



Four pathways to achieve gender equality and women's empowerment in small-scale fisheries and aquaculture: Insights from FISH research

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Authors

Rahma I Adam, Cynthia McDougall, Kate Bevitt, Sarah Freed, Chelcia Gomes, Abigail Johnson, Jacqueline Lau, Netsayi Mudege, Lizzy Muzungaire, Surendran Rajaratnam, Anouk Ride, Sajeda Yasmin and Tasnuva Zaman.

Citation

This publication should be cited as: Adam RI, McDougall C, Bevitt K, Freed S, Gomes C, Johnson A, Lau J, Mudege N, Muzungaire L, Rajaratnam S et al. 2021. Four pathways to achieve gender equality and women's empowerment in small-scale fisheries and aquaculture: Insights from FISH research. FISH Gender Report. Penang, Malaysia: WorldFish. Program Report: FISH-2021-28.

Acknowledgments

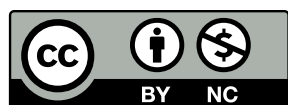
This technical report is published by the [CGIAR Research Program on Fish Agri-Food Systems \(FISH\)](#) led by [WorldFish](#) in partnership with the International Water Management Institute, Wageningen University & Research, James Cook University and the University of Greenwich. The program is supported by contributors to the [CGIAR Trust Fund](#). FISH is a multidisciplinary research for development program designed in collaboration with partners and stakeholders to develop and implement research innovations that enhance the contribution of small-scale fisheries and aquaculture to reducing poverty, increasing food and nutrition security, and improving natural resource systems.

This program report complements the FISH gender synthesis brief (Adam et al. 2021) and is one in a series of products published in 2021 to share learnings, outcomes and impacts from the FISH program.

Contact

WorldFish Communications and Marketing Department, Jalan Batu Maung, Batu Maung, 11960 Bayan Lepas, Penang, Malaysia. Email: fish@cgiar.org

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Executive summary

Addressing gender equality and women's empowerment is critical if aquatic food systems are to contribute more to improving food security, nutrition and livelihoods while reducing poverty. However, systemic gendered inequities and barriers persist, undermining progress toward achieving the UN Sustainable Development Goals (SDGs). This report aims to expound on the constraints and opportunities faced by women, men, marginalized poor and youths whose livelihoods depend on aquatic food systems. To address this, the report uses case studies and examples of research through the CGIAR Research Program on Fish Agri-Food Systems (FISH) that provide four pathways to advance women's empowerment and gender equality in aquatic food systems. The report is targeted toward researchers, practitioners and other bodies working and interested in making an impact in aquatic food systems, with a special focus on addressing social inclusion and inequities that arise from the systems. It is intended to stimulate actions and investments in fish and aquatic foods to realize their role in the transformation of food, land and water systems in a climate crisis. While the report is focused on aquatic food systems, it may also be useful for researchers and practitioners in other agricultural systems or products, and for gender researchers who are navigating the territory of understanding food systems. Through the review of previous work completed by WorldFish and its partners, FISH identified and progressed four pathways to enhance gender equality and women's empowerment in aquatic food systems.

- **Pathway 1:** Gender equity considerations must be integrated into every stage of innovation development, dissemination and uptake. This involves moving beyond male-focused innovation processes to include explicit assessments of women's needs and engage women as innovators. In addition, during the process of designing, developing and deploying a new innovation, it is important to consider the interests of youths and take into account the intersectionality aspects of the technology, such as wealth, education, age, caste, ethnicity and disability, among others.
- **Pathway 2:** Achieving inclusive livelihoods and wealth generation—including economic empowerment of poor women, men and marginalized individuals in a community—requires building the right enabling environment. Key enablers include supportive familial relations, education and strategies to avoid further loss of assets, such as social protection, investments in social networks, and engaging women in equitable decision-making at all scales.
- **Pathway 3:** Inclusive governance of small-scale fisheries (SSF) and aquaculture can be enhanced through gender-responsive and rights-based policies, closing the gender data gap, amplifying the voices and leadership of women and marginalized individuals, and creating strong buy-in from political leaders.
- **Pathway 4:** Gender-transformative approaches (GTAs) are needed to engage women and men in addressing underlying structural barriers in aquatic food systems, including constraining gender norms and relations.

Introduction

Gender equality and women's empowerment are globally recognized priorities, as enshrined in SDG 5.¹ Yet, gender inequalities and barriers remain prevalent in rural areas of low-income countries, including where there is a high reliance on aquatic food systems. The aquatic foods sector is crosscut by and reflects interconnected macro- and micro-patterns of social and gender inequalities and inequities (Rajaratnam et al. 2020). These play out in terms of gendered imbalances in unpaid work burdens, through the high proportion of women compared to men in low-return employment and less profitable nodes of value chains, unequal power and decision-making at multiple scales, and associated distributional inequities of benefits from the sector (FISH 2017a). These preexisting inequalities have exacerbated the effects of COVID-19 (and other shocks), which have hit women and already marginalized actors in the sector particularly hard in terms of loss of income and food and nutrition security (UN 2020).

Through its multipronged gender strategy (2017), FISH carried out research (2017–2021) to illuminate gender barriers and identify strategies to address them. This focused on four pathways: (1) gender-inclusive and gender-responsive innovations, (2) inclusive livelihoods and wealth generation, (3) inclusive governance and (4) GTAs to address underlying structural barriers. These connect to broader global themes of gender and social justice in terms of women's economic empowerment, human-rights based approaches (women's voice and choice), overcoming the data-design-policy cycle of gender-blindness, and transformative approaches.

This report presents a synthesis of key insights into the four pathways, including the main barriers, opportunities and evidence-based impacts and innovations that have wider relevance for transforming aquatic food systems and building forward better. These insights are in line with FISH's theoretical roots in a gender social relations approach and draw on feminist political ecology and economy. As such, they recognize intersecting forms of marginalization and power, take a multiscale approach and engage the knowledge and agency of local women and men in generating learnings and ways forward.

