



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Feed the Future Bangladesh Aquaculture and Nutrition Activity

Annual Progress Report: October 01, 2021 to September 30, 2022



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Acronyms

AIN	Aquaculture for Income and Nutrition Animal Source Food
ASF	Animal Source Food
AOR	Agreement Officer's Representative
BFRI	Bangladesh Fish Research Institute
BNNC	Bangladesh National Nutrition Council
CLA	Collaborating, Learning, and Adapting
CoP	Chief of Party
DCoP	Deputy Chief of Party
DoF	Department of Fisheries
DU	Dhaka University
EHA	Essential Hygiene Action
ENA	Essential Nutrition Action
EMMP	Environmental Mitigation and Monitoring Plan
FtF	Feed the Future
GIP	Genetic improvement program
GIS	Geographical Information System
GoB	Government of Bangladesh
ICT	Information and Communications Technology
iDE	International Development Enterprises
IEC	Information, Education and Communication
IEE	Initial Environmental Examination
IPHN	Institute of Public Health Nutrition
INFS	Institute of Nutrition and Food Science
INGO	International Non-Governmental Organization
LMSA	Last-Mile Sales Agents
LSP	Local Service Provider
MoHFW	Ministry of Health and Family Welfare
MEL	Monitoring, Evaluation and Learning
MIS	Management Information System
MMC	Market Management Committee
NGO	Non-Governmental Organization
RTC/RTE	Ready to Cook/Ready to Eat
SBCC	Social and Behavior Change Communication
SDC	Swiss Agency for Development and Cooperation
SoP	Standard Operating Procedure
SOW	Scope of Work
ToR	Terms of Reference
USAID	United States Agency for International Development
ZOI	Zone of Influence
ZOR	Zone of Resilience

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1. Executive Summary

The Feed the Future Bangladesh Aquaculture and Nutrition Activity (Aquaculture Activity) is a USD 24.5 million, five-year assistance program, awarded to WorldFish on February 6, 2018, which is expected to continue until February 5, 2023. Aquaculture Activity aims to improve the livelihoods of at least 400,000 beneficiaries, including smallholder fish farmers and other actors in the aquaculture value chain. The interventions put emphasis on cross fertilizing knowledge, and sharing expertise so that the skills of the actors are developed, facilitating sustainable growth in the market. The Activity is being implemented by engaging partners from both private and public sectors located at 21 south-western districts and 2 south-eastern districts of Bangladesh, which are known as Feed the Future Zone of Influence (ZOI) and Zone of Resilience (ZOR), respectively.

The key outputs during the reporting period delivered in partnership with 50 partners and collaborative public sector include;

- Nearly 75% of the private sector partners' revenue from their ongoing business has been increased as a result of the intervention piloted with of the Feed the Future Aquaculture and Nutrition Activity
- Aquaculture farmers and processors received around USD 1.95 million as loan from the Banks and NGOs who has promoted agency and micro retailer agent banking through tailoring small and delayed repayment schedules to match the seasonality of farmer/processor income
- The Activity has supported the development of recipes for Ready-to-Eat (RTE) and Ready-to-Cook (RTC) cultured fish products and their market promotion. A total of 20 metric tons of white fish in form of RTC and RTE items was processed and sold worth USD 329,633.
- The Activity partner has had significant success in promoting the production and marketing of natural pituitary gland (PG)¹, collected 3.03 kg PG from new fish cutters and PG collectors, sold 3.03 kg dry PG to 26 hatcheries and generated USD 196,000 revenue.
- Activity reached 384,570 people including 11.80% women and 12.81% youth up to year 5
- The Activity created access to 31,323 tons fish feed through newly established service points
- 7,567 Kg carp hatchlings and 216 million tilapia fries were produced worth of USD 2.56 million and sold to the 2,74,262 carp and 9,952 tilapia farmers
- Farmers applied improved management practices in total 89,497 ha area and produced 3,736 kg/ha carp and 6,525 kg/ha tilapia
- The farmers earned USD 440 million from their fish sales

As most of Aquaculture Activity's work involves supporting more effective commercial interaction between the private sector and aquaculture farmers, it is likely that this might have and will be impacted by the continued challenges related to ongoing war in Ukraine which include higher commodity prices, and so the program will continue to closely engage with its partners to understand any need to re-focus activities in response to such pressures. For example, it may be pertinent to review training materials for farmers to support the use of less expensive locally produced feed rather than continuing to drive adoption of commercial products which may be becoming unaffordable in a market where consumer demand for fish will also be impacted by the same factors of price inflation. The Aquaculture Activity is continuing to leverage on its knowledge of the aquaculture value chain in order to respond where necessary to the effects of this conflict on Activity participants' livelihoods.

¹ Pituitary glands are used to induce the fish for spawn. The hormone secreted by pituitary gland stimulates growth, development, maturity and ovulation of eggs.

Summary of highlights for Year 5

Key activities performed	Remarks
Established and continued partnership with 50 partners	A total of USD 4,661,342 has been invested, with Aquaculture Activity contributing 57% of the total in the form of cost-sharing grants.
Successfully completed 48 planned interventions with partners	Aquaculture Activity has improved access to institutional finance for smallholder fish farmers and aquaculture market actors including women and youth; increased access to information on aquaculture technologies; improved access to inputs and aqua medicinal products; and linked rural fish producers to consumers by strengthening distribution channels.
Key Market System activities	As part of the ongoing study on systemic change, the Aquaculture Activity Team made field visits to ongoing and closed intervention partners to assess impact and seek opportunities to build on successes generated to date. Aquaculture Activity aims to bring systemic change in the market through working in the following thematic areas - improving access to a) finance, b) quality inputs, in particular feed, c) information through digital platforms, d) increasing access to forward market, with special emphasis on international market, and e) establishing one-stop service center.
Access to Finance for Women Producers	Mukti Cox's Bazar has disbursed USD 402,842 loans to 795 dry fish actors during the reporting year. The micro-financing initiative helped dry fish actors to sell 1,238 metric tons safe dry fish worth USD 5.75 million. The formal banking partner, Bank Asia disbursed USD 306,947 in loans to 565 fish farmers (63 women). Another micro-credit partner, Shushilan disbursed USD 302,811 to 972 fish farmers including 940 women.
COVID-19	There was limited impact of COVID-19 during the reporting year and the field team adopted appropriate mitigation measures to address the anticipated potential risks.
Year 6 work plan including 10-month No Cost Extension (NCE) Phase	The Activity progress was reviewed in meetings organized in ZoI and ZoR, captured learnings, generated evidence of systemic changes, and set future plans for the Aquaculture Activity. The year 6 work plan, budget and Detail Implementation Plan (DIP) were revised in consultation with the Activity team and submitted to USAID on September 29, 2022. The Aquaculture Activity's core focus during the extended 10-month phase will be on scaling the proven business models and technologies, and supporting its private sector partners based on the lessons learned, and best practices to reach the goals and objectives of the Activity. It is expected that the interventions proposed in the NCE proposal will have an impact on transforming the aquaculture market systems into more inclusive system where the benefits equally reach the smallholder aquaculture farmers and associated market actors.
Opportunities identified	Partners have commenced adapting and expanding their activities as a result of the support they have received from Aquaculture Activity as noticed from results generated from the comprehensive study described above. These systemic changes have become more visible, particularly in the areas of getting access to inputs, access to finance, business through e-commerce and digital tools, and adoption of better management practices (BMP) by the partners. This will form the core of programmatic output in the remaining program period.

Partnerships:

Aquaculture Activity developed partnerships with 50 partners in year 5 of which 11 partners' contracts might be extended with costs during year 6 with a total value of USD 427,193 where Aquaculture Activity contributed USD 246,777 (58%) while partners' contribution was USD 180,416 (42%) (*Annex I*). The extended contracts with costs include Afil Aqua Fish Ltd., GRAUS, Protyyashi, Aftab Feed Products Limited, Petrochem BD Ltd., Bank Asia Limited, FishTech Hatchery and Ms. Shah Amanath Traders. New contracts with Protyyashi, FishTech BD, KMSS and Shushilan will be signed for ZoR and ZoI.

Key interventions and highlights

- **Protyyashi:** Protyyashi has established linkages among aquaculture market actors and improving access of fish farmers through Local Service Providers (LSPs) to finance from formal financial institutions.
- **Ms. Shah Amanath Traders:** Ms. Shah Amanath Traders developed new product lines such as Ready to eat (RTE) and Ready to cook (RTC), quality and safe dried fish production and marketing the products
- **CoxsBazarShop.com:** CoxsBazarShop.com improved quality and developing new product lines of RTE (Ready to Eat) and RTC (Ready to Cook) dry fish products and marketing all over Bangladesh through online platform outsourcing from smallholder dry fish processors.
- **Khulna Mukti Seba Sangtha-** KMSS established 50 local Aquaculture Business Centers (ABCs) as One-Stop Service Center for aquaculture, to provide necessary information on aquaculture technology, products and services, especially on the sources of finance.
- **Mukti Cox's Bazar:** Mukti Cox's Bazar improved access to finance and built capacity on financial literacy, business and technical aspects to grow, maintain and sustain fish farmers and processors' business.
- **Sea Natural Food Limited:** Sea Natural Food Limited promoted ready-to-eat (RTE) processed fish through a variety of retail channels, making it affordable, and accessible to consumers from all walks of life, as a viable and palatable alternative to chicken and other meat-based products already available in the market place.
- **MarGEN:** MarGEN improved the cold chain facilities for farm-to-fork distribution of fresh fishes and promoted ready-to-cook (RTC) fish products through business-to-business (B2B) channels and e-commerce platform.
- **KNB:** KNB improved access to quality extension services, fish feed, and seed for smallholder farmers.
- **Petrochem Bangladesh Limited (PCL):** PCL created a market-driven, women-inclusive distribution model to create access for rural farmers with aqua products.
- **Afil Aqua:** Afil Aqua introduced In-Pond Raceway System (IPRS) technology, as a first mover in southern Bangladesh.
- **FishTech Hatchery Ltd.:** FishTech Hatchery Ltd. has established two natural PG (Pituitary Gland) processing plants to collect, process, and market quality PG locally.
- **Aftab Feed:** Aftab Feed promoted LSP-driven feed business, and a call center service built around an app-based advisory services for smallholder farmers.
- **Shushilan:** Shushilan improved access to finance, combined with nutrition-sensitive messaging for rural families.
- **Bank Asia:** improved access to formal financial products and services for aquaculture stakeholders.
- **GRAUS:** GRAUS developed fish market actors and strengthening market linkages engaging 250 new and 330 graduated farmers in Bandarban sadar, Rowangchari & Nihongchari upazila
- **Maa Mothsha Hatchery and Nursery (MMHN):** MMHN produced and marketed high quality carp seed with support from Aquaculture Activity. They have developed an aquaculture business plan to extend and sustain their business in the Bandarban region.
- **Satata Poultry:** Satata Poultry improved the supply of quality inputs and advisory services to fish farmers and nursery operators of Lama and Alikadam upazila, Bandarban. Satata Poultry

will extend technical advisory services to address existing value chain constraints including testing of water quality parameters, and deliver high-quality feeds and seed to farmers.

- **Bolipaara Nari Kalyan Somity (BNKS):** BNKS promoted nutrition-sensitive aquaculture and build capacity of fish farmers, fish nursery operators, and fish harvesting groups in Thanchi Upazila, Bandarban.
- **Tahzingdong:** Tahzingdong developed the aquaculture market actors and strengthen the aquaculture market systems in Alikadam, Bandarban. They developed the capacity of fish farmers so that these farmers adopt nutrition-sensitive aquaculture technology; improve their business skills and increase productivity and income. Besides, Tahzingdong developed fish nursery operators to create access to quality fingerlings at an affordable price. A fish-harvesting group will also be developed to create forward market linkage.
- **Plenary Aqua:** Plenary Aqua is a youth-led intervention that supported the supply and processing of Ready-to-Cook (RTC) fish business with a focus on increasing the marketing efficiency of RTC products.
- **FishBooth:** The concept of FishBooth was first introduced in September 2020 with support of the Activity with the aim to introduce quality aquaculture inputs and expert guideline services in the remote hilly areas. Based on the success of the earlier intervention, FishBooth expanded its business of aquaculture advisory services and inputs to a wider customer group through increased marketing and promotional activities.
- **Palongki Konna:** Palongki Konna is a youth enterprise promoted dry fish powder product with better branding and marketing strategies.
- **Green Biofloc:** Green Biofloc popularized and expanded the bio-floc business.

COVID-19 impacts and mitigation measures:

The Aquaculture Activity addressed COVID 19 crisis mainly through raising awareness on how to mitigate COVID 19 pandemic, disseminate information online about aquaculture technologies and nutrition, and share Information, Education and Communication (IEC) materials with 37,500. The Activity maintained regular communication with aquaculture market actors and hatchery owners about bio-security measures, and there was increased partner outreach by partners to thousands of people in both the ZOI and ZOR. The Activity distributed GoB announcements about sanitation and emergency credit to farmers and also produced new nutrition posters for distribution in all 23 districts of the ZOI and ZOR. Internally, WorldFish places the highest emphasis on the safety of its staff, beneficiaries, and partners. All GoB guidance and safety measures pertaining to the COVI-19 pandemic and has instituted a comprehensive protocol regarding sanitation and social distancing. All WF offices were adopted a staff attendance on rotational basis during June-July 2022 to cope with COVID 19 pandemic. Country-wide, WorldFish has worked with the DoF throughout this period and published guidance in the national press.

Cooperation with the private sector to mitigate the impact of Covid-19

Import replacement:

FishTech Hatchery Ltd has built a business to supply natural carp pituitary glands (PG) domestically to replace chemical variants and imports to ensure fish seed production at the hatchery level. Since the lockdown PG prices have increased four to five times as imports stopped, and UAF continues to operate at capacity. The Activity partner has had significant success in promoting the production and marketing of natural pituitary gland (PG), collected 3.01 kg PG from new fish cutters and PG collectors, sold 2.83 kg dry PG to 26 hatcheries and generated USD 196,000 revenue.

Finance:

Requirement of finance during Covid-19 phase was very immense among the Aquaculture farmers. To ensure the requirement of finance, FTF Bangladesh Aquaculture and Nutrition Activity facilitates Bank Asia, City Bank, KMSS, Mukti Cox's Bazar to ensure convenient flow of finance to reduce the impact of Covid-19 situation. Mainly Bangladesh Aquaculture Activity focused on ensure connectivity with between financial organization and farmers by establishing micro-merchants and agent points and also introduced a number of financial literacy modules which helped farmers to make a proper financial

management which helped farmers to get financial support conveniently during the adverse situation of COVID-19. The Activity partnered 5 MFIs and 4,737 farmers (3,993 women, 1311 youth) received USD 1,946,800 as loan which helped them to buy aquaculture inputs.

Digital Solutions:

FTF Bangladesh Aquaculture and Nutrition Activity facilitating different digital solutions/mobile applications which mainly focuses on advisory services, transportation services, access to finance & forward market linkages. During Covid-19 phases, Bangladesh Aquaculture Activity facilitates to ensure information, market connectivity through these digital solutions. These digital solutions helped farmers in getting different support from these digital solutions. Through these initiatives 15,600 farmers are reached.

Monitoring, Evaluation, and Learning (MEL):

The performance monitoring surveys were rolled-out as an on-going process and systematically tracked and monitored IPs activity progress against the targets. These enabled the decision makers and implementers to determine whether an activity was making progress towards its intended goal within stipulated time frame or required any programmatic decisions. The MEL applied system for updating data values for the Performance Data Table (PDT). GIS data was collected and prepared maps. The web-based info hub was upgraded for improved data access, GIS navigation and visualization. Internal Data Quality Assessment (iDQA) and initiating measures for improvement were carried as a routine activity. Completed the study on 'measuring changes in the market system' and a report has been produced for IPs, market actors and final service recipients (*Annex 2*). The web-based management information system (MIS) was upgraded from time to time to collect and gather the Activity information. Implementing partner's (IP's) MEL deliverables were regularly checked and tracked using the KPI matrix. Introduced and maintained an MIS based solution to keep IPs' monthly progress reports and track the progress as well.

Key results:

Activity reached 384,570 people including 11.80% women and 12.81% youth. The Activity partnered 5 financial institutions and 4,737 farmers (3,993 women, 1311 youth) received USD 1,946,800 as loan which helped them to buy aquaculture inputs. The Activity leveraged USD 3,547,972 of which USG committed amount is USD 1,391,540 that leveraged private sectors to invest USD 2,156,432. It created access to 31,323 tons fish feed through service points. Besides, 7,567 kg hatchlings and 216 million tilapia fries were produced worth of USD 2.56 million and sold to the 2,74,262 carp and 9,952 tilapia farmers. As a whole, the leveraged investment generated total sales of USD 19,621,166 which was 99% of the targeted sales in FY2022. As a result of Activity interventions farmers applied improved management practices in total 89,497 ha area and produced 3,736 kg/ha carp and 6,525 kg/ha tilapia. The farmers earned USD 440 million from their sells of fish in FY2022 (*Figure 1, Table 1*).

AQUACULTURE ACTIVITY ACHIEVEMENTS TILL 2022



384,570

Individuals have participated in food security programs



318,657

Individuals have applied improved management practices or technologies



11.8%

Female participants in programs designed to increase access to productive economic resources



12.8%

Youth participants in programs designed to increase access to productive economic resources



\$3.55 Million

Private sector partner investment leveraged



\$460 Million

Value of annual sales of producers and firms



\$1.95 Million

Value of agriculture-related financing accessed



89,497

Hectares under improved management practices or technologies



Yield of targeted agricultural commodities among program participants (kg/Ha)

Carp **3,736**

Tilapia **6,525**



Figure 1: Infographic of Aquaculture Activity key performance indicators progress

Table 1: Feed the Future Bangladesh Aquaculture and Nutrition Activity Indicators performance data summary

Indicator Ref# & Name	Level	Unit	2022 Target	2022 Results	% ACHV
EG.3.1-14-Value of new USG commitments and private sector investment leveraged by the USG to support food security and nutrition [IM-level]	Private sector partner leveraged amount	US Dollars	2,292,555	2,156,432	94%
	USG commitment amount	US Dollars	1,921,184	1,391,540	72%
	Sub-total	US Dollars	4,213,739	3,547,972	84%
EG.3-2-Number of individuals participating in USG food security programs [IM-level]		Number	354,748	384,570	108%
EG.3.2-24-Number of individuals in the agriculture system who have applied improved management practices or technologies with USG assistance [IM-level]		Number	300,824	318,657	106%
EG.3.2-25-Number of hectares under improved management practices or technologies with USG assistance [IM-level]	Commodity: Carp	Hectare	91,543	87,421	
	Commodity: Tilapia	Hectare	1,108	2,077	
	Sub-total		92,651	89,497	97%
EG.3-10-11-12-Yield of targeted agricultural commodities among program participants with USG assistance [IM-level]	Yield: Carp	Kg/Ha	3,493	3,736	107%
	Yield: Tilapia	Kg/Ha	7,741	6,525	84%
EG.3.2-26-Value of annual sales of producers and firms receiving USG assistance [IM-level]	Commodity: Fish	US Dollars	433,257,135	440,214,541	102%
	Firm -Enterprises	US Dollars	19,815,448	19,621,166	99%

Indicator Ref# & Name	Level	Unit	2022 Target	2022 Results	% ACHV
	<i>Sub-total</i>	<i>US Dollars</i>	<i>453,072,584</i>	<i>459,835,707</i>	<i>101%</i>
EG.3.2-27 Value of agriculture-related financing accessed as a result of USG assistance	Number of recipients	Number	2,021	4,737	234%
	Size of recipient	US Dollars	816,597	1,946,800	238%
GNDR-2 Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources [IM-level]	Number of female program participants (GNDR-2 numerator)	Number	1,617	4,084	253%
	Number of male and female program participants (GNDR-2 denominator)	Number	2,021	5,483	271%
	Percentage of female participant	Percentage	80.0	74.5	
YOUTH-3 Percentage of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29) [IM-level]	Number of youth program participants	Number	101	1,512	1497%
	Number of total participants in the program	Number	2,021	5,483	271%
	Percentage of youth participants	Percentage	5.00	27.58	

Strategy Review: The conclusions of the review, which was conducted last year, were followed to track and assess the impacts and sustainability of the current and previous interventions through a comprehensive direct and indirect impact study described above. The team has re-engaged partners to understand how the aquaculture space has evolved with the Activity’s support for the private sector and NGO actors.

2. Introduction

The Feed the Future Bangladesh Aquaculture and Nutrition Activity aims to improve the sustainable livelihoods of fish farmers and other aquaculture market actors by applying a market systems approach. Aquaculture Activity takes the approach where the emphasis is on facilitation rather than direct implementation. Activity staff identify critical underlying issues constraining the sector and encourage co-investment by private sector companies and NGOs through grants to address these issues. A key principle is to encourage capacity building in existing value chains rather than supporting unsustainable capacity building initiatives that fade away at the end of the project support. The Activity focuses on improved nutrition through more productive aquaculture and has strong cross-cutting elements of the environment, youth, and gender which are inculcated into sub-grantees.

The Activity is now in its fifth year of implementation, and is at a mature stage with significant learning from its interaction with all actors in the aquaculture value chain. The program is currently concluding a process of critical assessment of impact and sustainability of its past and current interventions. The Activity focused on market resilience, promotion of women and youth focused initiatives, access to affordable finance, the promotion of e-commerce and e-information platforms, and the further use of LSPs to foster greater impact and long-term sustainability.

3. Activity goal and objectives

The overarching goal of this Activity is to achieve inclusive aquaculture sector growth through a market system approach. Specific objectives are:

- 1) Increased productivity of aquaculture production systems.
- 2) Strengthened aquaculture market system, with particular attention to expanding opportunities for women and youth.
- 3) Increased awareness and adoption of nutrition-related behaviors, with a particular focus on women and youth.

