa and Asia MELINN426 | Other | Stage 2: successful piloting | Global |
| Design of tilapia single nucleotide polymorphisms (SNP) chip MELINN576 | Research and communication methodologies and tools | Stage 3: available/ ready for uptake | Global |
| Digital tool for on-farm performance assessment of aquaculture systems MELINN602 | Research and communication methodologies and tools | Stage 3: available/ready for uptake | Global |
| Dried Small Fish Species (SIS) powder as complementary food in Myanmar targeting particularly young children | Other | Stage 1: discovery/proof of concept | National (Myanmar) |

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| MELINN650 | | | |
| Fish powder for new livelihood opportunities for women in Timor-Leste<br>MELINN669 | Production systems and Management practices | Stage 3: available/ready for uptake | National (Timor-Leste) |
| Fish seed business models for socially inclusive tilapia value chains in Ghana<br>MELINN674 | Production systems and Management practices | Stage 1: discovery/proof of concept | National (Ghana) |
| Gender Transformative Approaches in fish agri-food systems<br>MELINN608 | Social science | Stage 3: available/ready for uptake | Global |
| Gendered value chain: framework and methodology<br>MELINN613 | Social science | Stage 1: discovery/proof of concept | Global |
| Generation 17 of Genetically Improved Farmed Tilapia (GIFT) strain regeneration in Penang, Malaysia<br>MELINN577 | Genetic (variety and breeds) | Stage 3: available/ready for uptake | Global |
| Generation 3 rohu carp<br>MELINN580 | Genetic (variety and breeds) | Stage 2: successful piloting | Global |
| Generation 8 of genetically improved farmed tilapia (GIFT) has been produced in India<br>MELINN677 | Genetic (variety and breeds) | Stage 3: available/ready for uptake | National (India) |
| Genetic diversity of the tilapia lake virus genome segment 1 from 2011 to 2019 described and a newly validated semi-nested RT-PCR method developed<br>MELINN591 | Research and communication methodologies and tools | Stage 1: discovery/proof of concept | Global |
| Genetic markers (SNPs) for identifying improved tilapia strains in Asia<br>MELINN581 | Research and communication methodologies and tools | Stage 3: available/ready for uptake | National (Bangladesh, Philippines) |
| Genetically Improved Farmed Tilapia (GIFT) introduction in Odisha State (India)<br>MELINN594 | Production systems and management practices | Stage 3: available/ready for uptake | National (India) |
| Land-use modeling, scenarios and decision-support tools to optimize integrated fish agri-food systems for Myanmar<br>MELINN622 | Research and communication methodologies and tools | Stage 2: successful piloting | National (Myanmar) |
| Low-cost feed formulation with local ingredients in DR Congo (Bukavu and Kinshasa)<br>MELINN425 | Production systems and management practices | Stage 2: successful piloting | National (Democratic Republic of Congo) |

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| Low-cost portable fish drier to produce food safe dried fish and promote the use of dried powdered small indigenous fish species (SIS) for improved nutrition in Myanmar<br>MELINN600 | Production systems and management practices | Stage 1: discovery/proof of concept | National (Myanmar) |
| Malawi Gold Standard Aquaculture Production System<br>MELINN610 | Production systems and management practices | Stage 3: available/ready for uptake | National (Malawi) |
| Methodological innovation for the Illuminating Hidden Harvest initiative of small-scale fisheries<br>MELINN605 | Research and communication methodologies and tools | Stage 3: available/ready for uptake | Global |
| Model resilient fishing village: an approach of livelihood transformation of fishery communities in Bangladesh<br>MELINN483 | Production systems and management practices | Stage 2: successful piloting | National (Bangladesh) |
| Monitoring, Evaluation and Learning (MEL): a flexible, multi-center and multi-CRP online platform for integrated management, planning, monitoring and reporting of projects and activities, knowledge management and sharing<br>MELINN539 | Research and communication methodologies and tools | Stage 4: uptake by next user | Global |
| New generation of fish friendly irrigation innovations (sluice gates, irrigation canals, dams) to strengthen the resilience and sustainability and livelihoods of fisheries-dependent communities in Asia and Africa<br>MELINN601 | Production systems and management practices | Stage 1: discovery/proof of concept | Global |
| Project Monitoring Unit (PMU) with a GIS-based Management Information System (MIS), web and mobile application adopted by the Government of Odisha, India<br>MELINN598 | Research and communication methodologies and tools | Stage 1: discovery/proof of concept | National (India) |
| Protocol for Genetically Improved Farmed Tilapia (GIFT) broodstock replacement from within for satellite hatcheries in Myanmar<br>MELINN579 | Production systems and management practices | Stage 1: discovery/proof of concept | National (Myanmar) |
| Rapid diagnostic for Flavobacterium columnare developed. This bacteria is a causative agent of columnaris, a serious disease affecting numerous freshwater fish species worldwide. | Research and communication methodologies and tools | Stage 1: discovery/proof of concept | Global |

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| MELINN592 | | | |
| Rapid pathogen sequencing (Rappseq): a cloud platform for identifying aquaculture bacterial pathogens from long-read DNA sequence data MELINN606 | Research and communication methodologies and tools | Stage 1: discovery/proof of concept | Global |
| Re-creation of generation 17 of Genetically Improved Farmed Tilapia (GIFT) in Vietnam MELINN578 | Genetic (variety and breeds) | Stage 3: available/ready for uptake | National (Vietnam) |
| Rice fish production practice typology in Southern Asia MELINN670 | Social Science | Stage 2: successful piloting | Regional (South-Eastern Asia, Southern Asia) |
| Shwe Ngar (Golden Fish) App: a newly developed mobile App to support fish farmers in Myanmar MELINN611 | Research and communication methodologies and tools | Stage 3: available/ready for uptake | National (Myanmar) |
| Social, political, environmental and technical adjustments for viability of rice-fish systems in Myanmar MELINN623 | Production systems and management practices | Stage 3: available/ready for uptake | Regional (South-Eastern Asia, Southern Asia) |
| Standard operating procedure (SOP) for tagging Indian major carps with Passive Integrated Transponder (PIT) tags in India MELINN678 | Production systems and management practices | Stage 1: discovery/proof of concept | National (India) |
| Standard Operating Procedure (SOP) for the inclusion of dried small fish in the Supplementary Nutrition Program (SNP) in Odisha, India MELINN596 | Production systems and management practices | Stage 1: discovery/proof of concept | National (India) |
| Standardized processing methods for boneless rohu (Labeo rohita) products in Odisha, India. MELINN597 | Production systems and management practices | Stage 1: discovery/proof of concept | National (India) |
| Step-by-step guide to conducting farmer surveys for tilapia epidemiology and health economics MELINN239 | Research and communication methodologies and tools | Stage 3: available/ready for uptake | Global |
| Women's Empowerment in Fisheries Index (WEFI), a methodological tool for assessing women's transformative change in fisheries and aquaculture MELINN609 | Research and communication methodologies and tools | Stage 2: successful piloting | Global |

## Table 5. Summary of status of planned outcomes and milestones (sphere of influence-control).

The following table provides the status of planned outcomes and milestones for 2020.

| Flagship (FP) | FP outcomes 2022 | Sub-IDOs | Summary narrative on progress against each FP outcome in 2020 | Milestone | Milestones status: complete, extended, cancelled or changed | Brief explanation (Evidence) | Links to evidence |
|---|---|---|---|---|---|---|---|
| FP1 | Outcome 1.1: 1.5 million households have access to and are using our selectively improved, faster growing and more resilient strains of tilapia and carp seed | 1.4.3: Enhanced genetic gain | Adoption of the performance assessment tools is enabling partners to widen the coverage of performance assessment research. | IT-based performance assessment methods and tools adopted by national partners in three countries (Bangladesh, Egypt, and Myanmar). | Complete<br><br>[extended from 2018] | National partners are using performance assessment methods and tools in Bangladesh, Egypt and Myanmar. This expanded to farmers and partners in Nigeria and Sierra Leone too. | MELINN239<br>MELINN602<br>MELINN158<br>MELINN611 |
| | | | Progress was made in the production of improved strains of silver carp in Bangladesh and in the production of genomic data for resilience traits for tilapia. | Production of the first selected generation of *Catla* and silver carp (in Bangladesh) and the production of genomic data on specific traits designed to increase | Extended<br><br>[extended from 2019] | Silver carp completed in 2020.<br>*Catla* delayed due to challenges related to maturity of broodstock (2019) and Covid-19 (2020).<br>Genomics data on resilience in tilapia is reported in four published papers. | Hamilton, Matthew G., 2020, "Worldfish Silver Carp Genetic Improvement Program G1 families", Harvard Dataverse, V1<br><br>MELINN255 |

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| | | | | resilience in tilapia (global). | | | MELINN575<br><br>Barria, A. et al. (2020). Genetic parameters for resistance to Tilapia Lake Virus (TiLV) in Nile tilapia (Oreochromis niloticus). Aquaculture, 522: 735126.<br>Genetic resistance to lethal virus found in key farmed fish species<br><br>Rodde, C. et al. (2020). Can individual feed conversion ratio at commercial size be predicted from juvenile performance in individually reared Nile tilapia Oreochromis niloticus. Aquaculture Reports, 17: 100349.<br><br>Mengistu, S. B., Mulder, H. A., Benzie, J. A. H. et al. (2020). Genotype by environment interaction between aerated and non-aerated ponds and the impact of aeration on genetic parameters in Nile tilapia (Oreochromis niloticus). Aquaculture, 529: 735704.<br><br>Taslima, K., Wehner, S., Taggart, J. B., et al. |

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| | | | | | | | (2020). Sex determination in the GIFT strain of tilapia is controlled by a locus in linkage group 23. BMC Genetics, 21(1): 49. |
| | | | Improved strains were produced for carps (rohu generation 3) and tilapia (GIFT generation 17) utilising genomic information. | Produce faster growing and more robust tilapia strains using genomic information and faster growing rohu and catla carp strains | Complete | Improved strains of rohu generation 3 utilised genomic information to correct pedigrees so enhancing accuracy of selection and tilapia GIFT generation 17 was created from backup stock using molecular data to confirm identity. Genetic tools (SNP markers and SNP chip) to achieve these goals were developed and published. | MELINN580<br>MELINN151<br>MELINN577<br>MELINN576 |
| | | | Phenotyping methods for disease resistance, feed efficiency and oxygen resilience were designed and tested. | Develop and assess practical methods to introduce resilience traits (feed efficient, disease resistant and oxygen resilience). | Complete | Phenotyping methods for disease resistance, feed efficiency and oxygen resilience were designed and those for feed efficiency and oxygen resilience tested. | Barria, A. et al. (2020). Genetic parameters for resistance to Tilapia Lake Virus (TiLV) in Nile tilapia (Oreochromis niloticus). Aquaculture, 522: 735126.<br>Genetic resistance to lethal virus found in key farmed fish species<br><br>Rodde, C. et al. (2020). Can individual feed conversion ratio at commercial size be predicted from juvenile performance in individually reared Nile tilapia Oreochromis |