Four pathways to women's empowerment and gender equality: Insights and research examples from FISH

Pathway 1. Resilience of aquatic food systems relies on gender-inclusive and gender-responsive innovations

Insights into the challenge: Gender-blind and top-down innovation perpetuates gender gaps and missed opportunities

Innovation processes in aquaculture and SSF, similar to agriculture and natural resource management (NRM), have historically approached innovation as a technical challenge. As such, they have tended to “leave gender out of it.” Yet, in many spheres, assumptions of gender-neutrality implicitly contribute to male bias in design (Criado-Perez 2019; Polar et al. 2019), with spinoff effects of limited adoption and perpetuation of gender gaps. Moreover, combined with top-down innovation processes—research only “on” and “for” local women and men as beneficiaries—these create missed opportunities for building agency and adaptive capacity. FISH has witnessed these patterns overall in the aquatic foods sector. Men (not women) are seen in local to global policy scales as “fishers,” “fish farmers” and “household heads” (Aregu et al. 2017; Kruijssen et al. 2021). There is also a sectoral blindness to women's experiences and needs and to gender-related risks as well as opportunities to benefit and empower women (Rajaratnam et al. 2020; Kleiber et al. in press).

One salient example of this is climate-smart aquaculture (CSA), which is critical to ensuring sustainable fish supply in the face of climate change. Notably, shocks hit low-income rural women especially hard, yet little research exists about women's CSA needs or how CSA innovation can help empower women who are fish farmers. Another example is fish seed and feed innovation, which are critical inputs to the growth and success of aquaculture in low- and middle-income contexts. Yet innovation in developing fish breeding in the public sector has historically lacked sex-disaggregated trait preference data (Mehtar et al. 2020; Murphy et al. 2020b). Similarly, a FISH collaborative review with the research institute

Includovate (Ganguly et al. in press) identified that while the aquaculture sector is advancing technological innovation toward low-cost local feeds, there is no data on or methodologies for potential social and risk assessment from the diversion of local ingredients into fish feeds.

Research findings and solutions: To advance social inclusion, adaptive capacity and mitigate risk, work with women as co-researchers and spearhead gender-responsive technologies

FISH applied previous program methodological insights (e.g. Farnworth et al. 2016) to CSA innovation. Specifically, women co-developed CSA options through a unique study in Bangladesh. In this study, the farmer-field school approach was adapted to smallholder aquaculture (known as “fish schools”) to assess climate-resilient fish species suited to the local context. Co-research through women-led fish schools complemented technical training on cultivation and farmers' development of their own low-cost, local fish feeds, since commercial feeds are expensive and not considered climate-friendly. An assessment in collaboration with the University of Galway found that this approach contributed to several dimensions of women's empowerment. Notably, over 75 percent of women in the study reported positive changes in their household decision-



A fish farmer feeds her catfish in Stung Treng, Cambodia.

making power. These insights underscore the importance of research creating a space for women's agency in their own innovation processes, as well as ensuring aquaculture inputs and income are in the hands of women and men.

FISH also undertook novel cutting-edge research to provide guidance about the current state and future of public-sector breeding programs. A seven-country study, due out in 2022, broke ground by investigating gendered trait preferences. The study looked at fish, crops and livestock from the WorldFish-hosted CGIAR Gender and Breeding Postdoc Capacity Development Initiative, in collaboration with the CGIAR Gender and Breeding Initiative, and found gendered differences—as well as overlaps—in trait preferences in and especially along value chain nodes (McDougall et al. in press; Mehar et al. 2022). In India and Bangladesh, women and men had a shared interest in fish size, growth, appearance and

taste, but women more often had a preference for traits relating to household food and nutrition security, while men based their preferences toward market-related attributes like price (Mehar et al. 2022). Moreover, fish preferences and priorities were neither homogenous nor completely separate between genders, but tended to be related to gendered division of labor and gender dynamics in fish agri-food systems (McDougall et al. in press). As well as confirming the need for more gender-inclusive needs assessments, the research advances conceptual framings for breeding programs about gender and trait preferences. (See Box 1, with a focus on the work undertaken on fish seed in Egypt by Murphy et al. 2020.) Instead of assumptions of homogeneity or complete differences of gender preferences, the study presented a more nuanced framework that considers overlapping preferences with embedded differences in granularity, ranking or intensity.



Photo credit: Mohammad Shohrab Hossain/WorldFish

Farmers involved in fish seed production harden fingerlings in the village of Palashi, Lalmonirhat District, Rangpur, Bangladesh.

FISH also pioneered a work on fish feed with a focus on gender. FISH partnered with Includovate to conduct a literature review that examines the social and gender risks associated or related with the use of local ingredients for fish feed. The review team identified potential key risks for consideration

in feeds innovations, which includes the diversion of ingredients that women rely on for their own livelihoods and the potential exclusion of women from local feed business opportunities (Box 1) (Ganguly et al. in press). The team also drafted a methodological blueprint to further fill this gap.

Box 1. A snapshot of FISH activities to enhance gender-inclusive and responsive innovation

Trait preference assessment highlights differences among consumers in Egypt

In Egypt, a country of nearly 100 million people, fish is a vital food source, accounting for 25 percent of the average household's protein intake. In 2017, FISH partnered with Bangor University (UK), the International Institute of Tropical Agriculture (Tanzania) and Western University (Canada) on a study (Murphy et al. 2020) to examine patterns of tilapia consumption and preferences among low-income women and men consumers across Egypt. Sex had a significant effect on consumer preferences. According to the research, the models predicted that “younger women consumers with children in Lower Egypt were more likely to consume smaller tilapia sizes and prefer larger tilapia head traits” (Murphy et al. 2020, 9). The study, published in *Aquaculture*, is the first to offer evidence around the tilapia trait preferences of low-income consumers to genetic selection programs, which has been largely lacking until now. The results underscore the need for tilapia breeding programs in Egypt to pursue pro-poor and gender-responsive objectives to help tackle national food security concerns while generating increased employment. In addition, achieving these breeding objectives requires selecting for traits such as size and total length, which are not commonly reported in commercial tilapia breeding programs. It also requires investigating how gender intersects with other social and economic characteristics, such as age, education, household size, household structure, age of children, employment and location. Well designed and deployed breeding programs engage explicitly with women, men, youths and the marginalized as clients to assess their needs along the value chains. Overall, when designed and deployed properly, these programs usually enhance adoption of improved fish and better address the needs of poor and nutrition-insecure consumers.

Gender analysis of risks and preferences in feeds innovations

As part of the growth of aquaculture worldwide, research and development organizations are exploring the possible use of local feed ingredients as a low-cost gateway to sustainable fish feed in low-income countries. If feed ingredients are able to be manufactured at a high quality, for a low cost, and sold at a relatively affordable price, they might have a chance of increasing access to low-cost feeds among women, poor men and marginalized individuals. FISH worked with Includovate to conduct a review, Ganguly et al. (in press), to identify related gender risks, social risks, and opportunities in specific settings for inexpensive local ingredients in fish feeds. Findings showed that (1) there is a significant gap in the available literature, (2) interventions must integrate gender and social lenses in fisheries and aquaculture development policies to effectively improve women's livelihoods, and (3) new questions about risk, especially gender and social risks, need to be asked during fish feed studies, along with new or different methods used. In addition, the review emphasizes the need for further targeted research—based on a mixed method, gender-integrated and context-specific approach—to fill information gaps on gender and social risks in the use of affordable local ingredients for fish feeds and associated opportunities. To avoid harm and to benefit women and men equitably, the aquaculture sector must tackle the technical and social dimensions of feed innovations in an integrated way.