4. Activity targets

The Activity has the following higher-level targets during its implementation period:

- 1) 400,000 men, women, and youth in the FTF ZOI and ZOR have improved access to better quality aquaculture inputs, services, and/or market channels
- 2) 30 percent expansion of investment by the private sector in the FTF ZOI and ZOR in aquaculture production and market related to inputs and services (e.g., seed, feed, production/ market related information, technology, etc.)
- 3) 30 percent increase in productivity from ponds and *ghers* in the FTF ZOI and ZOR
- 4) 20 percent increase in the number of households adopting improved nutritional practices (consumption of nutritious food, dietary diversity and hygiene practices)

5. Approach

The Activity is applying a combination of market systems and supporting direct delivery approaches in its interventions through engaging the private sector and NGOs to reach smallholder farmers and relevant market actors. In all but very thin markets in the ZoR, Aquaculture Activity is facilitating the process rather than delivering the interventions directly, stimulating co-investment which will then transfer ownership to the private sector and NGOs. The approach includes analysis of the field context, identification of the problems and the underlying root causes of poorly functioning markets, and methods of catalyzing private sectors to bring market-based solutions. These problems and solutions are interrogated through a series of regular co-creation meetings. The Activity Team regularly follows investment rationale steps that justify the Activity investments that should leverage co-investment by the private sector. The approach in some areas of the ZoR involves initial direct support to catalyse activity in very thin or moribund markets, with interventions designed to stimulate some sustainable change after the initial support. This initial work should then trigger market activity which may then be further supported through a purer Market Systems approach.

The Activity is also seeking sustainability from the start by building capacity and resilience of local systems so that the interventions last beyond the Activity period. It follows the adopt, adapt, expand, respond (AAER) framework to underpin its market system approach to the systemic change of Aquaculture. It helps to analyze whether systemic change is happening, or requires further program action in order to take hold. In the yearlong pilot investment period, the Activity closely monitors and learns how the early systemic change symptoms in the adopt and adapt stage create win-win situations for market players such as private companies as well as for small and poor farmers across ZOI and ZOR. Once it shows promising results in terms of sustainability and profitability, the Activity goes for further investment to strengthen the business model to move to the expand phase to push the boundaries of the model to re-engage in order to include new players or new areas to serve more market actors with more benefits.

6. Geographical focus

The Activity is being implemented across 21 south-western districts under 3 divisions, and 2 south-eastern districts under the same division, which are popularly known as Zone of Influence (ZOI) and Zone of Resilience (ZOR), respectively (*Table 2, Figure 2*). These areas present significant challenges in relation to the development of aquaculture sector and livelihoods opportunities. The growth in aquaculture in these areas can play an important role in changing this scenario by increasing production and income opportunities, through catalyzing systemic change in the market.

Table 2: Aquaculture Activity working districts

Division	District
Barishal	Barishal, Bhola, Jhalakathi, Pirojpur, Barguna, and Patuakhali
Dhaka	Faridpur, Gopalganj, Madaripur, Rajbari, and Shariatpur
Khulna	Jashore, Jhenaidah, Magura, Narail, Bagerhat, Khulna, Satkhira, Chuadanga, Meherpur, and Kushtia
Chattogram	Cox's Bazar and Bandarban

Figure 2: Aquaculture Activity working area

7. Year 5 (October 01, 2021 to September 30, 2022): Progress based on the work plan:

IR 1. Increased Aquaculture Productivity

Context: Availability of quality fish seed and feed is a major constraint in the sustainable and profitable development of the aquaculture sector in Bangladesh. Fish hatchery operators rarely maintain sufficient stock of quality broods to ensure genetic purity of the offspring, and pay little attention on biosecurity and other better management practices to produce quality seed, as the infrastructure, machineries, and production facilities of fish feed producers, and availability of quality raw materials, are not always adequate to address these issues .

Over the last decade, dramatic increases in the production of a variety of species from commercial aquaculture systems and sharp increases in per capita fish consumption have occurred in Bangladesh. This transition has been made possible by widespread adoption of semi-intensive and intensive production practices, accompanied by growth in the production and use of aqua feeds. Country's fish and poultry feed manufacturers have cut production by around 20 percent due to high prices of raw materials, which is likely to cause further hike in prices of fish, meat and egg. In response to this, the Activity has been supporting the sub-sector to increase availability of quality fish seed and feed with affordable price, as well as promoting better pond management practices.

Sub-IR 1.1 Increased availability of improved fish seed

Output- 1 Increased availability of high-quality brood fish and seed

1.1.1 Strengthen seed distribution channels through branding and promotion to ensure access to quality fish seeds

Gorai Films provided market promotion services to selected fish hatcheries who follow better management practices but are unable to tap into new market opportunities due to lack of a fish seed marketing strategy. Gorai took a formal business development approach to improve the marketability of quality fish seed to nursery operators, fingerling traders, and fish farmers. Gorai conducted 32 business promotion events reaching 775 fish farmers with information on quality fish seed and their sources. As a result, fish farmers have increased their knowledge about selection and appropriate use of quality fish seeds and their sources from hatcheries.

1.1.2 Wider scale adoption and replication of the hatchery branding model to ensure access to quality seeds

Gorai took a formal business development approach to improve marketability of quality fish seeds to nursery operators, fingerling traders and fish farmers. Results from the piloting showed that hatchery branding model has limited impacts on hatcheries' business as these businesses are geographically concentrated and focused on a local business model. Therefore, a wider scale replication of the hatchery branding model is not feasible.

1.1.3 Sustainable production and marketing of mola (*Amblypharyngodon mola*) seed through establishing mola brood bank

Bhola Monosex Tilapia Hatchery (BMTH), has been producing and disseminating mola (*Amblypharyngodon mola*) seed to farmers with the support from the Activity. BMTH also took initiative to breed mola naturally in hapa and produced 2 million fry. In this year, BMTH delivered ToT courses (*patilwalas*) on mola seed transportation and dissemination to 27 nursery owners, sales agents, and fry traders. Later on, the ToT participants could extend the knowledge they gained to 1,000 farmers including 447 women farmers in 40 batches. Moreover, they established 22 breeding hapas, 40 nursing hapas and constructed one additional nursery pond. BMTH also organized two knowledge sharing workshops on "Raising Awareness about Quality Brood among Multiplier Hatcheries" in Bhola and Jashore for dissemination of Mola brood. Participants from 23 hatcheries were present in these workshops. After these workshops, BMTH organized 2 days long "Capacity Development Training for Multiplier Hatcheries on Induce Breeding Techniques of Mola" in their hatchery premises where each and every technical aspect of induce breeding had been done practically demonstrated with direct assistance from external experts besides sharing theoretical knowledge. A total of 18 participants from 8 hatcheries were trained on mola breeding through this partnership. In addition, they organized a "Project Closing cum Annual Meeting" in Bhola to share experience, challenges and opportunities where 20 different aquaculture actors including hatchery owners, nursery owners, and representatives from AMP Company, etc. were attended. BMTH sold 50,000 mola fries worth BDT 25,000 (USD 265) to 24 farmers in the reporting year.

1.1.4 Improve access to Mola seeds through induced breeding at 4 to 5 hatcheries in ZOI

A total of 6 hatcheries with the support from the Aquaculture Activity started induced breeding of mola in ZOI in year 5. To build up the capacity of hatchery owners The Aquaculture Activity team delivered training to these 6 hatchery owners and their 11 technicians with the aim to develop their knowledge and skills on mola induced breeding technology, better management practices on mola spawn/ fry production. The Aquaculture Activity also developed communication materials on mola fish induced breeding technology and disseminated to other hatchery owners of ZOI and ZOR.

1.1.5 Strengthen the supply chain of indigenous carp Pituitary Gland (PG) to produce and market quality PG locally

In spite of having vast sources of raw Pituitary Gland (PG), a formal PG market was not built in Bangladesh. The raw PG along with the whole head of the carp fish are being consumed without knowing the value of PG. On the other hand, the hatchery owners are relying on imported synthetic hormones and PG, which created a negative impact on our national economy. Taking this fact into consideration, FishTech in partnership with the Aquaculture Activity conducted seven hands-on training with 213 PG harvesters and 42 PG collectors in seven districts this year. Besides FishTech conducted 48 meetings with 223 PG harvesters. They also conducted 20 refreshers meetings with 103 PG harvesters. One of the main purposes of these activities was to build a formal supply chain of PG and to reduce the import dependence of synthetic hormone or PG. As a result of these interventions, FishTech procured 3.03 kg raw PG from the ZOI areas and sold to 26 hatcheries in 19 districts of the country. FishTech earned USD 196,000 by selling PG during January to September 2022. Through the initiative of the Activity, geographical scale up has happened along with the formation of the formal supply chain of PG. Fish hatchery owners are now getting PG available at a reasonable price due to the intervention. Also, PG harvesters are getting opportunities to increase their income by 30% to 50% by extracting PG during cutting fish. One research paper on "Local and overseas carp pituitary gland in

the induced breeding of *Cirrhinus mrigala* (Hamilton 1822)” was published in the Asian Journal of Medical and Biological Research (Asian J. Med. Biol. Res. 2022, 8 (3), 146-153). FishTech has a plan to increase the production capacity to 8-10 kg next year. They also have a plan to conduct research on a comparison between natural PG and synthetic hormone (ovaprim) in terms of breeding performance and fingerlings’ survival rate.

1.1.6 Ensure access and promotion of high-quality carp seeds for development of aquaculture business in the Bandarban region

Maa Mothsha Hatchery and Nursery (MMHN) established a carp hatchery to reduce costs, gain control over different spawn and fingerling in Bandarban and Cox’s Bazar region and improve quality of fish seeds and finally achieve competitive advantages of price, quality, time, volume of customized products and services over competitors. MMHN established the hatchery with a deep tube well for underground water source, RCC tank for holding water to operate hatchery, prepared hatching jar, rectangular tank, drainage system developed and electric line installation, renovation of spawn/fry conditioning, packing & loading area. MMHN introduced 600 kg quality brood stock from different reliable sources and 205 pcs G-3 Rui fingerlings from Chatteshari hatchery of Jessore and raised with intensive care for seed production with the support from the Aquaculture Activity. As a result, MMHN was able to produce 31 kg rui, catla, common carp spawn and sold 23 kg spawn at USD 977. They also sold 30 kg of carp species fries at USD 916 and 4,580 kg fingerlings at USD 23,017.

MMHN delivered day-long capacity building training in 30-batches to 600 fish farmers including 192 women in Lama, Alikadam, Pekua and Chakaria upazila. Besides, they completed capacity building training for the 28 seed agents, nurserers (26 men, 2 women). MMHN received 2 days long capacity building training for the hatchery staff and technicians on better management practices at hatchery level. They performed a stakeholder coordination events with 50 different aquaculture market actors. The project activities have brought benefits for the entire value chain of carp aquaculture such as fish farmers, nurseries, inputs suppliers, processors, transporters and consumers of ZOR area.

Output- 2 Promoted High Yielding Varieties of Carp

1.1.7 Monitor the dissemination of HYV carp brood stock

The Activity extended support to CGIP program through facilitating the process of carrying out an on-farm trial to assess performance of G3 rohu. In addition, the Activity is monitoring the status of existing brood stock, how they have been used for quality seed production and disseminated. Around 30 hatcheries are known to have G3 rohu brood stock, and seven of them have produced seeds of this improved fish this year for the first time. Altogether, these seven hatcheries have sold 245kg of spawn to 183 aquaculture enterprises, including 104 nurseries. The nurseries have begun selling fingerlings to farmers. Thousands of farmers are expected to buy the improved rohu fingerling from these nurseries until mid-2023.

1.1.8 Conduct field trial to assess growth performance of G3 rohu

As part of the dissemination of G3 rohu among the hatcheries, nurseries and fish farmers, the Activity supported a field trial involving 20 demonstration farmers to compare the growth of G3 rohu. It was revealed from the trial that G3 rohu grew 37% faster in comparison to the existing rohu of riverine and hatchery sources, respectively (*Figure 3*). Besides, 4 hatcheries in Jashore produced 138 kg G3 rohu spawn and sold to 90 nurseries and farmers. To disseminate the information of G3 rohu’s on farm trial performances the Aquaculture Activity organized five seminars in five districts as Jashore, Khulna, Barishal, Bandarban and Cox’s Bazar. A total of 237 participants including hatchery and nursery owners, farmers, private sectors, GO and NGO officials participated in the seminars. Among the government officials Deputy Director as well SUFO of Dumuria and Batiaghata upazillas, Khulna; DFOs from Jashore, Barishal and Cox’s Bazar and Extension Officer of Bandarban were important. Key questions commonly asked by the participants regarding G3 rohu were where to find it, how to ensure the quality and what would be the role of WorldFish when the quality would be compromised at field level. Major recommendations came from the seminars included government may help introduce certification for the hatcheries and nurseries who would sell G3 rohu, WorldFish may arrange inserting tags while providing the G3 rohu brood to the hatcheries, WorldFish may arrange G3 rohu management

training to the hatcheries to avoid inbreeding or cross breeding problems and WorldFish would find ways to ensure that the genetic improvement of rohu and other native and exotic fish species is continued.

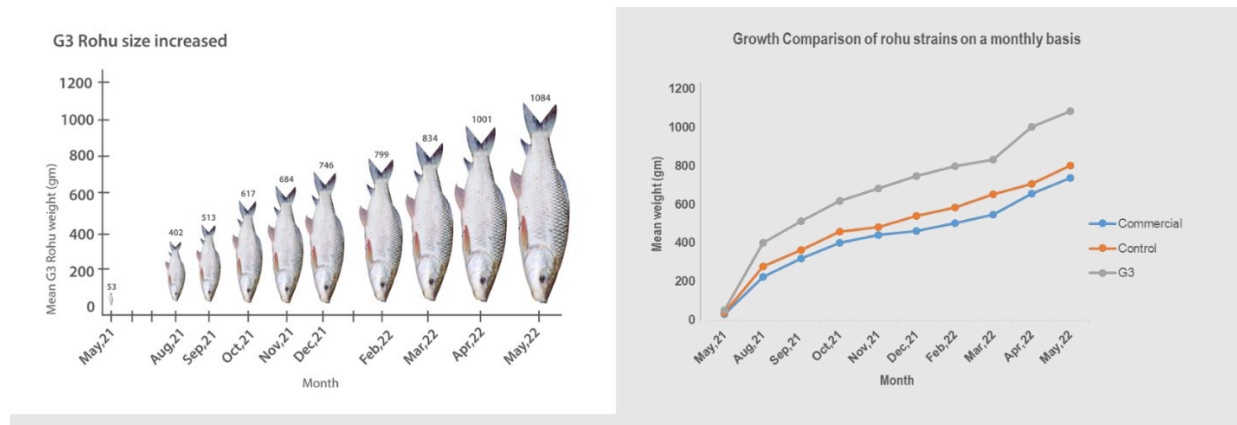


Figure 3: Growth comparison of G3 rohu and other rohu of riverine and hatchery sources in Jashore district

Output- 3 Genetically Improved Farmed Tilapia (GIFT)

1.1.9 Provide technical assistance to the hatchery partners on multiplication and brood stock development (BRAC)

BRAC produced and sold 0.09 million genetically improved mixed sex tilapia from their Cohort breeding System to 6 multiplier hatcheries as brood stock for production of high-quality mono sex tilapia fries and earned USD 10,000. The multiplier hatcheries earned USD 11 million through production and sale of 1,121 million mono sex fries to 22,500 grow-out farmers for tilapia table fish production. It is expected that 22,500 grow-out farmers will produce 149,353 metric tons tilapia table fish, which worth of USD 178 million. Besides this, around 5.5 million swim-up fries are being raised under methyl testosterone hormone (MTH) treatment in the sex reverse tilapia (SRT) hapas for mono sex fry production by those multipliers.

1.1.10 Foster linkages between GIFT nucleus and cohort

The Aquaculture Activity developed a hatchery database with contact details of 200 active multipliers hatchery owners which was shared with BRAC and BMTH. This database helps them to disseminate 0.1 million mixed sex fries as brood stock to 8 multipliers hatcheries. It is expected that these hatcheries will be able to produce around 1,300 million mono sex fries in coming year.

1.1.11 Establish market and technical linkages with SPAITS (Scaling Systems and Partnerships for Accelerating the Adoption of Improved Tilapia Strains by Small-Scale Fish Farmers) participants

The Bureau of Socioeconomic Research and Training (BSERT) under the Faculty of Agricultural Economics and Rural Sociology- the partner of the Scaling Systems and Partnerships for Accelerating the Adoption of Improved Tilapia Strains (SPAITS) Project organized a Training of Trainers (ToT) course on 'Tilapia Hatchery and Nursery Management' for 16 hatchery owners/technicians and 22 commercial farmers in Satkhira under Khulna Division. A capacity building training course on better management practices was delivered to 29 farmers and 4 seed traders in Satkhira. The project also facilitated a stakeholder workshop in Satkhira involving different layers of 37 participants of hatchery owners, fry traders, feed suppliers & farmers. Officials of the Department Fisheries and Khulna University also attended. All these events helped different layers of tilapia stakeholders to know the impacts of quality brood, sources from breeding nucleus, BMPs for hatchery operation and grow-out production systems.

Sub-IR 1.2 Increased availability of affordable quality fish feed

Output- 4 Increased availability of better-quality feed through Local Service Providers (LSP)

1.2.1 Establish an Inclusive business linkage for small household fish farmers through one-stop service points and market actors linkage

The One Stop Service Center (OSSC) is the platform where a comprehensive basket of services are being made available for different market actors, especially for smallholder farmers at community level. It will be differentiated from a traditional dealer point or retailer point, as several free and fee-based services can be found along with the usual core product or service. The services include - a) availability of quality feed and other inputs at affordable price, b) information on better management practices, c) soil and water quality testing facilities, d) advisory services such as pond visits, advice over phone and providing extension materials like leaflets, brochures, posters, etc. on different modern techniques and practices, e) transport services for delivery of products i.e. feed, seed, aqua medicinal products (AMP), etc. to farm gate, f) machineries support, g) information on access, and lastly, g) linkage support i.e. connecting farmers to forward market etc.

Under the initiative of establishing OSSC Aftab and SKF, Petrochem, KNB and KMSS were on-boarded and 112 OSSCs were established in different locations of ZoI and ZoR following a series of selection processes. An OSSC strategy paper and an OSSC selection criteria were developed and finalized. Two brand names were selected for the OSSCs, one is "Maach Bondhu Seba Kendro" which will offer a full range of services (7 services) and the other one is "Maach Bondhu Uddokta", which will offer at least 2 services. Based on the branding, 2 types of branding protocols and respective signboards were finalized and installed in the OSSCs. The service provision for farmers from the OSSCs had been started from last quarter of this year.

1.2.2 Establish a joint business model to increase access to quality inputs

Most of the smallholder fish farmers do not have adequate knowledge and information on better management practices (BMP) in aquaculture which eventually leads them to incur loss year after year. Meanwhile, marginal fish farmers' limited access to quality inputs, such as feed, and advisory services refrain them from gaining increased production and higher profit margin. Taking these considerations into account, KNB Agro Industries Ltd., in partnership with Feed the Future Bangladesh Aquaculture and Nutrition Activity, trained 41,993 small-scale fish farmers, including 21,063 women and 11,095 youth, in learning about pond management, seed stock management, supplementary feed formulation, calculation method for feed application, fish disease management, dyke farming, gender and nutrition-sensitive aquaculture, and other aspects of Better Management Practices in 5 ZOI districts named Khulna, Jashore, Jhenaidah, Chuadanga, Kushita. KNB also worked with 55 active dealers and transformed its 20 conventional dealer points into One-Stop-Service-Centers (OSSC) and established OSSC's presence in 11 ZOI districts, allowing fish farmers access to quality feed and basic testing services such as pH, Ammonia, Dissolved oxygen along with other technical advisory services. As a result of KNB's business promotion events and OSSC's presence, farmers realized the necessity of adopting BMP and other modern aquaculture practices, applied to their farms and have begun to see some return on investment as a result of their improved best management practices. Concurrently, demand for KNB's fish feed has grown significantly in those working districts, prompting KNB to open more dealer locations in those places in order to extend their market and attract rural fish farmers as valued customers.

Output- 5 Introduced and promoted app-based feed supply chain and feeding management

1.2.3 Promote digital feed supply chain management and advisory services to ensure maximum efficiency of seed distribution and utilization

In order to develop an e-platform to collate and synchronize data on market demands, supply/storage at different tiers, and production status, Aquaculture Activity established a partnership with Aftab Feed Products Ltd. The e-platform would facilitate developing an effective and sound supply chain management system. Aftab developed the App, and organized three (3) types of capacity building training for its project staff, call center staff, LSPs, feed dealers, and sub-dealers. During the reporting

period, Aftab in association with “Source Trace”, conducted 3 batches of capacity building events for 50 dealers and sub-dealers on the use of its App, BMP technical services, and business promotion. They also organized 4 batches of capacity building events for 100 LSPs on the digital feed platform, app-based feed demand & supply, and BMP technical services & business promotion to farmers, and completed 250 batches of courtyard meetings with 5,096 farmers including 943 women farmers. They also arranged 120 batches of Hat Activation events to promote Aftab digital services and call centers with the participation of 3607 fish traders, retailers, transporters, fish farmers, laborers (packaging, ice breaker, loading-unloading) and cleaners including 1 women farmer. The call center provided services to 1395 fish farmers including 53 women farmers. Additionally, Aftab arranged 6 B2B linkage workshops, 3 refresher capacity building workshops and 10 new capacity building workshops, and a total of 444 participants attended these events. Dealers, sub dealers, different level market actors, and DoF officials also joined in these events. In the reporting year, Aftab sold 8,968 MT feed valuing USD 5.7 million through dealers, 4,004 MT feed valuing USD 2.5 million through 100 LSPs in Jashore, Khulna and Barishal region. Aftab also sold 990,000 fish fries through dealers and LSPs.

In the cost extension phase partnering with SKF, Aftab Feed Products limited established 32 one stop service centers in ZoI and ZoR, of which 22 were from Aftab part and 10 from SKF. They conducted 600 product promotion events in ZoI, where 15,970 participants were present including 3,063 women. In ZoR, they conducted 35 courtyard session with 500 participants including 173 women. They also organized 50 hat activation campaign where 747 participants including 11 women attended. Aftab also organized 3 capacity building events, 3 B2B linkage events for dealers and LSPs, and 6 capacity building events for LSPs where 218 participants attended. Aftab sold 2,542 MT feed valuing USD 1.6 million through 22 OSSCs, 930 MT feed valuing USD 0.6 million through 64 new LSPs during last 2 months of the year.

1.2.4 Introduce digital applications to strengthen linkages among market actors

Proper access to information is one of the critical components for harvesting better results, but Aquaculture farmers don't have adequate access to information regarding production practices, market price, and market information. These barriers often fall out as farmers' losses in accessing quality inputs and market prices. Besides, access to the forward market is another significant challenge, especially when farmers intend to sell their harvested fish. And last but not least, feed incurs a massive cost during the Aquaculture production cycle, and it isn't elementary for farmers to have the proper calculation to optimize the feed cost.