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| | | | | | | | niloticus. Aquaculture Reports, 17: 100349.<br><br>Mengistu, S. B., Mulder, H. A., Benzie, J. A. H. et al. (2020). Genotype by environment interaction between aerated and non-aerated ponds and the impact of aeration on genetic parameters in Nile tilapia (Oreochromis niloticus). Aquaculture, 529: 735704. |
| | Outcome 1.2: 2.5 million households have adopted disease detection and control strategies, cost-effective and sustainable aquafeeds and/or improved aquaculture management practices | 1.4.2: Closed yield gaps through improved agronomic and animal husbandry practices<br><br>2.4.2: Reduced livestock and fish disease risks associated with intensification and climate change | Public and private sector adopting improved health and feed management practices within their programs contributes to scaling of the innovations emerging from FISH research. Progress was made in Bangladesh, Egypt, Myanmar and Zambia in 2020. | Public and private sector in four focal countries are using improved health, feed and management practices through country wide programs. | Complete | FISH researchers collaborated with public and private sector in Bangladesh, Egypt, Myanmar and Zambia to co-develop and disseminate improved practices related to biosecurity, health, feed management to support aquaculture development. WorldFish collaborated with government and a private company to establish the first-ever aquatic animal disease diagnostic laboratory in Bangladesh. | MELINN691<br><br>MELINN360<br><br>MELINN579<br><br>MELOICR447<br><br>https://thefinancialexpress.com.bd/national/worldfish-bangladesh-opens-first-ever-aquatic-animal-disease-diagnostic-laboratory-1613054465<br><br>Egypt aquaculture best management practice training for private and public sector recognized in Commonwealth Blue Charter success stories. |

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| | Outcome 1.3: 4.8 million metric tons of annual farmed fish production with reduced environmental impact and increased resource-use efficiency (measured by 20% reduction in GHG emissions and 10% increase in water and nutrient-use efficiency) | 1.3.4: More efficient use of inputs<br>3.3.3: Reduced net greenhouse gas (GHG) emissions from agriculture, forests and other forms of land use. | Environmental analysis of aquaculture improvements associated with FISH research and innovation is partially completed and in some cases published, with translation into better management practices (BMPs) and policy guidance now scheduled for 2021. | Environmental improvement plans prepared from FISH research to be adopted by public and/or private sector partners in three countries: one in Africa (Egypt) and two in Asia (Bangladesh, Indonesia). | Extended<br><br>*[extended to report in 2021]* | BMPs have been prepared that incorporate environmental improvement, but further work is required in 2021 to integrate into policy guidance. | No evidence provided at this stage |
| | | | Partnerships with public and private sector through formal and informal platforms, working groups and other mechanisms is considered an important mechanism for influencing policy, capacity development and investment in putting FISH research into use, including environmental performance and management of major technologies as part of a sustainable development of aquaculture in partner countries. | Public-private sector partnerships or platforms established and R&D agenda adopted for improving environmental performance in remaining focal countries, in Africa [Tanzania, Zambia] and in Asia [Cambodia] | Complete<br><br>[extended in 2019- to report in 2020] | The focus on "environmental performance" has been extended to cover other dimensions necessary to accelerate sustainable aquaculture practice and policy in cooperation with public and private sector.<br><br>Zambia: joint work with public and private sector to partner on integrating FISH research into vocational education.<br><br>India: Odisha State and Indian Joint working group with the Ministry of Fisheries, Animal Husbandry and Dairying<br><br>Cambodia: Participation in the aquaculture working group for aquaculture development | Zambia:<br>Mudege, N. N. Muzungaire, L. Kakwasha, K. Siamudaala, V. (2020). The Aquaculture Technical, Vocational, and Entrepreneurship Training for Improved Private Sector and Smallholder Skills Project in Zambia Dissemination and 2021 project planning workshop report. Penang, Malaysia: WorldFish. Workshop Report.<br>MELPOL377<br>MELOICR447 |

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| | | | | | | In Africa, participation in a Country Engagement Coordination (CEC) mechanism in Tanzania, Malawi, Nigeria and Benin under the African Development Bank TAAT investment.<br><br>Contributions were made to the development of global criteria for investment into aquaculture and fisheries through “Climate Bonds”. | India: https://www.worldfishcenter.org/events/signing-ceremony-worldfish-and-department-women-and-child-development-wcd-government-odisha MELPOL333<br><br>Cambodia: Aquaculture working group report<br><br>Tanzania, Malawi, Nigeria and Benin: Bernadette Fregene, Ajibola Olaniyi. (14/1/2021). AfDB Technologies for African Agricultural Transformation (TAAT) Progress Report October to December 2020.<br><br>Nigeria: Report of the Roundtable on the Role of the Private Sector in Nigerian Aquaculture<br><br>Global: House et al (2020) Considerations for developing criteria to assess the compatibility of fisheries and fishing with climate mitigation and resilience goals |

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| FP2 | Outcome 2.1: 1 million fishery dependent households have reduced poverty as a result of adopting improved fisheries management | 1.3.1: Diversified enterprise opportunities<br>1.3.2.: Increased livelihood opportunities<br>2.1.2: Increased access to nutrient rich foods | Evaluations of co-management application in coastal fisheries progressed and are being used to assess and identify improvements in policies and practice for co-management, and livelihood diversification at national, regional and global levels. | Assessments of adaptive management and livelihood interventions in small-scale marine and inland fisheries in Bangladesh, Cambodia, Myanmar and Solomon Islands (focal countries), the Philippines and Timor Leste (scaling countries). | Complete | A four country meta-analysis and case study was completed (Bangladesh, Cambodia, Sri Lanka and Philippines) and is in press with FAO. Public event held to present main findings.<br><br>Evaluations of Hilsa fisheries co-management and livelihood interventions complete in Bangladesh and Myanmar. An evaluation of investments in hilsa management in Myanmar demonstrated a 1:6 return on each dollar invested in management.<br><br>Methodology for diagnoses and design of livelihood interventions is being applied with lessons from pilots in Timor and Solomon Islands and scaling in Pacific with regional partners.<br><br>FAO cooperation on small-scale fisheries evaluations highlighted in the Thirty-fourth Session of the FAO Committee on Fisheries. | FAO hosted public event<br><br>Rahman, M. J. et al. (2020). Hilsa fishery management in Bangladesh. Conference Series: Earth and Environmental Science, 44: 012018.<br><br>Béné, C. Haque, M. A. B. M. (2021). Strengthening the Resilience of Vulnerable Communities: Results from a Quasi-experimental Impact Evaluation in Coastal Bangladesh. The European Journal of Development Research, online first 7 April.<br>MELPOL422<br>MELPOL423<br>MELPOL322<br><br>Independent Hilsa management investment evaluation complete<br><br>Burcham et al (2020) Myanmar's artisanal hilsa fisheries: how much are they really worth?<br>MELPOL408<br>MELOICR437 |

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| | | | | | | | Livelihood guide for Pacific region published – uptake and impact guide for the 26 countries and territories that are members of The Pacific Community (SPC).<br><br>Commiteee on Fisheries paper on small-scale and artisanal fisheries |
| | | | Data collection and analysis was progressed through the global, collaborative Illuminating Hidden Harvests research, using data from geographies and livelihoods of 100 million women and men.<br><br>New models arising from research on nutritional values of inland and marine fisheries (building on Hicks et al 2019) are being developed, all leading towards national and regional roll out processes in 2021 and integration of findings and recommendations into national and regional investment plans and policies. | Evidence gathered and policy recommendations prepared on (i) Small-Scale Fisheries functions for food security, poverty alleviation and threats; and (ii) impacts of intra-regional and global trade patterns and policies on the pro-poor functions of SSF. | Complete | Data collection complete for IHH –four case studies, and nutrition and gender chapters completed by FISH scientists for integration into a 2021 global.<br><br>Zambia national synthesis & policy consultation completed.<br><br>IHH analysis reveal 20% of children in Zambia and Malawi reliant on fish as only animal source food, locate geographic and social nexus where fish needed most to address micronutrient deficiencies.<br><br>Intra-regional trade research illuminated substantially greater volumes of fish and employment (particularly of | Zambia data: Nankwenya, Bonface, 2021, "IHH Country Case Study - Zambia", Harvard Dataverse, V1<br><br>Egypt data: Nasr-Allah, Ahmed; Karisa, Harrison, 2021, "IHH Country Case Study - Egypt", Harvard Dataverse, V1<br><br>Malawi data: Nankwenya, Bonface; Nagoli, Joseph, 2021, "IHH Country Case Study - Malawi", Harvard Dataverse, V1<br><br>Bangladesh data: Tilley, Alexander; Simmance, Fiona, 2021, "IHH Country Case Study - Bangladesh", Harvard Dataverse, V1 |

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| | | | Trade research was completed through an evaluation in Africa, with research positioned to influence policy in Malawi and Zambia.<br><br>Global research progressed through a set of “Blue Food Assessment” papers being prepared for the UN Food Systems Summit in 2021. | | | women) associated with cross-border trade, exposed policy “myths” about the perceived (low) value of the sector and its importance to national and regional economies.<br><br>Global analyses complete for trade, climate and justice implications on nutrition potential of capture fisheries. The findings are in press as policy recommendations from the “Blue Food Assessments” to the Scientific Group of the UN Food System Summit 2021. | Kakwasha K, Simmance FA, Cohen PJ, Muzungaire L et al. (2020). Strengthening small-scale fisheries for food and nutrition security, human well-being and environmental health in Zambia. Penang, Malaysia: WorldFish. Program Brief: 2020-41.<br><br>Inland fisheries role in nutrition for sub-Saharan Africa: O'Meara, L. Cohen, P. J. Simmance, F. et al. (2021). Inland fisheries critical for the diet quality of young children in sub-Saharan Africa. Global Food Security, 28: 100483.<br><br>Independent evaluation of research from the FishTrade investment found that “Government officials in Malawi and Zambia indicated that research from the project had completely changed their perception of the scale, importance and issues faced by informal fish trade, and would |