Overall, the two studies noted above (fish seed and feed studies) show that there is a good opportunity to do research for development in these two sectors that can advance social inclusion and equity in aquatic food systems.

Pathway 2. Inclusive livelihoods and wealth generation in aquatic food systems help ensure women's economic empowerment and gender inequality matters are addressed

Insights into the challenge: Gender gaps and underlying gender barriers are persistent in and along fish value chains

A FISH global literature review found that the “quality of aquaculture value chain employment and returns differs between women and men” (Kruijssen et al. 2018, 331). Specifically, women often receive lower returns and are disproportionately represented in less-profitable nodes of aquaculture value chains (Kruijssen et al. 2018) or where jobs are regarded as especially insecure (Veliu et al. 2009). Moreover, even within the same nodes, a FISH value chain study in Egypt revealed profit gaps between women and men fish retailers. In Sharkhia, Egypt, the value of fishstocks that men retailers sold was almost double that of the fishstocks women fish retailers sold (Murphy et al. 2020a). In India, FISH research found that efforts to enhance women's socioeconomic development and empowerment by forming women's self-help groups may not achieve their intended impacts if they do not challenge the deeply rooted social and gender inequalities (Rajaratnam et al. forthcoming). While barriers for women's entry into processing and low-paid employment may be somewhat lower, barriers increase for less traditional areas of work, especially higher-value roles (such as supervisors) or opportunities such as intensive shrimp farming. This relates to constraining gender norms and stereotypes about who is a businessperson or a “leader” and gendered mobility constraints, as well as the higher entry costs that are prohibitive to women because of inequitable access to finances. FISH studies indicate that, to date, while processing work might often provide lower return, it can also be a relatively easier entry point than upstream nodes for women because it conforms to socially ascribed norms that associate women with reproductive work and domestic roles, including food preparation (Sari et al. 2017; Salmi et al. 2018).

FISH reviews and research in Asia, Africa and the Pacific found multiple overarching factors underlying the uneven gendered involvement in and return from aquatic food chains. Notably,

compared to men, women have lower access to and control over financial assets, market-related networks, extension services and productive assets in fisheries and aquaculture, including control over financial assets (Aregu et al. 2018; Lawless et al. 2019; Manyungwa et al. 2019; Nagoli et al. 2019; Haque et al. 2020; Kruijssen et al. 2021). Moreover, the burden of unpaid household work and associated lack of support tends to impede women's ability to earn higher profits.

Research findings and solutions: Women's entry and own income in the sectors are necessary but not sufficient—multiple and structural (“deep”) enablers are required

Despite the above imbalances, there can be positive outcomes for women from participating in aquaculture, especially through paid work. Evidence for this comes from homestead pond aquaculture production systems and shrimp processing factories in Bangladesh as well as household (micro-scale) shrimp farming and homestead-based milkfish processing in Indonesia (Choudhury et al. 2017; Sari et al. 2017). In both studies, women's own income was identified as a primary benefit, as it contributes to increases in their purchasing power and financial freedom, confidence and respect from their husbands in relation to earning income. Paid work was also associated with strengthening women's human and social capital and, in turn, their self-esteem.



A woman dried fish vendor in the local town food market in Oyo State, Nigeria.

FISH studies identified multiple enablers to entry into and success in value chains, including spousal and family support, education, social networks and forward market links (Choudhury et al. 2017; Sari et al. 2017). FISH activities carried out with women

in Bangladesh and Zambia and youths in Zambia illustrate better ways to support and encourage livelihoods and wealth generation in aquaculture sector (Box 2).

Box 2. A snapshot of FISH activities that support inclusive livelihoods and wealth generation

Inclusive business models in Bangladesh

In Khulna District of Bangladesh, approximately 55 percent of rural households are involved in fish farming. But many women are unable to engage in the sector due to restrictive sociocultural norms around going into the water and having to maintain their reproductive and productive roles at home. As part of the Bangladesh Aquaculture Activity, and implemented by the development charity United Purpose in collaboration with FISH, the Women Business in Gillnet initiative worked to increase women's access to fish farming. The initiative provided technical training and support to 100 women business entrepreneurs via 20 new women business centers (WBCs), which in turn provided knowledge and support to about 10,500 members of women fish producer groups. New aquatic products, such as low-cost gillnets, were stocked in the women's shops, and the women were connected with input and output market actors. This allowed them to build backward and forward market links as part of an inclusive business model. Results show that most of the WBC entrepreneurs now have better facilitation skills for producer training and are connected with market and private sector actors, while producers show high levels of interest in gillnets and mola after training. "I'm now economically independent and able to meet my family's financial obligations," said a 22-year-old fish farmer who received training from a WBC. "I've gained confidence as a woman that I can do it" (S. Yasmin, personal communication, 2021).

Gender-integrated business strategies empower women in Zambia

In Zambia, fish farming is often perceived as "men's work," leaving women to participate more in informal activities like fish processing and trading. To better incorporate women into fish farming activities, a series of aquaculture training seminars was conducted by FISH through the GIZ-funded Piloting Inclusive Business and Entrepreneurial Models for Smallholder Fish Farmers project. By increasing women's access to training and resources, the initiative helped rural women adopt fish farming as an income-generating activity. It also worked to identify and overcome other major constraints that limit women's participation, mostly cultural norms and a lack of land ownership (N. Mudege, personal communication, 2021).

Business planning training builds entrepreneurship of aquaculture students in Zambia

In Zambia, an estimated 80 percent of the population work in the informal sector, requiring individuals to possess entrepreneurial skills to ensure profitable and competitive businesses. In 2021, the WorldFish-led Aquaculture Technical, Vocational and Entrepreneurship Training for Improved Private Sector and Smallholder Skills project, funded by the Norwegian Agency for Development Cooperation, ran a mentorship program to build the entrepreneurial knowledge and skills of aquaculture students from the Natural Resources Development College. Ten students from the fisheries and aquaculture course (five women, five men) and three interns from WorldFish were selected for the program, with nine of the participants completing it. The six students that finished the aquapreneurship training program were awarded USD 1000 in seed money to support them to collectively set up a business that they would agree on as a group (the money was not to be split, but used for a collective project that they will work together on). In addition to the mentorship program, the project upgraded the fisheries curricula (including integrated gender topics), constructed an aquaculture skills training center, developed an online training platform and launched a novel internship program—all aimed at enhancing the delivery of aquaculture knowledge and skills among students. These targeted efforts will support students to thrive in fish-based businesses following graduation and have led to an increase in the number of women enrolling in the fisheries and aquaculture course.