Despite these challenges, there is no viable ecosystem/platform available for Aquaculture farmers to get proper accessibility. Existing services are mainly human-centric, sometimes not financially viable, and unsuitable for gaining broader market reach. So, to ensure information accessibility, market access, and optimize feed cost, Bangladesh Aquaculture Activity facilitated a possible and easy-to-use digital solution that includes all the necessary features that are useful for Aquaculture farmers. In Bangladesh, several applications are developed, but most are not workable. The main reason behind this is that the Apps are designed without an in-depth study of farmers' critical challenges. Some Apps only seek to address one or two constraints, which are not very supportive from the point of farmers' priorities. Bangladesh Aquaculture Activity partnered with ARITS Limited (an IT company) to develop a "One Fish" mobile application that includes all required features to mitigate the mentioned challenges in the market. The prototypes have already been developed and are now at field testing. We are also updating the essential elements like the "Feed Calculator," "Fish Buying Section," etc.

1.2.5 Develop sampling protocol for fish feed sample collection and analysis

The sampling protocol was developed to collect samples from market systematically as it can represent feed market situation. The purpose of the sample collection of fish feed was to know availability of quality feed in market.

1.2.6 Facilitate feed sampling and analysis program and generate report from feed sample analysis

The samples were already collected. As government laboratories are accredited, reliable and acceptable, we are recommended to test in these laboratories. These laboratories do not accept samples without any

cash payment of testing fees. But recent financial policy of WorldFish did not allow to pay testing fees in advance or cash. This is why we have planned to drop these activities.

1.2.7 Developing Business guideline for Community Feed Center (CFC)

The key objective of establishing CFCs is to improve access to feed with affordable price for small marginal farmers in the remote areas. The Activity supported participants to establish CFCs both in ZOI and ZoR and improved access to feed. A business was drafted which helped CFC operators to make their business profitable.

1.2.8 Awareness raising on quality Tilapia seed and better feed management practices

The Aquaculture Activity has taken initiative collaboration with WorldFish project- SPAITS and through BSERT partner (Bureau of Socio-economic Research and Training, Bangladesh Agricultural University) to build awareness on this.

A training course was organized on quality tilapia seed and better management practices in Satkhira on 13 June 2022 where a total of 31 farmers and 4 seed traders attended. A stakeholder consultation workshop was also facilitated on 14 June 2022. In this workshop, a total of 37 participants from farmer, trader, hatchery, feed supplier, Department Fisheries (GoB), Khulna University attended.

1.2.9 Link feed company with disease diagnostic laboratory to reduce fish disease incidence

There was meeting with FishTech (BD) Limited and Nourish Feeds Ltd. They are agreed to work together. FishTech like to do a seminar and training for Nourish sales staff as they can understand importance of diseases identification and based on that they can prescribe treatment to their farmers. The treatment products are available in Fishtech. Therefore, there is business incentive for them not only from testing but also from product selling which is their core business. Fishtech will provide some discounts to dealers of Nourish on testing fees. This will add as an embedded service of feed dealer and also support service from Fishtech in respective feed dealer. The two-way support to Nourish farmer will also increase feed sales. Fishtech and Nourish are also jointly like to arrange some awareness program.

1.2.10 Support IPs Capacity building of CFC (Community Feed Center) and feed agents

Reviewed training materials of Matrix, consultation with trainer of Matrix to deliver correct message to CFC operators and farmer. Provided hands on training to CFC operators in Bandarban IP named GRAUS.

1.2.11 Support to formulate feed and develop extension materials: poster, festoon and leaflet for IPs

Support IP Matrix to develop feed formulation, and extension materials: poster, festoon awareness slogan and leaflet.

1.2.12 Develop questionnaires for assessing feeding practices adoption

The questionnaires have been developed for assessing impact of feed interventions and merge with MEL questionnaires.

1.2.13 Provide technical support on better feed management practices and facilitate capacity building of LSP and farmer of Partners

Provided technical support on better feed and feed management for AIT, KNB and. This is additional support activities for IPs.

1.2.14 Feed utilization in different aquaculture system- an assessment report

The recent trend of fish culture intensification in Bangladesh is turning the sector to industry and business for companies. The different intensification systems are going to adopt in Bangladesh. But the amount of feed usage in this system is still an issue for profitability and environmental impact. To address the issue Aquaculture Activity has taken initiative to assess the performance feed in different systems. This activity is linked with activity (harvesting) of IPRS, Bottom clean and Bio floc. The analysis of harvesting data and feed utilization will be done in October, 2022.

Sub-IR 1.3 Increased adoption of improved pond management practices

Output- 6 Introduce and promote intensive farming in Aquaculture production systems

1.3.1 Promotion and adaptation of In Pond Raceway System (IPRS) in the south-western part of Bangladesh to intensify aquaculture production

The gradual decrease of arable land enhanced the need to increase production in pond aquaculture through In-Pond Raceway System (IPRS) in Bangladesh. Through the support of the Activity, Afil Aqua Fish Ltd. (AAF) innovated IPRS machinery which helped promoting IPRS and reducing import dependence of IPRS machinery. During this year, AAF trained 148 advanced fish farmers on how to establish IPRS. To adapt the technology to different agro-ecological contexts AAF conducted seven research works on the selection of suitable fish species to be stocked and the environmental impact of IPRS in collaboration with Jashore University of Science and Technology (JUST), Khulna University (KU), and Khulna Agriculture University (KAU). AAF organized exposure visits in six batches for 387 students of the fisheries department of JUST, KAU, KU and Youth Development Department (YDD) of GoB. The students learned different aspects such as increased fish production capacity, export potentials, and climate coping mechanisms of IPRS as part of their respective course curricula. In the first production cycle, AAF harvested 121.40 MT fish from the IPRS production cells worth BDT 34.19 million (USD 350,613). In the second production cycle, AAF harvested another 17.1 MT of tilapia fish from the IPRS pond which is worth BDT 1.97 million (USD 20,168).

On September 16, 2022, two representatives from JUST and the Aquaculture Activity team jointly presented a paper on the research findings, “Economic feasibility of commercial fish farming in In-Pond Raceway System in Bangladesh” at the 2nd International Conference on Sustainable Fisheries organized by Sylhet Agricultural University, Sylhet. AAF has a plan to start a new venture to provide information and sell machinery to interested farmers willing to set up IPRS. AAF also has a plan to continue the research work to identify low-cost IPRS technology for marginal farmers and improve water recirculation through purifying the water and environmental impact of IPRS. The Activity is also facilitating market linkages between AFF and exporters of white fish.

1.3.2 The wider scale promotion and adaptation of In Pond Raceway System (IPRS) in southern Bangladesh

The intervention was extended from June 2022 to September 30, 2022 to conduct research on environmental impact and wider scale promotion of IPRS. The Fisheries and Marine Resources Technology (FMRT) discipline of Khulna University collaborates with Afil Aqua Fish Ltd. to conduct research on the environmental impact of IPRS.

1.3.3 Promotion and adaptation of Bottom-clean (IPRS) in the south-western part of Bangladesh

Sardar Agro continued bottom sludge removal technology in its 50 decimal ponds. Regular removal of bottom sludge was done through pumping, which helped to maintain water quality suitable to grow fish in the pond at a higher density, and grow napier grass in the nearby area of the pond with the use of the bottom sludge. During the reporting period, Sardar Agro organized 78 farmers' capacity building in different areas of the Jashore and Khulna region. Recently 8-10 farmers have shown their interest on bottom clean raceway model. Sardar Agro harvested o crops 11.8 MT high value pabda fish, worth BDT 3,132,000 (USD 32,123).

1.3.4 The wider scale of Promotion and adaptation of In Bottom-clean (IPRS) in the south-western part of Bangladesh

Proposed activity for conducting a collaborative research with Sardar Agro and Fisheries and Marine Resource Technology discipline of Khulna University on environmental impact of bottom sludge removal technology (IPRS) but impact related issues it was dropped.

Output- 7 Farmers adopted improved fish farming practices

1.3.5 Diversification of existing Aqua Medicine Product's sale through vertical expansion including LSPs, Institutes and lead stakeholders

The absence of quality raw materials, advisory services, and knowledge on better management practices (BMP) prevent smallholder farmers from unlocking their economic potential. To address these constraints, KAAS Trade began strengthening the distribution channel of Aqua Medicinal Products (AMP). KAAS has planned to reach 17,400 fish farmers, 360 nursery farmers, 36 hatchery owners through 45 dealers/retailers and 90 LSPs under sub-agreements with ARGON, AgroBased, and Unique Agro Care.

During the project period, KAAS Trade trained 45 dealers/retailers and establish 30 AMP School, and selected 90 LSPs. KAAS Trade established 30 AMP Schools *i.e.* One Stop Service Centers to create improved access to quality inputs, water and soil quality parameter testing facilities and advisory services for the fish farmers. All of these 30 AMP Schools were equipped with water and soil testing meters and kits. Farmers started receiving quality products and advisory services through product promotion events organized at their one-stop service centers. KAAS delivered training courses to 460 nursery owners, 30 Hatchery owners and 93 LSPs to extend technical assistance to farmers. KAAS reached 4,452 farmers during their project phase through AMP Schools and LSPs. Implementing partners of KAAS found that, service-providing mechanism to the smallholder farmers through AMP School escalates the total sales volume as well increase the overall customer base for their companies.

1.3.6 Ensure Advisory Services for Small-scale Aquaculture Farmers through Developing Women Micro-franchise

Farmers in remote areas struggle to access quality input and advisory services. Petrochem Bangladesh Limited (PCL), with support from Aquaculture Activity, extended advisory and aqua input services to small-scale aquaculture farmers through 60 women micro-franchisees (WMF) who are linked with the master franchisees (company dealers). The Activity extended the contract of PCL to establish an additional 30 One-Stop Service Centers (OSSC). Through this business model, PCL has a plan to reach 10,200 farmers (7,800 directly from technical events, and 2,400 from sales and advisory services) with particular attention to women and youth in the aquaculture sector.

During their activity implementation period, PCL established 60 WMF points and 30 One Stop Service Centers, and capacitated them with providing training on aquaculture technical advisory services & business development services, equipped with water parameter testing kits & meters, and different types of business promotional materials (festoons, leaflets, and signboard). With the assistance of these WMFs and OSSC, PCL organized 390 “Technical Knowledge Sharing Events” at farmers’ courtyards to disseminate improved aquaculture technologies and knowledge on appropriate usage of aquaculture products. A total of 8,725 farmers including 2,333 women participated in these technical events. During their project period 2,660 small holder farmers received technical services and products from the business centers (WMF & OSSC). PCL established “one-stop service centers” and “women micro-franchisees” will ensure advisory services for the smallholder farmers through meeting and training, printing documents, water and soil testing facilities, aquaculture machinery and equipment, access to information about finance, disseminate information of fish seeds, and market information related to sell products and buy inputs. Through this intervention, customer base and sales volume are increasing both for PCL and their distribution channel (OSSC & WMF), and the farmers are getting appropriate advisory services through these service providers.

1.3.7 Develop market actors and channels for promoting nutrition-sensitive aquaculture in Bandarban

The Activity partner GRAUS successfully promoted nutrition-sensitive integrated carp-mola polyculture with dike cropping in a sustainable manner facilitating the aquaculture market actors and market channels in Bandarban. During the reporting period, GRAUS worked with and built capacity of 580 nutrition-sensitive integrated aquaculture with dike cropping farmers, 25 fish nurseries for availability of fish seeds at rural level, 2 community fish feed centers for availability of fish feeds near to the farmers hand, 2 fish harvesting and marketing groups to for harvesting the produced fish in time at reasonable price, and 45 other backward and forward aquaculture market actors for create a market linkage among the fish aquaculture actors though 7 market linkage events. GRAUS also observed 5 Farmers Field Day with fish farmers and adjacent neighbors for crowding in the nutrition-sensitive integrated aquaculture. GRAUS facilitated 3 hapa based SRT (Sex Reversed Tilapia) nursery to ensure

fry supply among rural fish farmers in hilly areas, the 3 SRT nurserers sold 273500 pcs mono sex Tilapia fry and worth BDT 547000 equivalent to USD 5610.

As a result of the intervention, the earnings from aquaculture have increased and the farmers are developed as entrepreneurs from subsistence farmers. Fish production has increased compared to the past. Fish culture and best management practices are replicated among the neighbors. The fish nurseries are supplying the good quality fingerlings among farmers, as well as their sell has increased and man, women and youth's participation in fish culture has increased in this region.

1.3.8 Strengthen supply of quality inputs and advisory services for fish farmers in Bandarban

Satata Poultry, one of the partners of the Activity, improved farmers' access to quality inputs, especially fish feed, provided technical services, measured pond water and soil quality, and delivery of feed to farmers doorsteps. Satata Poultry sold 479 MT quality fish feed, 1.2 MT lime, and different kinds of aqua-medicines to 217 fish farmers of Lama and Alikadam from its service center. In addition, Satata Poultry handed over 2 seine nets and 1 cast net to a local fish harvesting group and the group provided fish harvesting support to 37 fish farmers. Satata Poultry delivered training on improved aquaculture technology and business development to 204 aquaculture farmers including 75 women and completed 4 market linkage events with the participation of 82 different aquaculture market actors to create farmers' access to quality inputs, services and forward markets. 230 farmers (including 70 women farmers) received pond water quality testing services from Satata Poultry. A total of 30 aquaculture farmers learned about improved aquaculture technologies through joining in the 3 exposure visits organized by Satata Poultry. Satata Poultry also established 10 demo ponds in Lama and Alikadam upazila to educate farmers regarding improved feed management in aquaculture through Farmers Field Day. Satata Poultry also supplied fish feed to other partner's 500 aquaculture farmers of GRAUS 350 (Bandarban Sadar, Rowangchari, Naikhongchari), Tahzingdong 100 (Alikadam), BNKS 50 (Thanchi).

Through this intervention, Satata Poultry has brought a new innovation of improved aquaculture technologies, technical advices on farmers' problems including testing of water quality parameters and delivery of feeds at farm gate in Lama and Alikadam upazilas. Satata Poultry has developed 3 mini agents to distribute its fish feed products and services to the farmers living in rural villages.

1.3.9 Strengthen nutrition-sensitive aquaculture developing market actors in Cox's Bazar

The Activity made partnership with Protyashi from April 1, 2022 to strengthen nutrition-sensitive aquaculture developing market actors. Major activities accomplished by Protyashi during this reporting period were staff orientation on the intervention, organized ToT (training of trainers) course for the Field staff and the LSPs (Local Service Providers) on improved aquaculture and business development developed IEC materials like leaflets, festoons, and training modules on improved aquaculture, nutrition, gender and vegetable cultivation, capacitated 600 fish farmers by LSPs (phased out 480 farmers) and by staffs (120 new farmers) on improved aquaculture and business development from Ukhiya and Ramu upazilas under Cox's Bazar district. Besides, Protyashi celebrated National Nutrition week 2022 to disseminate the nutrition messages among mass community, National Fish Week 2022 with the department of Fisheries at Ramu and Ukhiya upazilas and International Youth Day at Pannyashia primary school under Ukhiya upazila. They also conducted 2 market linkage events with the aquaculture market actors at Ramu and Ukhiya, and nutritious mola fish cooking demonstrations at the school level in Ramu and Ukhiya to build awareness among students

As a result, the knowledge and skills of farmers has been increased on nutrition sensitive aquaculture particularly on use of lime, fertilizers, fish feed, stocking of fish considering carrying capacity of the pond. More importantly they are applying their acquired knowledge in their pond and the nutrition sensitive aquaculture has been popularized in the intervention area. The level of adoption of this aquaculture technology widely varied from farmer to farmer. For example, some farmers are practicing tilapia-carp-mola polyculture at a commercial scale using commercial fish feed with higher stocking densities while some farmers are cultivating in their homestead ponds aimed at own consumption of fish round the year and to sell surplus fish. The farmers are expecting higher fish productivity about more than 40% higher than the last year (production is expected to 4.6 MT per ha). All the participants

are consuming their produced fish and vegetables which have been increased significantly after the intervention. The intervention has been successfully completed on 30 September 2022.

1.3.10 Aquaculture market channel development in Alikadam

Due to poor market channel in Bandarban, the aquaculture production potential is underutilized. To improve the situation, Aquaculture Activity made partnership with Tahzingdong to in Alikadam Upazila of Bandarban District. Tahzingdong provided capacity building training to 100 Aquaculture farmers of Alikadam upazila and the farmers adopted the nutrition sensitive aquaculture and improved their productivity and income. The farmers are getting access to quality seed from nurseries developed by the project t at lower price, in time. 1 fish harvesting group has developed with 5-6 members. They conducted 2 Market linkage events, which strengthened market linkages with different aquaculture market actors, increased availability and accessibility of the fish seed feed and other aqua inputs. Tahzingdong also observed 2 Farmers Field Days to demonstrate results. This has increased farmers' confidence and replicates the better practices among farmers and neighbors of Alikadam upazila.

1.3.11 Promoting Nutrition Sensitive Aquaculture in Thanchi

With the aim to promote nutrition sensitive aquaculture in Thanchi, the Aquaculture Activity in partnership with BNKS and addressed the existing challenges including lack of access to extension service on improved aquaculture practices, access to quality fish seed, feed, other inputs, high price of inputs and access to markets in the remote hilly area.

BNKS organized 6 community awareness meetings, delivered training on nutrition sensitive aquaculture for 50 fish farmers. As a result, farmers adopted the nutrition sensitive aquaculture and improved pond productivity and income. 2 fish nurseries were developed by BNKS, which improved access to seed at local level in time. 1 fish harvesting group has been developed involving 5-6 members was also developed by BNKS.

One fish aggregation center has been established and the farmers are using the aggregation center and practice collective purchasing and marketing initiatives. 2 Market linkage event has created linkage with different backward and forward aquaculture market actors. 2 demo ponds have set up for observing the quality, growth, diseases of fish, which has increased the farmers confidence level and 2 Farmers Field Day has observed to result demonstration and it helped in replication the nutrition sensitive aquaculture among neighbors of Thanchi upazila.

Challenges encountered while implementing activities in IR 1 during this year:

FishTech Hatchery has faced challenges due to the informal market actors who are working as PG collectors. KNB Agro Industries have faced difficulties in achieving the targeted number of farmers. Afil Aqua Fish Ltd. had a hard time collecting information in the market regarding machinery, species and the environment. KAAS Trade found that training frequency and time were not adequate for developing service providers' (mainly dealers and LSPs) capacity, affecting the activity implementation, event organizing capacity and event quality. Petrochem Bangladesh Limited has faced challenges around women participation in technical events and lack technical staff at regional level to conduct farmers meeting.

IR 2. Strengthened Aquaculture Value Chains

Context: Strengthening of aquaculture value chains is important to ensure that aquaculture products reach the market in good condition, waste is minimized in the supply chain and there are effective governance and policy support mechanisms for all aquaculture value chain actors. As aquaculture production grows in particular localities, local consumers can no longer absorb local production, creating opportunities for SMEs to specialize in trading, transporting and marketing of fish and fish products. The Activity is addressing this by encouraging innovation in key value chains while providing background information that will be useful to businesses wanting to invest in value chain improvements.

Sub-IR 2.1 Increased market linkages

Output- 8 Ensured efficient ways of fish transportation systems

2.1.1 Develop and promote an uber-like model for efficient fish transportation

Transportation system in Aquaculture in Bangladesh has many challenges, such as poor vehicle condition, lac of required facilities in the vehicles, high charges, lack of ride sharing facility, absence of a tracking mechanism, etc. Under this situation, quality of fish during transportation degrades, mortality increases, cost of transportation increases, which ultimately result in poor income for the fish farmers. MWorld with support from the Feed the Future Bangladesh Aquaculture and Nutrition Activity introduced a mobile application “Maach Gari” to improve transportation for strengthening supply chain efficiency in aquaculture. The App helps farmers, hatcheries and nursery owners to transport fish efficiently by using a digital transportation technology. To familiarize the “Maach Gari” app, MWorld conducted 60 promotional events with 1,381 participants (1,343 farmers and 348 vehicle owners). MWorld also conducted 5 market activation events with 120 fish traders in Jashore. 283 vehicles were also registered to deliver the transportation services through the app.

As a result, 1,723 fish farmers and 25 nursery owners transported their fish using the app and its associated call center. The App generated 302 trips and delivered 172 metric ton fish worth USD 225,240 to desired destinations and markets by the registered transport service providers.

MWorld developed a long-term business plan for to operate the app in a sustainable manner and engaged itself with different government, NGO and private sectors. The app will be linked with the Activity’s One-Stop Service Center (OSSC) initiatives to encourage wider scale promotion.

Output- 9 Developed effective business linkage to ensure the availability of better quality aqua inputs

2.1.2 Establish an effective and inclusive business linkage for small feed millers to get on-time access to quality input, machinery service and feed sales

Matrix Business Development Ltd., a private company worked to improve feed millers’ knowledge and skills on business development and fish feed marketing. Matrix has built capacity of 50 community feed centers (CFCs) and established institutional linkages with 120 aquaculture market actors, 80 LSPs and 100 machinery technicians. Besides, Matrix organized 100 product promotion events and promoted the business of these 50 community feed millers to about 3,005 fish farmers in five districts of Zone of Influence (ZOI). Matrix also produced and distributed Information, Education and Communication (IEC) materials such as aquaculture booklet, feed formulation festoons, signboards and t-shirts to increase business visibility of these small-scale fish feed producing ventures.

Sub IR 2.2 Increased engagement of private sector in aquaculture markets

Output- 10 Built a sustainable farm-to-fork supply chain to promote processed fish foods

2.2.1 Develop a Cool Chain Management Model for the Aquaculture sector to reduce post-harvest loss

The aquaculture sector suffers from serious post-harvest losses due to ignorance and negligence in proper fish handling and processing at different stages of the fish supply chain, from harvest to retail distribution. Inappropriate handling deteriorates the quality of the fish and fish products and creates concern to food security and consumer health. The Activity partnered with MarGEN Limited and jointly developed a cool chain-based supply line for fresh fish and fish products. MarGEN procured 45 metric tons of fish from Satkhira, and Jashore which was then sold to buyers maintaining proper cool chain. MarGEN also conducted 9 product promotion events to introduce farmers with the newly developed plastic crates, particularly designed by NM Plastic Limited for fish transportation. More than 1,100 farmers attended these events. This was also promoted through Facebook posts. MarGEN procured a 1 MT capacity freezer van that can maintain the temperature at -18°C. They also procured nine insulated (three-wheeler) paddle vans to distribute the raw and processed fish in retail stores maintaining the desired cool chain.