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| | | | | | | | inform policy development"<br><br>The Blue Food Assessment WebSite |
| | | | Progress was made in enabling adoption of improvements in fisheries co-management policies and practice, in the Pacific, Bangladesh and Myanmar. Adoption is taking place through direct engagement with policy makers and in some case communities in FISH focal countries, but also increasingly through national and regional partnerships. | Adoption of improved co-management models in focal countries at wider-scale, and policy recognition and support for complementary governance models. | Complete | In Solomon Islands are integrated into new and adapted arrangement management plans in 40 coastal communities across Solomon Islands, Vanuatu and Kiribati. These fisheries management arrangements address the weakness of many community-based, co-management, that is gender equity.<br><br>Scaling strategies for gender-inclusive methodologies and approaches of co-management developed with Pacific regional partner The Pacific Community (SPC). Further adoption by national governments, larger investment programs and NGOs will be evaluated in 2021.<br><br>Hilsa fisheries co-management in Bangladesh has been strengthened with additional management measures and alternative livelihoods measures: including size of fish and | MELPOL365<br><br>MELPOL322<br><br>MELPOL423<br><br>MELOICR451<br><br>Independent Hilsa management investment evaluation complete<br><br>FISH innovations, lessons & tools integrated in Pacific handbook for gender equity & social inclusion in coastal fisheries & aquaculture |

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| | | | | | | resilience enhancing measures for fisher households. A revised national management plan (2021-2030) was prepared. | |
| | | | Small-scale fisheries are often “hidden” in agriculture, water, Blue economy, climate and food system transformation measures. Progress was made in enhancing visibility of small-scale fisheries in various policy initiatives, seeking to avoid marginalising small-holders and the food and nutrition security benefits they provide.<br><br>Progress in enhancing visibility of small scale fisheries in multi-sectoral policy and practice will ultimately contribute to a policy environment that enables the nutrition and food security benefits to flow, and for small-holder actors to experience agency and wellbeing. | Raised visibility of SSF functions in cross sectoral NGO and public sector policies | Complete | Gender, nutrition, food security, stewardship, livelihoods FISH innovations and insights used to raise awareness and investment potential of SSF through various partners, networks and media.<br><br>Key points for raising visibility given attention in 2020:<br>(1) Climate and SSF funders;<br>(2) UN Food System Summit preparation;<br>(3) environmental NGOs working on SDG14;<br>(4) amongst water governors and agriculturists; and<br>(5) preparation for 2022 International Year of Artisanal Fisheries and Aquaculture<br>These strategic interactions are guided by a communications plan developed as part of the Illuminating Hidden Harvest (IHH) initiative | Formats include webinars, blogs, invited keynotes, donor presentations, participation in/devilment of multi-stakeholder platforms. Key evidence<br><br>Nourishing billions Virtual Oceans Dialogue World Economic Forum; Seminar on Food and Nutrition, hosted by FAO UNFSS action track 4 public forum<br>Creation of the SSF Hub. Strategic communications for World Ocean Day; webinar Small-scale fisheries as a nexus of SDGs to ensure a future we want webinar, blog post, ’through their eyes’ story, Lived experiences story<br>Co-created the Inland Fisheries Alliance as multi-stakeholder platform to raise profile of SSF values and innovations<br>Launch and associate communications of Fish- |

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| | | | | | | | friendly in Irrigation Guide<br>IHH communication plan Yemaya article, IHH virtual dialogues webinar, IHH authors |
| | | | Development of tools and approaches to "nutrition sensitive fisheries" made progress, but was extended to incorporate further work on nutrient values of inland fisheries and work on integration of nutrition into the FishBase.<br><br>When complete, the tools, methods and database will provide the data and foundation of knowledge to finalise a nutrition sensitive approach to fisheries during 2021. | Nutrition sensitive approaches to fisheries articulated, evidenced and prepared for scaling | Extended | Some foundation publications and presentations were completed in 2020, but the range of system- specific nutrition sensitive innovations are still under development for release in 2021. The delay is due to the need to include some additional findings on the nutritional values of inland fisheries and the work on integrating nutrition into the FishBase (https://www.fishbase.us). | Nutrition-sensitive approaches to fisheries futures of India, hosted by ICAR<br><br>Nutrition status, and role of fish analysed and published for Solomon Islands coastal communities. |
| | Outcome 2.2: 1.2 million people, of which 50% are women, assisted to exit poverty through livelihood improvements | 1.3.1: Diversified enterprise opportunities<br>1.3.2: Increased livelihood opportunities<br>2.1.2: Increased acces s to nutrient rich foods | Important progress was made through the maturing of innovations, and their wider adoption in four major areas:<br>(1) BigData & ICT tools;<br>(2) rice-fish systems;<br>(3) livelihood intervention diagnosis; and<br>(4) gender-inclusive innovations. | Wider application of improved management models, technologies and livelihood solutions that promote equitable resource access and benefits in focal and 2 scaling countries | Complete | PeskAAS: A near-real-time, open-source monitoring and analytics system (BigData award winner) adopted by government as Timor Leste fisheries monitoring system, with early scaling (Malaysia and Kenya). | PeskAAS innovation published in journal article – with recognition of gender bias balanced by two complementary research articles "Contribution of women's fisheries substantial, but overlooked" and "Gleaning beyond the subsistence narrative" |

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| | | | | | | ICT applications in small-scale fisheries evaluated and a handbook developed with FAO to enable wider application.<br><br>Rice-fish systems Guide (2019) being applied for scaling in Cambodia by government and WorldFish scientists and further development of a Novel rice-fish typology (drawing on agroecological principles) completed and published.<br><br>Livelihood diagnosis guide being appliedwith partners in the Pacific (SPC/EU/ACIAR).<br><br>FISH guidance for gender inclusion integrated into various M&E guides and policy and practice guidelines | MELINN659<br>MELPOL363<br>MELOICR452<br><br>Information and communication technologies for small-scale fisheries - A handbook for fisheries stakeholders<br>Rice fish system assessments in Fisheries Research and evidence in<br>MELOICR451<br>MELPOL365<br>MELOICR440<br><br>Frontiers in Sustainable Food Systems paper on Maintaining diversity of integrated rice and fish production confers adaptability of food systems to global change<br><br>Livelihood diagnosis guide published with Pacific regional scaling partner SPC<br><br>Pacific handbook for gender equity & social inclusion in coastal fisheries & aquaculture |

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| | | | | | | | Monitoring and Evaluation module<br><br>Community engagement Module<br>Coastal Fisheries module |
| | Outcome 2.3: 2.1 million hectares of inland aquatic and coastal marine habitat restored and under more productive and equitable management | 3.2.1: More productive and equitable management of natural resources<br><br>3.3.1: Increased resilience of agroecosystems and communities, especially those including smallholders | Three evaluations designed, delivered and published for Hilsa fisheries indicating co-management and livelihood investments have positive returns for productivity, resilience. Evaluations guided revision to Bangladesh Hilsa fishery national management plan (2020-2030), that is now under government consideration. | Evidence collated and research designed to determine ecosystem productivity and equity outcomes from management interventions in Bangladesh, Cambodia and Solomon Islands. | Complete | Evaluations of Hilsa fishery stock, management, livelihood interventions were completed in Myanmar and Bangladesh (3 evaluations).<br><br>Novel indicators showing previously overlooked benefits of co-management on ecosystem productivity developed and tested in community-based co-management in Solomon Islands, and two other Pacific countries.<br><br>Cambodia rice-fish systems innovations and ecosystem productivity and resilience paper published. | Peer review article present evidence that Hilsa co-management of inland and marine habitats contributed 11% per annum increase in total hilsa catch, increased average size of fish (510 to 915 g), and increased fisher household income.<br><br>Review article showed Hilsa research and development led actors to have higher propensity to adopt positive responses and experience higher recovery rate (resilience) but maladaptive strategies still pursued<br><br>Independent Hilsa management investment evaluation complete |

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| | | | | | | | Submitted journal article on novel indicators developed and tested<br><br>Cambodia rice-fish systems paper<br><br>Back to the future with rice-fish agroecosystems |
| | | | Knowledge on trade-offs was progressed through evaluations of marine fisheries and conservation; publication of a guide on fish in multi-functional landscapes and fisheries; and research within the Africa's Great Lakes region. Together, research is helping identify policies and practices for managing trade-offs and enhancing food, nutrition and livelihood outcomes from better recognition and management of fish within multi-sectoral policies and multifunctional landscapes. | New knowledge of trade-offs between small-scale fisheries, infrastructure and land use. | Complete | Trade-offs evaluated in 3 systems:<br><br>(1) For marine systems trade-offs between conservation of biodiversity goals and fisheries goals evaluated, as well as social justice goals as changes are navigated in coastal systems.<br><br>(2) For multi-functional landscapes trade-offs and opportunities of agricultural development were evaluated – with this and previous evaluations between developed into a guide for water managers – launched with FAO and IWMI in 2020.<br><br>(3) In Africa's Great Lakes region research protocols were designed, ethics approved and were collected to evaluate the trade-offs and opportunities in the fish oil and fish meal industries – where | Tradeoffs and synergies in coastal systems<br><br>Social determinants and justice analysed and published for navigating change in coastal systems.<br><br>Guide for water resource managers and a WLE blog "Water for Fish: Sustainable inland fisheries" highlighting background, history and key research products.<br><br>FISH Managing Partner Natural Resources Institute blog "Small but mighty: enhancing the superfood potential of small pelagic fish" |

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| | | | | | | livelihood and nutrition trade-offs were explicitly examined. Novel Delphi stakeholder analysis was used to identify policy pathways (in prep). | |
| | | | | Completion of foresight analysis (accounting for environmental, demand, production trends) of small-scale fisheries performance | Extended | Milestone is extended awaiting analysis of data sets from the Illuminating Hidden Harves (IHH) country case studies. These data will enable a new level of precision in national and regional foresighting.Data collated for small-scale fisheries will be used to refine foresight models in Egypt, Zambia, Nigeria and Malawi as part of the national policy dialogues planned in 2021 | |
| | | | FISH has successfully partnered closely with a number of global, regional and national institutions to enable wider application of governance and production models for freshwater systems.<br><br>The approach will now shift to assisting and enabling uptake of the guidelines into national policies, with some progress in 2020 in Cambodia with adoption of | Wider adoption and application of governance and production models for freshwater systems. | Complete | The joint launch with FAO and IWMI of the guidelines "Increasing the benefits and sustainability of irrigation through integration of fisheries: A guide for water planners, managers and engineers" provided a globally influential policy guideline for further widescale application of governance and production models.<br><br>In addition, joining a coalition of partners in the newly | Global fish integration guidelines published with FAO<br><br>Public launch event and publicity<br><br>Inland Fisheries Alliance<br><br>Mini symposium on fish rice in Cambodia and the lower Mekong basin<br><br>MELOICR451<br>MELPOL365 |