FISH research and innovations have also surfaced potential financial and asset enablers for diverse groups of women as a key means of leveling the playing field, as well as normative change (Box 3). An intersectional lens shows that assets matter: wealthier women are better positioned for these enablers and thus better able to navigate the range of barriers (Choudhury et al. 2017; Sari et al. 2017), including entry costs and the need to hire laborers (Haque et al. 2020).

Indeed, mechanisms for financial inclusion are critical to enabling women's participation in large- and small-scale aquaculture value chains, so is the importance of responsive and bundled financial access, such as inclusive financing for fish processing technologies as shown in Nagoli et al. (2020). Along the same lines, closing the digital divide using information communication technology (ICT) can synergistically help close the finance divide.

Box 3. FISH evidence on inclusive business models and enablers for financial inclusion

FISH reviews and studies have identified evidence-based, scalable and transferable lessons and strategies for inclusive business models, financial inclusion and women's economic empowerment:

- **Inclusive business models** (Kaminski et al. 2020): This emphasizes the need for aquaculture value chain business models to focus on social upgrading in order for them to be inclusive and meet the needs of poor smallholders, women and the marginalized. Other significant factors to look at are the environmental considerations, the role of business and the donor community in sub-Saharan Africa, in particular, and the need to understand the context of aquaculture of a place.
- **A review of women's self-help groups in aquaculture and fisheries in India** (Rajaratnam et al. forthcoming): The findings show that self-help groups enable members to access banks and credit. The outcome benefits for the members include increases in income and savings, employment opportunities and nutrition. The group members also noted being empowered in terms of being able to make decisions within their households and community, voice their opinions and take hold of leadership positions in their communities. In addition, members also found economic and social value chain upgrading, enhanced status and recognition, and increased confidence.
- **Entrepreneurship-based, local service provider (LSP) models using a gender lens** (Kruijssen et al. 2019): The LSP model is a decentralized extension model whereby local actors (including farmers, business owners and breeders) are trained to provide extension services, particularly knowledge, technology transfer, and training to farmers. The LSP model of delivery has positive impacts on men and women farmers, including technical, economic and nutrition outcomes. Farmers were able to adopt improved farming practices, resulting in increased yields. Most importantly for women, they were able to increase their awareness and self-confidence to interact with LSPs and improve their problem-solving skills. Moreover, a good model should be able to overcome limitations for women to access LSPs, which is related to addressing social norms and mobility. For instance, women can be provided technical support, such as training on better aquaculture practices, within their homes or areas that are very close to their homes.
- **Capacity building, organizing, supporting and establishing women fish retailers into market cooperatives** (WorldFish 2019): Through the Empowering Women Fish Retailers in Egypt project, FISH has been able to empower 200 existing and 50 new women-led fish entrepreneurs in the Sharkia governorate. FISH has been able to (i) get women engaged in e-commerce to sell fish thus expanding their market share, (ii) establish five women-led fish and training centers in five urban communities, which were equipped with processing and storage facilities, and (iii) provide training for the development of better fish products, certification and marketing to project beneficiaries.
- **A transformative approach to enhance control over processing assets** (Cole et al. 2020): In Zambia, GTAs combined with participatory testing of post-harvest technologies led to significant changes in gender attitudes and women's empowerment. Specifically, the transformative approaches contributed to more gender-equal attitudes among men and greater women's control over income and exercise of choice and voice than standard gender-mainstreaming approaches. The findings of this study and the methodologies that were used can be applied to other development programs, which aim to tackle gender barriers and constraints within the fish value chain.

In fishing communities in coastal Bangladesh, FISH action research found that ICT allows women to work, train and receive payments from home, providing a “work around” to gendered mobility constraints (Choudhury and Tanzina 2020). The mobile banking system—combined with a livelihood opportunity—helped build women’s agency and control over income.

FISH findings demonstrate that women-led enterprises, including around aquatic food commodities, are an important solution. (See Kruijssen et al. 2019 for the LSP model in Bangladesh, and Mwema 2020 for gender-integrated business strategies to empower women in aquacultures and fisheries in Zambia.) In addition, transdisciplinary research in Africa goes further to reinforce that COVID-19 has hit women’s enterprises in the aquatic foods sector extremely hard (Box 4). Recommendations for enabling women-led enterprises to recover and thrive include the following:

- immediate action to reduce further asset loss, such as through social protection, specifically cash and in-kind transfers
- investments in gender-responsive processing and cold chain infrastructure
- rapid policy and program investments to close the financial and digital gaps
- addressing social and governance aspects to combat harassment of women traders and transactional sex-for-fish

- directly engaging women’s networks and associations and recognizing their voice and agency in COVID-19 recovery planning and assessment as well as sector dialogues.

Box 4. COVID-19 impacts on women fish processors and traders in Africa

COVID-19 has amplified the preexisting gender barriers facing women in fish value chains. The innovative collaboration between FISH, the African Women Fish Processors and Traders Network, the University of Lancaster and the participatory media agency On Our Radar has identified strong negative impacts in many areas. Among these impacts are reduced income, inconsistent supply, disruptions to market access, increased (already high) domestic work and care work, lower food intake and, overall, increased stress and undermined mental health and well-being of women fish processors and traders (Atkins et al. 2021). The combination of researcher-led interviews and community reporter-based work (women sharing their own stories and reporting on their own communities via text message, photos and video) signaled that building forward better will require urgent investments in women in the aquatic food sector. It starts with engaging women as equal actors with agency in dialogue and planning and responding to their immediate needs.²



Bina’s success story: From day laborer to hatchery owner in Hajipur, Bangladesh.