2.2.2 Develop Sales & Distribution model to promote Processed, Frozen and Diversified Fish Item (RTC & RTE)

In the forward market of fish value chain, the Activity worked with two partners, MarGEN Limited and Sea-Natural Resources Limited (Roja) to develop new market for processed fish. The Activity supported MarGEN to develop and commercially introduce ready-to-eat (RTE) and ready-to-cook (RTC) processed fish. MarGEN processed RTE fish with the help of their vertical partner, Euro Asia

Food. But now they are preparing to process it at their own plant to reduce dependency of Euro Asia. To grab a larger market share, MarGEN also placed shop signs in 80 grocery stores in Dhanmondi, Mirpur, Banasree, and Khilgaon area as a tool of marketing. Besides the retail stores, MarGEN promotes their products on Facebook and YouTube which reached more than 100,000 Facebook users. In addition to the marketing of their products, MarGEN also organized 20 cooking events where three reputed chefs demonstrated different recipes made with fish. More than 230 office-going urban women participated in these events. It is expected that the participants will be able to prepare different delicious items for their children to take as school tiffin.

MarGEN organized fish fair in 20 super shop outlets in Dhaka city to promote their fish based RTE and RTC products. Besides super shops, they also branded more than 80 retail shops with banners and festoons to promote their products. During the partnership tenure, a total of 800 Kg processed RTC and 1200 Kg processed RTE fish products were sold worth BDT 20,700,000 (USD 230,000). All RTE products have been tested in the food technology lab of Bangladesh Agriculture University and Sylhet Agricultural University to improve food safety and quality.

2.2.3 Promote Fish based Ready-to-Eat (RTE) foods in the mainstream market channels

Sea Natural Fish Limited (Roja) has created a new market of RTE fish products and made them available in more than 400 retail stores in Dhaka, Chittagong, Sylhet, and Narayanganj city. Roja has developed five new recipes of RTE fish products from cultured fish. More than 1300 consumers have tested free samples of the new recipes and provided their feedback. From consumers' feedback, Roja has finally selected three recipes, which they are now processing in a large scale at their own processing plant. Roja has also moved its small processing plant from Narayanganj to Chattogram to a larger space with a large production capacity. With the Activity support, Roja has placed branded refrigerators in 100 super shop outlets and experienced an amazing 269% sales growth compared to the previous months. Roja, in partnership with Nabolok Parishad, a Khulna based local NGO has trained more than 2,000 farmers on better management culture practices and improved post-harvest management.

Output- 11 Increased access to financial products and services

2.2.4 Improve access to formal financial package for aquaculture stakeholders: Access to Finance

To improve the financial inclusion of the aquaculture farmers and other market actors, The Activity partnered with Bank Asia Ltd. Bank Asia with the Activity support, integrated the financial literacy module in their services, established micro-merchant points to create accessibility in the remote areas and expanded their agent banking points to create and ensure easy access to formal loans and other financial services for the fish farmers. In the Zone of Influence (ZOI), Bank Asia conducted 30 batches of financial literacy training where 1,641 farmers, including 135 women, were trained on basic financial literacy and received booklets on aquaculture technology. Besides, they also conducted four "Fish Card" distribution events where 200 farmers received "Fish Cards". 89 micro-merchant retailers were onboarded this year, and 11 micro-merchants received SME loans. Bank Asia also conducted 12 loan feedback sessions with 412 farmers, including 28 women. As a result of these activities in ZOI, Bank Asia disbursed BDT 30.8 million (USD 362,500) loans to 601 aquaculture farmers, including 63 women. Based on the success of the access to finance models in the ZOI, Bank Asia replicated the same in the Zone of Resilience (ZoR). They organized 12 local campaigns that covered awareness messaging related to financial literacy and banking services for the aquaculture farmers. Besides, they have completed 5 financial literacy trainings including 238 farmers. As a result, 64 fish farmers received BDT 6.50 million in loans from Bank Asia.

2.2.5 Improve Financial Literacy of the aquaculture stakeholder through Formal Financial Institute

Lack of knowledge on financial literacy is one of the key challenges for small and medium-sized enterprises (SMEs), including small-scale aquaculture farmers, to operate their businesses successfully. However, opportunities to access such knowledge from public and private sectors are limited. The Aquaculture Activity has partnered with City Bank to improve financial literacy of aquaculture market actors. City Bank with North South University (NSU) and Bangladesh Institute of Banking Management (BIBM), delivered training on financial literacy to 1,200 fish farmers in 50 batches. In total, City Bank provided BDT 300 million (USD 3.6 million) in loans to 184 fish farmers, nursery owners and hatchery operators through 13 Aquaculture Access/Service Points that enabled easy access to loans and consulting services for smallholder farmers.

2.2.6 Improving Access to Finance and aquaculture business development through local business centers

While many fish farmers and other aquaculture market actors rely on micro-finance institutions (MFIs) for loans, the lack of skills in business management and investment planning often leads them poor business results. The Activity partners with Khulna Mukti Seba Songstha (KMSS) to improve access to finance to help improve aquaculture business by establishing One-Stop Service Centers (OSSCs).

KMSS developed 50 women-led Aquaculture Business Points and branded them as “Maach Bondhu Uddokta” at three different locations of Khulna district. These women entrepreneurs were equipped with appropriate knowledge and skills in business management and aquaculture advisory services and enabled them to offer varied services to the smallholder fish farmers. KMSS improved the aquaculture management skills and financial literacy of 5,300 fish farmers (90 percent women) through training them in 400 batches. Further to this, KMSS mobilized BDT 6 crore (USD 63,500) loans for 2,000 fish farmers through the newly established Aquaculture Business Points.

2.2.7 Introduce 'digital lending' platform to promote easy, cash flow finance for the smallholder farmers

The Aquaculture Activity identified that a data-driven digital lending system (cash flow-based model) could be a potential solution to reduce perceived risk for formal financial inclusion (*Annex 3*). To explore the opportunity of connecting fish farmers to formal banking services, Aquaculture Activity made a partnership with Kiu-Bangladesh, a private fintech company. The Kiu Bookkeeper App and Lending-As-A-Service (LAAS) Platform are being used to improve access to finance. Fish Farmers/Retailers insert their business transaction data in the Kiu Bookkeeping App. Based on the transaction data, a credit rating profile is generated. Using that credit rating profile, fish farmers/retailers apply for loans to financial institutions. Kiu on boarded more than 1,200 aquaculture farmers in Khulna and Bagerhat and oriented on its digital business record-keeping platform. Out of 1200, Kiu trained 550 farmers and 50 retailers (252 were women out of 600) on the Bookkeeper app. Kiu entered into a partnership with AB Bank Limited and KMSS for loan disbursement to selected aquaculture farmers and other stakeholders. The tripartite venture disbursed BDT 12.6 million (USD 150,000) in loans to 379 (320 women) aquaculture farmers and market actors, based on the credit rating generated from the Bookkeeper app.

2.2.8 Provide microfinance support to promote nutrition-sensitive aquaculture

Smallholder farmers usually access loans from local Mahajan (moneylenders) with an excessively high rate of interest that becomes a burden for them to repay. A significant portion of their income go to these Mahajan, which makes it very difficult for these farmers to manage their family and business. Besides, the frequent episodes of natural calamities in the coastal districts of Bangladesh create significant hurdles for household fish farmers to scale up their fish cultivation to business level. In 2021, the Aquaculture Activity engaged Shushilan to introduce and promote microfinance services for aquaculture market actors, especially for women fish farmers, to reduce their dependency on loans from local money lenders (Mahajan) or other sources with high-interest rates. The project also intended to provide shock recovery support to the fish farmers from recent natural disaster like Cyclone Amphan, Cyclone Yaas, and COVID-19.

In the reporting year, Shushilan disbursed BDT 2.88 million (USD 285,313) in loans to 972 aquaculture farmers, including 940 women with an annual interest rate of 12.5%, 14 to 15 times lower than the local moneylenders. Overall, they disbursed BDT 3.18 million (USD 314,880) in loans to 1,095 fish farmers, including 1,059 women, since the inception of the project. Shushilan conducted 584 courtyard sessions and provided information on aquaculture, basic nutrition, and effective utilization of credits to 8,921 women and 3,136 men. Shushilan field facilitators visited 4,700 aquaculture farming households for disseminating basic nutrition information and providing aquaculture services at doorsteps.

2.2.9 Ensure access to micro-Finance Services for dry fish business in Cox's Bazar

Dry fish actors in Cox's Bazar lack access to affordable formal finance to operate their businesses. There are limited options for processors to get access to loans from local lenders at prohibitively high-interest rates which negatively impact on the profitability of their business. The Aquaculture Activity, in partnership with Mukti Cox's Bazar, created access to finance for dry fish actors to address their capital shortage. Mukti Cox's Bazar provided BDT 20.41 million (USD 209,324) in loans to 430 dry fish actors (422 women). They delivered training to 565 participants including 544 women dry fish actors on financial management and 589 dry fish actors including 568 women on savings and credit management. Mukti also organized three learning and sharing meetings in three upazilla of Cox's Bazar district where 91 (65 men, and 26 women) participants attended the meetings. As a result of Mukti's initiatives in the dry fish sector, 730 dry fish actors sold 1179.56 metric tons of safe dry fish worth BDT 536.70 million (USD 5.50 million). With this loan support and improved knowledge of financial management, dry fish producers are expecting to recover the losses they incurred in 2021 due to the nationwide lockdown.

2.2.10 Ensure access to microfinance and technical services for dry fish and aquaculture actors in Cox's Bazar

Dry fish processors and marketers, including aquaculture farmers in Cox's Bazar lack access to affordable formal finance to operate their businesses. The limited access to loans from local moneylenders is prohibitively high interest rates. The Aquaculture Activity, in partnership with Mukti Cox's Bazar continued working to improve the situation since May 1, 2022.

Mukti Cox's Bazar provided BDT 7.62 million equivalent to USD 78,148.79 to 171 women and 03 men dry fish actors and BDT 10.285 million equivalent to USD 105,480.36 to 168 women and 24 men fish farmers as loans during the reporting period. They also conducted training for 170 participants including 165 women dry fish processors on dry fish business development and safe dry fish production and for 245 participants including 170 women fish farmers on improve aquaculture and business development. Mukti also provided ToT on improved aquaculture and dry fish business development to 26 project staff. Mukti also organized two market linkage workshop for dry fish stakeholders and aquaculture stakeholders. Mukti also conducted a training on business planning for dry fish businesspersons where 10 participants attended including 05 women. With the loan support and improved aquaculture and dry fish business development training knowledge, aquaculture farmers and dry fish producers are expecting to recover the losses they incurred in 2021 due to nationwide lockdown.

Output- 12 Promoted Mechanization and technology in aquaculture

2.2.11 Promote small-scale machinery to foster mechanization in the aquaculture sector

IMEXpro (BD) Corporations, a private business company, introduced small-scale aqua machinery such as pH meters, dissolved oxygen meters and Secchi disc, and water/pond soil testing services for aquaculture farmers. With the Activity support, IMEXpro established 40 One-Stop Service Centers (OSSCs) in six districts of the Zone of Influence to make kits and testing services available to the fish farmers. These OSSCs offer pond soil and water quality testing facilities, sell aqua inputs and provide necessary aquaculture advisory services. Each center appointed a Local Service Provider (LSP) who extends the same service to the farmers' doorstep. A total of 1,252 farmers received water/soil parameter testing facility and advisory services from IMEXpro's one-stop service centers. The services help fish farmers to take correctives measures and thus reduce the risks of productivity loss. IMEXpro sold 3,353 Secchi disks, 11 pH meters and 7 Ammonia test kits through these OSSCs.

Output- 13 Recovered Dry fish market from the effects of the pandemic

2.2.12 Promote Dry Fish Business through Marketing and Branding

Due to the lack of proper marketing and branding strategies, dry fish entrepreneurs are struggling to maintain and grow their businesses. The Aquaculture Activity made a partnership with Shah Amanath Traders (SAT) to address market promotion of safe dry fish and fish products since March 1, 2021 to February, 2022. Major activities carried out during the partnership period include, 1) capacitated 80 dry fish processors including 32 women on business development, marketing, and BMP (Better Management Practices) for dry fish production technology, 2) capacitated 20 fishermen on post-harvest management 3) trained 39 dry fish processors and businessmen on new product RTE and RTC product development, 3) conducted three experiments on effects of improved fish drier on the quality and economics of Ribbon fish, Bombay duck and Pomfret at SAT plant premises, 4) arranged workshop on the market linkage for dry fish business development and 6) web page, web application, billboards and social media campaign to make consumers aware on safe dry fish products and 7) organized sales promotion events.

SAT provided capacity building training to 60 women workers on dry fish sorting, grading and cleaning. SAT participated in the Industry and Trade Fair at Cox's Bazar organized by the Cox's Bazar Chamber of Commerce and Cox's Bazar District Administration and set a stall for the promotion of its products. SAT sold 23,187 kg dry fish valued at BDT 13.18 million (USD 135,158) through online and offline platforms and their own distributors. Together, SAT improved their product quality and increased their sales volume by 75% than previous years.

Promote and branding safe Dry fish business

The Activity successfully completed the partnership activities with CoxsBazarShop.com, a private company, to produce and promote safe dry fish by improving their marketing techniques which was started from 1 April 2021 and finished on 31 March 2022. CoxsBazarShop.com organized 4 batches of capacity building training for 60 dry fish processors on safe dry fish production and 20 women dry fish producers on safe RTE dry fish products (Balachao), developed and distributed communication materials like sticker (1000) and leaflet (12,000), labeling and vacuum packaging of dry fish products, organized 10 awareness campaigns among tourists on safe and healthy RTE and RTC dry fish products, completed 3 sales promotion events, conducted consumers acceptance test for RTE Balachao dried fish products, advertised on social media like Facebook, YouTube, WhatsApp, and developed and aired 36 video clips on various dry fish recipes on YouTube. As a result of these market promotion initiatives, CoxsBazarShop.com was able to sell 9642 kg of various dry fish products (which is 150% higher compared to last year) worth BDT 9.44 million (USD 96,788) (153% higher than the last year) and also sold RTE Balachao products 586 Kg worth BDT 879,000 (USD 9,015 which is 581% higher than the last year). Thus, the intervention successfully completed on 31 March 2022.

2.2.13 Analyze the benefit-cost ratio of safe dry fish business for SAT

The selling price and profitability of various dry fish products are varied widely based on the fish species, price and quality of raw fish, size of fish, production technology used, seasonality, sales volume and marketing strategy followed by the dry fish processors. The selling price of Bombay duck per kilogram was estimated by SAT at BDT 1000, BDT 750 and BDT 375 which were produced in improved fish dryer without head and chopped, in improved fish dryer with head and in traditional method respectively while the BCR was found to 0.35, 0.18 and 0.10 for the same. Similarly, the selling price of Ribbon fish per kilogram were calculated at BDT 1800, BDT 1400 and BDT 800 those were produced in improved fish dryer without head and chopped, in improved fish dryer with head and in traditional method respectively and the BCR was obtained at 0.48, 0.32 and 0.25 for the same. The highest selling price and profitability (per Kilogram) were found for Pomfret which were estimated to BDT 3500, and BDT 2000 those were produced in improved fish dryer and in traditional method respectively in which BCR were gained at 0.65, and 0.38 for the same.

2.2.14 New product and market development of dry fish business

Due to the lack of proper marketing, product diversification and branding strategies, dry fish entrepreneurs are struggling to maintain and grow their businesses. Currently, a significant number of

dry fish entrepreneurs are producing good quality organic and safe dry fish products with the support of the Aquaculture Activity. Despite their quality products, they seem to be dormant as they lack proper and coherent marketing strategies. Therefore, the Aquaculture Activity made a partnership with Shah Amanath Traders (SAT) for producing different types of safe dried fish, RTC and RTE products and marketing the products all over the country.

Major activities are carried out during the reporting period include, 1) capacitated 80 dry fish processors including 32 women on business development, marketing and BMP for dry fish production technology, 2) 20 fishermen on post-harvest management 3) 39 dry fish processors and businessmen on new product such as RTE (dry fish powder), ready to cook (RTC) and rent a sales center in Dhaka, 3) conducted three experiments on effects of improved fish drier on the quality and economics of Ribbon fish, Bombay duck and Pomfret at SAT plant premises, 4) workshop on market linkage for dry fish business development and 6) web page, web application, bill boards and social media campaign to make customers aware about safe dry fish products 7) sales promotion event.

2.2.15 Promote and branding safe dry fish business

Aquaculture Activity made a partnership (2nd phase) with CoxsBazarShop.com to develop its dry fish business and improve sales of different dry fish products through promotion and branding, to reach target markets all over Bangladesh. As a part of the initiative, CoxsBazarShop.com has trained 19 women dry fish processors on safe Balachao (RTE) dry fish production and trained 36 processors (man-13, woman-23) on safe RTC dry fish production technology. CoxsBazarShop.com also tested randomly 11 samples of RTC and RTE dry fish products on nutritional and safety issues at Institute of Public Health, Mohakhali and Department of Livestock Services, Farm gate, Dhaka. They continued advertising safe and healthy dry fish products on social media, such as Facebook, YouTube and its webpage and developed android App., created digital content like animated video clips and aired to increase the sales of various dried fish products and to popularize these among targeted customers.

During the intervention period of 6 months from April to September, the total sales of partner have been sharply increased at 114% compared to the same duration in the last year, selling a total of 11,197 kg of various dried fish worth of BDT 7,836,500 (USD 80,369, 1 USD equivalent to 97.5063 BDT) and also increasing 833%, a total of 817 kg safe RTE dried fish (Balachao) worth of BDT 1,225,500 (USD 12568). Furthermore, 12 women dry fish processors are successfully producing RTE Balachao dry fish products of different fish species and are supplying to CoxsBazarShop.com and another more than 15 women processors have engaged in Balachao production and are doing business after receiving training from CoxsBazarShop.com. Observing the quality products of CoxsBazarShop.com, the Bangladesh Bank has agreed to provide loans BDT 2,000,000 @ 4% interest rate through Bank Asia for business development. With the support of the Activity, CoxsBazarShop.com established linkages with the online marketing companies namely Protein Market, Khola Bazar.com and Parmeeda.com and sold various dry fish products worth BDT 1,941,200 (USD 19,908). They also made relationship with MFS provider company bKash and Nagad about payment of products using their digitalized systems.

Sub IR 2.3 Improved enabling environment for inclusive growth in aquaculture

Output- 14 Developed advisory services for farmers

2.3.1 Promote digital advisory services for aquaculture stakeholders (TRK, Source Trace) to effectively connect them to the backward and forward market

Proper access to information is one of the critical components for harvesting better results, but aquaculture farmers do not have adequate access to information regarding production practices, market price, and market information. These barriers often fall out as farmers' losses in accessing quality inputs and market prices. Besides, access to the forward market is another significant challenge, especially when farmers intend to sell their harvested fish.

The Activity worked with The Right Kind (TRK) to introduce a digital aquaculture advisory service platform to effectively improve the market linkage, both backward and forward (*Annex 3*). TRK introduce a mobile platform called “Right Fish” and a web-based platform called “Right Haat” and on boarded over 40,000 farmers through its different advisory service points and events (e.g., cluster

meetings, field visits, input sellers, call center). They have established 143 retailers as their service referral points in 6 districts in the ZOI. TRK conducted 45 cluster meetings with smallholder farmers, three orientation training sessions with government stakeholders, and 15 onboarding meetings with input retailers. The main ground activity of the project was to move door to door of farmers' houses and inform them about this advisory platform. So far, TRK has reached the doorsteps of 10,000 farmers in person and made them aware of this digital advisory platform.

TRK increased the business model's financial viability by engaging private companies. So far, they have approached over 50 private companies and on-boarded 6 of them. TRK's Facebook page has gained 15,000 farmer followers since its inception and participated in live sessions on a regular basis. So far, 17 live sessions with various aquaculture specialists were organized, during which farmers posted questions to the experts in real time. Farmers also registered their queries as an official post and received answers within 24 hours. More than 500 aquaculture stakeholders have downloaded "The Right Fish" app and started getting advisory services.

2.3.2 Standardizing and developing dry fish products and consumers' preference Test

This activity has planned to start in Y6 as the peak season of dry fish production starts in September/October and it continues to March. The production of dry fish remains almost closed from 20 May to 23 July for 65 days due to the scarcity of raw fish as the government bans sea fishing.

2.3.3 Advocacy on ensuring optimal and sustainable utilization of aqua inputs in Bangladesh with a focus on compliance-related issues

Completed in the 2nd quarter of Year 5, Bangladesh Shrimp and Fish Foundation (BSFF) facilitated intra-governmental and public-private sector consultation to create awareness on prohibited aqua inputs. Consultation with key government stakeholders mainly, Department of Fisheries (DoF), Bangladesh Fisheries Research Institute (BFRI), Ministry of Commerce (MoC), Directorate General of Drug Administration (DGDA) and Universities clarified the definition and classification of permissible and prohibited aqua inputs in the country context. The key output of this intervention is a comprehensive list of 605 permissible and prohibited aqua inputs applicable for Bangladesh, which will be handed over to DoF and DGDA to help them prepare a policy recommendation going forward (*Annex 4*).

2.3.4 Promote door-to-door access to quality aqua-inputs and services through the expansion of women-centric Micro-franchise

iSocial has developed a robust supply chain in aquaculture input market by forming a women-inclusive Last Mile Distribution model. They are testing the commercial viability of such model in the Bottom of the Pyramid (BoP) market for major aquaculture products and services. Seven partnerships were made with local and regional level aqua-input dealers and distributors who use iSocial's alternative distribution channel to sell products - feed, fertilizer and lime in particular.

iSocial identified and deployed 378 women as its aquaculture micro-franchisees. These women micro-franchisees were trained on small trading, product basket, aquaculture services, sales and marketing techniques in 33 capacity-building sessions. These micro-franchisees have now formed a network of small businesses and are providing essential aqua inputs and services to their communities. To date, they have extended aquaculture services to 4,248 fish farmers and sold aqua input products worth BDT 2.6 million (USD 31,065). While doing the distribution business, iSocial mobilized BDT 1.5 million (USD 17,900) as working capital for 20 women micro-franchisees for selling aqua inputs. iSocial and Bank Asia entered into an agreement where Bank Asia provides Trade Credit or Working Capital Loans to iSocial's women micro-franchisees.