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| | | | the community-fish refuge management guidance through the Cambodia Government and integration of the principles into an ADB water management investment in Cambodia. | | | founded Inland Fisheries Alliance is a further pathway towards enabling wider application of governance and production models for freshwater systems.<br><br>Mini-symposium convened for Cambodia and the Mekong region to publicize and support scaling of rice-fish innovations with partners IRRI, IWMI, Cambodia FiA, ACIAR, Australian Universities | |
| | | | Research protocol developed to evaluate scaling strategies for gender-inclusive, community-based co-management – builds on research published on scaling social principles. Research on scaling strategies had commenced in the Pacific – but delayed by research partner reprioritisation. The potential to provide a scaling framework for these flexible and dynamic innovations (practices, adaptive management) also pending nutrition-sensitive model finalisation. | Investment in effective (evidence based) scaling strategies to spread innovations in focal and scaling countries and supporting nutrition-sensitive fisheries management model. | Extended | Developed framework for scaling social principles and dynamic/flexible practices published, but further work needed to apply framework to evaluate scaling strategies). | Rights, equity and justice: A diagnostic for social meta-norm diffusion in environmental governance |

## Table 6. Number of peer-reviewed publications from current reporting period (sphere of control)

The following table provides overall numbers of peer-reviewed publications, with a link to the full list indicated in Part C.

| | Number | Percentage |
|---|---|---|
| **Peer-reviewed publications** | 81 | 100% |
| **Open access** | 62 | 77% |
| **ISI** | 79 | 98% |

## Table 7. Participants in capacity development activities

The following table summarizes participants in capacity development activities during 2020, subdivided according to CGIAR performance indicators, in short- and long-term programs.

| Trainees | Female | Male |
|---|---|---|
| In short-term programs facilitated by FISH | 267,673 | 138,431 |
| In long-term programs facilitated by FISH<br>(Including 16 female and 11 male researchers in PhD programs) | 19 | 13 |

## Table 8. Key external partnerships

The following table lists key partnerships in 2020 for each flagship. A full list of current partners is provided as supporting evidence (Evidence F: Full list of current external partnerhips).

| Lead Flagship (FP) & Cluster | Brief description of partnership aims (30 words) | List of key partners in partnership. Do not use acronyms. | Main area of partnership: Research/Delivery/Policy/ Capacity development/Other, please specify _____ |
|---|---|---|---|
| FP1<br>C1 | Research is being done on genomics and genetics of advanced disease resistance and resilience traits in tilapias and carps. | a) French Agricultural Research Centre for International Development (Montpellier, France)<br>b) The Earlham Institute (Norwich, UK)<br>c) The Roslin Institute (University of Edinburgh, UK)<br>d) Swedish University of Agricultural Sciences (Uppsala, Sweden)<br>e) Wageningen University and Research Center (Wageningen, Netherlands)<br>f) Mississippi State University, Feed the Future Innovation Lab for Fish | Research (a, b, c, d, e, f)<br>Capacity development (a, b, c, e) |
| FP1<br>C2 | Research and delivery of epidemiological, diagnostic and management tools are being done to reduce disease risks in tilapia and carp aquaculture. During 2020, there was increased emphasis on engaging with national partners in testing and scaling tilapia and/or carp diagnostics, epidemiology and health tools and their application to decision-making. | a) Bangladesh Agricultural University<br>b) Bangladesh Fisheries Research Institute<br>c) Center of Excellence for Shrimp Molecular Biological and Biotechnology, Faculty of Science, Mahidol University (Bangkok, Thailand)<br>d) Centre for Environment, Fisheries and Aquaculture Science (Lowestoft, UK)<br>e) Chulalongkorn University (Bangkok, Thailand)<br>f) Department of Fisheries (Bangladesh)<br>g) Food and Agriculture Organization<br>h) Khulna University (Bangladesh)<br>i) The Norwegian Veterinary Institute (Oslo, Norway)<br>j) The University of Exeter<br>k) University of Queensland<br>l) Wilderlab NZ Ltd (Wellington, New Zealand)<br>m) World Organisation for Animal Health | Research (a, b, c, d, e, h, I, j, k, l)<br>Delivery (f)<br>Policy (f, g, m)<br>Capacity development (a, g, m) |
| FP1<br>C2 | Research is being done to reduce the use of AMR agents, and One | a) Centre for Environment, Fisheries and Aquaculture Science<br>b) Dutch Science Foundation<br>c) Ending Pandemics (San Francisco, US) | Research (a, f, g, h, I, j)<br>Delivery (d)<br>Capacity development (b, c, e, j) |

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| | Health approaches are being applied in aquaculture. | d) Fleming Fund (London, UK)<br>e) Fish Inspection and Quality Control (Khulna, Bangladesh)<br>f) Food and Agriculture Organization<br>g) Khulna University ()<br>h) Royal Veterinary College (London, UK)<br>i) Stockholm Resilience Centre (Sweden)<br>j) The University of Exeter<br>k) University of Waterloo (Toronto, Canada)<br>l) World Animal Health Organization | Policy (k) |
| FP1<br>C2 | Research partnerships have been formed for on-farm trials and scaling of the nutritious pond concept. | a) De Heus Animal Nutrition, Ede (fish feed company in Bangladesh)<br>b) AllerAqua, Christianfeld (fish feed company in Zambia) | Research (a, b)<br>Capacity development (a, b) |
| FP1<br>C3 | Research is being done for the implementation of a baseline study on tilapia farm performance in Egypt. | a) Skretting (fish feed company in Norway) | Research (a)<br>Capacity development |
| FP1<br>C3 | Research is being done on the development of tools for life cycle assessment (LCA) and environmental and climate performance of different aquaculture systems. | a) Stockholm Resilience Center (Sweden)<br>b) Washington State University (US) | Research (a, b) |
| FP2<br>C1 | Research and scaling is being done for improvements in equitable nearshore fisheries management and capacity building, with coastal communities and agencies in Solomon Islands, Vanuatu and Kiribati (Pacific regional scaling focus via the SPC) as well as Bangladesh. FISH partnered with Minderoo and Schmidt Foundations in support of digital tools for small-scale fisheries management | a) Department of Fisheries (Bangladesh)<br>b) The Pacific Community (Nouméa, New Caledonia)<br>c) Ministry of Fisheries and Marine Resources (Solomon Islands)<br>d) Timor-Leste Ministry of Agriculture and Fisheries (Dili, Timor-Leste)<br>e) University of Wollongong (Australia)<br>f) Charles Darwin University<br>g) Minderoo and Schmidt Foundations<br>h) The Royal Norwegian Embassy (Jakarta, Indonesia)<br>i) Food and Agriculture Organization | Research (a, d, f)<br>Capacity development (d, f)<br>Delivery (a, g)<br>Policy (a, b, c, g) |

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| FP2<br>C1 | Co-development is being done for a participatory MEL process, system and indicators to support the transparent implementation of the SSF Guidelines (FAO 2015) by governments, initiatives and organizations. | a) Food and Agriculture Organization<br>b) International Center for Agricultural Research in the Dry Areas | Research (a, b)<br>Delivery (a, b)<br>Policy (a, b)<br>Capacity development (a, b) |
| FP2<br>C2 | Fish and aquatic food systems are being integrated into water management infrastructure and systems management, including research on solutions, release of a set of guidelines on fish-friendly irrigation and partnership dialogue to enhance uptake. The implementation of guidelines is also being integrated into a new partnership on inland fisheries. | a) Charles Sturt University (Albury, Australia)<br>b) National ministries (Cambodia and Myanmar)<br>c) Food and Agriculture Organization<br>d) Inland Fisheries Alliance<br>e) Vulnerability to Viability Global Partnership | Research (a, e)<br>Capacity development (a, e)<br>Delivery (b, c)<br>Policy (b, c, d, e) |
| FP2<br>C3 | Connections were increased between research and key FAO policy instruments. This included FISH research being represented at the FAO International Conference on Fisheries Sustainability in November 2019 and in IHH research on the value of small-scale fisheries. | a) Food and Agriculture Organization (relevant also for Cluster 1, and Cluster 2)<br>b) Duke University (North Carolina, US) | Research (b)<br>Policy (a) |
| FP2<br>C3 | A collaboration was formed to complete the research for the IHH initiative and to translate the research into policy and investment.<br><br>Rational and healthy use of small fish is being incorporated into the | a) Lancaster University<br>b) Africa Centre of Excellence: Malawi Aquaculture and Fisheries with Lilongwe University of Agriculture and Natural Resources<br>c) Stockholm Resilience Center and Stanford Center for Ocean Solutions<br>d) Food and Agriculture Organization of the United Nations<br>e) FishBase<br>f) University of Tasmania, Centre for Marine Socioecology, Australia | Research (a, f)<br>Capacity development (b)<br>Policy (c) |

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| | feed and food systems of small-scale agriculture.<br><br>Partnership with Stockholm Resilience Center and Stanford Center for Ocean Solutions in a Blue Foods Assessment, a component of the EAT-Lancet initiative on transforming food systems | | |
| FP1 and FP2 | Research is being conducted around impacts of FISH innovations and policies, including the development and rollout of a project benefits methodology to assess future benefits of innovation packages in relation to the five One CGIAR impact areas. | a) University of Tokyo<br>b) University of Pisa, Department of Agriculture, Food and Environment<br>c) University of Ferrara, Department of Chemical, Pharmaceutical and Agricultural Sciences | Research (a, b, c, d)<br>Policy (b, c, d) |
| FP1 and FP2 | COVID-19 research and policy development | a) Multiple partners, but notably FAO and national public partners | |

## Table 9. Internal cross-CGIAR collaborations

The following table provides key collaboration among CRPs, platforms and centers during 2020, where these are not already core partners of FISH.

| FP | Brief description of the collaboration | Name(s) of collaborating CRP(s), Platform(s) or Center(s) | Optional: value added, in a few words e.g. scientific or efficiency benefits |
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| FP1 C1 | No new collaboration was made with the Excellence in Breeding Platform in 2020. | Excellence in Breeding Platform | Efficiency was improved. |
| FP1 C2 | WorldFish, the ILRI, IFPRI and IWMI shared research post-doc and collaborative initiatives on modeling AMR in water systems and assessing and reducing AMR use in aquaculture. | CGIAR Antimicrobial Resistance Hub | AMR stewardship, capacity building and collaborative research on AMR were done under the One Health framework. |
| FP1 C2 | Big Data Inspire Challenge is a project for rapid genomic detection of a culture pathogens. | Big Data platform of International Center for Tropical Agriculture (CIAT) | Collaborative research was done for harnessing the power of big data, bioinformatics and genome sequencing for rapid disease diagnosis in aquaculture. |
| FP1 C3 | Collaborations included a CGIAR foresight report with all CGIAR centers, foresight research in Nigeria and development of a fish module for the IMPACT model. Several co-investments were also made in aquaculture value chains and COVID-19 research in Ghana, Nigeria and India. | PIM | Collaborative research was done to understand fish futures and development of foresight modeling tools. Market chains, gender and policy responses to the COVID-19 pandemic were formed, including a journal article on COVID-19 policy responses in Nigeria and their impacts on fish value chains. |
| FP 1 & FP2 | Collaboration with the CCAFS was strengthened across FISH in several areas: (1) CCAFS Flagship 4 (Climate Services and Safety Nets) on increasing access of climate information services to aquaculture farmers and fishers in Bangladesh and Odisha, India, (2) development of a “fish” component in Mali and Zambia within the new World Bank-funded AICCRA project, and (3) development of the 2DI mainly through two “challenges,” the first addressing climate change in Asian mega-deltas (with the IRRI and IWMI) and the second a Blue Challenge covering the Pacific, South Asia and the African Great Lakes (with IWMI and regional partners). | CCAFS | The integration of aquaculture and small-scale fisheries within climate change initiatives has been accelerated. Results of the 2DI “listening sessions” were integrated into the World Resources Institute conference proceedings. |

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| FP1<br>C3 | A food system integration story was published that captures synergies between fish and roots, tubers and bananas in food systems, focusing on Nigeria and Bangladesh. The cooperation was also extended to new research in African Great Lakes region. | RTB | |
| FP2 C1 | FISH partnered with the Big Data Platform to scale big data from small-scale fisheries. | Big Data platform of the CIAT | Research was done on the automation and scaling of digital fisheries monitoring and analytics to drive inclusive small-scale fisheries management and governance in Asia and Africa. |
| FP2, C1, C2, C3 | A framework was developed to guide research engagement in the policy process, with application to small-scale fisheries. | IFPRI, WorldFish | Development of an analytical framework to understand the impact of research on policy processes |
| FP2<br>C2 | A partnership with the WLE combined complementary research interests, including refinements to ecosystem-based approaches to fisheries management and associated innovations and relations between landscapes and diets in Myanmar. | WLE, particularly the flagship on Managing Resources, Risks and Competing Uses for Resilience | Joint funding was successfully pursued. as were design and delivery of scientific research. The likelihood of policy influence has been increased. |
| FP2<br>C2 | FISH collaboration was formed with various partners on rice-fish systems and the 2DI on Asian mega-deltas. | WorldFIsh, IRRI, IWMI, Center for International Forestry Research | Scientific, integrated, interdisciplinary research outputs were co-authored and designed, focusing on rice-fish systems. The potential for policy and practice influence has been increased. |
| FP2 C2 | WorldFish and the IWMI partnered on a WLE-led project investigating gender in the highly vulnerable wetlands in transition to the Ramsar conservation areas in the Gulf of Mottama, Myanmar. WorldFish is playing the role of senior gender advisor to the project, partnering with the IWMI gender leader. | WLE, particularly the flagship on Managing Resources, Risks and Competing Uses for Resilience | Lessons were applied from FISH regarding methodologies to assess inclusion-exclusion in governance, drawing on earlier CGIAR GENNOVATE methodologies, as well as applying Aquatic Aquaculture Systems (AAS) and FISH insights regarding GTAs. |

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| FP2 C2 | Collaborative research and co-investment was made into global synthesis research on policy impacts and COVID-19 research. | IFPRI, PIM | Scientific, policy influence, institutional strengthening. |
| FP2 C3 | A research collaboration was formed with A4NH food systems researchers to build a fish in food systems research agenda. A PhD on fish in diets of youths in Bangladesh was co-funded with Wageningen University. FISH also participated in the A4NH Academy, publishing a joint blog titled "Failing Food Systems: Can Aquatic Foods Turn the Tide." | Wageningen University, A4NH | A research article (in revision) was co-authored. Research advice was provided on food system research framing and design. A PhD candidate is being co-funded and co-supervised. |
| Gender | FISH is represented on the management committee of the GENDER platform and was awarded several competitive grants. | GENDER Platform | FISH/WorldFish led a chapter on GTAs (to be released in 2021). |
| IITA | Cooperation in aquaculture was formed in the DRC in the youth agripreneurs program, making significant progress in the Lake Kivu region of the country. | IITA (DRC) | MELOICR425 |
| CGIAR COVID-19 Hub | This partnership connected FISH research through participation in CGIAR's COVID-19 working groups and research, including working groups on value chain fractures and One Health and in supporting country responses. | CGIAR COVID-19 Hub | Active participation the COVID-19 hub began late in 2020, with a variety of research activities ongoing in 2021. |
| MELIA | A close cooperation with other key centers and CRPs has continued since 2018 to refine and develop the MEL platform. Communication material and training tools have been jointly developed and training provided to all FISH researchers. Three webinars to support the development of the 2021 POWB as well as refresher demos to augment online planning exercises via the MEL platform were collaboratively conducted by three CRPs. A learning exercise was conducted to feed into succeeding MEL webinars. | ICARDA, CIP and IITA and the RTB and GLDC CRPs) | Efficiency and effectiveness of FISH has increased through MEL and cross center/CRP cooperation and support for capacity development. |

## Table 10. Monitoring, evaluation, learning and impact assessment (MELIA)

The following table provides the status of evaluations, impact assessments and other learning exercises planned in the POWB.

| Studies/learning exercises planned for this year (from POWB 2020) | Status complete, extended, cancelled, changed | Type of study or activity | Description of activity / study | Links to MELIA publications |
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| Baseline study for the assessment of current tilapia production, productivity and environmental effects in Egypt | Complete | Ex-ante, baseline and/or foresight study | This study on aquaculture performance assessment in Egypt is a direct result of a successful partnership between Skretting and WorldFish developed under the umbrella of FISH. The report provides important insights about the current status of aquaculture in Egypt, identifies areas of urgent intervention in addressing constraints to aquaculture production, and serves as a good baseline against which future evaluations can be benchmarked. | Shikuku KM et al. 2019. Aquaculture performance assessment in Egypt: Preliminary descriptive analysis. Malaysia: WorldFish. Presentation.<br><br>Shikuku, Kelvin Mashisia; Van Tran, Nhuong; Henriksson, Patrik; Nasr-Allah, Ahmed; Roem, Arjen; Badr, Alaa; Cheong,Kai Ching; Sbaay, Ashraf S.; Calmet, Maria Angela; Charo-Karisa, Harrison; Rossignoli, Cristiano M., 2021, "Dataset for Baseline Integrated Assessment of Aquaculture Systems Performance in Egypt", Harvard Dataverse, V1 |
| Baseline study to assess the current aquaculture systems in Northern and Luapula provinces, Zambia | Complete | Ex-ante, baseline and/or foresight study | The main objective of the census was to provide baseline data for the Aquaculture Technical, Vocational, and Entrepreneurship Training for Improved Private Sector and Smallholder Skills project. The project is implemented by WorldFish in partnership with the NRDC in Lusaka, Zambia, the BluePlanet in Norway and the Musika Development Initiatives in Zambia's Northern and Luapula provinces. The census collected data to understand smallholder fish farming systems in Northern and Luapula provinces, including the fish farmers, their locations and the fish production systems. The census collected the following data on the smallholder farmers: (i) demographics (ii) fish farming | Kakwasha K and Mudege N. 2021. Dataset: Smallholder fish farmers population census report 2020: Northern and Luapula provinces, Zambia. Harvard Dataverse, V1.<br><br>Kakwasha K, Mudege NN, Sichilima T, Sebele M, Nabiwa L and Lundeba M. 2020. Smallholder fish farmers population census report 2020: Northern and Luapula provinces, |

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| | | | background, (iii) resources and fish species cultured, (iv) gender, youth and the division of roles in fish farming, (v) access to input and output markets, (vi) production constraints and opportunities, (vii) and the Global Positioning System location of the farming households. | Zambia. Penang, Malaysia: WorldFish. Program Report: 2020-40. |
| Assessing the impacts of genetically improved farmed tilapia (GIFT) on livelihoods, nutrition and food security, and gender empowerment in Bangladesh | Changed | Correlates of adoption / impact study | The performance of genetically improved farmed tilapia (GIFT) in various contexts has been demonstrated through on-station and on-farm evaluations. Evidence indicates that adopting GIFT can improve economic returns for farmers through increased fish yields. It can also increase survival rate, shorten harvest time and increase individual harvesting weight, reduce production and operational costs, and reduce local fish market prices—all of which improve affordability among consumers. While some of these possible impact mechanisms are relatively well understood, the challenge faced in all impact evaluations is the establishment of a convincing counterfactual without which it is impossible to infer causality. The study was conducted in Bangladesh, with funding from SPIA, and identified dissemination and catchment areas of the GIFT in Bangladesh. In the study, we surveyed tilapia hatcheries and farmers and showed that information provided by hatcheries closely matched that provided by farmers. We demonstrate how “catchment areas” for an innovation disseminated over a long period of time, such as GIFT, can be identified. We also show that there are enough tilapia farmers (both GIFT and non-GIFT) to allow an adequately powered impact evaluation for GIFT in Bangladesh. Our ability to validate the catchment areas for GIFT and non-GIFT farmers suggests the possibility to construct a counterfactual for evaluation of impacts of GIFT, which will be the next step. | Shikuku KM, Rossignoli CM, Lam RD, Kumar Barman, B. 2021. Evaluating impacts of GIFT adoption at scale: Understanding the dissemination process from hatcheries to farmers in Bangladesh. Harvard Dataverse, V1.<br><br>Rossignoli, C. M. Shikuku, K. M. and Dam Lam, R. (19/2/2021). Evaluating Impacts of Genetically Improved Farmed Tilapia: Challenges and strategy. SPIA Webinar Series. Presentation. |
| Baseline study for small-scale aquaculture systems in Myanmar | Extended | Ex-ante, baseline and/or foresight study | The Fish for Livelihoods (formerly SAIL) project is funded by USAID and implemented by WorldFish in Myanmar. The study aims to provide important insights about the current status of aquaculture in Myanmar, identify areas of urgent | |

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| | | | intervention in addressing constraints to aquaculture production, and serve as a good baseline against which future evaluations can be benchmarked. Data collection was concluded despite the delay due to the COVID-19 pandemic. A report will be published in 2021. | |
| Baseline study for the assessment of current aquaculture systems in Rajshahi and Rangpur divisions, Bangladesh | Extended | Ex-ante, baseline and/or foresight study | This study was planned in two phases. The first was based on a participatory consultation to identify hot-spots and cold-spots for aquaculture production and related prevalence of different aquaculture systems in Bangladesh. The scope of this was to inform sampling for the rollout of the second phase of data gathering. The study completed the first phase but had to delay the second due to the COVID-19 pandemic. Data collection is expected to be conducted in 2021. | |
| Review of inclusive business models and their application in aquaculture development | Complete | Synthesis (secondary) study) | We reviewed 36 papers under seven business models commonly used in agriculture development to assess their application in aquaculture value chains in lower-income countries. A global value chain analysis is used to unpack the economic and social upgrading objectives of the different inclusive business models (IBMs), as well as the types of relational coordination used between actors in the chain to achieve development outcomes. The extent to which these IBMs helped poor actors overcome certain barriers is evaluated with a focus on how they may ensure or be a risk to inclusiveness through the relations and upgrading opportunities evident in their makeup. The analysis found that the majority of the models focused on economic upgrading over social upgrading. Providing opportunities for the latter is key to achieving the inclusive objectives of IBMs. Greater horizontal coordination between actors can create further opportunities for economic upgrading established under vertical coordination with other nodes upstream and downstream in a value chain. There is a need to further contextualize these models to aquaculture systems and develop clear indicators of inclusiveness. | Kaminski AM et al. 2020. A review of inclusive business models and their application in aquaculture development. *Reviews in Aquaculture* 12(3):1881–1902. |

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| Forecasted impact evaluation of genetically improved carp in Bangladesh | Extended | Ex-ante, baseline and/or foresight study | The study was not carried out due to the delay in implementing the trials to evaluate the performance of the genetically improved carp in farming conditions in Bangladesh. This is a key piece of information for modeling the impact evaluation in advance. The study will be carried out in 2021. | |
| Impact assessment of the Odisha Convergence program on Fish Farming by women self-help groups in village tanks in Odisha, India | Changed | Program/project adoption or impact assessment | Due to the COVID-19 pandemic, the study was not carried out as for limitation in field activities. However, based on open discussion with stakeholders in Odisha, the scope of the impact assessment is now being revisited to capture additional aspects about the aquaculture program in Odisha. Impacts of polyculture systems will be included in the impact assessment design. | |
| Project evaluation: Improving the Production, Nutrition and Market Values of Small-Scale Aquaculture in Myanmar's Shan State and Sagaing Region (INLAND MYSAP) | Extended | Program/project adoption or impact assessment | INLAND MYSAP supports the sustainable intensification of the small-scale freshwater aquaculture sector, improving the availability and access to nutritious, affordable food and increasing incomes for poor and vulnerable households in four fish-deficient townships in Shan State and Sagaing Region. The assessment tries to assess the progress of the project, and it highlights the impacts of improved small-scale freshwater aquaculture practices on poverty reduction and nutrition and food security in the area of implementation. The project was extended for an additional year based on the request of the donor who provided additional funding. As a consequence, the evaluation has also been postponed and will be carried out in 2021. | |
| Project evaluation: Enhancing livelihoods while governing marine resources in Pacific Island countries | Extended | Program/project evaluation or review | A participatory evaluation was started in November 2019 and continued during 2020 to assess progress made by the project. Qualitative and quantitative data produced by the project and the evaluation have been analyzed; however, the report has been delayed. It is expected in 2021. | |

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| Impact assessment of hilsa co-management system on productivity, nutrition and food security, and environment in Bangladesh | Extended | Synthesis (secondary) study) | Early experiences and implementation challenges regarding fisheries co-management systems related to hilsa have been collected about sanctuaries in Bangladesh. Further knowledge about co-management systems has also been produced with impact-related publications from different case studies. In 2021, the impact assessment will continue to provide a more structured and holistic view of the effects of a hilsa co-management system on productivity, nutrition and food security, and the environment in Bangladesh. | Islam MM, Nahiduzzaman MM and Wahab MA. 2020. Fisheries co-management in hilsa shad sanctuaries of Bangladesh: Early experiences and implementation challenges. *Marine Policy* 117:103955. |
| Evaluation of fisheries performance of community-based co-management in Pacific Island Countries | Extended | Synthesis (secondary) study) | Various evaluations for fisheries co-management systems were initiated in the Pacific, including from different case studies. However, a comprhensive evaluation process has not yet concluded due to the delay in compiling the case studies. In 2021, the impact assessment will continue to provide a more structured and holistic view of the effects of co-management systems on productivity, nutrition and food security, and the environment in Solomon Islands, Timor-Leste and wider Pacific. | Smallhorn-West PF et al. 2020. Community management yields positive impacts for coastal fisheries resources and biodiversity conservation. *Conservation Letters* 13(6):e12755.<br><br>Smallhorn-West PF et al. 2020. Incentivizing co-management for impact: Mechanisms driving the successful national expansion of Tonga's Special Management Area program. *Conservation Letters* 13(6):e12742.<br><br>Tilley A et al. 2020. Evaluating the fit of co-management for small-scale fisheries governance in Timor-Leste. *In* Purcell SW, Crona BI and Pomeroy R, eds. Small-scale and artisanal fisheries: Insights and approaches for improved governance and management in a globalized context. Lausanne: Frontiers Media SA. 123–39. |

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| Fish foresight modeling study in Nigeria | Complete | Ex-ante, baseline and/or foresight study | The study was completed and a report prepared to better understand future macro-level fish market demand and supply trends in Nigeria. The publication process has begun and it will be completed in 2021. | |
| Policy effectiveness study (SA and SSFs): Land use policy reform (2018–2022) in multifunctional landscapes as a driver to increase income and well-being in Myanmar | Cancelled | Synthesis (secondary) study) | Due to the COVID-19 pandemic and the situation in Myanmar, the policy process for the land use reform has been interrupted, so the study could not be completed. It has been suspended for the time being. | |
| Foresight modeling on aquatic foods in global food systems | Extended | Ex-ante, baseline and/or foresight study | Progress was made in development of a fish module for the International Food Policy Research Institute (IFPRI)'s International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT), but the model was delayed due to the committment of IFPRI to the one CGIAR transition. Informal contributions were made to foresight research with IFPRI in preparation for the OneCGIAR, but no additional research products were published in 2020. | |
| Capacity development and joint learning exercises for the improvement of the Monitoring, Evaluation and Learning (MEL) platform and its integration within the CGIAR data architecture system | Complete | Other MELIA activity: Collaboration for capacity enhancement | RTB, FISH and GLDC collaborated developing joint webinars for more than 300 scientists across the programs aiming to provide better understanding of CGIAR Indicators and their use. This is an activity performed each year to support new scientists and provide updates for the existing ones. | https://hdl.handle.net/20.500.11766.1/ed5940 |
| Ensure real time data visualization based on conceptualized indicator framework Monitoring and Evaluation of Agri-Science Uptake in Research and Extension (MEASURE), Managing Agricultural Research for Learning and | Complete | Other MELIA activity: Indicator-based information visualization | The initial phase, carried out in 2019, has achieved the development and implementation of a mutual visualization dashboard (CLARISA). However, the need for a further integration around CGIAR AR Indicators, for a better disaggregation of data and new requirements, led the MEL-MARLO team to continue the activities in 2020 for an increased synergy of the systems under the guidance of CGIAR System Management Office Team and in partnership with the GLDC, FISH and RTB CRPs. | https://www.cgiar.org/impact/results-dashboard/ |

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| Outcomes (MARLO), CGIAR Level Agricultural Results Interoperable System Architecture (CLARISA) | | | | |
| MEL platform implementation | Complete | Other MELIA activity: MEL installation | The FISH MELIA system has been migrated to the MEL platform (installation in 2018), and 95% of ongoing projects were recorded in 2019. Training tools were developed and training was provided to FISH researchers. Routine-based training was planned to support program-wide implementation in 2020. | Megi Cullhaj. (18/1/2021). Illustrated guideline on how to finalize the reporting of Milestones via the Monitoring, Evaluation and Learning (MEL) platform. Presentation.<br><br>Megi Cullhaj. (23/1/2020). Illustrated guideline on how to report an output on MEL. Presentation.<br><br>Holmes H, Stacey S, Muliro J, Rossignoli C, Bonaiuti E, Proietti C, Cullhaj M, Jani S and Graziano Valerio. 2019. How MEL supports the data management cycle. WorldFish.<br><br>Holly H, Rossignoli C, Bonaiuti E, Proietti C, Muliro J, Graziano V, Jani S, Cullhaj M and Stacey S. 2019. Connecting MEL and ORCID. WorldFish. |

## Table 11. Update on actions taken in response to relevant evaluations

The following table provides an update (since 2019 reporting) on the response of FISH to recommendations made from the Independent Evaluation Arrangement (IEA) of previous CRPs (AAS and the Livestock and Fish CRP), the 2020 independent review of the FISH CRP and other relevant crosscutting evaluations.

| Name of the evaluation | Rec. # | Text of recommendation | Status of response to this rec. | Concrete actions taken for this recommendation | By whom | When | Comments |
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| FISH Independent Review | 4.1.1 | Quality of science<br><br>1.Efforts to unify and reduce reporting effort should continue.<br><br>2. The interaction of small- and large-scale fisheries should be given slightly more consideration in the future.<br><br>3. Slightly more emphasis on reproduction has the potential to enhance quality of science and effectiveness in both aquaculture and small-scale fisheries as outlined in this review. | Ongoing | For Recommendation 1, the MEL system continues to be used to improve the overall efficiency of reporting.<br><br>For Recommendation 2, the interactions between small- and large-scale fisheries are being included in the synthesis products of FP2 planned for 2021. Substantive research on this topic will need to be integrated within the new OneCGIAR research portfolio.<br><br>For Recommendation 3, reproduction of tilapia is included within the FISH POWB 2021 through increased investment in crypopreservation. | R1. Director and MEL team<br><br>R2. FP2 Flagship leader<br><br>R3. FP1 Flagship leader | By end of 2021 | Recommendations also to be considered in the development of the new OneCGIAR portfolio |
| | 4.1.2 | Effectiveness<br><br>1. More funding needs to be devoted to research on impact assessment.<br><br>2. The value of various traits differs among countries. To increase impact, different lines | Ongoing | For Recommendation 1, additional W1/W2 investments have been made into impact assessment research in 2021. In addition, bilateral projects are being encouraged to investment sufficient budget into impact assessment research. Cooperation with SPIA is also being pursued for impact assessments of | R1. Director and MEL team<br><br>R2. FP1 Flagship leader | By end of 2021 | Recommendations also to be considered in the development of the new OneCGIAR portfolio |

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| | | will likely need to be developed for different countries.<br><br>3. The development of genetically enhanced tilapia is at a critical juncture. To make a quantum leap forward, either multiple trait selection or the simultaneous use of multiple genetic enhancement programs is needed.<br><br>4. The poor are not always in a position to adopt some of the most effective new technologies. Increased involvement of medium and large private businesses may help with technology transfer to the poor and may open employment for the poor, shifting the paradigm toward more exporting of foods and fish and less importing, improving the nutrition and quality of life of the poor.<br><br>5. An increased number of manuals and grey outputs should be produced in the native tongue of the target countries. | | genetically improved tilapia in Bangladesh.<br><br>For Recommendation 2, a response is incorporated into a working paper on the future of CGIAR fish genetics being prepared during 2021.<br><br>For Recommendation 3, a response is also being included in the working paper refered to above, for consideration in the new One CGIAR portfolio 2022-2030.<br><br>For Recommendation 4, inclusive business model research will be pursued to a conclusion in 2021, and selected impact assessment research in 2021 will be used to further explore this recommendation and recommended actions for the new One CGIAR portfolio 2022-2030.<br><br>For Recommendation 5, we will further explore in 2021. | R3. FP1 Flagship leader<br><br>R4. FP1 Flagship leader and impact assessment lead<br><br>R5. Director,. FP1 and FP2 flagship and bilateral project leaders. | | |

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| | 4.1.3 | <u>Future orientation</u><br><br>1. Shortcomings in resources and inputs were overcome by partnering and leveraging with high-quality scientists from universities, research institutions, NGOs, and other CRPs, creating a large web or network. The legacy, reputation, and vast network of WorldFish have allowed them to leverage the investment in FISH into a high-quality and effective CRP, and this strategy should continue.<br><br>2.Partners stated that WorldFish's reputation and network have allowed them to obtain significant bilateral funding and partnerships with universities, research institutions, the private sector, and governments that bring resources and funds into the CRP; thus "the spider has spun an enormous, highly effective, and high-quality web." Respondents describe the strategy as "to work with the best," an approach and result recognized and highly admired by all partners interviewed, including all managing partners, several private companies, end users, and country partners, and this should continue. | Ongoing | For Recommendation 1, FISH will continue to use this strategy of partnerhip and leveraging into 2021, and the new OneCGIAR portfolio 2022-2030<br><br>For Recommendation 2, FISH partnership strategy in 2021 will continue as per the recommendation.<br><br>For Recommendation 3, work was initiated in 2020 and will continue in 2021 on a micronutrient model for inland fisheries.<br><br>For Recommendation 4, mechanisms for enhancing internal communications will be explored in 2021.<br><br>For Recommendation 5, the priorities highlighted have been integrated into the FISH POWB 2021. In addition, these recommendations are being brought to the attention of teams involved in preparation of the new OneCGIAR research portfolion 2022-2030. | R1. Director and MEL team<br><br>R2. FP1 Flagship leader<br><br>R3. FP1 Flagship leader<br><br>R4. FP1 Flagship leader and impact assessment lead<br><br>R5. Director,. FP1 and FP2 flagship and bilateral project leaders. | By end of 2021 | Recommendations also to be considered in the development of the new OneCGIAR portfolio |

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| | | 3. Harnessing Global Fisheries to Tackle Micronutrient Deficiencies was extremely impactful research. Perhaps small-scale fisheries, aquaculture systems, and genetics should diversify even more in the future and gravitate more toward increasing micronutrients and protein, not just protein. This paper focuses upon marine fish, and it would be impactful to repeat this analysis with freshwater fish.<br><br>4. Although this CRP is high quality and effective, small improvements in communication would be beneficial for improving the remaining life of FISH. Perhaps a small number of team-building exercises could be considered to improve communication, trust, empathy, and respect between administration and research, which would likely impact quality and effectiveness.<br><br>5. Most of the flagships, clusters, and cross-cutting themes are highly impactful and should be continued in One CGIAR to derive full benefit from the strong foundation that has been laid. Genetics, feed stuffs, diseases (the most important problem in aquaculture), nutritious ponds, | | | | | |

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| | | micronutrients, small-scale fisheries in general, rice refuges, policy enhancement, small community self-management as a continuum, and gender stand out in particular. More impact assessment research should be instituted. Youth and climate change are difficult topics, and increased collaboration with other Centers in One CGIAR may be beneficial. | | | | | |
| | 4.2 | <u>CGIAR System Level Recommendations</u><br><br>1.Quality of science and effectiveness would benefit in the future if delays in funding and early termination of CRPs could be avoided.<br><br>2. The main objectives of the unfunded FP3 (enhancing the contribution of fish for the nutrition and health of the poor) were integrated into FP1 and FP2. This has been one of the most successful and impactful areas of research and should receive increased support in the future.<br><br>3. The FISH CRP, which had a relatively small budget, has done an excellent job of leveraging resources (US$4 per every dollar invested), and increased support | Ongoing | For Recommendation 1, action is required at the OneCGIAR system level<br><br>For Recommendation 2, a line of research on fish and nutrition should be incorporated into the new portfolio development. FISH will continue to gather evidence of nutrition-related outcomes during 2021, and raise the profile of fish and aquatic foods for achieving OneCGIARs nutrition goals in the new portfolio 2022-2030<br><br>For Recommendation 3, FISH welcomes additional investment in the new portfolio. FISH will conduct additional research on the projected benefits of key innovations, helping to provide further evidence of the value of investment in fish agri-food systems in the new One CGIAR portfolio.<br><br>For Recommendation 4, additional SW1/W2 funds have been included in FISH POWB 2021, but this | R1. One CGIAR<br><br>R2. Impact assessment research lead. One CGIAR<br><br>R3. One CGIAR, MEL teams<br><br>R4. FP1 Flagship leader and impact assessment lead<br><br>R5. Director,. FP2 flagship and MEL lead | By end of 2021 | Recommendations also to be considered in the development of the new OneCGIAR portfolio |

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| | | would likely result in a good return on investment.<br><br>4. More funding needs to be devoted to research on impact assessment.<br><br>5. More funding needs to be devoted to the highly impactful work on small-scale fisheries. | | recommendation requires further uptake by One CGIAR in planning the new portfolio 2022-2030.<br><br>For Recommendation 5, this is noted and the 2021 FISH priorities will be used to build a further case for investment in small-scale fisheries in the future. | | | |
| AAS | R2 | Strengthening research capacity: AAS management should rethink its approach to staffing and the allocation of human resources. | Ongoing | High quality in the recruiting process in FISH was assured in order to guarantee the program with the right mix of human resources needed to develop science capacity across the program.<br><br>Additional recruitments were made in 2019 to strengthen research capabilities in FP1 and FP2.<br><br>Cross-CRP and partnership development was also used to strengthen research capacity within FISH. | MC, CRP director, flagship/cross-cutting leadership | End of 2021 | This is an ongoing process, and research capacity and quality will continue to be strengthened in FISH within our research teams and partners. |
| | R4 | Increase alignment of AAS activities: The decision to associate bilateral projects with the AAS should be based primarily on their potential to further the AAS research agenda. | Ongoing | All new bilateral projects are discussed and designed to further strengthen the FISH research agenda.<br><br>By doing this, FISH pursues the greatest efficiency and effectiveness of its | MC, CRP director, flagship/crosscutting leadership | End of 2021 | |

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| | | | | research by strengthening the synergies of research funded by W1/W2.<br><br>A formal alignment process is applied for W3/bilateral projects, which is undergoing further refinement with the development of the MEL system. The process has been assessed through the performance management standards. | | | |
| | R9 | Management information: A functional research management information system should be established. | Completed | The adoption of the MEL system was formally approved by the MC in June 2018 and has been progressively introduced into FISH. | M&E lead, program/project leads | Ongoing | |
| | R10 | CGIAR should justify further investment in aquatic agricultural systems more on the grounds of comparative advantage, and to do this the focus needs to be much more on fish. | Completed | FISH brings together and mutually integrates CGIAR's existing competences around fish—aquaculture and small-scale fisheries—and the generation of new knowledge and methodological innovations.<br><br>A food systems agenda has been strengthened through cooperation with A4NH under certain FISH research clusters (FP2, C3). | MC,<br><br>CRP director, flagship/crosscutting leadership | End of 2021 | |
| Livestock | R2 | Increase synergies between livestock and aquaculture. | Ongoing | The collaboration with the Livestock CRP continues to develop. Recently, it has focused around AMR and some interaction with the CRP in relation to research on health and feeds. | Flagship/cluster leads within FP1 | End of 2021 | |
| | R5 | Establish an M&E system based on the theory of change. | Completed | The MEL system is now in place to serve both performance monitoring and outcome evaluation on the basis of the | CRP director,<br><br>FISH M&E lead, FISH | By mid-2019 | |

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| | | | | theory of change, impact pathways and outcome targets.<br><br>A set of theories of change at the focal country level were further improved in 2019 to improve the capacity of the MEL system and to capture the results and performance in a more relevant, efficient and effective way. These continue to be used and revised in 2020. | MEL community of practice | | |
| | R6 | Build private sector partnerships for technology delivery. | Ongoing | Since its design, FISH has looked to identify potential private partners with shared objectives in order to find win-win solutions both for research and commercial interests. There was significant increase in private sector partnerships in 2020. | Flagship/cluster leads within FP1 | End of 2021 | |
| Gender in CGIAR Research and Workplace—Evaluation Report—CGIAR Gender in Research (Vol I) | R5 | CRPs should refresh and refocus their gender strategies and/or future workplans, as relevant to ensure alignment with priorities in the Gender in CGIAR Research Policy. | Ongoing | The FISH gender strategy was completed in 2018, and various supporting actions were introduced to integrate gender into FISH research and workplace activities. Ongoing activities strengthen gender integration. | CRP director, FISH gender lead | FISH gender strategy published in July 2018 | |

## Table 12. Examples of W1/W2 use in this reporting period (2020).

| Specific examples | Broad area of use of W1/W2 |
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| **FP1, Cluster 1.1 Genetics and genomics research in GIFT and carps**: W1/W2 funds contributed partial funding to the following:<br>(i) production of next generations of GIFT strains (Malaysia), Abbassa strain (Egypt) and tilapia genomics and genetic architecture research<br>(ii) production of a tilapia single nucleotide polymorphism chip for genetics/genomics research<br>(iii) support for the development of new rohu, catla and silver carp generations in Bangladesh<br>(iv) access and benefit sharing assessments in FISH focal and scaling countries<br>(v) research on sex-disaggregated trait preferences by users or carp and tilapia in Egypt and Zambia (tilapia) and Bangladesh and India (carps)<br>(vi) performance assessment of genetically improved carps and tilapia<br>(vii) standard operating practices for management of GIFT. | • Genetics and genomics research<br>• New tilapia and carp strains<br>• Investments in key research partners<br>• Aquatic genetic resources policy development<br>• User preference research |
| **FP1, Cluster 1.2 Tilapia disease:** W1/W2 funds contributed partial funding to the following:<br>(i) TiLV diagnostics, management and biosecurity in tilapia core genetic programs, hatcheries and farms<br>(ii) tilapia epidemiology and health economics research in Bangladesh, Egypt and Zambia<br>(iii) development of rapid genomic methods for disease detection<br>(iv) patho-microbiomes, pond-side diagnostic tools, antimicrobial use, and diagnostic techniques for tilapia farming<br>(v) lab-in-a-backpack prototype design for small-scale farmer diagnostics. | • TiLV diagnostics and risk reduction<br>• Biosecurity policy and practice development<br>• Epidemiology and economic assessment tools<br>• Fish disease diagnostic tools |
| **FP1, Cluster 1.2 Sustainable fish feed ingredients**: W1/W2 funds contributed partial funding to the following:<br>(i) novel fish feed ingredient research<br>(ii) development and testing of tools for fish feed formulation using low-cost ingredients<br>(iii) nutritious pond research and support for proof of concept and scaling of the concept<br>(iv) energy and feed management analysis of Bangladesh carp systems<br>(v) BMP guidelines and other extension products in support of scaling of feed and health management measures. | • Research partnerships<br>• Novel feeds research<br>• Nutritious pond scaling |

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| **FP1, Cluster 1.3 Aquaculture systems:** W1/W2 funds contributed partial funding to the following:<br>(i) new knowledge on aquaculture system performance assessment in FISH focal and scaling countries<br>(ii) policy development and scaling activities<br>(iii) new knowledge on environmental effects of aquaculture systems in focal and scaling countries<br>(iv) analytical framework and design studies on aquaculture innovation systems<br>(v) business models for inclusive business<br>(vi) digital solutions and tools for aquaculture performance assessment. | • Performance assessment of genetically improved tilapia<br>• Research on scaling and innovation systems<br>• Development of digital tools for performance assessment |
| **FP 2, Cluster 2.1 Resilient coastal fisheries**: W1/W2 funds contributed partial funding to the following:<br>(i) A partnership with JCU for adaptive coastal fisheries management and climate change research<br>(ii) co-management assessments in Solomon Islands<br>(iii) tools and methods for co-management application<br>(iv) gender integration in co-management<br>(v) livelihood alternatives in coastal fisheries. | • Co-management model assessments<br>• Gender integration<br>• Integration of climate resilience into coastal fisheries management<br>• Livelihood alternatives for coastal fisheries |
| **FP 2, Cluster 2.2 Fish in multifunctional landscapes:** W1/W2 funds contributed partial funding to the following:<br>(i) policy research and scaling of fish-rice systems and multifunctional landscapes in Myanmar<br>(ii) innovations for enhancing fisheries outcomes in rice-based landscapes, farming systems and water management in Cambodia and Myanmar<br>(iii) youth, fisheries and aquaculture in multifunctional landscapes<br>(iv) water management in Cambodia<br>(v) gender integration in fisheries and aquaculture innovations in multifunctional landscapes<br>(vi) rice-fish systems decision support tool. | • Shifting policy for integrating fish into rice-based landscapes and farming systems<br>• Water productivity and fisheries research<br>• Fish friendly irrigation and water management<br>• Youths and small-scale fisheries in multifunctional landscapes.<br>• Developing and testing a gender empowerment tool for rice-fish systems<br>• Decision-support tool for rice fish system interventions |
| **FP 2, Cluster 2.3 Fish in food systems*:*** W1/W2 funds contributed partial funding to the following:<br>(i) IHH research continuation with FAO and Duke University<br>(ii) capacity development/co-funding of PhD researchers in the African Great Lakes region<br>(iii) food system reviews for key geographies<br>(iv) emerging COVID-19 impacts, responses and lessons for building resilience in the seafood system<br>(v) partner funds for research on fish in the African Great Lakes system | • Small-scale fisheries in food systems research and policy development |

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| **Gender:** W1/W2 funds contributed funding to the following:<br>(i) strategic gender research, including development and testing of a GTA and WEFI<br>(ii) capacity building and coaching initiatives for gender integration within FISH | • Gender research and integration into FISH<br>• Research partnerships |
| **Youth:** W1/W2 funds contributed funding to the following:<br>(i) publishing the FISH youth strategy and working paper and integration into an HLPE paper<br>(ii) youth case studies in Myanmar and Nigeria. | • Youth research and integration into FISH<br>• Integration of FISH youth learning into HLPE paper |
| **Capacity development:** W1/W2 funds contributed funding to the following:<br>(i) completion of FISH capacity development strategy<br>(ii) integration of capacity development indicators into MEL<br>(iii) support for focal countries to improve reporting of capacity development. | • Capacity development supported and indicators captured |
| **Monitoring and evaluation:** W1/W2 funds contributed funding to the following:[5]<br>(i) M&E activities across FISH, including partial funding of selected outcome/impact assessments<br>(ii) continued strengthening of the MEL platform. | • MELIA<br>• MEL platform development |
| **Program management:** W1/W2 funds contributed funding to the following:<br>(i) investments in core program management activities, including partial funding of key PMU leaders and management staff, operations and learning meetings, including MC and ISC meetings. | • Governance and management of FISH |

Notes on column 2: **Explanation and some examples to help with categorization of the categories offered:**

(While understanding that some activities fall into several categories, it is still convenient for system-level presentation to divide the results by main category. If a choice must be made, it is usually preferable to select a more specific category (toward the top of the list) in preference to a phase of research (bottom of list).

- **Policy:** sole or partial funding source for disseminating findings, learning from evidence, etc.; for example, policy workshops, contracts with partners working on policy.
- **Partnerships:** startup and maintenance.
- **Capacity development:** any activities reported under the capacity development indicator.
- **Other crosscutting issues:** gender, youth, climate change; for example, funding research projects tagged as “principal” for one of the following: funding crosscutting work by the PMU, funding specific gender/youth/climate action ‘”add-ons” to other projects. *In every case, it should be obvious from the title of the activity what the crosscutting issue is*.
- **Other MELIA:** activities covered under the MELIA section of this reporting template.

[5] Tables 2, 3, 5 and 10 provide further information on the activities implemented.

- **Contingency/emergency:** for example, immediate unplanned responses to a new virulent disease or moving germplasm collections as a result of conflict.
- **Pre-startup:** conceptualization, design, ex-ante analysis before research startup; for example, foresight, ex-ante studies, building theories of change, proof-of-concept studies for novel areas of work. (However, startup meetings with partners should normally be tagged as “partnerships.”)
- **Research:** sole or partial funding source for a research line or significant research activity.
- **Delivery:** funding for any activities connected with scale-up and delivery.
- **Other, specify** _____

## Table 13. CRP financial report.

The following table provides the status of FISH financials for 2020 (all figures in USD).

| | Planned budget 2020* | | | Actual expenditure 2020** | | | Difference | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | W1/W2 | W3/bilateral | Total | W1/W2 | W3/bilateral | Total | W1/W2 | W3/bilateral | Total | |
| FP1 (Sustainable Aquaculture) | 2,157,000 | 18,452,043 | 20,609,043 | 2,411,200 | 14,525,197 | 16,936,397 | (254,200) | 3,926,846 | 3,672,646 | |
| FP2 (Sustaining Small-Scale Fisheries) | 927,000 | 4,648,326 | 5,575,326 | 1,130,831 | 3,693,443 | 4,824,274 | (203,831) | 954,883 | 751,053 | |
| Cross-program investments | 1,520,000 | | 1,520,000 | 1,891,268 | | 1,891,268 | (371,268) | | (371,268) | |
| Carry over and contingency funding | 825,086 | | 852,086 | - | | - | 852,086 | | 825,086 | Additional investment of W2 made available in November 2019, carried over and used for 2020 priorities |
| CRP management and support cost | 756,000 | | 756,000 | 608,321 | | 608,321 | 147,067 | | 147,679 | |
| CRP total | 6,212,086 | 23,100,369 | 29,312,455 | 6,041,620 | 18,218,640 | 24,260,260 | 170,466 | 4,881,729 | 5,052,196 | |

*Planned budget 2020 = 2020 SMO final approved budget USD 5.556 million plus 2019 carryover of USD 655,000.
**Source: Audited lead and participating center financial report.

# Part C: Additional evidence to be submitted through management information systems or as indicated

The following evidence is submitted separately and will be available via the MEL platform:

Evidence A: Full list of policy contributions in reporting year (Common Reporting Indicator I1): in MEL

Evidence B: List of CRP innovations in reporting year (Common Reporting Indicator C1): in MEL

Evidence C: Outcomes and milestones: in MEL

Evidence D: Full list of publications published in reporting period: in MEL

Evidence E: Altmetrics (Common Reporting Indicator I2): in MEL

Evidence F: Full list of current external partners: in MEL

Evidence G: Participants in capacity development activities in the current reporting period (Common Reporting Indicator C3): in MEL

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