Pathway 3. Inclusive governance is the foundation of equitable and resilient aquatic food systems

Insights into the challenge: There are persistent gender and social exclusions in the sector, from intracommunity to global scales—and these have structural roots in policy and data gaps

Despite recognition of gender in global policy guidance in the fisheries and aquaculture sector (Kleiber et al. 2017; FAO 2018), exclusions in governance persist at all scales. Unique policy analysis by FISH, focusing on SSF in the Pacific, identified that gender is watered down in SSF policy and practice. Instead, it is trending toward instrumental and individual perspectives and losing its intrinsic and societal focus (Lawless et al. 2019). Similarly, FISH found that outdated gender assumptions hinder climate policy and practice in the sector. Specifically, there are four misleading yet still prevalent assumptions: (1) women are innately caring and connected to the environment, (2) women are homogenous and vulnerable, (3) gender equality is a women's issue, and (4) gender equality can be addressed by simply increasing the number of women involved in climate change projects, policy and practice (Lau et al. 2021a).

Good quality data underpins good and equitable policy (FAO 2017). Yet FISH gender analysis in 17 countries anchored in the Illuminating Hidden Harvests (IHH) initiative, led by the Food and Agriculture Organization (FAO), Duke University and WorldFish, uncovered "sexist data structures." These data challenges perpetuate the "cycle of invisibility" in the sector and constraining norms that frame fisheries as men's domain. This has led to official data collected primarily about men's paid engagement and the fish harvesting node. In doing so, it excludes women's engagement, including unpaid work, gleaning and engagement along the value chain. This gender-blind data contributes to gender-blind policies, which in turn reinforce gender barriers in the sector. These factors, combined with local gender and social hierarchies and tendencies toward gender-blind programming and extension, lead to community-based natural resource management (CBNRM) that is participatory in name but exclusionary in practice, with women and people from less powerful socioeconomic groups having relatively little to no voice in decision-making (Locke et al. 2017; Kleiber et al. 2019; Johnson et al. in press).

Research-based insights and solutions: Transforming systems across scales through gender-responsive and rights-based policies, closing gender data gaps and amplifying women's leadership

In line with its recognition of power and exclusions being shaped at multiple scales, FISH identified strategies for enabling inclusion, gender equality and social justice at multiple scales. At the global scale, in the face of a rapidly expanding neoliberal blue economy, FISH collaborated with key agencies to outline 12 opportunities for action for equity, including key areas to improve gender equality (Österblom et al. 2020). The key message in that paper, the Sustainable Ocean Economies Blue Paper, is that ocean governance processes at all scales need to draw on and reflect local voices and visions. These processes should focus on marginalized groups, especially women, in plans for the ocean economy, and should protect and respect human rights, improve human well-being and provide fair opportunities for employment, among others (Österblom et al. 2020).

At the local scale, where policies and programs are implemented, FISH highlighted the need to recognize and disrupt limiting gender assumptions to move toward gender equality in climate change policy and practice (Lau et al. 2021a). In particular, Lau et al. (2021a) recommended the need to be specific about how organizations, projects and policies seek to recognize gender equity. This includes realizing that empowerment is an ongoing process of challenging inequitable gender norms and ensuring that those less empowered can contribute to and find an opportunity to influence. They also recommended collecting, challenging and communicating gender- and sex-disaggregated research, and monitoring and evaluating collected data to ensure robust results and outcomes, as well as questioning the hard-to-quantify and more intractable barriers to gender equality.

In addition, tackling gender inequality in biodiversity conservation, policies and investments made by different actors needs to be more gender sensitive and responsive. Critically, this is done by engaging with the concept of gender, and not only with women, by (1) considering gender as a social relation, (2) understanding power and (3) addressing the four dimensions of gender

relations—gender division of labor, access to resources, decision-making, and gender and social norms (McDougall et al. 2021). Furthermore, conservation policies and investments must factor in how a person’s gender identity intersects with other identities, and must account for the fact that people’s identities mean different things in different circumstances (Lau 2020).

To close the gender data gaps in fisheries and CBNRM, Kleiber et al. (in press), through the IHH research, identified the need for government fisheries and statistics agencies to systematize the collection and analysis of sex-disaggregated data and to expand definitions of “fishing” to include gleaning and seaweed harvesting, as well as an inland and integrated fisheries management plan. Connecting policy change to pathways for women’s empowerment, a FISH assessment of women’s empowerment in Myanmar undertaken with Includovate illustrated the need for integrated, cross-sectoral approaches in blue transitions. For

example, shifting toward dual titling (both spouses) of land rights in married households would be an important foundation if policy investments in integrated rice-fish production systems are to benefit women and men equitably (FISH in press).

Finally, while still focusing on the local scale, long-term FISH investments in CBNRM in the Pacific highlight that good practices enabling inclusion and gender equity at the interface of extension and communities are essential. Moreover, the work found that the availability of gender-sensitive facilitation techniques (Kleiber et al. 2019) is very important, but not sufficient; awareness of local gender norms and ongoing tracking of best practices can enhance both use and learning. FISH recommendations for field workers in this area include generating rapid data, such as tracking the number of times men and women speak during meetings, and recording observations on gender dynamics in decision-making (Box 5) (Gomese et al. 2020).

Box 5. Enhancing inclusive community-based fisheries management (CBFM) processes at the local scale in the Pacific

In the Pacific Islands region, communities take a lead role in managing their fisheries resources. Yet when governments or nonprofit sector actors engage in development activities with fishing communities, the concepts of “inclusion” and “attending a meeting” are often rolled into one. To combat this problem, FISH developed a framework and methodology to assess inclusion and exclusion through an intersectional lens in local-scale natural resource governance (Johnson et al. in press). Piloted in Solomon Islands, the framework is a critical first step to understanding inclusion.

When engaging with communities in CBFM setup and planning processes, governments or nonprofit sector actors must use deliberate, thoughtful and reflexive strategies to reduce the risk of exacerbating existing gender and social power imbalances. To help facilitators be more gender-inclusive in this critical work, WorldFish developed gender-sensitive facilitation techniques (Kleiber et al. 2019) as part of the Pathways project funded by the Australian Centre for International Agricultural Research. The techniques have been endorsed by the Pacific Community, which is the principal scientific and technical organization in the Pacific region, and continue to be scaled by WorldFish and partners in Solomon Islands, Vanuatu and Kiribati. As a companion, the project tested a simple way to systematize self-monitoring of the use of these gender-sensitive techniques by CBFM actors. To maximize self-reporting, FISH recommends allowing staff enough time for trips to record the number of times men and women speak in meetings, training staff on the importance of gender-specific observations and ensuring staff are aware of local cultural norms in communities.

In tandem with the facilitation guide, FISH and the University of Wollongong, in collaboration with national and provincial fisheries agencies, developed the CBFM plan reviews [facilitation guide] (WorldFish and University of Wollongong 2021) as a reference for community discussions to devise or review their CBFM plans collaboratively. The guide, which is produced and shared by the Secretariat of the Pacific Community (SPC), offers tips to support facilitators in conducting effective participatory reviews of CBFM, including through the active engagement of people of diverse backgrounds, ages and genders. Project monitoring data into the guide’s use shows it has led to a marked increase in the influence of women and youths—who have different interests in the fishery and management area—over their CBFM plans.

FISH conducted various research and development activities to enhance inclusive governance of fisheries, aquaculture, and food systems. The activities aimed to (1) empower women to take leadership positions within their communities

and households in Cambodia, (2) get fishers in the Solomon Islands to account for their knowledge and experience in SSF and living in the Pacific, and (3) form women community savings groups to help women access credit in Bangladesh (Box 6).

Box 6. A snapshot of FISH activities to enhance inclusive governance of fisheries, aquaculture, and food systems

Empowering women as leaders in households, communities and businesses in Cambodia

In Cambodia, as part of the Feed the Future Rice Field Fisheries II project, WorldFish (FISH) conducted activities to empower women as leaders in the community and economically in the household, and as entrepreneurs. Activities included household visioning exercises, women's participation and leadership in community fish refuge (CFR) management planning and activities, and women's entrepreneurship for drinking water treatment stations. The project was funded by the United States Agency for International Development (USAID)/Feed the Future and implemented with Cambodia's Fisheries Administration and partners from local nongovernmental organizations. FISH analyses indicate that some women benefitted by increasing their economic and/or leadership activity, and the CFR committees and communities also benefitted from women's leadership through increased levels of fundraising and more comprehensive management planning. At the same time, the underlying factors of family norms, demands on time, and self-efficacy remain as barriers for some women's involvement in leadership and/or economic activities. Practitioners found that providing ongoing coaching, public recognition of women's and households' achievements, and peer-to-peer learning were contributors to overcoming such barriers. These collective learnings are captured in Shieh et al. (2021), contributing an important resource for the development and natural resources sectors in Cambodia.

The participatory research method helps share small-scale fishers' experiences and local knowledge of their surroundings in Solomon Islands

In the Pacific, most data collected by researchers is quantitative in nature and thus unable to answer questions that can only be understood with qualitative research. In Solomon Islands, WorldFish scientists worked with the Santupaele community to undertake a participatory action research (PAR) method called photo voice. Participants between the ages of 21 and 49 were invited to take 10 pictures relating to four questions about women's and men's participation in SSF, benefits, challenges and engagement in decision-making. At the end of the research, participants reported that the pictures showed real issues and raised the profile of communities. They also made (research) interviews easy, and made the participants feel confident, responsible and inspired. The study reinforced the importance of PAR for accounting for indigenous knowledge and letting communities be researchers to help them tell their own stories.

Community savings groups strengthen women's access to credit in Bangladesh

In fishing communities of Bangladesh, women usually lack access to adequate financial resources and technologies because of conservative gender and social norms. The USAID-funded ECOFISH II project led by FISH has been working to provide equal opportunities to fisherwomen in decision-making and participating in alternative income generation. The project has also opened up opportunities for them to play leadership roles in the zone of resilience, the Cox's Bazar–Teknaf peninsula coastal fishing areas, and in the Nijhum Dwip Marine Protected Area at the mouth of the large Meghna River system. Key interventions included forming 51 fisherwomen community savings groups, each with 30–35 women for a total 823. This resulted in collective savings of BDT 1,143,425 (approximately USD 13,350) up to September 2021 and enabled women to access low-cost entrepreneurial loans. The project provided the groups with training on savings management, business and leadership, along with social awareness on transforming gender attitudes and behaviors through business literacy schools. In addition, 1014 fisherwomen received training on safe and hygienic dried fish production, and 8744 households received livelihood supports like goats, sheep, ducks, chickens, pigeons and vegetable seeds to establish alternative livelihoods. Results show that women participants had increased income opportunities, resulting in them being more valued and respected in the household and seen as income-generating partners rather than a liability often considered by the low-income group, especially their husbands. Their active participation in income generation and decision-making processes has also reduced domestic violence and conflicts, allowing women to be more vocal in expressing their opinions and taking charge as household leaders.

Pathway 4. Gender-transformative approaches are necessary to overcome invisible barriers to gender equality

Insights into the challenge: Constraining gender norms perpetuate gender inequalities

FISH research in the Pacific, Africa and Asia has identified constraining social and gender norms in fisheries and aquaculture, including in relation to livelihoods and value chains. Using a methodology from the research initiative GENNOVATE in the Pacific, specifically Solomon Islands, FISH found that while both women's and men's livelihoods are more diverse now than 10 years ago, men can pursue a broader range of livelihoods than women (Lawless et al. 2019). This stems from women being more constrained by individual perceptions of risk and socially accepted mobility. Moreover, livelihood diversification as a strategy has a gendered risk: it has the potential to limit women's more immediate freedoms to exercise agency because they are simultaneously experiencing intensified time and labor demands, having to juggle taking care of the family and their farming or entrepreneurial activities (Lawless et al. 2019).

FISH studies in Africa, specifically Malawi, show that one of the barriers that preclude women from participating equitably in the fishing industry is deep cultural, social, traditional and religious beliefs, which are noted to disadvantage women's participation in fishing (Nagoli et al. 2018). For instance, fishing has traditionally been considered as a man's job in fishing villages. Women are rarely expected to go fishing because the arduous work and long hours involved are not considered favorable for them, particularly as it takes them outside the household for long periods (Nagoli et al. 2018).

FISH studies in Asia found similar patterns of underlying informal structural barriers. In Myanmar, for example, traditional perceptions of men as the main income providers are related with them having greater entitlements to and control over key household assets such as land. In turn, this allows men to dominate livelihood decisions, such as whether or not to adopt small-scale aquaculture (Aregu et al. 2017). Similarly, related perceptions of men as (real) "fishers" and "farmers" lead to women in this context being excluded from extension services (Aregu et al. 2018).

Research-based insights and solutions: Gender-transformative strategies shift constraining gender norms

Since 2011, WorldFish has been spearheading the development of GTAs in fisheries, aquaculture and aquatic foods as a whole, both in country (e.g. Cole et al. 2020) and scaling to CGIAR and globally.³ The approach focuses on shifting—rather than working around—structural factors of constraining gender norms. At the local scale, specifically, GTAs aim to create conditions for women and men to critically self-reflect on gender norms and dynamics in their given context and assess how these help or hinder them in relation to local well-being and aspirations. And if determined to hinder, then women and men identify and test locally identified, more gender-equitable ways of being.

FISH's GTA and polyculture technology case illustrates why GTAs are valuable alongside other forms of innovation. The purpose of GTAs is to improve gender equality by addressing gender barriers through challenging and changing these underlying structures, including shifting constraining gender norms. Often, GTAs work at both the intrahousehold and community level to stimulate a process of critical awareness where both women and men identify the barriers and norms they want to shift to achieve gender equality. Over the years, WorldFish has implemented homestead-based pond polyculture technology through various projects. It is one of the packages of technologies that WorldFish introduces to women with little variation to the extension process and the technology itself. Integrating social (GTA) and technical (homestead pond polyculture) interventions is at the core of FISH's gender strategy and ensures gender is integrated into the delivery of homestead aquaculture technology and participatory research initiatives. This is key to addressing gender barriers that exist within households and communities at large, which impede women from engaging fully in aquaculture, accessing markets and assets and overcoming other related social and gender norms that exist within her surroundings.

In terms of evidence of GTA outcomes, FISH has provided one of the few comparative datasets available in agricultural research for developing GTAs versus "business as usual" gender mainstreaming (McDougall et al. 2021).

In a Zambia-based quasi-experiment, a GTA outperformed an accommodative approach in terms of significant changes in gender-equal attitudes and women's empowerment outcomes relating to a post-harvest fish loss reduction intervention in the country (Cole et al. 2020). In Bangladesh, women faced not one but two barriers to harvesting fish, even from their own household ponds. First, harvesting with existing nets required women to physically enter the pond, which meant their clothes were wet and uncomfortable all day (a practical barrier). Second, constraining norms made it socially unacceptable for women to harvest fish because it is seen as "men's work" (a social barrier). FISH designed gillnets to address the former, and they enabled women to harvest small fish from bank of the pond without having to enter the

water. Yet households who wanted to use the technology faced retribution from neighbors if women used the nets. For example, women were criticized for overstepping, while men were criticized for allowing their wives to do "men's work." As such, FISH included GTA exercises within a polyculture and nutrition training program to allow women and men from within households and across the community to reflect together on these norms and the opportunities if women did harvest fish. This combined social-technical innovation (women-targeted technology and GTA) contributed to an increase in regular access to nutritious fish for households, and in turn created the possibility of increased consumption of nutritious small fish (mola), which is vital in a country where 36 percent of children under 5 are malnourished (USAID 2018).



Photo credit: Dorina Hauso/WaterFish

A woman in Zambia providing fingerlings to a man who will be using them as seed to grow fish.

FISH has worked with its partners to enhance GTA scaling research and development activities. These activities have included integrating GTAs into coral reef livelihood programs and policies and into men's and women's rural dwellers savings groups in Africa and South America (Box 7).

FISH has developed research tools and guides for each of the four pathways to enhance and ensure that research contributes to gender equality and women's empowerment in aquatic food systems (Box 8).

Box 7. A snapshot of FISH activities to enhance GTA scaling

Integrating GTAs into coral reef livelihood programs and policies

Gender equality is a necessary foundation on which to build equitable and sustainable livelihoods in coral reef social-ecological systems. FISH, James Cook University and CARE partnered on research to understand how much GTAs have been integrated into coral reef livelihoods programming globally. Results showed little evidence of GTAs in coral reef settings, representing a substantial opportunity to advance gender equality. Most coral reef programs only addressed more symptomatic gender inequalities and did not engage with transforming inhibiting structures. Building on these findings, FISH developed a good practice and technical brief (Lau et al. 2021b) that provides guidance on understanding GTAs in reefs, and how to pursue them across an iterative cycle from scoping, to design, to implementation, and monitoring, evaluation and learning. These resources, along with a policy brief (Lawless et al. 2021), outline the key steps organizations and programs need to take to move toward addressing gender equality beyond a symptomatic level in reefs. Specifically, gender inequalities must be addressed at individual, household, communal, organizational and societal scales. Key steps include identifying and addressing the informal and formal root causes of gender inequality, seeking to prevent and eliminate gender-based violence, connecting to existing gender equality laws and considering how policies support gender equality as a goal in and of itself.

GTAs in savings groups scaled across Africa and South America

Throughout the FISH program, the Catholic Relief Services (CRS) development agency continued to scale the GTA-integrated savings groups approach (SILC+GTA) that WorldFish piloted in Zambia in 2015. Since then, CRS has scaled up the combined approach to nine countries: eight in Africa (Benin, Central African Republic, Ghana, Liberia, Niger, South Sudan, Uganda, Zambia) and one in Central America (Guatemala). This has been through 13 projects and funded by a range of donors, including, for example, GIZ, Global Affairs, USAID and the US Department of Agriculture. In each country, CRS has adjusted the GTA curriculum and delivery model, based on the SILC+GTA manual developed by Promundo and WorldFish, to reflect each project context.

Results show that the combined approach, which challenges inequitable social norms and power relations, supports an increase in joint decision-making around project-promoted initiatives and decreases the rigidity in the gender division of labor. "The benefit of practicing the GTA training is very clear, the impact is instant, and we have all seen the difference it has in our lives—we hardly fight as a couple any longer," reported a woman participant in Ghana. As part of the I-SEARCH project in Ghana, four local church partners observed GTAs to improve relationship changes and dynamics between couples in their communities. "Even within the minority group, Fulani, through GTA the men and women began to sit together in meetings, which helped women build confidence. This had a 'spillover effect' within their communities, where women became more participatory in contributing to discussions [community meetings and decision-making] with men supportive of this change," said Carolyn Edlebeck, head of programs for CRS Ghana, of an example benefit noted by the Diocesan development coordinator for Damongo. In Benin, one-woman participant said, "We can now participate in decision-making and have our own cashew farms. Women are now better listened to in meetings." CRS will continue to scale SILC+GTA globally. "SILC has become an integral part of CRS's programming around the world, and it is a perfect entry point for discussions incited by the Gender Transformative Approach curriculum," said Abby Johnson, CRS regional technical advisor for gender equality.

Box 8. The FISH Toolbox for gender-inclusive and gender-responsive research

The following resources were developed for each pathway to enable, enhance or ensure research contributes to gender equality and women's empowerment.

1. Gender-inclusive and gender-responsive innovations

- i. Ten strategies for research quality in distance research during COVID-19 and future food system shocks** (McDougall et al. 2020). Framed within the One CGIAR Quality of Research for Development Framework,⁴ these strategies draw on multiple international sources of best practices and are crucial for effective, inclusive and ethical research during COVID-19 social distancing and for distance research during future shocks.
- ii. Tool Navigator: Using market-based research methods for user-responsive innovation.**⁵ The Tool Navigator offers a suite of tools to guide data collection in informal markets. Together these inform user-responsive innovation, focusing on understanding the needs, perspectives and preferences of farmers, retailers and consumers.
- iii. Gender integration in research: A guide for the CGIAR Research Program on Fish Agri-Food Systems** (McDougall, et al. 2021). The resource explains core gender concepts and provides overall guidance for effectively integrating gender analysis into small-scale fisheries and aquaculture research in FISH, including a theory of change. Critically, the guidelines support integrating gender into research for development, drawing on lessons from FISH projects in Myanmar, Bangladesh and India and related research literature.

2. Inclusive livelihoods and wealth generation

- i. Conceptual framework for gendered aquaculture value chain analysis and development** (Danielsen et al. in press). This framework was developed by FISH and the Royal Tropical Institute (KIT) to address gender blindness in value chain approaches in fish agri-food systems. This framework, piloted in Bangladesh, embeds an explicit gender social relations approach with functional and economic value chain analysis.
- ii. Identifying niches for women's entrepreneurship in aquatic food chains: A methods package** (BoP Innovation Center and FISH, 2021). This resource highlights a market-based, participatory approach to decipher women's interests, constraints and best-bet opportunities in fish value chains. The package was developed with the BoP Innovation Center and piloted in Nigeria under the Technologies for African Agricultural Transformation project.
- iii. Exploring women's empowerment in fisheries: A methods pack for a collaborative study on women's empowerment in small-scale fisheries** (Druzca et al. in press). This pack helps to fill the gap in assessments of women's empowerment by eliciting framings that capture, and take seriously, local women's understandings of what constitutes empowerment in SSF. Developed with Includovate and FISH, the pack responds to growing momentum around sustainable aquatic development pathways and efforts to ensure no women are left behind.

3. Inclusive governance

- i. Assessing inclusion in community-based resource management: A framework and methodology** (Johnson et al. 2021). Building on critical foundations from governance literature (Agarwal 2001), this resource uses a bespoke "five degrees of inclusion framework" and offers methodologies for assessing inclusion and exclusion through an intersectional lens in local-scale natural resource governance. It was piloted in Solomon Islands.
- ii. Gender-inclusive facilitation for community-based marine resource management** (Kleiber et al. 2019). This brief helps facilitators use, reflect on and adapt gender-inclusive strategies in their work with communities. It aims to increase the frequency and quality of strategies used to reach women, men, youths and other social groups in the preparation, design, implementation and adaptation stages of CBRM.
- iii. Rights, equity and justice: A diagnostic for social meta-norm diffusion in environmental governance** (Lawless et al. 2020). This diagnostic examines eight drivers of and responses to norm diffusion that shape the spread of social principles on gender equality and social equity. Applying this lens in research and investment has potential to improve the meaningful diffusion of equity and equality in multiscale environmental governance.

4. Gender-transformative approaches to address underlying structural barriers

- i. The SILC+GTA facilitation manual: The savings and internal lending communities plus gender transformative approach** (Promundo-US and WorldFish 2016). Savings group programs often only target women, but engaging men and improving equity in decision-making processes can enhance outcomes. The manual is intended for coordinators and facilitators of savings and internal lending communities and was piloted in the Barotse Floodplain of western Zambia (FISH 2021).
- ii. Promoting gender transformative change with men and boys: A manual to spark critical reflection on harmful gender norms with men and boys in aquatic agricultural systems** (Promundo-US and AAS 2016). This manual supports community facilitators and programs to create spaces for critical reflection and action focused on harmful masculinities and their effects on the lives of women, girls and men themselves—in combination with other approaches.
- iii. Women's Empowerment in Fisheries and Aquaculture Index (WEFI)** (McDougall et al. 2021). This survey and focus group-based tool package, to be released in 2022, is designed for SSF and aquaculture projects to assess women's empowerment and gender attitudes. It is based on past research in Zambia, Egypt and Bangladesh, with cognitive testing completed in West Bengal, India, and pilot testing and validation in Bangladesh.
- iv. Gender transformative approaches for advancing gender equality in coral reef social-ecological systems** (Lau et al. 2021b). This good practice and technical brief provides guidance for those working in coral reef social-ecological systems to expand gender approaches that tackle the symptoms of gender inequality to concurrently and deliberately address its root causes by integrating GTAs.

Gazing into the future

The four pathways outline strategies for improving gender equality and women's empowerment in aquatic food systems, but accelerating progress requires amplified commitment and collaboration by government, civil society and private sector actors. This is especially true in the face of the COVID-19 pandemic, which has exposed and exacerbated inequalities. Progress will rely on better use of evidence to inform gender-responsive, inclusive and transformative policies and programs, and on bold thinking and action to recognize and address underlying barriers. Furthermore, efforts need to be done by researchers, scientists and entrepreneurs to make technologies and other tools that are used by value chain actors in aquatic food systems gender appropriate and affordable (without compromising the quality), catering to the needs of women, youths and marginalized individuals in a society.



Photo credit: Ibrahim Hossain/WorldFish

Tilapia harvesting in household pond. WorldFish jointly trained fish farmer Parvin and her husband Aminur Rahman, Avoynar, Jessore, Bangladesh.

Notes

- ¹ Achieve gender equality and empower all girls and women.
- ² See Atkins, McDougall and Cohen 2021 and On Our Radar video: https://youtu.be/iPPw3_Q578Y
- ³ See GTA on the CGIAR top 50 innovations webpage (<https://www.cgiar.org/innovations/gender-transformative-approaches/>) and FISH GTA timeline (<https://fish.cgiar.org/gender-research-in-fish>)
- ⁴ <https://cas.cgiar.org/isdc/QoR4D>
- ⁵ <https://www.slideshare.net/worldfishcenter/worldfish-tool-navigator-for-market-based-research-2018>

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The CGIAR Research Program on Fish Agri-Food Systems (FISH) is a multidisciplinary research program. Designed in collaboration with research partners, beneficiaries and stakeholders, FISH develops and implements research innovations that optimize the individual and joint contributions of aquaculture and small-scale fisheries to reducing poverty, improving food and nutrition security and sustaining the underlying natural resources and ecosystems services upon which both depend. The program is led by WorldFish, a member of the CGIAR Consortium. CGIAR is a global research partnership for a food secure future.

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