Challenges encountered while implementing activities in IR 2:

One of the major challenges encountered in implementing the activities in IR 2 is the improvement of the digital literacy of the fish farmers for them to adopt new digital tools and technologies. The Activity is trying to promote financial inclusion through digital means. While, many farmers lack financial literacy, this also implies for their digital literacy.

Major activity plans for the next year:

Under IR-2, the major focus would be to identify synergy and leverage models between the Activity partners and facilitate discussions. These discussions will take in form of consultation and workshops in small and large groups, so that the Activity inspires replication of its successful business models and expand the existing business performance at scale. The Activity will also identify necessary policy recommendations, especially to improve access to finance for the aquaculture sector through developing forums. The Activity is also interested to explore export market opportunities for freshwater fish by engaging existing and new potential private sector partners.

IR 3. Improved Nutrition-related Behavior of Rural Households**Context:**

Food security has significantly been improved in Bangladesh; however, under-nutrition rates remain unacceptably high, and dietary quality for the majority remains low. Inadequate intake of vitamins and minerals such as iron, zinc, calcium, vitamin B12, and vitamin A in infant child development contributes to stunting, which leads to a lifetime of cognitive impairment, reduced productivity, and lowered earning potential. Stunting, combined with other nutritional deficiencies associated with poverty, undermines the trend of improvement in national development. Fish is the culturally preferred animal-source food in Bangladesh and is uniquely placed to contribute to reducing undernutrition. Focus is being given to significantly increasing the production of micronutrient-rich small fish. The following Sub-IRs will contribute to improving nutrition-related behaviors of rural households in a gender-equitable manner.

Sub-IR 3.1 Improved nutrition awareness and practices***Output- 15 Improved access to information on nutrition*****3.1.1 Support Nutri-champs winning chefs as ambassadors to promote consumption of fish**

To increase the production, sales, and consumption of fish along with dissemination of the key essential nutrition messages, the Aquaculture Activity supported six Nutri-champs from the champion chefs of the cooking competition organized jointly by the five USAID-supported projects and Save the Children in the period 2019–2020. The Aquaculture Activity demonstrated nutritious cooking methods and disseminated nutrition messages through the six champion chefs in three teams in Cox's Bazar, Jashore and Patuakhali from March 2021.

In year 5, the Nutri-champ teams organized 45 community-based events, where 2,353 individuals participated. They conducted 16 cooking demonstrations, 7 school-based nutrition awareness events, 3 fish-market based events, 11 University canteen-based events, and 4 University based awareness gatherings, 4 big awareness gatherings at different communities. The Nutri-champs disseminated essential nutrition, Water, Sanitation and Hygiene (WASH), and COVID-19 messages, and distributed different Information, Education and Communications (IEC) materials on nutrition, aquaculture and nutritious fish cooking recipes among the participants of the events conducted. Several local and national news media covered the events in detail. Besides, they developed 3 cooking videos on nutritious cooking recipes, and uploaded to YouTube channel. Already, one thousand viewers watched the videos

3.1.2 Organize a daylong workshop on the importance of fish nutrition at Dhaka

The Aquaculture Activity planned to organize a Dhaka-level event to promote fish consumption, widely disseminate the nutrition-sensitive aquaculture messages and its approach, and advocate it across the government and non-government organizations, particularly pushing it to the government's mandate. The Activity planned to organize the event in collaboration with the Bangladesh National Nutrition Council (BNNC) since it is the government entity under the Ministry of Health and Family Welfare (MOHFW), with a solid multi-sectoral committee of governmental and development top-level nutrition actors. Besides, it is the responsible entity for and entitled to plan, facilitate implementation, and monitor nutrition-sensitive activities across the country. The Activity planned to make long-lasting

outcomes through maintaining liaison and advocacy with BNNC to incorporate nutrition-sensitive aquaculture within BNNC's mandate since it can be a perfect vehicle beyond the Activity life.

Feed the Future Bangladesh Aquaculture and Nutrition Activity, in collaboration with the BNNC, facilitated a workshop with BNNC's the standing technical committee members at CIRDAP International Conference Center, Dhaka. Dr. Md Anwar Hossain Howlader, Secretary of the Health Service Division, Ministry of Health and Family Planning, was the chief guest of the event. Other distinguished attendees included the Director General of BNNC, the Director of the Institute of Nutrition and Food Science (INFS), the Director of the Institute of Public Health Nutrition (IPHN), and top public health experts of the country among the 60 technical participants of the event.

The Aquaculture Activity utilized the platform to sensitize and catalyze government stakeholders on nutrition-sensitive aquaculture for leveraging and sustaining outcomes. Partner of the Aquaculture Activity, CHHIP Food BD, promoted their fish-based Ready-to-Cook products by providing free samples to the event participants.

3.1.3 Facilitate coordination meetings with the government stakeholders to increase the message dissemination on the benefits of fish consumption

In Bangladesh, the government health department and family planning department play crucial roles in educating the community people on essential nutrition actions (ENA) and essential hygiene actions (EHA). However, health professionals are not well aware of the nutritional value of fish and its potential role in improved human nutrition. As a result, the importance of fish consumption has not been given much priority or is often ignored in the message they deliver during their interpersonal communication (IPC) with the service recipients at various levels. The Activity aimed to consult and capacitate health professionals to sustainably and widely disseminate the importance of fish in the first 1,000 days of life.

The Aquaculture Activity facilitated six coordination meetings with the government health professionals in year 5 at the Civil Surgeon Offices in Barguna, Satkhira, Khulna, Bandarban and Cox's Bazar districts to boost the dissemination of nutrition messages regarding the benefits of fish consumption to increase the inclusion of fish, especially small fish in the diet for first 1000 days of life. More than 120 health professionals' participated in those events.

3.1.4 Observe national nutrition week 2022

The Government of Bangladesh (GoB) has been celebrating national nutrition week (NNW) every year from April 23-29 nationwide to promote good nutrition for all since 2017. This has been providing a unique platform for all sectors and all stakeholders to come together for a united common purpose. It also creates a great opportunity for the development projects to showcase their activity results as well as disseminate their intended messages to a huge number of people.

The Aquaculture Activity collaborated with the Bangladesh National Nutrition Council (BNNC) to celebrate national nutrition week 2022 during April 23-29, 2022. As part of the celebration, BNNC organized a discussion event at Hotel Lakeshore, Dhaka. More than one hundred individuals from different organizations participated in the event. The Activity also observed the week in collaboration with its partners and the relevant government departments. Prottayshi, Shah Amanat Traders (SAT), and GRAUS collaborated to observe the associated events in ZOR, while Shushilan collaborated for the event in =ZOI. The partners facilitated 5 rallies, 7 discussion sessions, and 10 courtyard sessions. More than 500 individuals participated the events and received important nutrition messages related to fish as food. The Activity facilitated 8 nutrition message dissemination events through pot songs in Khulna and Satkhira districts. Total 1,343 (women 786, Men 535) individuals attended the events in different locations.

3.1.5 Promote fish consumption by printing of nutrition IEC materials

The Aquaculture Activity has been carrying out extension activities in the last 5 years, in the ZOI and ZOR districts, to promote nutrition-sensitive aquaculture practices and create awareness on expected nutritional behaviors in the aquaculture communities. The extension activity includes facilitating training and courtyard sessions, coordination meetings with the government and private stakeholders, capacity-building sessions for the LSPs, cooking demonstrations, street dramas, etc. The Activity

distributed appropriate Information, Education & Communication (IEC) materials during these events to provide support to participants' learning. Besides, the Activity also installed signages, festoons, signboards, etc., across the ZOI and ZOR districts for sustainably disseminate benefits of fish consumption and essential nutrition action to the mass people.

In Year 5, the Aquaculture Activity installed 48 signages with long-lasting structure in Barguna, Barishal, Jashore, Khulna and Patuakhali districts of ZOI and Cox's Bazar and Bandarban districts of ZOR. Besides, the activity also printed and distributed 10,000 nutrition brochures, 2,000 fish cooking recipe pamphlets, 500 festoons and 10,000 leaflets to aquaculture farmers and LSPs.

Sub-IR 3.2 Improved access to diverse and nutritious foods

Output- 16 Increased nutritious food intake

3.2.1 Establish partnership with fish processor for wholesale fish supply

Bangladesh has progressed outstandingly in fish production and achieved self-sufficiency in recent times. However, the new generation, particularly the school and college students are less interested in eating fish due to reasons, like fear of fish-bones, fish smell, and monotonous conventional fish cuisines. The Aquaculture Activity partnered with CHHIP Food BD to increase fish consumption through initiatives of creating alternative options to eat fish, and meet nutritional demand with the healthiest animal protein.

With the Activity assistance, CHHIP Food BD developed 17 fish-based Ready to Eat (RTE) and Ready to Cook (RTC) products, such as fish balls, fish fingers, fish nuggets, fish sausage, fish burger patty, fish samosa, fish spring roll, etc. To promote the fish products, the partner developed 10 promotional videos, 88 promotional still pictures, 40,000 leaflets, 500 poster-cum-stickers, 70 festoons, and 10 X-banners. The Aquaculture Activity linked CHHIP Food BD with 28 potential retail shops supported by the Feed the Future Bangladesh Nutrition Activity for selling the RTE and RTC products. The partner also selected 20 supermarkets in Dhaka to sell their products. They established one subsidized distribution channel covering 28 outlets in Patuakhali. They also used Facebook and YouTube platforms for the promotion of their products. CHHIP has accomplished 200 promotional activities at food corners of 20 super shops in Dhaka. They conducted 24 events for RTE product sampling at Kalapara Upazila in Patuakhali District where 371 individuals including 40 women and 45 children participated.

As a result of the intervention, CHHIP Food BD was able to reach approximately 62,565 customers including 83% men and 17% women in this reporting period. The company also reported that they sold 1,714,529 BDT (\$16,814) and 5,763,893 BDT (\$56,527) of RTE and RTE product.

3.2.2 Underpin the supply chain to distribute fish-based RTE/RTC products in the Aquaculture Activity working districts to increase fish and fish product consumption

The Activity supported three companies (MarGen, CHHIP Food BD and Roja) to produce and market attractive, convenient to eat and tasty fish-based RTE/RTC products to increase the consumption of fish, the best animal protein.

3.2.3 Promotion of nutritious moringa cultivation at the pond dykes and homestead in ZOI and ZOR

Moringa (*Moringa oleifera*) is a highly nutritious plant with a good market price. It can be grown in the pond-dyke and homestead fallen land with minimal care. As a part of the nutrition initiative, the Feed the Future Bangladesh Aquaculture and Nutrition Activity took an initiative for mass production of Moringa at the pond-dykes and homestead in ZOI and ZOR. The Activity is in the process to hire a supplier to deliver moringa cuttings/saplings to it's the fish farmers in the Activity working area. The supplier is expected to start their activities from October 2022 to reach around 2,000 aquaculture farmers with 5,000 moringa cuttings.

Challenges encountered while implementing activities in IR 3 during this year:

CHHIP FOOD BD and three teams of Nutri-Champs have insufficient human resources to document their progress and produce relevant deliverables. The aquaculture farmers wanted big amounts, which was often beyond Shushilan's targeted limit. In some groups (like the KHAMATAYAN project group

in Satkhira) the aquaculture farmers were not interested in taking loans from Shushilan, since the farmers were encouraged to take loans from the group's savings. The activities of Nutri-champs were delayed by the long-time closure of educational institutions due to Covid-19 pandemic, however all the activities were accomplished.

Major activity plans for the next year:

Under Sub-IR 3.1

- Strengthening nutrition-sensitive aquaculture through enhancing nutritional behaviors and private sector engagements
- Boosting dissemination of nutrition messages through government health services
- Coordination with government stakeholders to increase the dissemination of messages on the benefits of fish consumption

Under Sub-IR 3.2

- Introducing moringa plantation in pond dykes and homestead land of fish farmers s
- Supporting women entrepreneurs to develop and popularize nutrient-rich fish-based products as a new income opportunity
- Establishing demonstrations sites to promote pond dykes vegetable cultivation
- Facilitating schoolfocused nutrition message dissemination and fish-based RTE/RTC product promotion events

8. Project management and cross-cutting

8.1. Activity Management

Common Programs

8.1.1 Year 5 progress Review and Year 6 planning Workshops

The Activity conducted a workshop in Kuakata, Patuakhali, to review Year 5 progress with the participation of all staff. The workshop allowed the Activity staff to perform in-depth exercises in groups and come up with a systemic change matrix on six thematic areas, namely access to inputs, access to finance, access to forward market, innovation of improved technology, access to information and support services and crosscutting- nutrition, gender, youth, and environment. Workshop meeting minutes is available in *Annex 5*.

8.1.2 SMT/Coordination & other meetings/Workshops/learning sharing workshops with IPs/stakeholders

Senior Management Team (SMT) including some other senior staff continued meetings to discuss set agendas to strengthen the implementation to accomplish all deliverables of Year 5 in a timely manner. The SMT members conducted meetings to review intervention proposals of interested private agribusinesses and NGOs to select competent local implementing partners. All staff meetings were conducted from time to time to discuss the progress against targets, constraints faced, measures taken, and the way forward. The Aquaculture Activity progress review meetings were held and many useful decisions were made to determine the way forward. Besides, weekly regional level staff meetings at Jashore, Khulna, Barishal, and Cox's Bazar were conducted to strengthen teamwork to increase the output of the Activity interventions. Weekly/fortnightly meetings with USAID were also held regularly.

8.1.3 Assessing performance of Market System Approach

Aquaculture Activity has conducted a thorough in-depth study involving a wide range of market actors operating in ZOI and ZOR districts and beyond to unfold and dig-out the effectiveness, impacts and performances on the programmatic interventions and innovations that occurred over the project period at various forms and shapes. The aim of the study is to explore scope for scalability of the interventions, market resilience and increase more meaningful participation of women and youth. Also, it is intended to categorize and rank the existing and phased out partners' interventions based on the solid facts, evidences and findings and help guide implementation over the rest of the project period. Aquaculture Activity team has already collected data from Activity partners (tier 1), their clients (tier 2) and farmers

(tier 3) through a semi-structured questionnaire. The summary on key findings including evidence of change/impact revealed from this study is presented below.

Level of satisfaction

IPs were asked about the level of satisfaction of their business performance. 63% of the respondents said they were satisfied, 30% were highly satisfied and only 9% were moderately satisfied. None of the partners said they were dissatisfied with the performance of the intervention, which is a good indicator of Activities overall performance with respect to its partners. And, when asked about customer experience and their level of satisfaction, 54% said they were satisfied and 41% were highly satisfied and 2% said they were moderately satisfied; only one of the partners (2%) said their customers were not satisfied.

Business performance and efficiency

Many of the partners have seen an improvement in business performance and efficiency since the interventions started. The City Bank said that their loan disbursement has increased from BDT 3 crore per annum to BDT 30 crore per annum, a ten-fold increase. Partners such as the Chittagong Meridian Agro Industries Ltd., BRAC and Bhola Monosex Tilapia Hatchery have increased their area coverage and thus increased their customer base. Many of the IPs have seen an increase in sales revenue. This includes the likes of Parmeeda, iSocial, Rupali Fish Hatchery and United Agro Fisheries. FISHTECH BD has seen an increase in sales of nearly 14% from 27.6 crore in 2020 to 31.4 crore in 2021. KNB Agro Industries has seen their feed sales increase from 275 MT/month to 454 MT/month in the project area – a 65% improvement. Harun Mathsya Hatchery said that their sales went down in 2021 because of Covid-19.

Sustainability

Increased revenue/profit for the business

Nearly 75% of the partners noted that their profit/revenue has increased as a result of the intervention piloted with Activity. Nine percent (9%) were unsure if the intervention made a difference while another 9% said that their profit/revenue did not increase. One of the partners, Community Development Centre (CODEC), noted that their brand value has increased as a result of the pilot intervention:

Continuation of intervention without further support

When asked if they planned to continue with the intervention without further support from Aquaculture Activity, 23% said that they had no plans. The remaining 77% said that they planned to continue in one form or another. The areas they planned to continue with are as follows: 23% said they would continue to apply the experiences they have gathered from the project, 16% said they would maintain smooth supply of inputs and provide services, 12% said they would implement activities in other places and 9% said they would strengthen market linkages. The draft report with all details is available in *Annex 2*.

8.1.4 Enhancing MSD Monitoring, Evaluation and Learning system

Existing good practices of M&E during implementation of the Aquaculture Activity were consulted with the Activity team in several occasions. The team agreed upon how to further map the indicators across the results and outcomes, and target values have been well-defined. The team discussed also the result framework and further developed their understanding about the three interconnected processes, namely good planning, monitoring and evaluation (M&E), which can greatly enhance the effectiveness of Aquaculture Activity.

For each selected indicator, MEL tools (means of verification) have been well defined. The MEL team has come up with a checklist of types of tools which would be used to assess performance of the Activity, e.g., semi-structured interviews, focus group discussions, surveys and questionnaires, regular workshops and roundtables with stakeholders, and field monitoring visits. Frequency and responsibilities for applying the tools, for analyzing relevant information and for reviewing this information have been verified with the USAID approved MEL plan.

8.2. Finance and Grants

Budget

8.2.1 Year 5 Budget development

Activity Year 5 budget was rigorously developed with the program and senior management team having the detailed list of interventions and activities set in the work plan as main reference. The information used in budget development came from historical data, previous activity costings, and assumptions. The Activity's Year 5 budget is \$5,087,427.

By the end of Year 5, Activity will have an estimated remaining budget of \$4,727,947. This projection assumed the need for a No Cost Extension (NCE). Below table (Table 3) shows the estimated budget for Year 6 ending 5 February 2023 amounting to \$1,810,823 and the amount variance of \$2,917,124 which will be allocated if NCE request is approved.

The Activity requested a budget realignment from USAID as there are additional consultants required in Year 5. The Activity, needed to sign a contract with Dr. Charles Kirby as Market Systems Consultant and Mohammed Nurul Azam as Market Systems Development Project Monitoring, Evaluation and Learning Consultant. This budget line item will fall short of \$123,245 in this budget year.

Table 3: Aquaculture Activity year 5 budget

Bangladesh Aquaculture and Nutrition Activity											Figures in USD		
Budget Line	Total Budget	Year-1 (Feb'18-Sept'18)	Year-2 (Oct'18-Sept'19)	Year-3 (Oct'19-Sept'20)	Year-4 (Oct'20-Sept'21)	Year-5 (Oct'21-Sept'22)	(Oct'22-Nov'23)	(Oct'22- Feb 5'23)	NCE (6 Feb'23-Nov'23)	Total Revised Budget	Amount Variance	% Variance	
	A	B	C	D	E	F	G	H	I	J=B:G	K=J-A	L=K/A	
Direct Labor	5,474,585	414,022	926,710	1,082,060	1,162,779	1,199,747	1,170,631	409,721	760,910	5,955,948	(481,383)	-9%	
Fringe Benefits	1,765,430	131,311	294,843	375,758	360,918	346,070	385,062	134,772	250,290	1,893,961	(128,531)	-7%	
Consultant	288,593	-	70,998	73,348	57,419	160,074	50,000	-	50,000	411,838	(123,245)	-43%	
Supplies, Equipment and Opera	1,741,916	153,671	476,943	325,368	173,893	162,835	214,933	75,387	139,546	1,509,644	232,272	13%	
Travel and Per Diem	967,676	51,841	206,295	141,701	103,476	179,772	180,454	63,159	117,295	863,538	104,138	11%	
Other Direct Cost	4,282,319	112,324	695,954	333,383	599,437	554,553	975,000	516,150	458,850	3,270,651	1,011,668	24%	
Sub-Grants	5,800,365	-	1,274,492	1,607,383	1,248,560	1,332,757	952,092	305,317	646,775	6,415,284	(614,919)	-11%	
Total Direct Cost	20,320,864	863,168	3,948,235	3,939,001	3,706,481	3,935,807	3,928,172	1,504,506	2,423,666	20,320,864	0	0%	
Indirect Cost	3,657,756	155,370	710,682	709,020	667,167	708,445	707,071	270,811	436,260	3,657,756	0	0%	
CGIAR Cost Sharing Fee	479,572	20,371	93,178	92,961	87,474	92,885	92,704	35,506	57,198	479,572	(0)	0%	
Total Activity Cost	24,458,192	1,038,909	4,752,095	4,740,982	4,461,122	4,737,137	4,727,947	1,810,823	2,917,124	24,458,192	-	0%	

8.2.2 Quarterly Forecasts

Activity so far has performed well and have achieved 100% of its forecasted expenses of \$4,703,807 submitted to USAID from October 2021 to September 2022 (Figure 4).

Forecast vs Actual Expense					
	A	B	C	D	E=C-D
	Revised Budget	OCS Budget	Forecast	Actual Expense	F vs E Variance
October-21	\$291,282	\$291,282	\$375,173	\$291,282	\$83,891
November-21	\$529,334	\$519,447	\$378,604	\$505,345	\$(126,741)
December-21	\$440,056	\$478,931	\$401,987	\$454,355	\$(52,368)
January-22	\$259,155	\$559,394	\$384,424	\$258,404	\$126,020
February-22	\$341,481	\$342,912	\$353,172	\$345,053	\$8,119
March-22	\$448,709	\$571,372	\$377,346	\$458,235	\$(80,889)
April-22	\$468,213	\$437,646	\$427,826	\$449,501	\$(21,675)
May-22	\$454,680	\$374,402	\$403,619	\$374,007	\$29,612
June-22	\$409,314	\$362,228	\$370,936	\$406,613	\$(35,677)
July-22	\$423,707	\$445,779	\$406,670	\$269,258	\$137,412
August-22	\$482,220	\$411,364	\$401,043	\$390,589	\$10,454
September-22	\$539,278	\$344,368	\$423,007	\$534,494	\$(111,487)

Figure 4: Forecast vs Actual expense

8.2.3 Activity Budget review

Midyear budget review

The midyear budget review was completed on (June 20, 2022) and few updates and changes on activities were presented in the revised Yr. 5 budget which was submitted to AOR in 20 June 2022. The budget review was done to remind the whole team of the achievements it has done so far. It provides the senior Management Team information on what strategies they have to develop to catch up on the completion of year 5 work-plan. It also provided a midyear information on the financial performance of the Activity. This mid-year budget review allows the Activity to make adjustments to achieve a more accurate budget for the current fiscal year, resulting in greater budget transparency and guidance to the management in shaping the next year’s budget including the NCE proposal.

Quarterly budget review

This information below analyzes the financial performance of Activity based on the submitted budget and actual expenses. Activity year 5 actual expense is at \$4.7 million or 93% of the total budget of \$5.08 million.

Year 5	Amount in USD
Total budget	5,087,427
Total expense	4,737,136
Budget Balance	350,291
Burn Rate	93%

Total Award Balance

The accumulated expenses from 2018 to date are recorded at \$19,730,244 leaving an available budget balance of \$4,727,948 as of September 30, 2022 (Figure 5).

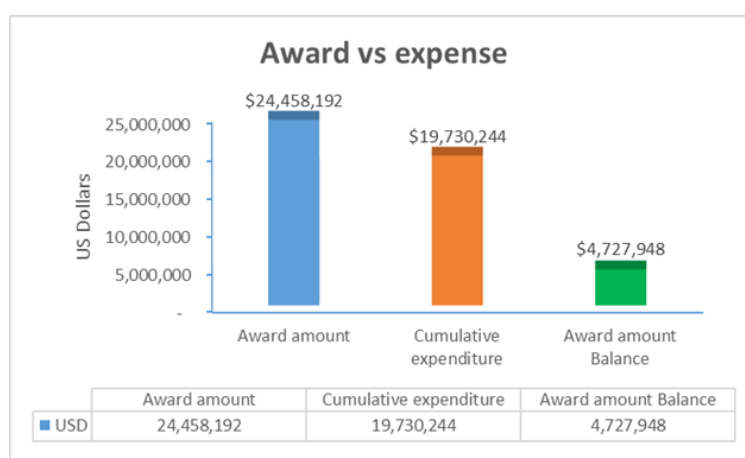


Figure 5: Award balance as of Year 5

Sub-grants:

The Activity signed fifteen sub-grants with a total value of \$ 427,193 where Activities investment is amounting to \$246,777 and sub-grantees investment is a total of \$ 180,416. List of Partnership signed during the year 5 is given below (

Table 4).

Table 4: Partnership signed in Year 5

From October 2021 to September 2022				Negotiated SGA Value (USD)		
SL No	Sub-Grantee Name	Start Date	Approved End Date	Total	FtF BAA	Sub-Grantee
01	MAA MOTHSHA HATCHERY & NURSERY	November 1, 2021	October 31, 2022	66,043	28,990	37,053
02	SATATA POULTRY	November 1, 2021	October 31, 2022	31,324	12,151	19,173
03	FISH BOOTH	March 15, 2022	September 30, 2022	12,253	10,064	2,189
04	GREEN BIOFLOC	March 15, 2022	September 30, 2022	8,403	5,413	2,990
05	PALONGKI KONNA	March 15, 2022	September 30, 2022	18,382	8,387	9,995
06	PLENARY AQUA	March 15, 2022	September 30, 2022	14,866	7,493	7,373
07	TAHZINGDONG	March 16, 2022	September 30, 2022	22,797	17,888	4,909
08	BOLIPARA NARI KALYAN SOMITY	March 16, 2022	September 30, 2022	20,507	16,682	3,825
09	FISHTECH HATCHERY LIMITED	March 17, 2022	September 30, 2022	16,570	7,562	9,008
10	PROTTYASHI	April 1, 2022	September 30, 2022	40,614	34,899	5,715
11	MS. SHAH AMANATH TRADERS	April 1, 2022	September 30, 2022	30,155	13,471	16,684
12	COX'S BAZAR SHOP	April 15, 2022	September 30, 2022	14,221	8,594	5,627
13	KHULNA MUKTI SEBA SANGSTHA	April 15, 2022	September 30, 2022	44,637	26,936	17,701
14	MUKTI COX'S BAZAR	May 1, 2022	September 30, 2022	41,400	20,313	21,087
15	KNB AGRO INDUSTRIES LTD.	July 16, 2022	September 30, 2022	45,021	27,934	17,087
Total				427,193	246,777	180,416

To date, the Activity has signed a total of one hundred (91) sub-grants and nine (9) service contracts with a total value of \$ 11,913,482, where Activity has invested \$6,755,475 and sub-recipients investment is \$ 5,158,007. Among these, four were terminated, two are continuing their activities, and ten sub-recipients were recently approved for cost extension and eighty four were completed by the end of September 2022. A total of \$ 5,463,192 was expended under the Sub-grant budget that gave a remaining budget balance of \$ 337,173 by the end of this reporting period.

8.2.4 Year 6 Planning

The Year 6 planning commenced in June 2022 with the work plan development led by the technical staff. Finance and Grants developed two budgets, first, with the assumption that the Activity will be closed by February 5, 2022, where budget figures are mainly project closeout activities. The second budget is if the application for No Cost Extension is approved, budget figures include programmatic activities the Activity can still implement within the NCE period including project close out related activities.

Agreement Development

8.2.5 Revisit Grants Manual

The Activity's Finance and Grants Manager has initiated the review of the Grants Manual by creating a review committee that will review and update some processes and flowcharts and other sections of the manual. The review committee comprises the Finance, Grants, and Contracts, and Risk Management Lead at headquarters. The draft was completed in August 2022 and now being edited.

8.2.6 Revisit SGA Template, Application form and Budget preparation Template, project description

As part of the overall Grants Manual, associated templates were also updated in the first quarter of 2022.

Risk Management Plan

8.2.7 Update Risk Management Plan and coordinate with Global Risk and Compliance Team

This is an ongoing task and discussion. A section on Risk and Compliance will also be added in the Grants Manual to describe and give clarity on the roles of grants accountants and the Global Risk and Compliance Team at Head office. Finance and Grants Team developed a simple template to monitor the Activity's related risk including partner/sub-grantees. This is now being used by the Grants Accountants. This is a regular task where Finance and Grants Team discusses in a monthly basis to monitor the risk and come up on resolutions. If there is a high risk, individual risk is escalated to CoP as well as to the Global Risk and Compliance Lead.

8.2.8 Select Audit Firm

The terms of reference and RFP and selection of the auditors for the year 2020-2021 has already been completed and audit team started work in mid of August 2022.

Workshops and Training

8.2.9 Sub-grant orientation to new sub-grantees

The orientation program for new sub-grantees took place on October 24, 2021 and May 22, 2022. The project focal and project finance from the newly signed agreement were invited to the training. The invitee partner organization were Bank Asia, IMEXpro (BD) Corporation, Aftab Feed Ltd., Shushilan, GRAUS, Petrochem, Gorai Films, Matrix, Margen Ltd., KNB, Fishtech, Sea Natural Food Ltd., and Sardar Agro, BSFF, Kiu Bangladesh Ltd., Afil Aqua Fish Ltd. Fishtech Hatchery Ltd. and M-World, Fish Booth, Palongki Konna, Green BioFloc, Planary Aqua, GRAUS, Tahzingdong, BNKS, Protyashi, Satata Poultry, Mukti Cox's Bazar, Maa Mothsha Hatchery & Nursery, Ma Motsho Hatchery, KMSS, Shah Amanath, MarGEN. WorldFish- Aquaculture Activity employees especially newly joined staff were also invited to join this training. Number of attendees was 76. The training was facilitated and conducted by Ms. Faria Islam, Grants Specialist of Aquaculture Activity, Ms. Tahamina Yesmin, Head of Finance conducted and facilitated the training. The training covered key discussion areas such as; Sub-grant management process, documentation, financial management and compliance, payment etc.

The training covered key discussion areas such as introduction on sub-grant agreement, sub-award management, Responsibilities of Grantees and Sub Grantees, collaboration between grantee and sub-grantees, financial management. The training materials were later shared among the participants for their reference and guidance (*Annex 6*).

8.2.10 Compliance and Fraud Prevention workshop

The training on Fraud Prevention and Compliance was conducted on October 25, 2021 and May 30, 2022. The invitee partner organization were Bank Asia, IMEXpro (BD) Corporation, Aftab Feed Ltd., Shushilan, GRAUS, Petrochem, Gorai Films, Matrix, Margen Ltd., KNB, Fishtech, Sea Natural Food Ltd., and Sardar Agro, BSFF, Kiu Bangladesh Ltd., Afil Aqua Fish Ltd. Fishtech Hatchery Ltd. and M-World, Fish Booth, Palongki Konna, Green BioFloc, Planary Aqua, GRAUS, Tahzingdong, BNKS, Protyashi, Satata Poultry, Mukti Cox's Bazar, Maa Mothsha Hatchery & Nursery, Ma Motsho Hatchery, KMSS, Shah Amanath, MarGEN. The training was facilitated by Ms. Faria Islam, Grants Specialist of Aquaculture Activity and was conducted by Ms. Glenda Munyukwi, Global Risk and Compliance Lead, Ms. Sally Mallari, Finance and Grants Manager of WF- Aquaculture Activity, Ms. Azira Azmi, Risk and Compliance Analyst. Number of attendees was 77. The training covered key discussion areas such as; Definition of Fraud, its impact, policies to prevent fraudulent activities, consequences of fraud, identifying risk and risk management etc. Topics that were discussed were key definition, corruption index, examples of fraud and unethical behavior in the workplace, red flags, consequences of fraud, how to response on fraud, risk management strategy, importance of internal control, role of project focal, finance focal and senior management in risk management etc. The training materials were later shared among the participants for their reference and guidance (*Annex 7*).

8.2.11 Procurement planning and execution

On November 10, 2021 training on procurement policy and process was conducted. The project focal and project finance from the newly signed agreement were invited to the training. The invitee partner organization were Bank Asia, IMEXpro (BD) Corporation, Aftab Feed Ltd., Shushilan, GRAUS, Petrochem, Gorai Films, Matrix, Margen Ltd., KNB, Fishtech, Sea Natural Food Ltd., and Sardar Agro, BSFF, Kiu Bangladesh Ltd., Afil Aqua Fish Ltd. Fishtech Hatchery Ltd. and M-World. WorldFish- Aquaculture Activity employees were also invited to this training. WorldFish staff including core admin and procurement were also invited to this training. Number of attendees 41. The training was facilitated and conducted by Ms. Sally Mallari, Finance and Grants Manager of WF- Aquaculture Activity the presented topics were procurement planning, key definitions, procurement process and documentation, retention of documents, responsibilities of procurement committee, terms and condition, inventory management, disposal of equipment and additional guideline. The training materials were later shared among the participants for their reference and guidance (*Annex 8*).

8.2.12 Project Closeout

Project close-out training was held online on March 21, 2022. The project focal and project finance from ongoing partnership were invited to the training. The invitee partner organization were Nutri-champs (Cox’s Bazar, Patuakhali and Jashore), KAAS, Cox’s Bazarshop, GRAUS, Margen, Petrochem, M-World, ChhipFood BD, AIT, Satata Poultry, BSFF, FishTech etc. WorldFish-Aquaculture Activity employees were also invited to attend this training. Total number of attendees is 63.

The training was facilitated and conducted by Mr. Md Hanif, Grants Accountant of Aquaculture Activity. The training covered key discussion areas such as; Steps to be followed for close out, documents and preservation, Inventory and property management, disposition plan, final technical and financial reports if any, and final payment (*Annex 9*).

8.2.13 Online capacity development workshop

In addition to close out training, grants team took a 45 minutes session on “Online capacity development workshop for the Implementing Partners (IPs)” organized by Mr. Nazrul Islam, Capacity Building and Training Coordinator on March 13 & 14, 2022. The invitee partner organization were CossBazarShop.com, Aftab Feed Products Ltd. Bhola Monosex, Bangladesh Shrimp and Fish Foundation (BSFF), FishTech Hatchery, Afil Aqua Fish Ltd. M-World, KNB Crash, Shushlan, ImexPro (BD) Corporation, Aftab Feed Products Ltd, Margen Ltd. Sea Natural Ltd, KAAS, Petrochem Bangladesh Ltd. Sardar Agro, Bank Asia Ltd, KiU Bangladesh, Matrix Business Development Ltd. Aquaculture Activity employees were also invited to attend this training.

8.2.14 Online learning through YouTube video

For Activity employee’s capacity building, Ms. Sally Mallari, Accounts Manager (Finance & Grants) shared a YouTube video on “How to Work with USAID: Understanding USAID Awards.” The topic covers- the types of awards the Agency uses and how they work. Which type of award is the best fit for the organization? A total of 30 Activity employee’s watched the video.

<https://www.youtube.com/watch?v=p87uBQixPTE&t=1750s>

Table 5: Summary of trainings held in year 5

Training/ workshops	No. of trainings	Timeline	Dates	# Attendees
Sub-grant orientation to new sub-grantees	2	Y5Q1	October 24, 2021	44
		Y5Q3	May 22, 2022	32
Compliance and Fraud Prevention workshop	2	Y5Q1	October 24, 2021	48
		Y5Q3	May 30, 2022	29
How to work with USAID: Understanding USAID Awards	1	Y5Q2	March to April, 2022	30
Procurement planning and execution	1	Y5Q1	November 10, 2022	
Project close-out training	1	Y5Q2	March 21, 2022	63
Online capacity development workshop	1	Y5Q2	March 13 & 14, 2022	82

8.3. Monitoring Evaluation and Learning (MEL)

8.3.1 Review and update the MEL plan

The Activity's MEL plan is annually updated to reflect new targets against the indicators as new partnerships are formed or contracts are extended. To capture effectiveness and sustainability of partners’ business models, the Activity initiated a qualitative assessment to measure the changes in the aquaculture market system which has been completed in the last quarter of the year. Besides, in year 5, the majority of the Activity partnerships are already mature or near to mature. At this point, the Activity team initiated the process for learning capturing and harvesting systemic change information. Details of the mechanism have been incorporated in the updated MEL plan.

8.3.2 Review and update Aquaculture Activity Theory of Change (ToC)

The Activity conducted its year 5 progress review workshop in April 2022 where the exercise on theory of change (ToC) was included. Activity staff members were divided into several groups to work on different thematic areas of intervention. Group presentations were done and the feedback of the participants was incorporated. The final output of the study on ‘measuring changes in the market system’ will help to generate more evidence to updating of the ToC further.

8.3.3 Address Mid-Term Evaluation's recommendations made on MEL

The Mid-Term Evaluation (MTE) made a number of recommendations on the MEL system and TOC/RF. Aligning with the recommendations, the Activity conducted qualitative study on market system changes. A detailed plan has been developed for further information collection and documentation for learning capturing. A learning capturing team is working on it. The MEL team also facilitated the revision of ToC, which will be further updated based on the evidence from the qualitative survey results.

8.3.4 Data collection pool development for surveys

The MEL team deployed 25 Data Enumerators (DEs) last year, from which the contract of 21 DEs renewed this year based on their performance last year. Besides, four new DEs were hired through competitive process to strengthen the data collection pool aiming to ensure data quality across the program interventions. DEs were engaged to collect quarterly and annual performance data along with field verification of submitted data/information by IPs. The DEs also collected GIS data, such as sales point's location, G3 rohu farmers' location and village landmark location including relevant programmatic data.

8.3.5 Updating Aquaculture Activity MEL MIS platform

The web-based MIS was upgraded from time to time to collect and gather the Activity information (Figure 6). This platform can be visited using the following link: www.melinsight.com

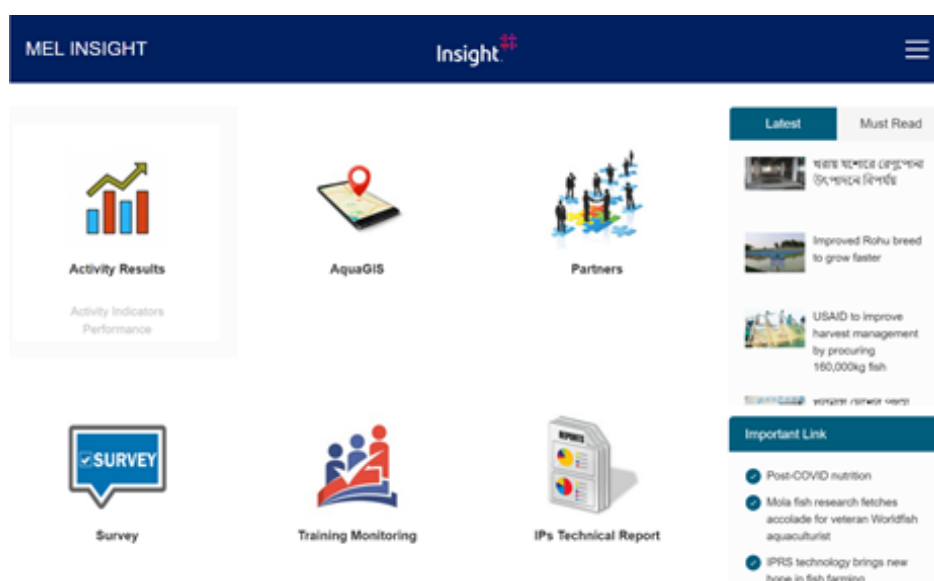


Figure 6: Activity MEL MIS

8.3.6 IPs' activity performance monitoring and internal data quality assessment (iDQA)

The IPs' progress was monitored using specific key performance indicators (KPI) that were set into their agreement documents. MEL deliverables were tracked using the KPIs and associated timeframe through regular updating the KPI matrix. A single matrix database containing program, grants and MEL aspects were also kept up to date to track progress. The quality of MEL deliverables was checked based on MEL standard formats and using verification tools. MEL feedback was shared with the IPs to help them understand the process and improve data quality of the MEL deliverables. The MEL team also monitored different training events organized by different IPs in ZOR and ZOI.

8.3.7 Assist Aquaculture Activity teams to upgrade/ maintain the IPs progress monitoring dashboard

Aquaculture Activity developed a MIS based solution to keep IPs' monthly progress reports and track the progress as well (Figure 7). The MEL team has made the MIS platform accessible to the Activity staff to get the latest updates on IPs' intervention progress.

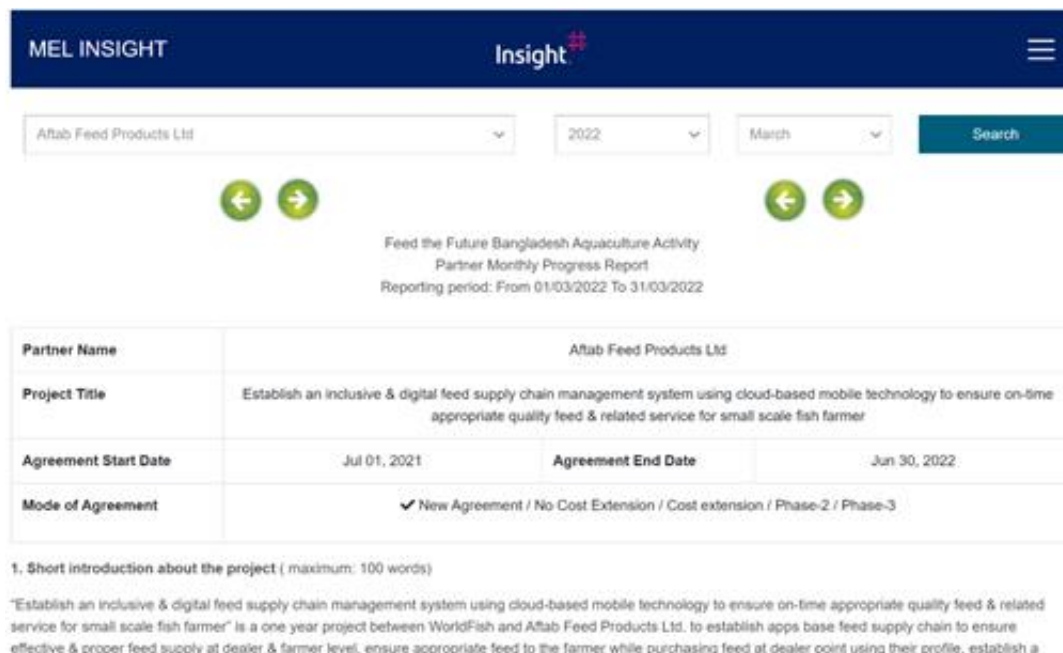


Figure 7: IPs Activity monitoring dashboard

8.3.8 USAID DQA activity

The Activity submitted FY 2021 results into USAID DIS system in October 2021. The Activity also shared brief methodologies for the data collection and reporting results in the Y4 annual report. The Activity is preparing to report results for FY 2022 on DIS/FTFMS/PPR reporting.

Surveys

8.3.9 Quarterly performance survey

The MEL team has worked extensively to customize sales and leverage investment data collection tools for FY2022, considering the nature and type of IPs and relevant market actors. Accordingly, six separate tools have been developed/updated to collect sales data from Aquaculture Medicinal products (AMP) sales point, fish feed sales point, carp hatchery, tilapia hatchery, processed/value added fish-based products and aqua machineries and equipment. Those tools are further customized for each IPs as well as for their sales points.

It was noticed that some IPs are investing in addition to the committed amount within the project period. They are also continuing this business (initiated by the project) beyond the project period and thus making additional investment to run the business. Such investments are identified as 'additional investment'. Previously, MEL team had a system to track the additional investment which is made within the project period. MEL team initiated to capture the additional investment which is made after end of the project. So, two different tools are developed and will be used to capture the additional investment-one for active IPs and the other for closed IPs. The tools will be further customized for individual IPs based on potential investment areas that the Activity can capture and report.

8.3.10 Annual performance survey (farms productivity)

The fish farming/production season has already been completed in Mar/Apr 2022. Accordingly, the MEL team has initiated the annual performance survey at producer's level started in June, 2022

engaging the DEs. Before that the DEs were trained on survey instruments, survey approach and data quality requirements. The training was conducted on June 4-7, 2022 in Jashore where 20 DEs participated.

8.3.11 Annual performance survey (Enterprise/Company/Firm)

Basically, the firm level survey covers sales and leveraged investment data. MEL team collects IPs sales data periodically based on their business dynamics/pattern and reporting preferences (e.g., quarterly or annually). The sales data collected from IPs will be compiled covering the period October 2021-September 2022 for FY 2022 results reporting.

The MEL team also initiated to collect additional leveraged investment amount from the IPs which will be completed by mid-October. This additional amount will not be reported under the indicator EG.3.1-14 (leverage investment) but will be used to realize the potential sustainability of the business/intervention supported by the Activity.

8.3.12 Programmatic data collection from IPs

In addition to the set MEL deliverables, the MEL team collects need based programmatic data from the IPs. Such programmatic data includes capacity development activities information, local service provider (LSP) and dealer point/one stop service point's related information, loan recipient's detail information, etc.

8.3.13 Need-based surveys per programmatic priority requirements

The Activity has planned to capture learnings across different projects and business models implemented by its IPs. As part of learning, the Activity has planned to perform several surveys based on programmatic priorities such as assessing impact of access to finance (A2F), profit loss calculation of aquaculture entrepreneurs, assessing impact of training and replication/secondary adoption of aquaculture knowledge and practices. A comprehensive questionnaire was developed for A2F impact study on farmers and dry fish producers and trained 20 DEs on A2F data collection tools. The survey started in August 22 and ended in September 4, 2022.

8.3.14 Assess effectiveness of capacity development initiatives for Aquaculture Activity participants

Irrespective of thematic areas, the IPs have implemented numerous training events covering similar or different topics. Primarily, the topics are broadly categorized as 'fish farming technology and better management practices (BMPs) for fish farming', 'post-harvest management and marketing', 'nutrition and hygiene', 'gender and youth engagement', 'financial management and literacy', 'business development', 'dry fish processing', 'product promotion/business linkage/business to business (B2B) session' and 'digital marketing/mobile applications. Considering the diversity of training topics/modules, separate checklists/tools has been drafted to capture the effectiveness of the training events specially to realize the behavior changes and its impact on the training recipient's (farmers and market actors) business performance. The MEL team has prepared a detailed protocol to conduct the survey. The survey has been rescheduled to be conducted by Jan 2023.

8.3.15 Qualitative Assessment and other MEL study

The Activity has collected qualitative information from its IPs (called 'tier-1'), relevant market actors (called 'tier-2') and final service recipients (called 'tier-3') in last quarter. Primarily, the IPs whose intervention have already been completed or to be completed by December 2021, were included in this survey. The IPs data were collected by the Activity staff members while the final service recipient's data was collected engaging the DEs pool. To capture market actors' information, a third-party consultancy firm (Nexel Research Limited) was hired through a competitive hiring process. In addition to market actor's data collection, the firm has also engaged in data transcription, analysis, synthesis and preparing reports of the study. As a progress, the report on tier-1, tier-2 and tier-3 has already been completed and attached in the *Annex 2*.

MEL Reports

8.3.16 Quarterly MEL report

MEL team provided inputs into the quarterly report incorporating MEL updates.

8.3.17 Annual MEL report

MEL team provided inputs into the Y5 Annual report incorporating MEL updates and FY 2022 results.

8.3.18 FTFMS PIRS report

Data analysis and reporting for Y4 Annual Performance Survey (FY 2021) was completed in November 2021 followed by data verification and data cleaning. Standard indicator results including appropriate disaggregates, respective deviation narratives, and out-years target (FY 2022-FY 2023) were entered into the FTF module on the newly introduced Development Information Solution (DIS) platform. As a progress for FY 2022 results reporting, the MEL team has completed data collection, processing and primary analysis and preparing for inputs in FTFMS reporting.

8.3.19 USAID Development Information Solution (DIS) report

Results for FY 2021 were uploaded into the DIS system of USAID. Disaggregated data for nine standard indicators and associated deviation narratives against FY 2021 results along with the out-year targets were reported into the system. To be noted that the MEL team has completed primary analysis for FY 2022 reporting and will upload on DIS as per scheduled reporting period.

Measuring Change in the Market System: Qualitative Assessment

8.3.20 Assessment methodology and protocol development

A protocol was developed containing the assessment objective, target groups, sampling frame, and data collection methods, timeframe and data collection checklist.

8.3.21 Data collection tools development

Three separate tools were developed to assess impact in the different tiers of each of the interventions- one to interview the implementing partners (tier-1), second to interview the market actors (tier-2) and third from the final service recipients (tier-3). To be noted that the tier-3 survey was accompanied by quantitative data collection. In addition to the main tools, some brief tools were also developed to capture information from the intervened markets regarding the secondary adaptation and spill-over effect of the Activity.

8.3.22 Orient Aquaculture Activity team on data collection tools

The hired third-party consultant, Nexel Research Limited organized a two-day long training event in February 16-17, 2022 for the survey team of tier-2 data collection. The MEL team and MEL consultant guided them to revise/update the data collection tools, guidelines and also facilitated the training sessions. Field trial and feedback sharing session was also a part of the training on the second day of the training.

The Activity team delivered 3-day long training to DEs on tier-3 data collection. The tier-3 data was then collected in quarter one by them. For this particular survey, 12 DEs were selected based on their previous performance regarding qualitative information collection for the Activity. Field test, demo data collection was integrated with the training package as well. The MEL team also organized day-long training session for the Activity staff to collect information from the IPs which was held in quarter two.

8.3.23 Capture qualitative information from IPs and relevant stakeholders

The Activity has collected qualitative data from its IPs, relevant market actors and final service recipients. Primarily, the IPs whose intervention have already been completed or to be completed by December 2021, were considered under this survey. Relevant market actors and final service recipients supported by the mentioned IPs interventions were sampled under the survey. The IPs and final service recipient's data were collected in quarter 1. In the last quarter, the information from market actors (tier-

2) was collected by Nexel Research Limited. The firm has closely worked with the MEL consultant for data transcription, analysis, and synthesis and reporting. Detailed report on IPs (tier-1), market actors (tier-2) and service recipients (tier-3) has already been shared by the consultant (*Annex 2*).

8.3.24 Data transcription, analysis, synthesis and reports preparation

The MEL team engaged selected data enumerators from its pool to transcript translated data particularly for tier-1 and tier-3. A data storing template was developed using MS Access to accumulate and preserve all data. After completion of data upload, the file was handed over to the MEL consultant for further analysis and report preparation. Besides, the market actors/tier-2 data were collected and transcription was done by the third-party firm. The MEL consultant in support of Nexel Research has completed data analysis and reporting.

8.3.25 Working towards a framework to assess systemic change: AAER

This MEL team will use AAER model to gather the systemic change data using the qualitative data collected from each intervention systemic change progress using the framework. The results from tier-1, tier-2 and tier-3 will be used to perform the systemic change measurement. The Activity has already received tier-1, tier-2 and tier-3 results and will work to gather systemic change information using the evidences captured by the study.

Geo-geographic Information System (GIS):

8.3.26 Aquaculture Activity beneficiaries GIS data collection and submission to USAID

MEL team worked to update the activity participants GIS data and collected beneficiary data from field survey. GIS data collection tools were updated based on the type of beneficiary to collect programmatic data. A total of 27,662 participants' database is developed so far including 71 sales point location which were surveyed (*Annex 10*). The participants' data collected during year 5 includes 45 feed dealer sales point and 26 AMP retailer sales point.

8.3.27 GIS-integration with the current Aquaculture Activity MEL MIS for aquaculture market actors mapping

Google map will be used to get a holistic picture of aquaculture market actors supported and covered by the Activity. Development of interactive maps showing the concentration of Bangladesh Aquaculture Activity beneficiaries in geographic area across the Feed the Future areas is ongoing to add into the MIS platform and planned to be completed by 1st quarter of year 6.

8.3.28 Introduce an Android app for GIS data collection

An introductory level training on data collection using Android app has been provided to the WorldFish Aquaculture Activity staffs using SW Maps android app. Staffs were provided a virtual training and a training module on the training topic was also provided.

Capacity development

8.3.29 Training to the survey pool on data collection and quality assurance

The MEL team facilitated capacity strengthening training for all data enumerators (DE) during the reporting quarter (*Table 6*). The training courses included annual performance survey and GIS data collection. Contents regarding safety measures, precautions and directives were in-built in every session.

Table 6: Major MEL training for DEs in Y5

Date	Title	Mode of Training	Participants		
			Total	Men	Women
Oct 26-28, 2021	Annual performance survey: farm productivity and nutrition household farmers survey	In-person	20	18	2
Nov 8-10, 2021	Training on qualitative assessment data collection	In-person	12	12	0
Jan 11, 2022	Training on qualitative assessment data collection for Activity staff and DEs	In-person	39	36	3

Feb 05, 2022	Training on City Bank loan recipients' data collection	Virtual	11	11	0
Feb 19, 2022	Training on GIS data collection (nursery and villages covered by Petrochem, KAAS and Mukti)	Virtual	13	13	0
Feb 28, 2022	Training on loan recipients' data verification of Shushilan	In-person	3	3	0
Mar 03, 2022	Training on GIS data collection (G3 Rui and IMEXpro)	Virtual	14	14	0
April 6, 2022	Training for DEs on GIS data collection (G3 farmers verification and iMaxPro)	Virtual	14	14	0
May 8, 2022	Training on GIS data collection for DEs	In person	22	20	2
May 24, 2022	Training for DEs on 'sales data collection from hatcheries'	Virtual	7	7	0
June 4-7, 2022	Training for DEs on annual performance survey	In person	20	18	2
July 2, 2022	Tab base farmer profiling training for IP staffs (Mukti Cox's Bazar)	In person	14	13	1
August 21-22, 2022	Study to measure impact of access to finance initiatives	In person	27	24	3
Sep 5, 2022	TOT on Capacity Building Training of Nursery Owners and Fry Traders on Aquaculture Technology	Virtual	14	14	0
Sep 8, 2022	Hands-on training on tab based real-time training monitoring in for IPs in ZOR	In person	20	18	2

8.3.30 Capacitate IPs on MEL

The MEL team worked with existing IPs and extended support as and when needed. The MEL team conducted desk check and field check of the IPs data and shared feedback with them to make necessary adjustment. The Activity MEL team also conducted field visits and observed farmers' training sessions organized by different IPs (e.g., Shushilan-2, M/S Shah Amanat Traders, Tazingdong, BNKS, Maa Matsya Hatchery) and shared observations with the IPs and the program team to address challenges.

8.3.31 Hands-on training on tab based data collection for IPs

MEL team engaged IPs only for tab-based data collection process based on their staffing, capacity and data requirement.

MEL Meeting/Workshop

8.3.32 MEL team meetings

The MEL team has continued weekly team meetings on a regular basis. In addition, the team persisted in its teamwork approach by executing need-based team meetings using official MS Teams as and when required.

8.3.33 Quarterly MEL workshop

On May 8-12, 2022, the MEL team conducted a workshop to discuss on a) results measurement plan for FY 2022 (e.g., farmers tracking, farm productivity survey, IPs sales data), b) Activity MIS, c) Activity learning capturing plan, d) planning for need-based survey/s (e.g., communications effectiveness, training effectiveness, impact of access to finance partnerships), d) planning for village level GIS survey, e) MEL strategy for ZOR considering new partnerships as needed and finalize MEL operational guideline, and update MEL plan.

8.3.34 Changes in Market System': Learning sharing workshop

The MEL team is working with the MEL consultant to accumulate systemic change information. After completion of the survey data analysis and reporting, the MEL team along with the MEL consultant will organize a workshop (virtual) to share the results using the systemic change model. The workshop will be organized in the next quarter.

8.3.35 Workshop with the Activity staff to go through the TOC and revise/ update

The MEL team along with MSD team facilitated group exercises on ToC matrix during last quarter of the year. To conduct the group exercise, staff members were divided into several groups considering thematic focus/intervention areas. The Activity has compiled outputs by all groups and is working on

it to give a final shape of the updated ToC. Besides, the ToC will be further updated using the results of qualitative study.

8.4. Capacity Building

8.4.1 Arrange capacity building events for IPs and Aquaculture Activity staff

Various trainings organized under the project in the last one year. Including Workshops, Seminars, TOTs and Basic Orientation. Their information is presented in the table below. All training/evets facilitated in participated approach. The participants join different group works, question answer and exchange experiential views (*Table 7*).

Table 7: Capacity building events for IPs and Aquaculture Activity staff in Y5

Dates	Name of the training course	Organizer	# of Participant	Focal
Nov 18, 2021	Workshop on quality tilapia seed business for the multiplier hatcheries	BRAC	21	Tilapia Breeding Specialist
Dec 1-2, 2022	Training of Trainers (ToT) for Project staff on nutrition-sensitive aquaculture through microfinance support, Khulna	Sushilan	28	Nutrition Specialists
Mar 13-14, 2022	Online capacity-building event for IPs and Aquaculture Activity staff	WorldFish	68	CBT Coordinator & Respective IPs
May 11-12, 2022	ToT on facilitation skills for IP staff of ZoR, Cox's Bazar	Do	21	ZoR Coordinator & CBT Coordinator
June 12, 2022	Special ToT training for Aquaculture Activity Team of ZoI at Shaymnagar, Satkhira	WF	13	DCoP & Tilapia Breeding Specialist
06-07 June 6-7, 2022	ToT on Aquaculture for point in-charge (woman), Khulna	KMSS	24	MSD Specialist (PoC)
Jul 26-27, 2022	ToT on facilitation skills for IP staff of ZoI, Jashore	WF	20	Sr. PM & Coordinator & Respective IPs

8.4.2 Identify and develop suitable event materials, e.g. flipchart, posters, picture, models, leaflets, real objects based on target groups' needs

An inventory of existing training materials for the USAID AIN project has already been developed. In the connection of AIN IEC Materials, Aquaculture Activity has taken steps to print different IEC Materials. Aquaculture Activity Experts have taken the role of development such types of materials. During the year the following materials published and soft version have been uploaded on MS Teams Channel. BMP Materials distributed among IPs and different training/field events

Materials	Quantity	Remarks
Farmers' Guide Book on Commercial Fish Polyculture and Vegetable Gardening	10000	9.5x7" (24 pages)
Patilwala in fish farming leaflet	20000	13x9.5" (3 folds)
Aquaculture Pocketbook	50000	8.5x5.5" (8 pages)
Bagda Guidebook	2500	9.5x7" (18 pages)
Nursery Management of carp fishes	5000	8.5x5.5" (8 pages)

8.4.3 Evaluation of impacts/performance of capacity building events organized by Aquaculture Activity partners

An evaluation checklist has been developed for real-time field training/event monitoring (*Annex 11*). The checklist has been finalized after the field test. The events data/information collected through Kobo toolbox with the assistance of MEL team. Activity staff continued to use this training monitoring tool whenever they visited any event. Instant feedback is given if any observation on facilitation process, venue, participants etc.

8.4.4 Develop/ regenerate capacity building guidebook, slides, etc. for the project participants

A videography captured on Aquaculture Capacity Building Training. A self-supervised video on the basics of fish farming. In the video, fish farming is presented from start to finish. This video is recorded together and in 4 parts. The 4 parts are as follows: pre-stocking management, post-stocking

management, fish harvesting and marketing and horticulture management. A beneficiary will be able to fish easily by watching this video. The document is available on the [link](#).

8.5. Gender

Output- 17 Increased access to productive economic resources for women

8.5.1 Strengthen capacity of 100 women Entrepreneurs on Business Development Services (BDS) to adopt their business in COVID-19 situation

During the first quarter of reporting year, mentorship between 100 Aquaculture Activity women entrepreneurs and Young Business Graduates have been completed. All required necessary tools, methods, monitoring mechanism, concept note developed, printed and distributed among the BDS training participants during that time. After that, activity partner, Enliven developed capacity of 100 women entrepreneurs on BDS through a 3-day training and mentorship program. Enliven also supported these women entrepreneurs over telephonic calls. A training handbook was designed and finalized after the BDS training and distributed. This intervention increased business awareness among the women entrepreneurs and increase their capacity in regards to management of cost-benefit register, emergency savings, create market demand and customer database.

8.5.2 Support ZoI and ZoR in marking International Women’s Day to create enabling environment for women in the aquaculture sector

Highlighting the campaign theme, "Break the Bias", Aquaculture Activity observed the International Women’s Day (IWD) 2022 in Khulna with our partner, Shushilan at their conference room on March 8, 2022. The Deputy Director, Department of Fisheries, Khulna Division as the chief guest along with the special guests, a Professor from Khulna University, DCOP and Senior Program Manager of Aquaculture Activity, the Chief Executive of Shushilan attended the event. The objectives of the event were to share background and overview of International Women’s Day 2022, and listening stories from the successful women aquaculture actors associated with different partner organizations, namely ENLIVEN, Shushilan, and United Purpose for the encouragement of empowering women though breaking the biases in aquaculture sector. Total 53 participants attended the event including 20 women group leaders, local journalists, elite persons, and WorldFish and Shushilan staff. Women group leaders promised to discuss the learning of the event at their upcoming meetings to make their members aware and encourage to remove their personal and social barriers working together to sustain their businesses in the aquaculture sector. Around 1000 copies of a leaflet on this year's IWD theme were distributed among different partners from Khulna, Jashore and Barishal to use in the discussion of their court-yard sessions to encourage women to break gender stereotypes in aquaculture sector for women empowerment.

8.5.3 Support ZoI and ZoR in marking International Men’s Day (IMD) to create enabling environment for women in the aquaculture sector

This activity has been dropped and the budget was used to print Gender Flipchart. A total of 100 copies of the Gender Flipchart were printed and distributed among Aquaculture Activity partners in ZOI and ZOR to use this in their different training, as per their demand.

8.5.4 Linkage WBC produced mola fish marketing channel with ongoing IP Plenary Aqua for increasing mola fish supply and consumptions

It was a non-budgetary activity and in the last quarter of the reporting year, the connection between Plenary Aqua and WBC outlet was established to increase Mola fish supply as both partners were interested in win-win business.

8.5.5 Gender Strategy

During the first quarter of the reporting year, a gender strategy has been prepared to give a pathway on the gender integration throughout the activities of Feed the Future Bangladesh Aquaculture Activity. The strategy has been shared in the *Annex 12*.

8.5.6 Gender Learning Workshop with Partners in ZOI

As a cross-cutting issue, the Bangladesh Aquaculture Activity worked to maintain gender equality and equity across the aquaculture market system. The Activity is undertaking different strategies for inclusion of women in aquaculture encouraging and incentivizing activity supported partners to emphasize women fish farmers and entrepreneurs into their business. However, it was required to learn partner's perception on women inclusion in their implementation. Consequently, during the last quarter of the year, the activity organized a Gender Learning Workshop with Partners of Zone of Influence (ZOI) on 14 September 2022 at Khulna. Representatives from all Partners in ZOI were present. The purposes of the workshop were learning sharing their experiences, challenges and lessons of women's inclusion, refresh their basic knowledge on gender and women empowerment and interchange learnings between NGOs and Private Sector Partners on gender inclusion. It also disseminated the learnings from USAID organized Gender Learning Workshop in July in Jashore. The workshop was designed on Power Point presentation on basic gender concepts, Aquaculture Activity gender integration strategy and how MEL integrates gender issues in the Activity results reporting. Well ahead, 3 women leaders from rural areas shared their practical experiences of the Aquaculture Activity journey and finally group exercises were conducted on challenges, learning and the way forwards for gender inclusion. As per the findings, social norms and lack of family support towards women's involvement in aquaculture were identified as an initial barrier to women's inclusion in ZOI region; lack of technical knowledge, and skills discourages them to take first step in aquaculture business. Current market related challenges identified as still barrier form women. Providing specialized training, ensuring financial support and access to easy accessibility to quality inputs, women-friendly and accessible transportation system, creating collection points at the community level, ensuring required support from government and other services providers, women-friendly technology can solve the challenges and may help to increase participation of women in aquaculture and related business.

The participating implementing partners expressed their commitments to increase participation of women in their activities/business as well as will work to create gender friendly-environment and ensure/improve necessary facilities for women in aquaculture sector of ZOI. A detailed report has been shared in the *Annex 13*.

8.6. Youth

Output- 18 Increased access to productive economic resources for Youth

8.6.1 Ensure access to quality aquaculture inputs and expert Guideline Services

FishBooth is an enterprise of supplying quality aquaculture inputs and expert guideline services to fish farmers in an area-based approach and through an online platform.

The area-based sales centers or booths at Boalkhali and Alikadam upazila helped to reach input services in the shortest possible way to farmers, and farmers get their input with the lowest transportation cost and limited time within their area.

During this reporting period, FishBooth completed inception workshop at Boalkhali and Alikadam upazila, where 50 market actors including 9 women participated. They organized program in Boalkhali and Alikadam upazila and distributed fish feed and P^h meter among the 36 aquaculture farmers including 3 women participants. They also completed the stakeholder linkage program at Chittagong to create market channel with Fish Booth and other different organizations, GoB and other aquaculture entrepreneur, in the stakeholder linkage program 41 different market actors participated. The 2 persons from FishBooth, participated in the youth linkage program with different ZOR partners of Bandarban. The online services of FishBooth have increased the possibility of new stakeholder and farmer engagement in the market chain and increased the chances of market growth of quality aquaculture inputs.

8.6.2 Establish and Consulting Bio-floc Fish Culture System & Marketing

The youth partner Shariful Islam, who is providing a consultancy service to promote bio-floc based aquaculture systems, has established a demo bio-floc to further support his consultancy service. An online workshop has been organized where 38 potential entrepreneurs have attended to understand more

about the bio floc fish culture system and the services that will be provided by Shariful Islam. After the workshop, Shariful provided consultancy services to 2 clients and communicated with 3 other potential clients who are interested in undertaking efficient bio-floc businesses. With Shariful Islam, 3 other youth team members are working to make this business a successful one. The partnership agreement with this youth has been closed on 30 November 2021, and an assessment of impact is now being undertaken.

8.6.3 Process and marketing of ready to cook (RTC) fish through youth entrepreneurs

The main objective of this intervention is to support the processing and supply business in ready-to-cook (RTC) fish. This partnership focused on marketing to increase the sales of RTC products. This was also a replicable intervention for the other youth entrepreneurs. The sub grant agreement was signed between Plenary Aqua and WorldFish during quarter two and finished in quarter four of the reporting year. Throughout the period, Plenary Aqua has established a processing center for fish cutting where 3 women can cut fish easily by ensuring all obligations and hygiene. They developed few documents like market survey questionnaire for RTC fish assessment, leaflet, festoon, PVC sticker, Business card etc. on Plenary Aqua business promotion in both Bangla and English. They also organized 6 campaigns in different locations of Khulna city including Khulna University premises to promote their business and expand their idea to university professionals and students. The campaigns also increased recent market demand for RTC fish, which is almost double that of the previous year. Meantime, Plenary Aqua also accomplished a market survey by random and selective sampling among 220 participants from Khulna area to know the current status and demand of RTC fish and meat products in the region. The findings show that only 15% of people were aware of RTC fish and 93% shows their interest to buy from them RTC fish. It also helped them to upgrade their sales strategy based on contemporary market demand. As a part of online promotion, they developed their website and boosted their Facebook page where people can order with no trouble.

Consequently, the sales graphs compared to the last year same time have increased 24% (June to September 2022) which motivates them to invest and expand their business. In future, they have plans to establish a factory where raw fish will be prepared for cooking or eating while maintaining proper quality and safety chain. They also want to introduce Ready to Eat (RTE) fish in the market, by which they dream of reaching the national and foreign market by exporting RTC and RTE products.

8.6.4 Partnering with youth entrepreneurs to scaling up the dry fish powder business

Despite several significant challenges, namely lack of consumer trust, difficulty in selling products, high production cost, and low profit margin, huge potential exists in the dry fish value chain in Cox's Bazar. To expand the dry fish market and exploit the potential, it is one of the important steps to produce dry fish-based ready to eat (RTE) products especially dry fish powder and market the products throughout the country. Considering the need- Feed the Future Bangladesh Aquaculture and Nutrition Activity started collaborating with Palongki Konna (PK), a youth woman-led micro-enterprise of Cox's Bazar from April, 2022 to produce dry fish-based products. As a part of the initiative, PK trained 30 women on safe dry fish production as well as the production of safe dry fish powder. PK also purchased some machineries like grinding machine, foil machine, mincer machine for producing safe dry fish powder, and smart packaging. It also has developed a website (www.palongkikonna.com) and advertised on social media to promote the business. PK also conducted three events on protein camp for good health for 33 lactating, pregnant mothers. PK organized a cooking competition with fish powder at Cultural center, Sadar, Cox's Bazar. As a result of this initiative, PK was able to sell 332 kg safe dry fish powder worth BDT 294,887 equivalent to USD 3024 which is 97% higher than last year that time and 375.5 kg safe dried fish worth BDT 444,225 equivalent to USD 4555.85 from April to September 2022. The total sales of dried fish has been increased 132% compared to the same period in the last year.

8.6.5 Youth engagement in modern fish farming; bio-floc initiative

Aquaculture Activity supported an already established bio-floc business through improving the overall management practices. The sub grant agreement was signed between Green Biofloc and WorldFish during the second quarter/March 29, 2022 and ended the fourth quarter/September 30, 2022 of the

reporting year. Throughout the time, Green Bio-floc established 3 structures of biofloc tank, prepared water for first cultivation, purchased seed and feed, maintained tanks regularly etc. They also done renovation works to improve the overall production system. Throughout the 3rd quarter, Green Bio-floc developed 3 tanks where they can cultivate around 1,000 fish fingerlings together. They purchased some bio-floc equipment like PH meter, TDS meter and others to uphold hygiene system, taste and measure density, temperature and saltiness etc. Additionally, installation of CC camera for monitoring was done during last quarter. Lastly, for unlamented electricity during load shading, they upgraded their electricity system etc. which helps to increase production properly during this time. In the last quarter of last month, Green Biofloc finished their first harvest and they sold around 1 lac 20-thousand-taka koi fish in the last 10 days. They also prepared for second cultivation.

8.6.6 Training/ workshop to all new partners on issues related to youth in aqua-business

The purpose of this task is to sensitize the matter of youth inclusion throughout the overall activities of the Aquaculture Activity. During this reporting period, all new partners have been sensitized in their orientation and ToT about youth intervention of the Aquaculture Activity.

8.6.7 Observe International youth day

This year theme for International Youth Day (IYD) was “*Intergenerational solidarity: Creating a World for All Ages*”. Based on the theme, all partners of the Aquaculture Activity observed the day to amplify the message that action is needed across all generations to achieve the SDGs and leave no one behind in the aquaculture sector of ZOI and ZOR. As a part of plan, all partners organized different events in August 2022 like Rally, Campaign, Discussion session, Seminar etc. where they discussed the background and history of IYD, their roles and responsibility to involvement youth in program, design and strategy etc. Besides youth beneficiaries, the Activity focused on schools, colleges and universities to create positive image on engagement in aquaculture sector and reduced gender stereotypes and social norms among future generation. The Activity Gender Specialist along with all POCs ensured the quality of the programs.

8.6.8 Grant agreement signing event with the youth partners

As part of youth engagement, Bangladesh Aquaculture Activity focused on creating linkage and synergies for youth with other partners who need support and mutual cooperation to run and expand their business opportunities in the aquaculture sector. As youth partners from ZOI and ZOR are facing some challenges to run and expand their business, the activity plan to organize youth linkage workshops with partners to reduce their challenges increase mutual support to expand the aquaculture sector in Bangladesh. A total of 3 events were organized in the last quarter of the reporting period based on the youth partner’s location. The first event was organized in Khulna at July 28, second event was organized in Cox’s Bazar at August 29 and the final one was organized in Bandarban at 1 September 2022. The objectives of these events were established linkage between youth and other partners, inform other partner organizations about youth business, identify youth engagement opportunities in the Aquaculture Sector and explore demand and identify how other partners can support youth initiatives. Representatives from all relevant partners were present in the workshop. In one event at Cox’s Bazar, Department of Fisheries (DoF) and Bangladesh Fish Research Institute (BRFI) representatives were present and provide their scopes to support youth. After the introductory session, the workshop assessed the demand and opportunity of youth engagement in the aquaculture sector by group exercises. The partners presented their works along with current challenges and future strategies and participants from all partners promised to provide support from their end. It was a very effective discussion and after this, youth partners sought support and ensured this from relevant partners by the win-win business situation. Detailed reports for 3 events are attached in the [link](#).

8.6.9 Youth Strategy Developed

During the reporting period a Youth Strategy has been prepared to give an idea on the youth inclusion in the aquaculture sector throughout the Aquaculture Activity activities and sheds some light on the scopes and opportunities for further inclusion of youth into the Activity. A draft version of the strategy is attached in Annex 14.

8.7. Environment and climate change

WorldFish initiated to ensure that none of the interventions of the Bangladesh Aquaculture Activity leaves negative impacts on the environment and/or on human health.

8.7.1 Update the IEE (Asia 17-078), which will be expired in September 2022

WorldFish remained very interested in extending assistance and cooperation to USAID to update the IEE (Asia 17-078). However, perhaps assistance was not required by USAID from the IPs in this connection.

8.7.2 Update the EMMP to (re)align with the new IEE, and submit it to USAID for the approval of AOR and MEO

The current EMMP of the Bangladesh Aquaculture Activity covers the entire period of the Grant (till February 5, 2023). All the mandatory environmental compliance standards will be incorporated into the current EMMP, immediately, once WorldFish receives the updated IEE. The updated EMMP will be submitted to the USAID for the approval of the AOR and MEO.

8.7.3 Conduct EDD and setting mitigation actions against the agreed interventions as specified in the SGAs

Whenever a new partnership was established, Environmental Due Diligence (EDD) was conducted. This EDD promoted embedding environmental compliance and Climate Risk Management (CRM) into the implementation process. As part of EDD, each of the proposed interventions was analyzed and screened out for setting ‘determinations/threshold decisions’ based on the anticipated risks that might have been left on environment and/or human health. Apart from environmental risks, potential climate/weather-induced risks on the proposed interventions were also analyzed to prevent hindering the opportunities of the interventions. All that required tolls were utilized to comply with the respective regulations of USG and GOB, in this connection.

Based on the identified environmental and/or climate-induced risks, appropriate mitigation actions along with responsibility and schedule against each of the proposed interventions was illustrated in a matrix. The output of EDD procedure against the detail proposal of a sub-grant applicant was documented precisely and compact fully. The EDD documents were then attached with the SGAs so that the environmental compliance and CRM were become instrumented officially.

A total of 18 EDDs have been conducted in Y5, which reached the cumulative number 111 (LOP).

8.7.4 Train project personnel on environmental compliance and CRM

One of the key objectives of such training was to develop a common understanding on the importance of environmental compliance and climate risk management (CRM) for the sustainability of development interventions, and the USAID obligations. With this knowledge, participants would be able to articulate the scope of environmental compliance and CRM, and hence would perform better in executing the Activity’s EMMP. The training covered 6 modules, as below –

Part I: Why Environmental Compliance and Climate Risk Management?

Part II: Identification of Environmental and Climate Risks.

Part III: Mitigation of Environmental & Climate Risks.

Part IV: Understanding Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)

Part V: Environmental Compliance Procedure in Feed the Future Bangladesh Aquaculture Activity

Part VI: Understanding Climate Service for Aquaculture

Two batches of training have been conducted in Y-5 where 53 project personnel were trained, which reached the cumulative number – 111 (LOP).

8.7.5 Provide backstop support to HYV CARP and GIFT team to promote BMP and safe fish seed production

Have extended assistance and co-operation with HYV CARP and Tilapia Breeding teams as and when required. For instances, cross fertilized knowledge and expertise with C-GIP team members on environmental compliance issues in hatchery operation. Have been assisting the breeding program team with relevant documents on better management practices to develop the 'OneFish App' in order to popularize environmental and CRM issues.

8.7.6 Conduct a qualitative environmental assessment on IPRS/high density fish farming

The qualitative environmental assessment on IPRS has already been completed. It was revealed that the 'new' aquaculture regimes that is high density fish farming by adopting bottom clean or IPRS techniques have the potentiality to maximize production by 5 to 10 folds while addressing the issues of fish- and human-health, environmental compliance, and climate change adaptation and mitigation. The 'new' aquaculture regime offers a 'double win' situation, and thus it can be fairly said that the future of aquaculture stays with bottom clean and IPRS techniques.

8.7.7 Oversee the compliance of mitigation actions and CRM against the interventions as specified in the SGAs

Environment and climate change unit have been overseeing the process in collaboration with the Program POCs. For instance, several joint field visits were done with the Program POCs in this connection. The Bangladesh Aquaculture Activity facilitated a field visit of the Regional Environment Advisor to demonstrate how the environmental compliance and CRM issues are being practiced by couple of sub-grantees. In collaboration with MEL team, an initiative has been commenced to conduct 3 surveys to assess the adoption environmental and CRM issues into the day-to-day practices in the production of tilapia seeds, carp seeds, and fish feeds. Well-structured questionnaires were developed to conduct the survey in the next couple of months.

8.7.8 Provide backstop support to sub-grantees to integrate environmental compliance and CRM in their training and communication materials

Backstop support was provided to the partners through the Program POCs as and when required. For instance, post-training assistances on maintaining personnel hygiene and avoiding contamination were provided in person to the partner organizations involved in fish drying at Cox's Bazar.

8.7.9 Collaborate with International Centre for Climate Change and Development (ICCCAD) to organize International Conference on Climate Knowledge and Service

In order to establish better linkage with climate change related networks, a close relationship with ICCCAD was maintained. A presentation on the CRM procedures that are being followed in the Bangladesh Aquaculture Activity was delivered on May 19, 2022 in their annual dialogue event. This kind of representation assisted in cross-fertilizing knowledge and expertise.

8.7.10 Collaborate with Bangladesh Academy for Climate Services (BACS) to organize training courses on Climate Services

As part of conducting an appraisal of BACS, an online interview was conducted to assess their current interventions, and develop their future strategies. Close relationships and networking with BACS are being maintained.

8.8. Knowledge Management and Communications

8.8.1 Document and publish and print stories (success and impact) on Aquaculture Activity interventions as journal

In this reporting year, a total of 56 success and impact stories were prepared covering the results so far achieved thanks to the Aquaculture Activity interventions already implemented. These stories have been arranged under five thematic areas to publish as a popular journal to disseminate the key changes the Activity made in the aquaculture sector at different market actors' level (*Annex 15*).

8.8.2 E-Quarterly Newsletter development and dissemination

The Aquaculture Activity prepares and publishes the quarterly newsletter to share the major events, interventions, progress against targets, key achievements, notable visits, major success stories, lessons learned, etc. The Activity already published the issues of year 5, which portrayed how the Activity interventions, through a market systems approach, helped increase production, income and improve nutrition of fish farmers and other aquaculture market actors.

8.8.3 Develop videos on Aquaculture Activity intervention results and capacity building training

In the last part of year 5, the Activity prepared three videos covering the story of a successful fish farmer, the success of In Pond Raceway System, , and the steps of capacity building training. The video on capacity building training on pre-stocking, stocking and post-stocking in aquaculture management will be uploaded on YouTube for wider dissemination of useful messages on improved aquaculture practice. Apart from these, a few partners prepared several short videos with the support of the Activity for the dissemination of relevant messages and promotion of businesses in the aquaculture sector.

8.8.4 Organize media round table meeting, TV talk shows and journalist visits to Activity interventions sites for media coverage

During this reporting year significant number of media coverage on different interventions and events were made from local to national level. A comprehensive list of all media coverage is available in the *Annex 16*. A few of the events have been briefly described below.

‘The Daily Prothom Alo’ coverage on Carp Pituitary Gland (CPG)

The Daily Prothom Alo, the country’s most popular daily newspaper, covered the news on the Activity’s initiative regarding establishing the supply chain of Carp Pituitary Gland (CPG). The media published a detailed report on the CPG intervention. A video documentary on the same was also published on the Prothom Alo YouTube channel and posted on Facebook. They shared both the article and documentary through their social media official platforms which were viewed 1.4 million times and shared more than 5,000 times. The news article featured how the Activity in partnership with United Agro Fisheries put efforts to increase supply of CPG domestically.

IPRS intervention covered by Ekattor TV

Ekattor TV, a popular news channel in Bangladesh, broadcasted a special report on In Pond Raceway System (IPRS) established under the intervention of the Feed the Future Bangladesh Aquaculture and Nutrition Activity in partnership with Afil Aqua Fish Limited in Jashore. This is the first-ever introduction of such intensive aquaculture technology in southwestern Bangladesh. The report was also promoted through Ekattor TV’s social media handles (Facebook, and YouTube).

Aquaculture Activity's pilot initiative to create learning opportunities for MBA students and Women covered by the Daily Star

Aquaculture Activity, partnering with ENLIVEN and ULAB, designed a pilot initiative to create a partnership between women MBA students and rural women entrepreneurs/participants. Ten students went through a two-week 'training of trainers' to conduct a three-day training program for rural women entrepreneurs and provide business development services in the long run. This initiative also generated opportunities for women MBA students to understand the field reality, business models, and challenges. The details of this initiative were published by the Daily Star.

Bottom sludge removal technology covered by SA TV, Jamuna TV and DBC TV

In partnership with Sardar Agro, The Aquaculture Activity introduced the “Bottom Sludge Removal Technology”, in a 50 decimal pond to demonstrate an innovative way to increase fish production significantly from pond aquaculture to meet the increasing demand for fish. This year Sardar Agro was able to increase production of pabda fish/butterfish along with carp to 66 metric ton/hectare, which is more than 5 times in comparison to the existing production, 12 metric ton/hectare. During the period,

Sardar Agro exported 11.8 metric ton pabda to India. Three national TV channel SA TV, Jamuna TV and DBC TV aired reports on this successful intervention.

Round table discussion on “Challenges and potentials to increase investment in fisheries sector”

The Aquaculture Activity hosted one round table meeting in collaboration with the country's top national newspaper, the Daily Prothom Alo. The discussion, titled “Challenges and potentials to increase investment in fisheries sector”, shed light on different setbacks that have long been prevailing in the country's fisheries sector, including marine and inland fish farming and recommended ways to mitigate these challenges. Dignitaries from the concerned government and non-government entities took part in the discussion.

8.8.5 Social media campaign and maintenance of social media platforms and contents generation (posts, stories, blogs, articles, news, events, reports, IEC materials, etc.) for social media and website

USAID Bangladesh and WorldFish Bangladesh official social media platforms published a mentionable number of social media posts throughout the reporting period. Around 6 social media posts on the Aquaculture published by USAID Bangladesh both in Facebook and Twitter. WorldFish Bangladesh posted news and stories on different interventions of the Activity from time to time (*Annex 17*).

8.8.6 Design, produce and disseminate IEC materials, signboards and promotional materials for events, awareness building, website and social media platforms

Throughout this year, different information, education and communication materials like brochures, leaflets, posters, festoons, etc. were produced and disseminated by the Aquaculture and its partners (*Annex 18*). To disseminate aquaculture and nutrition messages and promote the aquaculture sector growth, the Activity developed and installed 82 signboards across ZOI and ZOR. Moreover, the Activity printed and posted 375 info boards with 6 common messages in Bangla language for mass awareness building.

According to USAID advice, the Activity factsheet was revised and reproduced for wider and regular sharing. This factsheet describes about the Activity in brief with updated information. In this reporting period, a brochure was printed for wider dissemination of message on digital applications developed by the Aquaculture Activity in collaboration with different partners. It informed aquaculture market actors and others relevant on the features and how they can be benefitted from these modern digital applications. Another brochure on Patilwala (fry hawkers/traders), describing the improved fingerling transportation technique was published and distributed. Furthermore, the team produced and distributed aquaculture field training festoon set for aquaculture trainers, Bagda shrimp nursery management festoon set for nursery managers, festoon on nursery management etc.

The Aquaculture Activity continued its effort to document and share the key progress and success with target audiences including USAID and Government of Bangladesh. As a result of regular and timely sharing of events news, the Activity received expected number of reaches through WorldFish Bangladesh and USAID Bangladesh Official social media platforms particularly through Facebook and twitter accounts. Last but not least, implementing partners of the Aquaculture Activity promoted their activities and results using their own platforms. Through their social media and multiple forms of disseminations they increase the overall reach of the Aquaculture Activity which also helped boost the impact of different interventions across the Activity working areas.

IEC materials to be used commonly at the stakeholder level. It provides information, creating awareness and to motivate in practicing a new habit to care and attention. The dynamics of the materials help communicating, practicing and sustainable changing in the best ways. The broader aspect of IEC is simple and technical document for positive behavioral change. The materials focused on having real knowledge and utmost importance to the targeted users by using simple language, social norms, and depiction. During the reporting period (Y5Q1) the Aquaculture Activity team has printed and disseminated the following IEC materials in the project working areas (ZOI and ZOR). See the *Annex 18* contains all list of the published IEC materials by the Activity.

6 signboards in Bangla language

Moreover, the Activity developed 6 signboards in Bangla language for raising awareness around aquaculture, nutrition, hygiene, etc. (Figure 8). The Activity will produce more signboards/ billboards and disseminate across the working areas.

Signboard 1: Small fish and vegetables provide a nutritious meal that nourishes the whole family.

Signboard 2: Fish can be added to mashed rice; a good complementary food for children over 6 months.

Signboard 3: Stocking large fish fingerlings can decrease mortality and increase fish production.

Signboard 4: Apply fertilizers in pond regularly to keep your pond water color green.

Signboard 5: Wash hands properly for 20-30 seconds with soap and clean water often to protect you, your family and the community from diseases.

Signboard 6: Keeping your house and the environment clean makes you healthy and happy.



Figure 8: Signboards for raising awareness around aquaculture

Aquaculture Activity Factsheet

For further dissemination, the Activity revised and reproduced the factsheet for wider and regular sharing. This factsheet contains information about the Activity in brief. Apart from highlighting the goal and overall objectives, this factsheet grab attention on the targets and achievements as well. To read the latest factsheet see the *Annex 20*.

Aquaculture booklet on modern fish farming in ponds

During the reporting months, The Activity worked on a publication, titled 'Modern fish farming practices in ponds' (in Bangla) which describes ponds management before, during and after the fingerlings stocking and general tips for the fish culture. This handy booklet will be disseminated among implementing partners and farmers. This booklet will also be shared during relevant trainings, field level events, gatherings and in other platforms (*Annex 19*).

8.8.7 Celebration of National Fish Week including other relevant national days to raise awareness and promote aquaculture and nutrition practices

In this reporting year, National Nutrition Week was celebrated widely. The Activity field offices took part in different events and discussions to celebrate the event. The Aquaculture Activity, jointly with other projects of WorldFish, organized a competition for all WorldFish staff to raise awareness regarding nutrition and fish. Moreover, utilizing the social media platforms, WorldFish, aligning with the government declared theme, shared useful messages on nutrition. Promotional materials, like banners, factsheets, and mugs were produced and distributed targeting the event.

8.8.8 Impact assessment of interventions, publication, printing success stories, reports and other products to showcase successes and learning sharing

The Activity published a number of publications for different aquaculture market actors this year. The list includes 'Modern fish farming practices in ponds' (in Bangla)- 120,000 copies, 'Farmer's guidebook on carp fish farming and dyke cropping management' 20000 copies, and 'Booklet on modern technology for commercial tilapia farming in pond'- 20000 copies.. Considering the importance of bagda shrimp in the aquaculture of Bangladesh, the Activity published 5000 copies of a booklet on commercial farming of bagda describing nursery management, pond preparation and water quality management, stocking, feeding, better management practices and disease management. These publications were distributed among the relevant market actors and others concerned with the aquaculture sector in ZOI and ZOR.

9. Annex

Annex 1: List of Aquaculture Activity IPs (attached)

Annex 2: Measuring change in the market system: Qualitative assessment Report (attached)

Annex 3: Aquaculture Activity digital initiatives (attached)

Annex 4: Report on validation and dissemination workshop by BSFF (attached)

Annex 5: Year 5 progress review workshop report (attached)

Annex 6: Post award orientation program for sub-grantees (attached)

Annex 7: Compliance and fraud prevention workshop (attached)

Annex 8: Procurement planning and execution (attached)

Annex 9: Project closeout- required reports and actions (attached)

Annex 10: Aquaculture activity participants GIS information (attached)

Annex 11: Training, event monitoring checklist (attached)

Annex 12: Gender strategy (attached)

Annex 13: Gender Learning Workshop report.pdf

Annex 14: Youth strategy (attached)

Annex 15: Success stories (attached)

Annex 16: Media coverage (attached)

Annex 17: Social media coverage Aquaculture Activity (attached)

Annex 18: List of IEC materials developed by aquaculture activity (attached)

Annex 19: Aquaculture booklet on modern fish farming in ponds (attached)

Annex 20: Aquaculture activity factsheet (attached)

Annex 21: Photo (attached)

Annex 22: Bangladesh aquaculture activity indicators (attached)



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative