ANNUAL REPORT

Feed the Future Aquaculture Project

OCTOBER 2011- SEPTEMBER 2012

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Project General Information

Project Name:	Feed the Future Aquaculture Project
Project Objectives:	Contribute to achieving the Feed the Future goal of sustainably reducing poverty and hunger using aquaculture focused on 20 southern districts in Barisal, Khulna and Dhaka divisions, Bangladesh
Contact number:	EEM-G-00-04-00013-00
Contractor:	WorldFish Member of CGIAR USA
Contract Start date:	October 2011
Contract End Date:	September 2016

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FEED THE FUTURE AQUACULTURE PROJECT MAP (Working area)

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LIST OF ACRONYMS:

ASC	: Agriculture Service Center
BARC	: Bangladesh Agricultural Research Council
BAU	: Bangladesh Agriculture University
BCCP	: Bangladesh Center for Communication Program
BFFEA	: Bangladesh Frozen Food Exporter Association
BFRF	: Bangladesh Fisheries Research Forum
BFRI	: Bangladesh Fisheries Research Institute
BSFF	: Bangladesh Shrimp and Fish Foundation
BTV	: Bangladesh Television
CBO	: Community Based Organizations
CGIAR	: Consultative Group on International Agricultural Research
CIFA	: Central Institute for Freshwater Aquaculture
CoC	: Codes of Conduct
CODEC	: Community Development Center
CSISA	: Cereal System Initiative South Asia (CSISA)
CST	: Closed System Technology
DAFF	: Department of Agriculture, Fisheries and Forestry
DANIDA	: Danish International Development Agency
DIP	: Detailed Implementation Plan
DoF	: Department of Fisheries
DQA	: Data Quality Assessment / Audit
EMS	: Early Mortality Syndrome
FAO	: Food and Agriculture Organization
FtF	: Feed the Future
FY	: Fiscal Year
GAqP	: Good Aquaculture Practice
GHERS	: Greater Harvest and Economic Return from Shrimp
GnRH	: Gonadotropin-releasing hormone
GoB	: Government of Bangladesh
HA	: Hatchery Associations
HH	: House Hold
IPAC	: Integrated Protected Area Co-management
IRG	: International Resource Group
M&E	: Monitoring and Evaluation
MoA	: Memorandum of Agreement
MOFL	: Ministry of Fisheries and Livestock
MoU	: Memorandum of Understanding
MT	: Metric Ton
MTT	: Modified Traditional Technology
MYAP	: Multi-Year Assistance Program
NACA	: Network of Aquaculture Centres in Asia Pacific
NDF	: Nutrient Dense Food
NDS	: Nutrient Dense Small
PA	: Producer Associations
PCR	: Polymerase Chain Reaction
PL	: post-larvae
PMEP	: Performance Monitoring and Evaluation Plan
PNGO	: Partner Non-Government Organization
WSSV	: White Spot Syndrome Virus

1. EXECUTIVE SUMMARY

1.1. Introduction

The Feed the Future Aquaculture project is a five year transformative investment in aquaculture focused on 20 southern districts in Barisal, Khulna and Dhaka divisions, Bangladesh. This report describes the achievements of FtF-Aquaculture project activities implemented during FY12. Some of the targets for production and associated income have not been achieved yet as a large share of the fish will be harvested after closing of the reporting period. However, on the basis of growth monitoring, indications are that production is on track to achieve the targets.

1.2. Project Objectives

The project contributes to achieving the Feed the Future goal of sustainably reducing poverty and hunger through four objectives, each linked to one of four project components *(Table-1):*

Table-1:

No.	Project Components	Objectives
1	Fish and shrimp seed	Dissemination of improved quality lines of fish and shrimp seed
2	Household aquaculture	Improving the nutrition and income status of farm households
3	Commercial aquaculture	Increasing investment, employment and fish production through commercial aquaculture
4	Institution and policy	Policy and regulatory reform and institutional capacity building to support sustainable aquaculture growth

Project Achievements by component:

Component 1: Improved Fish and Shrimp Seed:

During its first year the FtF-Aquaculture has worked on the development of high quality seed supplies in order to generate rapid and widespread impacts within the project area. The project has distributed parent fish (brood stock) of selected strains of Rohu, Catla and Mrigel and tilapia to 38 and 18 project selected carp and tilapia hatcheries respectively. Rohu, Catla, Mrigel, egg were collected from natural sources, raised up to spawn (very small recently hatched fish) in mobile hatcheries developed by the project and distributed to public and private hatcheries. Common carp and Silver carp seed were collected from GOB recommended private farms, who maintain brood stock with known origin from government farms located at Natore & Jessore

The project has provided technical training to the owners and staff of partner hatcheries and nurseries. This resulted in improvements in the management of brood fish and egg incubation in carp hatcheries. Spawn production in partner hatcheries at least doubled after installation of water oxygenation towers, and hatchery owners received 10-15% higher price per kg of spawn than non-project hatcheries. Performance monitoring results showed that 80% of the hatcheries that received training followed the improved practices recommended by the project. Hatcheries that received brood stock have produced over

10 tons of carp spawn against a target of 6 tons. This has been supplied to both project and non-project supported carp nurseries. Altogether these nurserers have produced more than 1,000 million carp fingerlings from spawn they purchased from project hatcheries.

A variety of initiatives were taken to raise awareness on benefits of good fish and shrimp seed quality through mass media like bill boards, signboards and TV commercials. 243.5 million White Spot Syndrome Virus (WSSV) free shrimp post larvae (shrimp seed) were distributed to project and non-project shrimp farmers through 38 project supported depots (collection points where farmers sell their shrimp).

Component 2: Homestead Aquaculture:

The project entered into a strategic partnership agreement with Save the Children and its partners CODEC and Speed Trust to implement this component through their existing MYAP program. A total of 12,000 households (7,000 and 5,000 households for CODEC and Speed Trust respectively) were selected in the Barisal region. A partnership with the IPAC project facilitated support to a further 8,000 households in Khulna region.

In the Barisal region, 568 farmer groups were formed, which were provided with training on aquaculture and selected poor farmers were provided with pond management inputs. . Each group is comprised of 25 members, of which 82% are female. A total of 96 household demonstration ponds were established to enable neighboring farmers to learn about improved aquaculture practices. Poor farmers owning less than 50 decimal of land were provided input support in the form of fingerlings and vegetable seeds.

In the Khulna region, 320 farmer groups were formed, each comprising 25 members of which 99% were female. 64 household demonstration ponds were established for training and knowledge sharing purposes. All 8,000 HH received a package of vegetable seed to support vegetable cultivation on their pond-dikes. The performance of vegetable crops will be assessed during early 2013.
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Mola, a nutrient dense small indigenous fish, was stocked in 4,881 homestead ponds at an average rate of 100 g/dec in order to improve nutritional status of households involved in the project and to assess the effectiveness of stocking of Mola. Awareness about the nutritional benefits of nutrient dense fish (NDF) has been raised by the inclusion of information in regular group meetings with project farmers.

Dissemination of information on fish production to all target groups is supported by the distribution of leaflets, flip charts and stickers to farmers through small seed traders who purchase quality carp seed from project supported sources. The project has developed five training manuals and provided trainings to staff of WorldFish and PNGO nursery owners and demonstration farmers.

Component 3: Commercial Aquaculture

This component focused on stimulating investment, employment and incomes through commercial aquaculture in the Southern region. Commercial aquaculture of fish and shrimp is supported through several channels. Project staff is stationed at shrimp depots involved in shrimp marketing and distributed throughout the project working area. Four Aquaculture Service Centers were set up in Khulna region to provide technical support, business development services, advice and training to farmers.

A total of 20,012 shrimp farmers were selected from Khulna, Bagerhat and Satkhira districts and 765 farmer groups were formed to facilitate training. Shrimp demonstration ponds were established and 50

shrimp nurseries were selected for nursing shrimp post-larvae (PL) of shrimp seed that are tested for WSSV (White Spot Syndrome Virus0 by the Polymerase Chain Reaction (PCR) test. The project facilitated the testing and distribution of PCR tested PL among project and non-project farmers. Five thousand carp and tilapia farmers with commercial potential were selected from Barisal, Khulna and Faridpur regions, and 201 commercial farmer groups are formed to facilitate training and support. A total of 61 commercial demonstration ponds were set up and supported technically and also partially financially. Backward and forward market linkages were strengthened for these fish and shrimp farmer through organizing workshops with all value chain actors.

260 cages managed by 260 farmers organized in 25 groups were established under the commercial aquaculture component. Cages were stocked with mono-sex tilapia fingerlings. More than 13 tonnes of tilapia was harvested from 60 cages in Khulna and Jessore during the reporting period. One brackish water hatchery was assisted in producing seed of Tengra, an indigenous fish with high market demand. The hatchery has produced more than 20,000 seed, which were stocked in 7 ponds in Bagerhat.

A Memorandum of Understanding (MoU) has been signed with Bangladesh Fisheries Research Forum (BFRF) to conduct research on commercial culture of brackish water fish species. A Value Chain study on Shrimp, Prawn, Tilapia and Sea bass was conducted in order to better understand the existing status of these species in terms of market demand, relationships between actors engaged at different nodes of the value chain, and the constraints to and future potential of market development.

Component 4: Policy Reform and Institutional Capacity

A meeting of hatchery stakeholders was held in Jessore which led to the successful formation of a hatchery association. The project has begun planning to work with 10 associations, business management organizations, community-based organizations and farmer co-operatives to promote sectoral growth. Support for improvements to the reporting of aquaculture statistics is being discussed with FAO, to be implemented in 2013 as planned. A Technical Assistance Project Proposal (TAPP) is under process of signing with the Department of Fisheries. The Bangladesh Shrimp and Fish Foundation (BSFF) and the Bangladesh Fish Research Forum (BFRF) have signed MOUs to cooperate with project research and survey activities. .

MoUs have been signed with Bangladesh Center for Communication Program (BCCP), Save the Children, Innovision, CODEC, MYAP, SpeedTrust, Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh Fisheries Research Institute, BSFF and BFRF. A total of 130 private and public partnerships were established. Private sector partners include shrimp depots, carp hatcheries, shrimp hatcheries and tilapia hatcheries.

Monitoring and Evaluation

The Performance Monitoring and Evaluation Plan (PMEP) was developed following USAID FTF handbook and implemented, and a project baseline survey was conducted. The technical M&E Team was placed and trained up on M&E systems of USAID and Data Quality Assessment (DQA). Need based M&E tools were developed and implemented in the field. Performance Data till September 2012 was collected.

1.3. Constraints during FY12:

- Shrimp production is expected to be hampered this year primarily due to a scarcity of shrimp PL and poor transportation facilities due to the grounding of cargo plane flights from the main PL

producing area in Cox's Bazar. The need to transport PLs by road has contributed to higher than normal mortality rates and increased PL stocking costs. (The Daily Prothom Alo, 02 March 2012; and The Daily Financial Express, 04 March 2012).

- The failure of some input suppliers to fulfill their commitments despite valid agreements delayed the start of stocking some of the demonstration ponds.
- Due to late rain in the Khulna region, stocking of fish, and prawn seed was slightly delayed and overall aquaculture production may be negatively affected because of shortened culture duration.
- The brackish water shrimp price was lower in 2012 than it has been historically and this will negatively affect gross returns in comparison to previous years.
- Limited availability of Mola brood has resulted in higher than anticipated prices for the seed of this fish.
- The import of improved Jayanti Rohu brood fish from India could not be finalized during FY12 because not all authorities are aware of the agreement on transfer of species that was signed between the concerned Governments. These efforts will be continued in FY13.

1.4. Lessons learned and plan for next planning period.

COMPONENT 1:

- Selected strains of brood stock have had a positive effect on production and profit of hatcheries as well as on production of nurseries and farmers. More carp and tilapia hatcheries will be provided with selected brood stock.
- Fish feed is cost effective to increase production. Local feed millers and traders will be supported in the next phase to increase the distribution area of shrimp and fish feed, and to develop better linkages between traders and farmers
- Initial findings indicate that survival of seed, as well as growth, has improved. Actual data on differences in growth between regular and improved seed is being collected.
- Farmer's awareness on the importance of improved seed has been increased. Seed traceability will be developed further, so farmers will be able to confirm the source of seed that is offered by small seed traders.
- PCR testing of shrimp PLs will be continued. The impact of PCR testing and the stocking of tested PLs will be assessed.

COMPONENT 2:

- Growth of fish in household ponds appears higher than before due to the use of improved management methods. Actual increases in production and profitability will be assessed and data will be used in training for the coming growth season and for reporting on indicators in FY13.
- Attendance rates at household-based (i.e. whole family) farmer trainings have been good. Training for households will be expanded further.
- Preliminary results from demonstration ponds look promising. Results will be analyzed and used in the design of new demonstrations.
- Performance of small nutrient dense fish was found to be positive with increased harvest after natural reproduction in the pond. Farmers are making extra profits due to the high market price and have benefited from increased consumption. Stocking and harvest methods will be further improved.

COMPONENT 3:

- A growth experiment was started on Tengra, a brackish-water fish. Results will be analyzed and the technology will be further developed if found to have potential.
- The DOF has requested to further develop the culture of Hilsha. On the basis of a study conducted by WFC an experiment will be set up.
- WFC has carried out a study on the potential of Mud Crab culture with the help of a consultant. Seed availability and farm management are noticed to be the major limiting factors for crab aquaculture. The feasibility of setting up a mud crab hatchery will be further investigated
- Cage culture was found to be profitable, although the initial investment of the cages is high. Further research will be done to lower the cost of cages. Further research will be done to reduce feed cost, optimize stocking density and culture duration to further increase profit and reduce risk.
- A value chain study was conducted on sea bass and good market potential was found. The potential of sea bass culture will be further investigated.
- The baseline production of shrimp is low. Compared to other countries in the region, there is high potential to increase shrimp production in the coastal area.

COMPONENT 4:

- Several initiatives have started up during the FY12. With one year of results achieved, and relations build up, the coming 6 months will be the right time to work on the support of associations and the implementation of regulations before the start of the next production season.
- Efforts are continuing to increase the participation of government organizations (DOF, BFRI and BARC) in project activities to maximize the use of their existing facilities.
- Seed quality is important for good production. The project will support the implementation of the hatchery act which may lead to hatchery certification; hatcheries which do not comply with good management practices will not be certified and may not be able to market their seed.

1.5. Key Target Indicators over five years:

Table-2:

SL	Key Indicators	Targets: Oct 2011- Sep 2016				
		Yr 2012	**Yr 2013**	**Yr 2014**	**Yr 2015**	**Yr 2016**
1	Yields of rice, fish and potatoes (MT/ha)					
	Shrimp (average)	0.35	0.35	0.35	0.35	0.35
	Fish(Average)	1.94	1.94	1.94	1.94	1.94
	Horticulture (Average)	8.95	8.95	8.95	8.95	8.95
2	4.5-2: Number of jobs attributed to FTF implementation	-	10,000	24,000	37,500	50,000
3	4.5-4: Gross margin per unit of land, kilogram or animal of selected product ($/Ha)					
	Shrimp	-	929	929	929	929
	Fish	-	1496	1496	1496	1496
	Horticulture	-	982	982	982	982
4	4.5.2-2: Number of hectares under improved technologies or management practices as a result of USG assistance	16,800	145,724	286,531	437,456	591,904
5	4.5.2-5: Number of farmers and others who have applied new technologies or management practices as a result of USG assistance	45,587	75,931	100,500	153,450	181,500
6	4.5.2-13:Number of rural households benefiting directly from USG interventions (S)	45,587	704,112	1,149,127	1,196,769	1,329,743
7	4.5.2-23: Value of incremental sales at farm level attributed to FtF implementation	-	42.33	92.71	141.33	173.75
8	4.5.2-38: Value of new private sector investment in the agriculture sector or food chain leveraged by FtF implementation		4.23	9.27	14.13	17.37
9	4.5.1-24: Numbers of Policies/Regulations/Administrative Procedures in each of the following stages of development as a result of USG assistance in each case		2	3	3	3

1.6. Project Key Targets and Achievement:

Table-3:

Key Indicators	Project Progress and Target			
	Baseline Yr 2011	**Target Yr 2012**	**Achievement Yr 2012**	**Target Yr 2013**
4.5-2: Number of jobs attributed to FTF implementation	0	-	-	10,000
4.5.2-2: Number of hectares under improved technologies or management practices as a result of USG assistance	0	16,800	By Direct HHs : 15,844 ha By quality seed HHs: 78400 ha (Estimated)	145,724
4.5.2-5: Number of farmers and others who have applied new technologies or management practices as a result of USG assistance	0	45,587	45,689 23,356 Male 22,333 Female	75,931
4.5.2-7: Number of individuals who have received USG supported short-term agricultural sector productivity or food security training	0	45,587	45,689 23,356 Male 22,333 Female	100,500
4.5.2-13 Number of rural households benefiting directly from USG interventions (S)	0	45,587	Direct HH: 45,689 By quality seed HHs: 850000**	704,112
4.5.2-23: Value of incremental sales at farm level attributed to FtF implementation ($ Million)	156.07	-	9.06 [0.36cage and hatchery] 8.69 [9 months shrimp production]	42.33

COMPONENT 1

2. PROGRESS BY COMPONENT:

2.1. Dissemination of improved quality lines of fish and shrimp seed

This component received around 70% of investment during the first 12 months of the project, to develop and deliver better quality carp, tilapia, and shrimp seed. Improvements attained across these aquatic farming systems are expected to provide an additional 16,147 tonnes of fish and shrimp/prawn by 2013, and 70,714 tonnes by end of 2016; contributing significantly to meeting growing domestic and international market demand, raising farm incomes, and generating off-farm employment opportunities throughout the value chain. The provision of comprehensive support to private hatchery (38 carp, 18 tilapia and 14 shrimp hatchery) operators and government farms was central to achieving these goals. These hatcheries were assisted in sourcing and providing more than 25 tonnes of quality carp and tilapia brood stock and improving management systems to facilitate the production of better quality seed. A total of 211 carp and 50 shrimp nurseries were also brought under the project and provided with technical support and inputs targeting fish and shrimp yield improvements of 12-27% from ponds and *ghers* in Khulna, Barisal and Dhaka divisions in the southern delta, aiming to reach around 1.3 million aquaculture households end of the project period.

Brood stocking at a project supported hatcherv Pond

The project commissioned a professional consulting firm, Innovision, to conduct a study on the carp seed value chain in order to better understand issues around fish seed production and market constraints and facilitate development of effective market based interventions. The project also worked to facilitate the establishment and strengthening of linkages among hatcheries, nurseries and owners of grow-out ponds and *ghers.*

MAJOR ACCOMPLISHMENT AND RESULTS

2.1.1. Component Targets and Achievements

The project achieved 90% and 99% of the targets in terms of supporting the number of hatcheries and nurseries while exceeded spawn production targets by 71%. A total of 1297 million quality fish, tilapia and shrimp seed were produced against the target of 855 million (Table-4).

Table-4: Number of hatcheries and nurseries supported, and amount of spawn and seed produced by the project

Details	No. of Hatchery		Spawn production (Kg)		No. Nursery		Total seed production (million)	
	Target	Achieved	Target	Achieved	Target	Achieved	Target	Achieved
Carp Seed	40	38	6,000	10,272	214	211	600	1,027

Details	No. of Hatchery		Spawn production (Kg)		No. Nursery		Total seed production (million)	
	Target	Achieved	Target	Achieved	Target	Achieved	Target	Achieved
Tilapia seed	20	15	-	-	-	-	0.08	-
Shrimp seed	15	14	-	-	50	50	250	225
Total	75	67	6000	10,272	264	261	855	1,297

2.1.2. Progress against key activities in the DIP:

1. Distribution of existing and improved strains:

- Sources of improved strains of major carps (Rohu, Catla, Mrigel) and tilapia were identified and brood was stocked in selected private hatcheries for production of better quality seed. Training and support to ensure better brood management were also provided. MoA's were signed with 38 carp hatcheries and 18 tilapia hatcheries in Jessore, Barisal and Faridpur; Seven brood sources of good quality brood were identified and 29,892 kg of improved Rohu, Catla and Mrigel brood was supplied to 38 hatcheries in Jessore, Faridpur and Barisal. Each hatchery received an average of 500 brood stock each weighing 2 kg.

- In order to improve tilapia seed quality the project collected good quality germplasm from Bangladesh Fisheries Research Institute (BFRI) and Malaysia, and distributed it among 18 partner tilapia hatcheries. A total of 27,000 Nile tilapia were imported from Malaysia. Appropriate quarantine protocols were maintained before distribution to private hatcheries. Two trial research stations for tilapia and carp were established at *Matsho Kanon* Hatchery at Nowapara, Jessore to enable monitoring of seed quality and performance.

2. Capacity building for hatcheries:

a. **ToT for project staff:** Five capacity building trainings on hatchery, brood and nursery management were provided for project staff, based on the identification of basic training needs. The project arranged ToT for project staff with the support of DOF, which is directly assisting in brood pond management and breeding. A total of 222 project staff have been trained on hatchery and nursery management.

b. **Training for hatchery technicians**: The 126 hatchery technicians have been trained on brood stock management, exceeding the DIP target of 221. They directly are supporting hatchery operators in improving management of brood fish, hatching and quality seed distribution. BFRI and DoF have been directly engaged in the development of training materials for these trainings.

c. **Training and workshops for nursery operators:** The nurseries work at the second stage of improved seed distribution and are important in ensuring that quality seed is distributed to farmers. A total of 321 nursery operators have been trained and training materials have been distributed to them. Experts from government and non-government organizations were involved in providing this training.

d. **Workshops for value chain actors:** A total of 10 awareness building workshops on seed quality were organized and attended by actors at every stage of the value chain from brood collection to seed distribution, to farmers.

e. **Study tours and cross visits:** The project arranged a total of four foreign study tours to Thailand and Vietnam for training on brood and hatchery management. Those participating in the tours included hatchery operators and personnel from BFRI, DoF, and the Project, as well as carp hatchery owners, carp nursery owners, and fish and shrimp farmers. Participants also observed intensive Pangas and tilapia farming in the ponds in tidal zone, and live fish transportation. The teams also sea bass farms and hatcheries, and observed sea bass seed production from hatchery to rearing in pond and cages. A one day training session on white shrimp (*Penaeus vannamei*) farming was also provided in Thailand. Hands-on training for the production of high quality mono-sex tilapia fry, and commercial tilapia cage farming were also observed in Thailand. A summary of the participants is given in the table-5 below:

Table-5:

Participants category	Numbers on Vietnam tour	Numbers on Thailand tour
Hatchery owners	7	4
Technical specialists	6	7
Hatchery technicians	2	3
Management staff	5	2
DoF	2	2
BFRI	-	2
Fish farmers	-	2
Shrimp farmer	-	1
Total	22	23

f. **Support for Implementation of the Hatchery and Feed Acts:** National legislation governing feed and fish seed production already exists but government lacks capacity for implementation. The project is assisting GoB in implementing the Acts through raising awareness of the hatchery owners on hatchery act. Supports will be provided further to DoF for improving its hatchery database and monitoring system as a continuous process. Support mechanisms will be put in place to support development and implementation of certification systems.

3. Increase awareness, availability and use of PCR tested shrimp PL:

g. **Production of a documentary:** The project hired Bangladesh Center for Communication Program BCCP in December 2011 to conduct a need assessment and developed a communication strategy based on these findings to cover communication and promotion needs. A documentary on raising awareness on use of virus free shrimp PLs and improved management practice has been developed by them. .

h. **Awareness building campaigns:** A documentary promoting the benefits of using PCR tested shrimp PL was developed by BCCP.

i. **Broadcasting:** The TV commercial was on benefits of using virus free shrimp PLs and adopting improved *gher* management systems was developed and aired 30 times in national TV channel BTV and broadcasted 122 times through Bangladesh Radio with the support of BCCP. .

j. **Publicity:** The project provided 8,000 stickers to the project's PCR labs for labeling WSSV negative shrimp seed for branding purposes. Two large bill boards and 276 signboards placed on road sides and at hatcheries and demonstration ponds to circulate important messages on quality shrimp and fish seed and improved fish culture. Leaflets on PCR tested shrimp PL use and its benefits were developed and distributed to hatcheries, nurseries, shrimp depots and farmers at community level. Several press releases on the economic benefits of PCR tested PL were published in local and national newspapers.

k. **PCR lab operation:** Two PCR laboratories, namely Pranti and BFRI in Cox's Bazar, were used and the project provided support to improve their capacity. Using these lab facilities, 69 brood samples were tested of which 33 samples were found to be WSSV negative and 36 samples were found to be WSSV positive. 263 Nauplii samples were tested and among them 64 samples found to be WSSV negative and 199 to be WSSV positive. 74 PL samples were tested, among them 67 samples found to be WSSV negative and 7 were WSSV positive. A total of 243.5 million WSSV negative PLs screed at these labs were delivered to FtF Aquaculture project farmers and other farmers and traders.

l. **Linkage building workshops:** the project and DoF organized 3 different workshops in Bagerhat district on linkage building in supply networks to ensure availability of quality PCR tested PLs. Shrimp brood collectors, hatchery owners, PCR lab technicians, nursery owners, depot managers, input suppliers, fry hawkers, Thana Nirbahi Officer (TNO), Upazila chairman and shrimp farmers participated in the workshops.

m. **Establish shrimp nurseries:** The project promotes nursing of PLs prior to stocking in grow out ponds. 50 Shrimp nurserers and farmers who are interested to establish shrimp nurseries have been selected for shrimp nursery training. Two day long trainings were provided in Jessore and Bagerhat. DOF, private sector, associations and NGOs were engaged in these activities.

Increased Spawn Production:
Project-supported hatcheries have produced 10,257 kg of quality spawn and sold the spawn project and non-project nurserers. Nurserers have produced approximately 10,257 million fries and fingerlings using spawn produced in project supported hatcheries, which has been distributed to both project and non-project supported farmers (Fig-3).

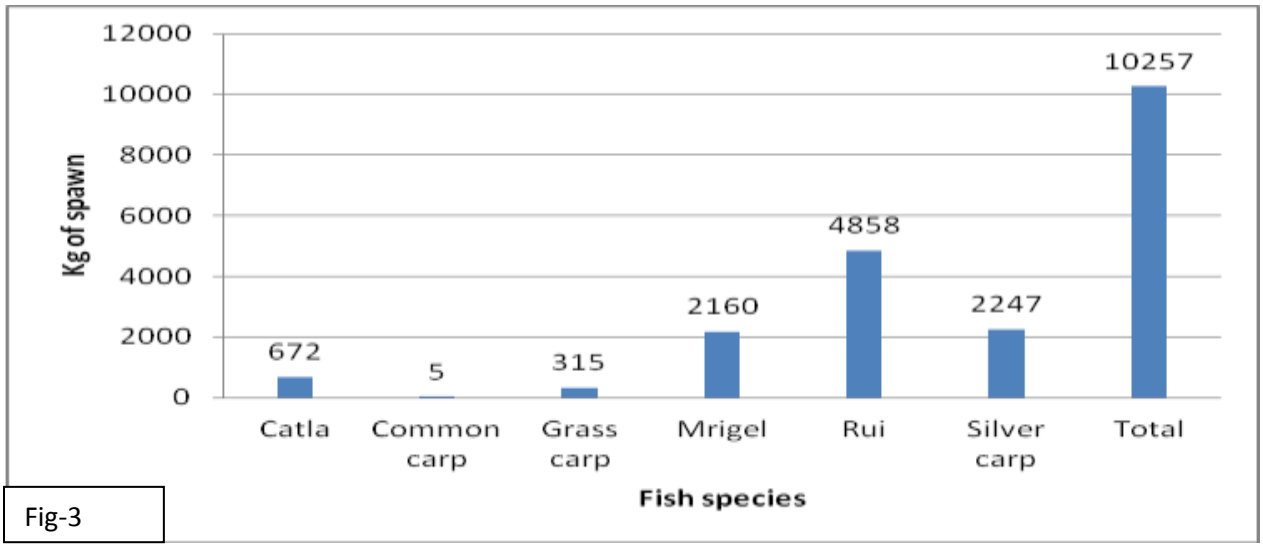

Fig-3

Figure 3: Amount of spawn produced by the project supported hatcheries

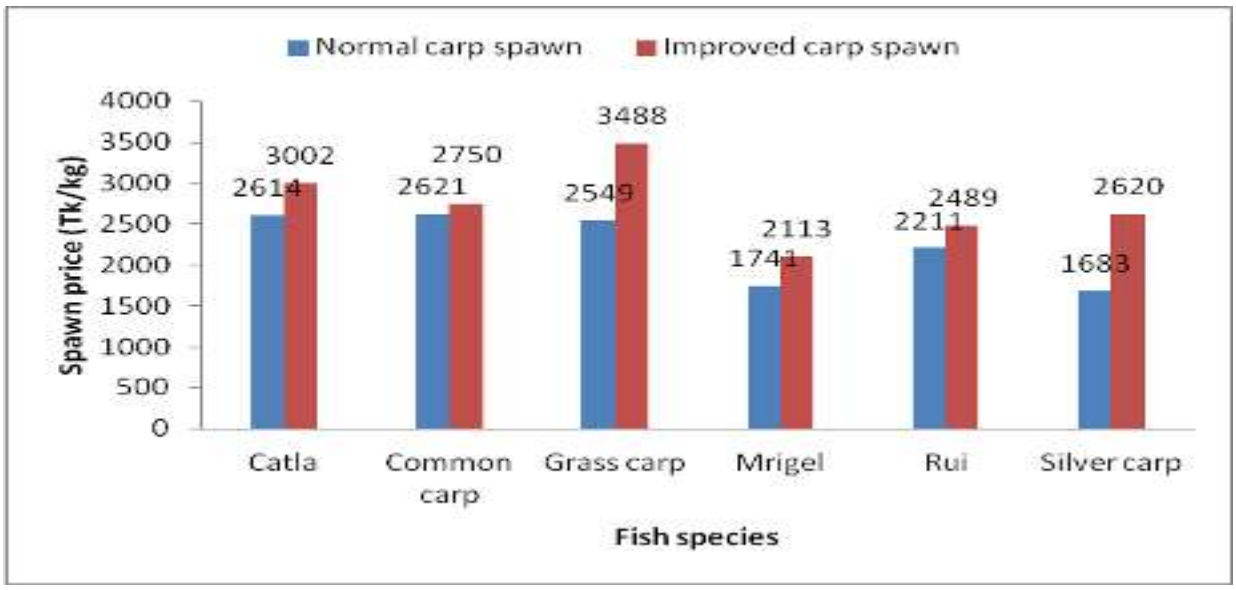

Figure 4: Price difference between spawn produced by project and non-project hatcheries

A performance monitoring survey found that spawn from project-supported hatcheries fetched a price 10-15% higher ***(Fig-4)*** than spawn from hatcheries not supported by the project.

Improved Use of Technology and Management Practices: 80-90% of hatcheries under the project improved management practices and adopted technologies recommended by the project. Training support helped these hatcheries to increase spawn production and brood management. This significantly increased survival rate of silver carp spawn.

2.1.3. SUCCESS STORY:

Success Story-1: Milt Bank Can Double Fish Hatchery Production

Fish hatcheries in Bangladesh have started using milt from a milt bank which can revolutionize fish production in the country

Francois Rajts, inventor of the milt bank,

WorldFish scientists working with private hatcheries and the Department of Fisheries have successfully developed technology that allows the preservation of fresh carp milt for periods of up to 3-4 days. This is done by cooling and oxygenating the milt, use of extenders and refrigeration at temperatures of 4-8^{o}C degrees. Preserved milt from three males once preserved and extended can be used to fertilize the eggs of up to 15-20 females. Hatching rates of 95% have been recorded in private hatcheries using milt preserved in this way. Preserved milt can be transferred across the country, and FTF has used milt preserved in Jessore to fertilize eggs in hatcheries in Barisal.

Transportation of adult brood fish is expensive and warm tropical temperatures can cause mortalities during transportation, and keeping the male and female fish in the same hatchery is the prime root of inbreeding, resulting low quality fry. The preservation and distribution of milt

has worked in the aquaculture sector of Bangladesh for more than three decades

It is possible to achieve 100 % improved seed within 5 years

to hatcheries addresses all these problems. Like artificial insemination in livestock, use of milt from improved carp lines has the potential to rapidly improve the fish "herd" and significantly reduce inbreeding. It also allows hatchery owners to reduce the numbers of males they maintain in brood ponds, thereby reducing hatchery operating costs.

Tarekul Islam, owner of 'Sromo-Projukti Matsya Utpadon Kendra' hatchery in at Barisal, has collected 600 ml of preserved milt from the project supported milt bank at a cost of 800 Tk only. This amount of milt is sufficient to fertilize up to 40 kg of stripped eggs. He said "hatchling rate of the preserved milt was 95%. Milt bank has spared my cost of raising male fish in my hatchery".

Following the intervention, 'Ma Fatima Hatchery' of Jessore has increased its production capacity from 150 kg/batch to 200 kg spawn (100 million fry) per 7-day cycle. The owner of the hatchery, Firoz Khan said, "30 years since the inception of hatchery business in the region has passed, but it is Feed the Future Aquaculture Project who has provided us sustainable as well as profitable technologies. It is anticipated that by adopting this milt bank system, it would be possible to achieve 100% improved quality fish seed within 5 years while reducing overall hatchery operation costs. This intervention has the potential to shift current hatchery management practices of from raising both male and female brood fish to produce and maintain female brood stocks only, thus greatly improving profitability.

SUCCESS STORY-2: Simple Technology Improved Hatchery Production Scenario

Aeration tower improved water quality and increased income

Jessore district is one of the most important sources of fish seed in the country. Most of the private hatcheries located here use underground water in their brood and nursery ponds and incubation jars. This water carries very little oxygen and high levels of carbon dioxide. This results in very low survival rates for hatchlings from even the best quality eggs, and causes economic losses, but hatchery owners were unaware of this critical problem.

Feed the Future Aquaculture project. Specialists from the Feed the Future Aquaculture project identified the problem of poor water quality as a crucial constraint while assessing baseline conditions in fish hatcheries. The project supported hatchery owners to install aeration

Photo: WFC/ Jessore

Aeration tower increased dissolve oxygen level in the water used in hatchery

"We have been living with the problem for more than 30 years without knowing such a simple solution exists! - Firoz Khan, President of Jessore Hatchery Owners Association

towers to mitigate this problem. The towers are made of locally available materials worth only 300 US Dollar, which is easily affordable by hatchery owners. The technique is simple – letting the water flow through 4 to 6 layers of perforated galvanized metal sheets before delivery to incubation jars and nursing tanks. This simple process increases the oxygen level from 3 to 8 mg per liter and increases the hatching rates by up to 95 percent.

Firoz Khan, President of Jessore Fish Hatchery Owners Association, has been involved in the process of popularizing the technology from the beginning of the project. "We have been living with the problem for more than 30 years without knowing such a simple solution exists! This technology has radically changed our fish seed production and profitability scenario" he said. Fish hatchery owners who adopted the technology now produce more than two times more fish seed than before the project intervention,

SUCCESS STORY-3: Milt Preservation and Transformation in the South

Hatcheries of southern Bangladesh started using preserved milt to improve spawn quality

Photo: WFC/Jessore

WorldFish Scientists working with private hatcheries and the Department of Fisheries have successfully developed technologies that allow the short term preservation of fresh carp milt for periods of up to 3-4 days. It is done by cooling and oxygenating the milt and the use of extenders and refrigeration at temperatures of 4-8^{o}C degrees. Preserved milt from three males once preserved and extended can be used to fertilize the eggs of up to 15-20 females. In private hatcheries we have received 95% hatching rate. It noteworthy that preserved milt can be transferred across the country. FTF has used preserved Jessore milt to fertilize eggs in Barisal hatcheries.

Like artificial insemination in livestock this technology using milt from improved carp lines has the potential to rapidly improve the fish "herd" significantly reduce inbreeding. In addition it will allow hatchery owners to reduce the numbers of males they maintain in brood ponds. Transportation of large size breeders is expensive and warm tropical temperatures can cause mortalities during transportation. On the other hand, keeping the male and female fish in the same hatchery is the prime root of inbreeding, resulting low quality fry.

Following this intervention, 'Ma Fatima Hatchery' of Jessore has increased its production capacity from 150

Hatchery owner is using preserved milt

The results indicate the great potential in maintaining genetic quality of hatchery stocks

kg/batch to 200 kg spawn (100 million fry) per 7-day cycle. The owner of the hatchery, Firoz Khan said, "30 years since the inception of hatchery business in the region has passed, but it is Feed the Future Aquaculture Project who has provided us sustainable as well as profitable technologies

SUCCESS STORY-4: FtF Aquaculture technical assistance brings five time profit than before to Ensan Ali

New technology and management practices changed a losing venture in to a big success

Photo: WorldFish/Barisal

Ensan Ali feeding in his pond.

Ensan Ali is now expecting a net profit of $2450, up from only $500 last year

Ensan Ali owns a fish nursery in Barisal. Prior to becoming a client of the Feed the Future Aquaculture project he had received no formal training on nursery management and poor returns and he had decided to stop nursing due to frequent losses His fortunes changed after receiving training on nursery management from project staff and he is now a confident and successful fish fry producer.

Ensan Ali enterprise improved after he collected high quality carp seed from FtF Aquaculture project hatcheries. His newly acquired knowledge on pond preparation, planned stocking, providing proper feed and fertilizer, timely sampling and harvest enabled him to turn his loss-making venture in to an ideal pond for demonstrating nursing to his neighboring fellow farmers. Speaking of this experience, Ensan said, "I used to work with risk before, but now I know how and what to do for successful fry production."

This year he has sold $455 worth of fry. He has a stock of fry supposed to be sold in and has $1850 worth of seed in stock which could bring him as much as $3000 if sold as over wintered fry in April-May. He is now expecting a net annual profit of $2450 up from only $500 last year. 65 client farmers of FtF Aquaculture project have collected high quality fry from Ensan, and he is now planning to extend his business by leasing two more 50 decimal ponds.

2.1.4. Lessons learned

- Water quality maintenance is one of the key to prevent shrimp white syndrome virus. A shrimp post larva was not sufficiently available in market in September and price was higher compared to other months. The hatchery owners sold their improved carp seed with 10-15% higher price than the existing seed. More number of non-project nurseries are interested to purchase quality carp seed.
- Identification and testing of quality brood is problem where needs to depend on very limited sources.
- Synthetic hormone is performing better compare to Pituitary gland due to cost and effectiveness,
- Yearling or big size fingerling is better and economically benefited compare to small fingerling use but transportation of this fingerling in the remote area is a major problem
- Found relatively lesser interactions among FtF Aqua supported hatcheries, nurseries and small traders considering first year of the project, which needs more support to improve the linkages among the actors to create strong service delivery points for the household level farmers.

COMPONENT 2

2.2. Improving the nutrition and income status of farm households

FtF Aqua Supported Demo pond at Barisal Hub

The FtF Aquaculture project is intended to increase household incomes and nutrition for over 20,000 pond-owning households in the first phase of activities. The project aims to extend impacts directly to 150,000 household pond owning families over the five years of the project. This outreach will be achieved through partnerships with USAID programs including the Nobo Jibon Multi Year Assistance Program (MYAP) implemented by Save the Children, and the Integrate Protected Area Co-management Project (IPAC) implemented through IRG. The project is working directly with MYAP and IPAC's key partners, CODEC and SpeedTrust, to ensure strong connectivity with rural communities. Discussions are underway with Care, BRAC and others to help sustain the project's efforts into the future. WorldFish is focusing on introducing its income enhancing aquaculture technologies, including production of indigenous nutrient dense fish species, into these existing livelihood programs though training, demonstration and communication programs. This component works with development partners to expand the scope of their activities to include promotion of homestead production of fish and vegetables with a particular emphasis on improving nutrition. The key activities against outputs are accomplished during this reporting period outlined at ***Annexure-5.1:***

MAJOR ACCOMPLISHMENT AND RESULTS:

2.2.1. Component Target and Achievement:

It has been expected that a total of 20,000 households would be benefitted through the project intervention within the reporting period which has been achieved. The project also targeted to stock 6,000 ponds with nutrient dense Mola in 6,000 ponds and 68% of this target has been achieved. The deviation from this target was because of lack of availability of Mola seed within the project working areas. It was also targeted to include 1,600 and 480 ha of pond area under improved aquaculture practices, but 69% and 35% of the targets have been achieved ***(Table-6).***

Table-6: Number of households supported, area covered and sales increased

Details	**No. of households**				**Pond area coverage (ha)**	
	Target		**Achieved**		**Target**	**Achieved**
	Total	**Female**	**Total**	**Female**		
HH Farmers	20,000	13,600	20,002	17,828	1,600	1,100

Details	No. of households				Pond area coverage (ha)	
	Target		Achieved		Target	Achieved
	Total	Female	Total	Female		
Nutrient Dense Fish Farms	6,000	4,080	4,881	4,344	480	268
Total	679,112				2,080	1,368

2.2.2. Activity progress against DIP

a. **Establishment of component management structure:** The project has signed MOUs with Nobo Jibon-MYAP and IPAC for implementation of project activities through local partners CODEC and Speed Trust. Nobo Jibon and IPAC are maintaining coordination with WFC-Barisal Office and WFC-Khulna office respectively.

b. **Staff training:** Two inception trainings were facilitated by the project (one for Nobo Jibon-MYAP and one for IPAC) for developing common understanding of project activities and responsibilities.

c. **Development of an M&E system:** A monitoring and evaluation system for data collection, documentation, and reporting has been designed in consultation with the partners and is running.

d. **Project inception meeting/workshop**: The project organized one inception meeting in order to provide an overview on the project, working strategy, progress and collaboration with DoF.

1. Household nutrition and income from integrated homestead fish and vegetable cultivation increased

a. Consultation meeting and staffing: To achieve synergies and avoid duplication of works the project has adopted a partnership approach in consultation with Save, MYAP and CODEC-IPAC and developed joint work plans.

b. **Additional staff recruitment and logistics:** A total of 121 staff (74 for MYAP and 47 for IPAC) field staff were appointed to implement the project work

c. **Working area and participants:** Project partner IPAC has selected 3 Upazilas as working areas in Bagerhat district and has selected 8,000 households under 7 Unions in as working area. The selection of MYAP working areas was done in consultation with FtF Aqua. 12,000 households (7000 CODEC, 5000 SpeedTrust) were selected in the Barisal region. The Project has given priority to selection of fish ponds which are mainly managed by women. Among the participants, 99.87% of IPAC clients and 82% of MYAP clients were women.

d. **Training for partner staff:** Partner staff was trained on better aquaculture management and vegetable cultivation to increase fish and vegetable production. Considering this, WFC and MYAPs arranged two batches of training for 64 PNGO (IPAC) staff on 14-21 March 2012. Five ToTs were

provided to 92 male and 35 female PNGOs staff on how to provide training on dike and homestead vegetables cultivation to household farmers.

e. **Group formation:** 810 farmer groups (25 members in each group) were formed and supported. 82% of group members were female. Group leaders were selected considering group dynamics and support needed. A total of eight training sessions were provided to farmers.

f. **Household pond demonstration**: A total of 96 household demonstration ponds were established and stocked with fingerlings. On-farm demonstration allows for innovative practices or solutions to problems to be demonstrated in an actual farm situation to show their viability or applicability to potential users. On average each demo pond received 60 fingerlings per decimal (40 m^2) and 200 kg of feed, depending on pond size. Pond preparation was a requirement and was paid for by the household. Each demonstration pond owner keeps records in a pond record book, and the final results will be analyzed by project M&E staff. Average stocking size of fingerlings was 80 gram/piece (4.8 kg/dec). At test netting after 180 days the standing biomass was 20 kg/decimal. The target for net production of 12 kg/dec will be exceeded after 210 days if this growth rate is maintained

g. **FFS trainings:** The project has organized 2,833 monthly Farmer Field School (FFS) trainings for participants on carp polyculture, homestead vegetable production and SIS production while the IPAC has arranged 1,732 trainings for famers on these subjects. 96% of planned training sessions were completed.

h. **Lesson sharing and linkages for extension agents and value chain actors:** MYAP has established 48 forums for lesson sharing and linkage building between project extension agents and with fish value chain actors, while IPAC will establish 32.

i. **Establish linkages between value chain actors and project clients:** MYAP and IPAC arranged 192 and 128 meetings respectively, to strengthen linkage between project clients and value chain actors such as feed dealers, fingerling traders, food fish traders and netting teams over the project period.

2. Household nutrition and income from integrated homestead fish and vegetable cultivation increased in FtF target groups (Codec - IPAC):

a. **Group formation:** 320 farmer groups (25 members per group) were formed to provide training and management support to farmers through Codec as partner of IPAC and WF. Among them 99% of group members were female.

b. **Demonstration:** 64 household demonstration ponds (90% female led) were established. On average each demo pond received 40 fingerlings per decimal and about 160 kg feed depending on pond size). Each pond was provided with fencing net averaging 130 yards. Pond preparation was paid for by the household. Each demonstration pond owner maintained activity records in a pond record book

c. **Inputs:** Average fingerling stocking size was 150 g per piece, with 6.0 kg fingerlings stocked per decimal. At test netting after 180 days the standing biomass was 18kg per decimal. It is anticipated that the target production of 12kg/decimal will be exceeded after 210 days.

d. **Homestead vegetable:** 8,000 households received 400 kg of vegetable seed (bottle gourd, bitter gourd, country bean, sweet gourd). Each farmers group has received eight training sessions on improved fish culture, technology and farm management.

3. Refinement and increased adaption of SIS production technologies and improved nutritional status of producing households by research on fish and nutrition

a. **Partners:** A consultation meeting with WorldFish and technical partners (DoF, BFRI, BARC and BFRF) was held and an MOU was signed for collaboration and research activities.

b. **Review:** A review report on the outcomes of SIS production technologies under FtF Aquaculture and other WorldFish programs is under development.

c. Research Strategy: After reviewing the state of current knowledge on SIS production, WorldFish, BFRI and BFRF have developed a joint research strategy for postgraduate students to evaluate nutrient rich fish production technologies.

d. **On-farm and on-station trials:** Eight on-farm and on-station trials on production of nutrient dense fish will be conducted by the project with the support of BFRI and BFRF during the last quarter of 2012.

e. **Analysis:** WorldFish is collaborating with overseas universities and BFRF to analyze the nutrient composition of 15 small indigenous fish species. Samples of different SIS have been collected and sent to the University of Copenhagen, Denmark for analysis.

f. **Market analysis:** A market analysis is under process which will provide information on market opportunities and constraints. WorldFish, with the help of consultants, will conduct a market analysis for nutrition dense fish in order to guide project strategies in 2013.

g. **Brood pond network and distribution system:** The project has established brood ponds and a brood distribution system to ensure project beneficiaries' access to nutrient dense fish brood. One source of Mola brood was identified in Patuakhali and two in Barisal. 50 farmers acted as sources of Mola brood in Bagerhat. The project conducted an orientation session on Mola transportation for 90 PNGO staff and stocked 3,412 kg of Mola into 4,881 household ponds, at an average of 100 g per dec. Awareness of the nutritional benefits of nutrient rich fish was raised through inclusion in regular farmer group sessions.

h. **Training manuals for extension workers:** Two training manuals on small scale household aquaculture and SIS production were developed for Project extension workers. ToT was provided to project and PNGO staff and famers training in group sessions were facilitated by the extension workers.

i. **Training manual for farmers:** In addition to the training manual for extension workers, three training manuals are being designed to distribute to farmers in 2013.

j. **Communication and awareness raising**: The project has appointed BCCP for developing communication materials and documents to raise awareness regarding fish and nutrition. Awareness building on the importance of nutrient rich fish and the benefits of small fishes for human nutrition,

particularly for children, pregnant women, and lactating mothers, was done at farmer group session by extension workers in SIS producing areas.

Mola fish stocking in household ponds

Vegetables cultivation in pond dike at Bagerhat

2.2.3. SUCCESS STORY:

Success Story-5: Nutrient-rich Mola Fish Getting Popular among the Farmers

Easy to culture nutrient-rich Mola is meeting family nutrition needs for the poor

Distribution of Mola brood among the farmers

500 g of Mola brood has produced 6 kgs of food fish just in a 3 month cycle

Habitat destruction in Bangladesh has contributed to a decrease in the intake of small indigenous fish species (SIS) such as Mola (*Amblypharyngodon Mola)* among the rural poor. Mola is a nutrient-rich small fish supplying essential nutrients, including vitamin A, calcium, iron and zinc to vulnerable population groups. Consumption of Mola can therefore help reduce under-nutrition and micronutrient deficiencies, but its market value is now high, putting it out of reach of many of the consumers who need it most.

To address the problem, the Feed the Future Aquaculture project is promoting Mola culture and delivering 'SIS and Nutrition training' to the farmers. Mola brood fish was initially distributed among a small number of project clients, but as interest from other community members was high this effort was scaled up and 2637 kg of Mola brood were distributed to be cultured in 3739 ponds.

As Mola is very sensitive to stress extra precautions were taken during transportation & distribution. Local sources of Mola were selected first and collection ponds were established at the union level. Fish were collected and temporarily stocked in the collection ponds which functioned as distribution centers. Oxygen cylinders and polythene bags were used for long distance transport and buckets for transport over short distances.

After receiving Mola brood, farmer Julekha Begum of village Nilgonj, Kalapara Upazila, Barguna said "our ponds used to be brimming with naturally grown Mola fish even two years back. These are small fishes are getting rare recently. Now I am trained on Mola culture and have got Mola brood. Just after 3 months, I have sold Mola 4kg and consumed 2kg from my 5 decimal pond this cycle. Recently we observed lot of juvenile Mola fish in the pond". All the farmers are happy with the output of Mola culture. It is found to be nutritious and in good demand in the market, and takes little effort to grow.

SUCCESS STORY-6: Mukul Rani's fallow pond turned profit making

Small unused pond now meeting family nutrition need and bringing money

Photo: WorldFish/Barisal

Mukul Rani with her husband

"now I know how to utilize the available resources for maximum income and nutrition" - Kamala Rani

Mukul Rani use to assist her husband on producing puffed rice. It was hard to get enough to live a good live with this means. Though her family, living at village Nababpur of Kalapara Upazila, Patuakhali District, has a small pond of 11 decimal and 66 decimal of agriculture land, these were not well managed to yield enough for her family.

Then she joined the USAID funded Feed the Future Aquaculture project. A number of training on improved technology & management and material inputs changed Mukul Rani's conception on using her pond.

With the assistance of FtF Aquaculture project, she was convinced, could turn her pond very productive using improved technology, management and quality input to earn a profit of fifteen to twenty thousand taka within 6 to 7 month. As per FtF Aquaculture suggestion, she stocked project provided 660 carp fingerlings of average weight 80 gm. stocking biomass was 52.38 kg on 4 April 2012. An improved management of proper feeding, fertilization, liming, etc. have helped to increase the standing biomass to 289.32 kg on 16 October 2012 and per decimal production was 25.46 kg. With a total expenditure of 14125 TK (fingerlings=5545, feed=7580, pond preparation, liming, fertilization, dyke cropping=1000, family labor input), she is expecting an income of 32000TK. She will have a partial harvest of Sarputi, Mirror carp, Silver carp etc. In the meantime, summer dyke vegetable cropping has already brought her 3800 TK.

During the culture period she earned substantial practical knowledge and skill which enhanced her confidence. According to Kamala Rani "now I know how to utilize the available resources for maximum income and nutrition".

SUCCESS STORY-7: Small Pond Fish Culture Helps Rehena to Earn

Small unused pond now meeting family nutritional needs and bringing in income
Photo: WorldFish/Barisal

Rehena Begum feeding her chickens and fish

Rehena is expecting a harvest worth $125 after meeting all her family's fish consumption needs

Rehena Begum is from a poor household with little land, Although she has a 12 decimal pond in which she occasionally stock fish, she never considered it to be a potentially important resource for her household.

In 2012, Rehena joined a farmers' group under the Feed the Future Aquaculture project. She was quickly applied her new knowledge on cleaning pond weeds, removing non-cultured and predator fish, using fertilizer and lime, monitoring plankton in pond water, stocking fingerlings and feeding. The project has provided her material assistance along with training and regular advice and she stocked high quality Rohu carp seed along with Mola to help improve her family's nutrition. The bank of her fish pond is now planted with vegetables as well. She feeds the fish, and regularly manages the pond by herself, which she never considered to be important before.

Rehena is expecting a harvest worth $125 after meeting all her family's fish consumption needs. This sum will be spent on her children's studies. Rehena is now always a ready to help her neighbors with assistance on fish culture.

2.2.4. Lesson learned

- Farmer's has improved management practices and applied technology which significantly changes their attitudes in record keeping and planning for future market based production
- Mola seed sources are not sufficient as the requirements of the project beneficiaries. Most of the cases farmer needs depend on existing natural stock which is of the limitations to promote NDF culture commercially though it has good market potentials. Salinity is another hindering point to promote Mola culture specially Khulna region.
- More Mola sources nearby or within project areas is need to identify as the project can easily distribute from source pond to target pond within shortage period. Farmers are more interested to stock Mola or other nutrient dense small (NDS) fish in next year.
- Due to project interventions and expansion fish culture created market demand quality fish feed but good quality feed is not available at remote level.
- Quality vegetable seed sources are not locally available but there is good demand.

COMPONENT 3

2.3. Increasing investment, employment and fish production through commercial aquaculture

The project is working in commercial aquaculture in the greater Khulna, Barisal and Faridpur region to stimulate further investment, employment and increased incomes and productivity.

This commercial aquaculture component has collaborated with the principal stakeholders in the shrimp and fish aquaculture sector to stimulate investment, employment and incomes in the southern region. The first year of operation has delivered increased production potential to around 20,071 shrimp and prawn farmers, and 5,033 entrepreneurs practicing high value commercial fish culture as well as 260 farmers who have established cages for fish culture. It has also started experiments on the culture of 'new' brackish water commercial aquaculture species that are resilient to the increasing salinity in the southern region associated with water abstraction and climate change.

FtF supported Cage farms

Commercial aquaculture has shown remarkable growth in Bangladesh over the past 10-15 years. As documented in recent WorldFish publications[1] [2] the commercial sector now represents almost 50% of overall aquaculture production. But, apart from shrimp and prawn, that growth has mainly taken place in north and central Bangladesh. WorldFish and the Government of Bangladesh believe that the south has competitive advantages for aquaculture in terms of higher water temperatures, and therefore a longer growing season for cold blooded shrimp and fish, and that it has more available water, both fresh and saline surface water, where a range of fresh and saline tolerant species can be cultured. The key activities and outputs accomplished during this reporting period are listed below.

Species included in this component:

Shrimp:
Carrying on from PRICE and the GHERS program WorldFish continues to support activities in shrimp culture in the SW region of Bangladesh. With over 200,000 ha area suitable for shrimp aquaculture, more than 200,000 full and part time shrimp farmers, and increasing salinities there is great potential in this sector for increased production, income and employment opportunities.

The initial results indicates an improvements in shrimp culture technologies that allow farmers to prevent white spot and other diseases, increased supply of virus screened shrimp PLs among project and non-project farmers through raising awareness on benefits of using such PLs, adopting improved shrimp culture methods (MMT and CST-explained below) that are aimed at generating consistent production.

[1] Belton, Ben and Azad, A. 2012. Bangladesh Aquaculture . WorldFish Web Site.

[2] Belton, Ben, et. al. 2011. Aquaculture and consumption in Bangladesh. WorldFish Web Site. www.worldfish.

Carp: The project adopted strategies for promotion of carp commercial aquaculture technologies similar to shrimp aquaculture in the region. Setting up demonstrations on commercial carp aquaculture through stocking with large size quality fingerlings and us of high quality feeds for culture up to market size within a short period, and establishment of linkages with backward and forward markets, were the main strategies for this species. .

Tilapia: A fresh water fish with potential in culture in coastal areas with low salinity. Strains will be developed in future which are increasingly saline tolerant. Tilapia is cultured in ponds as well as in cages. In general, all male/mono-sex tilapia were stocked to avoid rapid reproduction in commercial culture systems.

Koi: *(Anabas testudineus)* Koi is an important air breathing fish, which can be considered for culture in the areas with low dissolved oxygen. It is popular for their lean meat, which contains easily digestible protein and fat of very low melting point and many essential amino acids making them ideal food. So, it enjoys a good market demand in Bangladesh.

Magur: Magur *(Clarias batrachus)* is a common air breathing cat fish of fresh water. It has huge market demand for its high productivity. Market price is comparatively high so it is a lucrative investment for fish farmer.

Shing: *Heteropneustes fossilis* has several common names like Asian stinging cat fish or Fossil catfish but in our country this fish is locally called Shing fish. In many Asian countries this fish is commercially as well
aquaculturally an important species. It is an indigenous species to Indo-Pak-Bangladesh sub-continent. For high nutritious value, taste and flavor *H. fossilis* has a high market value and consumer preference.

New brackish water species:
Tengra: A coastal fish that is adapted to brackish water. It has high market acceptance and a good market price. Initial efforts for reproduction were successful and a first demonstration is ongoing.

Mud Crab: Mud crab with increasing demand in the international market is naturally and commercially raised in the coastal zone However, there are issues around this crop, for instance, production is limited by lack of seed availability, dependency on natural seed stock etc. A feasibility study was performed under this project which showed good potential for increased culture in one hand, on the other hand low productivity and disease are the major bottlenecks. The project is planning to address the above issues associated with this potential crop in the coming years.

MAJOR ACCOMPLISHMENT AND RESULTS:

2.3.1. Component Target and Achievement:

It was expected that a total of 25,000 households would be benefitted through the project intervention within the reporting period. It was also targeted to include 15,600 ha of pond area under improved aquaculture practices, but 90% (13,977 ha) of the targets have been achieved. A total of 9.06 million US$ out of a target of 42,33 million US$ incremental sales until September 2013, was achieved based on results from partial harvesting during the reporting period (Table-7).

Table-7: Number of households supported, area covered and sales increased (from partial harvesting)

Details	**No. of households**				**Pond area coverage (ha)**		**Increase Sales (US$ million) Year 2012**	
	Target		**Achievement**		**Target**	**Achievement**	**Target**	**Achievement (till Sep 2012)**
	Total	**Female**	**Total**	**Female**				
Commercial shrimp	20,000	-	20,071	2,809	15,000	13,030	0	**8.698**
Commercial fish (carp & tilapia) aquaculture	5,000	-	5,033	1,571	600	947	0	**0.338**
Cages	250		260	132			0	**0.020**
Total	**25,000**	**-**	**25,104**	**4,380**	**15,600**	**13,977**	**0**	**9.057**

2.3.2. Progress against key activities in the DIP

1. Establish component management structure

a. **Partner identification**: A wide range of partners (SC, IPAC, CODEC, Speed trust, BRAC, depots and 14 shrimp hatcheries) were identified for working with the project. Consultation meetings with potential partners were organized, working strategies was developed, staff recruited, working areas and farmers were through maintaining certain selection criteria. MOAs were signed with 38 shrimp depots to facilitate the services to the farmers. 103 field staff was recruited by partner shrimp depots to promote extension services. Beside set up four Aquaculture Service Centers under Khulna region (two at Bagerhat and other two at Satkhira) aimed to provide technical supports and sustainable sources of technical and business development services.

b. **Refine work plan:** One inception workshop was held in February 2012 where project and implementation strategies including work plan was shared and refined.

2. Productivity and profitability of commercial aquaculture increased

a. **Partners identified and MoU sign**: CODEC and Speed trust (partners of Nobo Jibon) and 6 fish hatcheries were identified, to implement commercial aquaculture component both in Barisal and Khulna regions. This component is working with 38 shrimp depots for commercial shrimp farming identified as partners in Khulna region. A total of five carp hatcheries have been identified as partners in Faridpur to implement this component.

b. **Appointment of partner staff**: The Nobo Jibon (CODEC and Speed trust) has appointed 74 field staff in Barisal while 47 staff joined in CODEC in Bagerhat. Depots and hatcheries have recruited 85 and 18 field staff in Khulna and Faridpur respectively by 2012.

c. **Selection of households**: A total of 25,364 commercial farmers were selected, of which 20,071 commercial shrimp farmers, 1,000 commercial fish farmers and 50 cage farmers in Khulna region

, while 2,000 commercial fish farmers and 100 cage farmers were selected in Barisal and 2022 commercial fish farmers and 100 cages in Faridpur regions and 10 cage farmers in Jessore region.

d. **Group formation**: Around 966 group (765 shrimp and 201 commercial fish) farmer groups were formed with one group comprised of 25 farmers including a group leader.

a. **Printing operational manuals**: The training team developed two operational manuals for farmer training. The manuals were printed and distributed to the field staff with proper orientation.

b. **MOU with shrimp hatcheries in Cox's Bazar**: To ensure production of sufficient PCR tested PLs, MOUs were signed with 14 shrimp hatcheries.

c. **Training for field staff**: Best Management Practice (BMP) is one of the tools that will be deployed to increase shrimp and fish production. A total of 85 staff was provided with ToT on BMP.

d. **Farmer training**: After receiving training from DoF, BFRI and WFC experts, the field staff provided training to shrimp and fish farmer groups. They delivered 7,236 training sessions on aquaculture technologies. Each of the farmer's group has received eight training sessions over the year where on average 86% of the participants attended. The sessions included pond preparation, pre and post-stocking management, harvesting, post-harvest management and disease. 997 informal needs based and refresher training sessions were conducted.

e. **Demonstration**: Demonstration ponds were set up to disseminate improved aquaculture technologies to gain higher production of fish and shrimp. People surrounding the demo ponds are encouraged to engage themselves in improved fish and/or shrimp technologies. The project is supporting 61 commercial fish and 69 shrimp farmers to follow recommended improved management in this year located across the project areas. Virus free shrimp seed and quality fish seed were stocked in all shrimp and fish demo ponds at Khulna, Barisal, Faridpur and Jessore region. A total of 27.38 MT shrimp feed was distributed to 6 shrimp demo ponds. Around 130 (Shrimp and Fish) ponds have been used as demonstration pond for dissemination of improved technologies and management practices with selected lead farmers from where technologies were demonstrated among the users. Demonstration and non-demonstration shrimp farmers adopted the following technologies:

Closed System Technology (CST): This system is much more capital and energy intensive where the production target is 1.5 tonnes/ha. Stocking density in this technology is 6-7 pls/m^2 and feeds are being used in this system. Before stocking the pond is thoroughly cleaned and disinfected by bleaching powder, at a dose of 600kg/ha. A reservoir tank of up to a maximum of 30% of the total grow-out pond area is maintained near the grow-out pond(s). The water of the reservoir pond is also bleached with the same dose and the stand-by water is maintained to compensate water losses from the culture pond due to seepage and evaporation. The pond is also applied with organic materials like mustard oil cake, molasses and rice bran during early stages of growth and development of the shrimp. The technology necessitates high level of supervision and monitoring on the part of the FtF project field level extension agents.

Modified Traditional Technology (MTT): This technology is a modification of the Closed System culture technology. In this system, virus free PLs are nursery-reared at relatively high density for up to one month. Before stocking of PLs, the nursery is cleaned and disinfected with bleaching powder at the dose of 600 kg/ha and fertilized with Urea and TSP. The PLs are fed with starter feed for one month in the nursery and then released in the untreated pond. The expected average production in this system is 450 kg/ha.

a. **Review workshop**: Two workshops will be organized during FY 2013 for component review, consultation, target setting, and program design for smooth program implementation during Apr 2013 to Sep 2016 involving partner organizations.

b. **In-country visits:** Five Cross visits were made to allow for the exchange of knowledge between partners and value chain actors in the shrimp and fish sector. The project sent 11 hatchery owners and government trainees to the Training course on "Sea bass and Shrimp hatchery and grow-out farming" during September 12-17, 2012 at the Asian Institute of Technology, Bangkok, Thailand. The training included theoretical lectures and field visits to Sea bass hatchery techniques and shrimp hatchery and grow out techniques. Practical training on tilapia hatchery and culture was organized for 12 participants, including BFRI and DoF counterparts: Training on "Production of Millions of High Quality Tilapia Fry and Grow-out farming "during September 6 - 12, 2012 at the Asian Institute of Technology, Bangkok.

c. **Training for value chain actors:** Training on post-harvest value addition, legal compliance, embedded services and product development was provided to value chain actors (hatchery, nursery, farmers, seed retailer (*Faria*) and farmers. Eight trainings were provided in mid-2012, led by WFC and partners.

3. Productivity and profitability of commercial pond-based aquaculture increased (Working with partner NGOs and association to develop commercial fish farmers to improve yields and quality standards):

a. Partner and farmer selection has been described in section 2

b. PNGO staff was oriented and supported to implement this component

c. Farmer Selection: 5,033 fish farmers were selected from Barisal, Khulna and Faridpur regions and 201 farmer groups were formed to facilitate training and other supports

d. 61 commercial fish demo ponds on carp and tilapia were (Faridpur 20, Barisal 20, Jessore 11, Khulna 10) supported. Carp seeds were stocked in all of 154 nursery ponds in project areas. 1,389 training sessions were delivered to commercial carp farmers on improved farm management and practices in all regions.

e. Distributed 41,400 Hungary Mirror Carp fries to the farmers and beside 45,200 fries were stocked at Bagerhat for distribution.

f. Pangas Super-Intensive Culture: In Vietnam, the production rate of Pangas (Pangasionodon hypophthalmus) is 6 to 10 times higher than the one in Bangladesh. In the Mekong delta the production of Pangas is on average ranging at 300-400 t/ha/7 months, but best farms are producing up to 600 t/ha/7 months. The actual culture technique of Pangas practiced in Bangladesh, with stagnant water, cannot produce similarly high yields conducting a demonstration of more advanced culture techniques can be done in selected appropriate areas, where water quality and topography allow building more intensive Pangas ponds. Field visits have been made to find appropriate sites and thousands of hectares of non-cultivated chars and river side low lying areas were identified that could be adaptable for intensive Pangas culture. One of the techniques could be to use natural tidal movement to reduce water exchange costs. The trial will be launched in the coming year.

g.

4. Productivity and profitability of commercial cage-based aquaculture increased (Working with partner NGOs and association to develop commercial fish farmers to improve yields and quality standards)

- Partner and farmer selection was described in section 2

- ***Cage culture :***

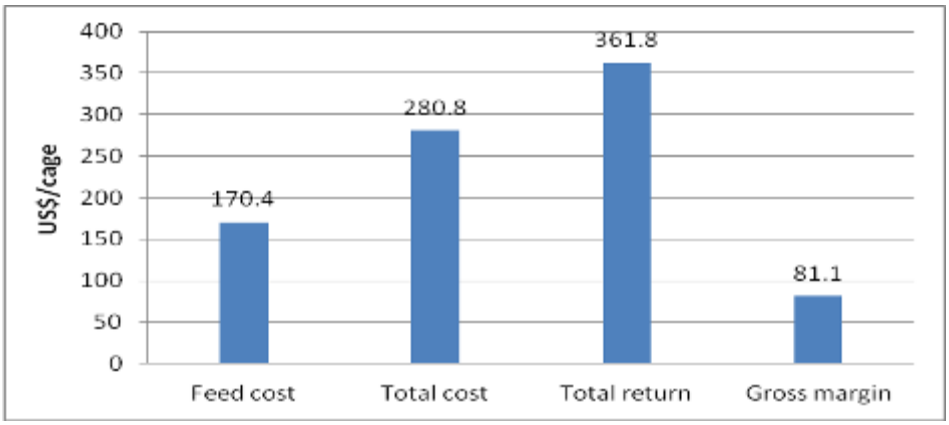

Figure-1: Economic gain from cage aquaculture

- ***Performance:*** As planned, 260 fish cages were distributed among 260 poor families (51% female) which were installed in public water bodies close to the farmers' houses. The cages were in total stocked with 252,175 Mono-sex Tilapia fry (90,000 in Khulna, 80,000 at Faridpur, 75175 in Barisal and 10000 at Jessore). Distributed 12.0 MT floating feed among 260 cage farmers. Conducted 36 group training sessions on cage culture where participated 132 female and 128 male cage farmers. In the cycle total 12,700 kg tilapia was harvested from 50 cages at Khulna. Around, 1,170 Kg tilapia harvested from 10 cages at Jessore. To assess production efficiency, 1,200 Sarputi stocked in 100 cages in Barisal region. In 2nd cycle again 9,000 Mono-sex fry were stocked in 10 cages at Jessore. According to the performance monitoring data from 50 participants, in cycle one per cage/hh has earned an average net income about Tk 6,500 (81 US) where total income was $361.8 and production cost is $280.8 (Figure-1) and average production was 261 kg from each of the cages. Cage farmers have reinvested on purchasing inputs after selling the first crop and rest was used in asset development.

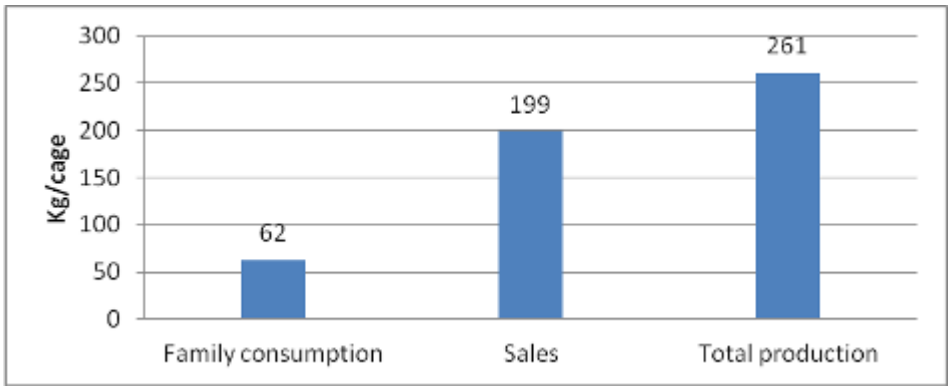

Figure-2: Utilization of tilapia produced in cages

5. Commercial Culture of new brackish water species established

a. **MOU signing:** A Memorandum of Understanding (MoU) has been signed with the Bangladesh Fisheries Research Forum (BFRF) to do research among others on Commercial culture of new brackish water species. A value chain study was done in September 2012.

b. **Study design, feasibility and current knowledge:** A study on the existing situation of demand, and feasibility and state of knowledge on the commercial culture of brackish water species was conducted.

c. **Establish a brackish water species hatchery:** One brackish water species (Tengra) based hatchery Mangrove Hatchery and Fishery was selected for improving its capacity to promote commercial brackish water species.

Shrimp farmers of the south-western region of Bangladesh use to accumulate water during high tide in their ghers. In the process some nature born Tengra seeds enter in to the gher which, though without any additional management, brings enough amounts to make the farmers interested about farming Tengra. But the problem was accessibility of Tengra seeds as it is only available in a small in the natural source.

As FtF Aquaculture project planned to work with shrimp farmers, it thought incorporating Tengra species as a commercial product within the gher system along with the shrimp. But the first hurdle to overcome was to ensure the availability of Tengra seed. In the way of search, it was known that Mangrove Hatchery and Fishery owned by Mr. Harun-ur-Rashid, tried of producing Tengra seed in 2011 having technical know-how from BFRI though without enough success. FtF Aquaculture decided to provide him technical and limited financial support with a view to make successful commercial Tengra seed production. A MoA was signed in this regard between FtF Aquaculture and mangrove Hatchery.

With the assistance of the project the hatchery produced eight batches of Tengra seed amounting total 3.6 million seeds. But the mortality rate of the seeds was high- about 80-90 percent. But frequent grading of the seeds helped to reduce the mortality of the seeds step by step up to 50% which is supposed to go higher in terms of survival. Presently (from September 2012) 5 non-project farmers and one project farmer stocked 0.3 million Tengra seeds in ten ponds. The farmers observed the survival rate of the seeds seems still good with an expected growth. In coming three months a total result is expected to come. To improve the seed production, the project is planning to send Mr. Rashid to get advanced training to a country where similar knowledge or technology is available.

CREATING SUSTAINABLE SERVICE DELIVERY POINTS: AQUACULTURE SERVICE CENTER (ASC):

Aim of the ASC is to create a platform from where fish farmers and users can get business development services sustainably. The center is to provide technical information, support and services. The centers are being equipped with various water quality measurement parameters, books, leaflets, article, posters, newsletters, brochures and other communications products. The centers will provide mainly four service packages namely- (i) information service, (ii) technical information services, (iii) disease diagnosis service, and (iv) training services. Initially the centers will be equipped with WFC project support (staff, equipment and materials). Shrimp or fish farmers should be an admitted to be one of members of the center. The member could whether be paying a fixed fee or not will be decided by the farmers. A group of local farmers will mainly contribute and participate to build up an operational constitution following "bottom up approach" to operate the service centers. The farmers could form an operational committee consist of 5-11 members elected or selected by the farmers are the member of center. All sorts of decisions and operations will be operated by the famers which could be a sustainable way to provide technical and reliable service point for farmers in locality. Initially project has started service centers 2 at Bagerhat and 2 at Satkhira. Mr. Ravi Kumar, Shrimp Consultant from India was assigned to help establishing the centers and he also visited MTT demo ponds, Shrimp PL nursing hatchery, CST at Bakhorgonj, Bagerhat.

2.3.3. SUCCESS STORY:

Success Story-8: Cage Fish Culture Can Bring Changes for Poor Women

Poor women found hope with a go easy technology

Women group members taking care of the cages

Within two months most families will be able to purchase at least one goat for rearing

The Feed the Future Aquaculture project is encouraging poor households, especially women, to work with small-scale intensive culture of fish in cages to unleash the potential of aquaculture in the enormous variety of public water bodies that exists in Bangladesh.

In Jessore, the project has established cage culture on a trial basis in the Mukteshwari River by training a group of ten women on this technology.

WorldFish provided steel frames for 10 cages, netting, mono-sex tilapia fingerlings, and good quality pelleted feed. Cages are sized 20'x10'x5' (1000 cubic feet). Group members grow 800-900 Tilapia per cage for 58 days. The work of looking after the cages divided between the women in the group by a roster so that they take it turns to tend the cages, with each group member working only 1 or 1.5 hours every ten days, This means that cage culture is complementary to women's existing household work and does not create any major additional burdens. Male household members are also active in helping to take care of the cages.

The group's total harvest was 1,129 kg which was sold for $1700, providing a total net return of $300 once all fixed and operating costs had been recovered. Each women in the group received $30 after the harvest. They invested most of this profit on productive assets purchased a total of seven goats, deposits on two cows and one sewing machine. Having seen this success other women of the area are very interested in adopting cage culture for themselves.

SUCCESS STORY-9: FtF Aquaculture Provided Technology and Inputs Changed the Life of Pagol Sen

Commercial Carp farmer saves business with modern technology and management practice

Photo: WorldFish/Faridpur

Pagol Sen & his wife sorting fish for family consumption.

"Now I can continue the study of my children. The bad days are over thanks to FtF"

- *Pagol Sen, FtF Aquaculture Beneficiary*

Commercial carp aquaculture can be risky Many individual operations have failed or are struggling due to lack of proper knowledge, poor management practice and use of low quality inputs. Pagol Sen from Tungipara Upazila in Gopalgonj District was a struggling commercial carp producer. He has a 62 decimal pond and some cultivatable land to support his large family, but his income was barely sufficient to cover their expenses and he was considering taking some of his children out of school as a result.

Previously he cultured fish traditionally and got only limited returns. A fellow farmer told Pagol Sen about the modern technological support being provided to commercial farmers by the Feed the Future Aquaculture project. After taking training and assistance from the project his traditional fish culture practices were transformed.

The project provided him with high quality fingerlings, lime, fertilizer and feed, and with knowledge to manage them effectively to maximize production and profitability
Following a partial harvest he sold 101 kg of Puti worth $ 160. In addition, his family consumed 19 kg of fish with a market value of $28. He is expecting to harvest a total of 1600 kg of fish from the pond. Stocking of large carp and Pangas fingerlings was one of the main factors for his success and good production. "Now I can continue the study of my children. The bad days are over thanks to FtF" said Pagol Sen, who is now followed by many of his fellow farmers in the locality.

2.3.4. Lesson learned

- Bangladesh shrimp continues to sell at a discount to international prices. This is due in part to a perception by buyers that Bangladesh shrimp is of poor quality. Improvement of culture conditions will reduce the use of chemicals. Higher production will increase trading volumes, which will make traceability of products more feasible
- As a result of activities of FtF and PRICE over the past three years farmers and depot owner have gained more trust and confidence on virus free screen shrimp PL for obtaining higher production and income. The nursery and small seed sellers feel good quality fish and shrimp seed demand by farmers. They made strong communication and linkage with project hatcheries to get quality seed in next year.
- A growth experiment was started on Tengra, a brackish-water fish. Results will be analyzed and the technology will be further developed if found to have potential.
- The DOF has requested to further develop the culture of Hilsha. On the basis of a study conducted by WFC an experiment will be set up.
- WFC has implemented a study on the potential of Mud Crab culture. Seed availability is a major limiting factor. The feasibility of setting up a mud crab hatchery will be further investigated
- Cage culture was found to be profitable, although the initial investment of the cages is high. Further research will be done to lower the cost of cages. Further research will be done to reduce feed cost, optimize stocking density and culture duration to further increase profit and reduce risk.
- A value chain study was conducted on sea bass and good market potential was found. The potential of sea bass culture will be further investigated.
- The baseline production of shrimp is low. Compared to other countries in the region, there is high potential to increase shrimp production in the coastal area.
- Disease is affecting the production of shrimp considerably. Disease risk needs to be reduced. This will be pursued with PCR testing. Culture conditions may be further improved with better pond preparation, deeper ponds and better control of inflow water quality.

COMPONENT 4

2.4. Policy, regulatory and institutional capacity building to support sustainable aquaculture growth.

To ensure long term continuity and impact of investments of the USAID Feed the Future initiative, the project is working closely with the Government of Bangladesh, particularly with the Department of Fisheries and Bangladesh Fisheries Research Institute. Initial activities assisted implementation of existing policy and regularity measures related to the hatchery and feed acts in order to maintain fish and fish feed quality. This component includes activities related to institutional capacity building, including expanding linkages between GOB and India, as well as the private sector associations and businesses. The key achievements against outputs derived from this component during this reporting period are described *at **Annexure-5.1.***

2.4.1. Progress against key activities in the DIP:

1. **Sector growth expanded through associations (Bangladesh Frozen Food Exporter Association; Hatchery Associations; Producer Associations)**

   a. **Consultation and MOU signing:** Associations are important players for sector growth in any sector. WFC will consult with Bangladesh Frozen Food Exporter Association (BFFEA), hatchery associations (HA), producer associations (PA) and Community Based Organizations (CBO) and sign MOUs for co-operation under the project. The project facilitated formation on a hatchery association in Jessore.

   b. **Association staff trainings:** Five staff of different associations was trained to improve service delivery, professionalize operations and enhance the impact of associations on the development of aquaculture production and marketing systems.

   c. **Support to associations:** Aquaculture associations are being supported Jessore, Barisal, Faridpur and Khulna by WFC to ensure strong representation for industry in national and international events and programs.

2. **Improved public and private services for rural fish farmers in the southern region**

   a. **Participatory review:** WFC, DoF, DANIDA and private firms planned jointly to conduct a participatory review on current public and private extension services, including community organizations within FY12. This will now be done by March 2013. The review will identify actions and strategies for improvements to meet future industry needs.

   b. **Trainings:** WFC and DoF conducted training programs on backward and forward market linkages for DoF district staff, NGOs and association partners involved in service delivery.

   c. **Identify, test and develop business models and roll out of new extension service and communication systems and tools:** WFC is in the process of developing business models for hatcheries and communication systems as well as tools after identifying and testing with partners and private investors.

2. Support Implementation of Bangladesh-India MOU for Fisheries/ aquaculture cooperation

a. **Assistance to host meeting:** A MoU between Bangladesh and India providing support for bilateral collaboration relating to agricultural technology was signed in 2011. WFC planned to assist DoF in hosting 2 meetings to prepare a plan to implement the Bangladesh-India MOU in relation for fish seed. However, this is now planned to be completed by April 2013 with the assistance of DoF.

b. **Assistance to implement action plan:** WFC will also provide support to implement an action plan (milestones) arising from the meeting. DoF, the India Central Institute for Freshwater Aquaculture (CIFA) and SAARC Agriculture Center will be considered as implementing partner for this purpose.

3. Operational system for collection, analysis and use of aquaculture statistics

a. **Review the DOF Fisheries Resource Survey System**: DoF is collaboration with FAO with the support from the project would review the current fisheries statistical system, to identify options for improvement of the fisheries data collection and storage facilities. This work was not accomplished as the agreement with GOB was delayed; however this activity has been included into the FY13 work plan.

4. Establish Aquaculture Research Priorities

a. **Consultation and Workshops**: With the help of BFRF, Universities, BARC (BFRI), and technical assistance from USDA, the WFC will conduct stakeholder consultations and workshops to establish aquaculture research priorities for Bangladesh by June 2013, thought it was planned to be done by 2012. To address aquaculture research priorities and develop innovations, WFC with the help of partners, will in future establish and operate 10 research funds.

A MOU was signed with the Bangladesh Shrimp and Fish Foundation (BSFF): BSFF will assist in the implementation of various activities including the following research activities:

- Applications of Good Aquaculture Practice (GAqP) and Codes of Conduct (CoC) at selected levels of the aquaculture based industry value chain
- Feasibility studies of SPS Litopenaeus Vannamei shrimp introduction and farming in Bangladesh.
- WFC participated with BSFF and DOF in an emergency meeting arranged jointly by NACA and Department of Agriculture, Fisheries and Forestry (DAFF), Government of Australia in Thailand on Early Mortality Syndrome (EMS): The participants are in the process of preparing a presentation on the information gathered from the top ranking experts on EMS issue.
- Participation in the World Aquaculture Society (WAS) Conference, 01 – 05 September 2012 in Prague, Czech Republic: BSFF representative made one Power Point presentation on "What Bangladesh has done in Aquaculture Food Safety" at the request of US FDA. An expert from FtF aquaculture also participated in the WAS Conference and made two presentations on two different topics.
- The Bangladesh Fisheries Research Forum (BFRF): BFRF is to implement PhD programs in collaboration with Bangladesh Agriculture University (BAU) to conduct research works jointly with 15 Tilapia hatcheries to produce Tilapia seed and distribute to

the farmers development of technical and business plans for up to 80 Carp hatcheries and facilitation for organizing workshops under FtF Aquaculture Project. BFRF agrees to carry out the tasks and deliver the outputs described below: Organized lesson learned workshops and organize round table Policy Dialogue on fish seed quality improvement, fish and nutrition and to conduct studies through enrolling PhD students for the following research topics:

- Improvement of brood-stock and Quality Seed Production of a Nutrient rich Small Fish, Mola, Amblypharyngodon Mola for commercialization Bangladesh.
- Development of improved strain of Rohu (Bijoy Rui/Sonali Rui/Bisha Rui) in Bangladesh
- Development of technical and business plans for up to 40 Carp and 30 Tilapia hatcheries

Training was implemented on Good Aquaculture Practice (GAP) and control on use of Veterinary Medicinal Products with respect to food safety and quality of the primary product. A consultant was hired to facilitate trainings. This activity may lead to further research on GAP.

5. Aquaculture research cooperation strengthened between Bangladesh and US researchers

a. **Identify Partners:** WFC will identify Bangladesh and US partners with the support of BARC, Universities and USDA to strengthen research cooperation and in this regard 1 report will be prepared by the supported organizations by Feb 2013.

6. Regulations, tools and capacity to implement the new Hatchery Law

a. **Stakeholder consultation and analysis:** WFC and DoF have conducted several stakeholder consultations and analyzed implementation requirements for the Hatchery Law. Participating hatcheries are overall positive of the implementation of the Law. In Jessore a hatchery association was initiated that can be used to assist in implementation of the Hatchery Law. Non-participating hatcheries may be more reluctant to comply. The DOF at national level has started a hatchery registration system that can be a first step in identifying hatcheries that comply with quality standards.

b. **Development of certification system, standards and training manuals:** WFC and DoF have started the dialogue on a certification system. First step will be the development of standards to which hatcheries need to comply. A draft hatchery training manual has been compiled which will be further elaborated in cooperation with DOF and private sector staff. Hatchery operating standards will be set in future. In the next phase of the project it will be further assessed if all hatcheries will have the infrastructure and management capacity to comply with the standards which may be part of a certification system.

c. **Drafting regulations and supporting manuals/educational tools:** Ongoing.

d. **Training and awareness activities:** WFC and DoF have conducted awareness activities regarding hatchery law. This will continue during phase 2.

As part of the cooperation between FtF and DOF on improvement of seed quality and as a preparation to the Hatchery law the following practical activities were implemented.

- Three ponds of the Jessore government farm have been included in the project to quarantine tilapia brood imported from Malaysia in this year. Government farms are also being used to develop future brood stock with the seed collected from river sources. Two ponds are selected from BFRI (Jessore) to quarantine imported tilapia seed and raising carp broods for future use.

- Five ponds of BFRI are included to development Gene Bank of Tilapia to use next year
- Carp spawn collected from Halda River and 2.2 kg were distributed to Koatchandpur DoF farm. The project will collected 60,000 fingerlings from them, they sold another 60,000 to private farms and stocked the rest to make brood bank.
- Project collected 20,000 GIFT strain and 2.0 kg spawn of 40-line improved silver barb, collected from BFRI, Mymensingh and distributed to project hatcheries to make brood bank
- Four DoF and two BFRI officials participated in project arranged study tour in Thailand and Vietnam
- BFRI supported and assisted in 3 cross visits and study tours for project staff and hatchery owners, nursery owners and farmers.

7. Regulations, tools and capacity to implement the new Feed Law

a. **Meeting:** To discuss the present situation and identify constraints for implementation of the feed law, WFC has organized stakeholder consultations in cooperation with DoF. WFC is conducting a comprehensive study of the feed sector, which will be reported on by March 2013.

Future Aquaculture Feed Study: In September 2012, this study was started within the context of the WorldFish/USAID "Feed the Future-Aquaculture Bangladesh" (and CSISA) projects, to provide guidance on investments required in the feed sector of Bangladesh to support sustainable growth of aquaculture, with an emphasis on freshwater fish production. At the same time, the study will contribute to the CGIAR CRP Livestock and Fish program, "feeds platform", providing a basis for development of feed assessment methodologies and insights that can be more widely applied to other countries. The main objective of this phase of the study is to prepare indicators and assessment tools that can be used to analyze the current and future performance of the aquaculture feed sector in Bangladesh. These will reflect various dimensions of sustainable feed supply, including logistical, social, environmental, economic, gender, and labor aspects. The findings from the study are going to support the government to review existing feed laws and to assist in implementation of the acts.

8. Regulations, tools and capacity to develop a shrimp PL quality certification system (New activity), Study tour to Thailand for sharing their experience in SPF shrimp farming: The study tour planning and program have been made with the help of NACA. A team of eight persons comprising two representatives from (i) DoF, one from (ii) the Ministry of Fisheries and Livestock, one from Bangladesh Fisheries Research Institute (BFRI), two from Bangladesh Aquaculture Alliance, and two from BSFF have visited various shrimp related facilities and organizations concerned with SPF shrimp brood stock development, hatchery operations and grow out farming in Thailand from 30 September to 05 October 2012.

2.4.2. *Lessons* learned

- Existing Hatchery act and policy is not being adequately implemented and operationalized. FtF-Aq will support MOFL and DoF to advance in implementation.
- FtF-Aq needs to develop a strategy for hatchery selection, standard development and capacity building, which include the requirements of government in the compliance of the hatchery act.
- PCR testing of PLs. reduces disease risk in combination with improved culture management. If all PLs that are produced are required by law to be free of WSSV, this will reduce cross contamination at the culture area. A law on PL quality may lead to overall improvement of shrimp hatchery operation. When sufficient biosecurity is reached it may be possible to import and maintain SPF shrimp stocks. Further study and facilitation on the feasibility of introduction of SPF stocks will be needed.

3. PROJECT MANAGEMENT

3.1. Staffing

All recruitment was focused on ensuring technical superiority and expertise in aquaculture technology and value chain development. WorldFish recruited an efficient group of 62 project staff (including 6 female staff) to perform project activities. Partner organizations hired 205 (male 165 and female 40) staff, mainly for operation in field activities. Project staff are categorized into different units namely administration, finance, monitoring and evaluation, communication, training, procurement, operation and research. WorldFish and PNGOs employed 267 staffs altogether, comprising 17% female and 83% male.

3.2. Partnership

During this year partnership and project outreach has been achieved through linkages with USAID programs including the Nobo Jibon Multi Year Assistance Program (MYAP) implemented by Save the Children, and the Integrate Protected Area Co-management Project (IPAC) implemented through IRG. The project is working directly with the MYAP and IPAC's key partners: CODEC and SpeedTrust; MoUs were signed individually. Discussions are in process with Care, BRAC and others to help to sustain our efforts in the next phase. Project management arranged several meetings with partners and PNGOs for team building and work to achieve the project goal. The FtF Aquaculture project made agreements (MoA) with Bangladesh Shrimp and Fish Foundation (BSFF) in collaboration with MoFL, DOF and BFRI. A partnership has also been made with the Bangladesh Fisheries Research Forum (BFRF). BFRF has been implementing PhD programs in collaboration with Bangladesh Agriculture University to produce Tilapia seed for distribution to the farmers of Mymensingh. BFRF also worked on the development of technical business plans for up to 80 Carp hatcheries and facilitation for organizing workshops under the project.

3.3. Procurement

The procurement unit is directly involved in all purchases made for the project. WorldFish central procurement was also engaged in the FtF Procurement process. Some major procurement is included in this report. During October 2011 to September 2012, the unit procured equipment to set up office facilities. To facilitate brood transportation 8 fiber glass tanks and 2 self-priming pumps were purchased. Different technical accessories like 5 Electro Conducting meters, 5 Soil PH meters, 22 Refractometers and 20 HACH kits were provided to project technical staffs (Technical Specialist and Hatchery Technician) to equip modern technologies and strengthen staff capacity. The project carp and tilapia hatcheries were supported with equipment like 40 ventury machines, 59 microscopes, 2000 doses Ovulin (synthetic hormone) and 36 aeration towers to increase their seed production capacity. . Two research stations and mobile hatcheries were set up and supported with accessories. To manage and identify brood fishes stocked in hatcheries, some fish tagging accessories were also supported. Two PCR labs and the Algae lab are being supported with accessories and test kits.

3.4. Performance and Result Management

WorldFish has established an M&E team to implement monitoring and evaluation activities of FtF Aquaculture project. The team consists of 6 members namely an M&E Manager (Central), 4 M&E officers (each in Khulna, Jessore, Faridpur and Barisal) and a Data Analyst (Central). The team developed a Project Monitoring and Evaluation Plan (PMEP) and Detailed Implementation Plan (DIP) at the beginning of the project. A data flow has been developed for regular data collection and reporting from PNGOs and hub/regional offices. The project Strategic and result chain diagram is described in Figure-4:

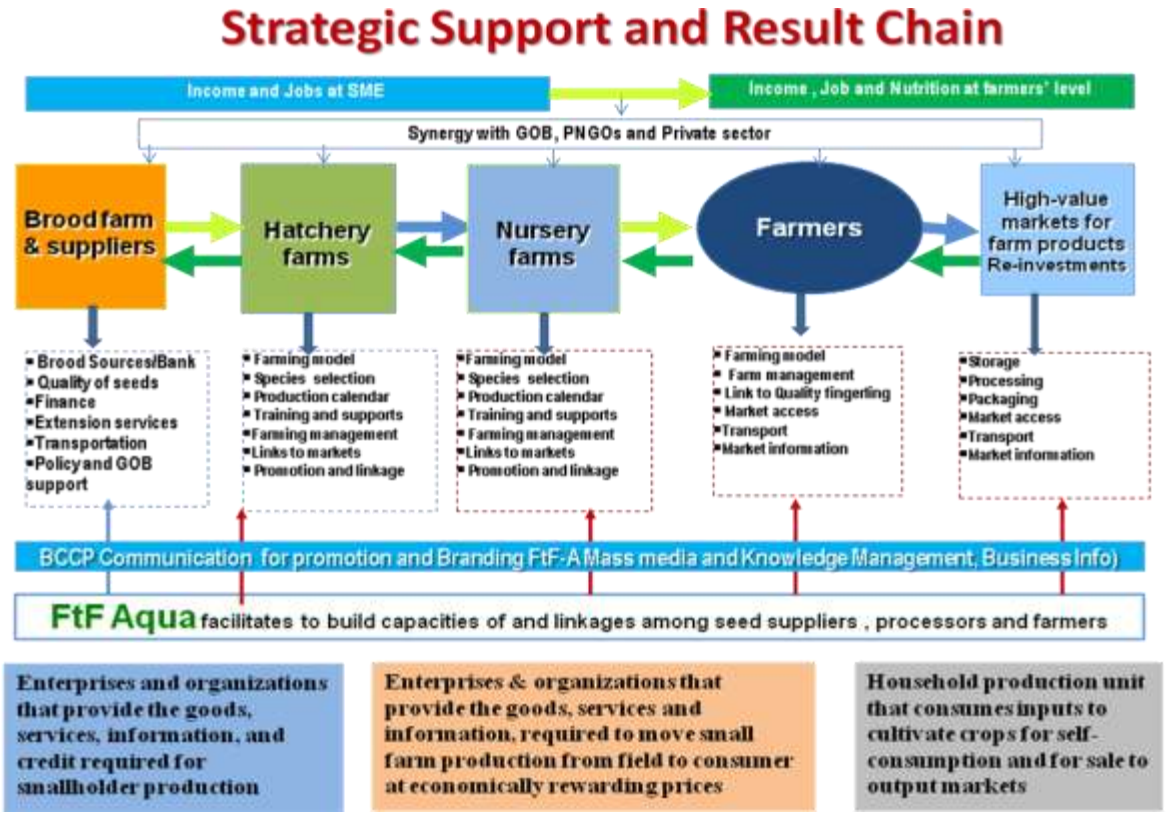

Figure-3: Result Chain diagram

The team designed a database which generated unique identity numbers for 44,815 project farmers, 260 cage farmers, 262 nurseries, 291 demo farmers and 62 hatcheries to track properly and to avoid overlapping. A database of small fry traders/patil wala was also developed. A baseline survey was conducted by a hired consulting firm to capture data on the situation prior to the project period in 2011, and a value chain analysis was conducted. An additional impact study will be conducted in early 2013. Quarterly performance data is collected from all types of project clients mentioned above as a part of regular monitoring, and a quarterly performance monitoring database has been developed accordingly.

A total of 5000 record books were distributed among all nurseries, demonstration farmers, hatcheries and 1210 sample farmers. The farmers are recording their daily fish and shrimp production related activities and are monitored by the M&E team regularly. . A strategy was developed to track outreach farmers (non-project farmers) who are using improved carp and shrimp seed from project supported hatcheries. A consulting team has been contacted to prepare a GIS based data bank where individual

farmer's locations and brief information will be stored. In addition, case studies of success stories are collected regularly and all studies will be uploaded on the website. Seven orientation and trainings were organized for PNGOs and front line staff on performance data collection tools, record book monitoring checklists etc. in 2nd quarter (Jan-Mar 2012). A variety of forms, hatchery register books, farmer identification forms, farmer basic information forms, farmer performance monitoring forms, hatchery identification forms, hatchery basic information forms, hatchery performance monitoring forms, pond record books, Gher record books, and cage record books were developed. All tools are translated into Bengali to make them user friendly for field staff. The M&E unit developed training tools for regular field level monitoring by WorldFish staff. Key performance monitoring results are presented in ***Annex-5.3.***

3.5. Media and Communication

The Communication and Documentation unit worked to establish and strengthen project capacity in communication, information, dissemination, and documentation as a central feature of the FtF Aquaculture interventions. It has worked among target communities, media, academia and direct stakeholders. The wing focused on publicizing the unique success of the project in implementing aquaculture interventions to reduce poverty

The Communication unit signed an MOU with BCCP at the initiation of the project for facilitation of professional communications. A total of 30 billboards and traffic canopies were installed at different best viewed commercial places in the carp and shrimp seed producing areas to distribute messages on improved quality seed selection and production. As part of this process, 276 project designed signboards were set at project demo ponds and nurseries to attract the attention of potential adopters. 850 tin-plates carrying messages promoting use of improved seed were tagged on trees and roadsides. . The project has printed 0.43 million leaflets and has made a plan to distribute them to non-project farmers through hatcheries, nurseries and patil wala/faria who sell fingerling directly to the farmers.

A total of 77 news items on project activities were published ***(Annex -5.5)*** or aired in different local and national daily newspapers and in TV channels. The number of mentions in print media coverage was 78, and the project was covered by 5 TV channels (Channel I, Independent Television, *Diganta* Television, *Mohana* Television, Bengali Vision and *Somoy* Television).

Two Aquaculture Service Centers were established in Bagerhat and Satkhira districts to promote technical and lab services and reach beyond project farmers. An advertisement about WSSV-negative shrimp seeds and good gher management was produced and aired 22 times on Bangladesh Television from 3 October to 7 October 2012. A radio commercial on the same subject was aired 122 times on Bangladesh Radio from 5 October to 9 October 2012.

3.6. Research and Innovation

The project has a strong focus on research into modern technology and its sustainable use. Development of a variety of innovative technologies has been planned since project inception to contribute efficient and effective fish seed production. Technologies introduced and promoted by the project are highlighted below:

Ventury aerator for brood stock ponds, from locally available materials: Low oxygen levels in brood stock ponds negatively affect breeding success. Existing techniques used by hatchery operators to solve this problem are not effective. The project supported all hatcheries with at least one ventury type aerator in their brood stock ponds. This intervention has caused tangible changes in the production.

Improvement and maintenance of mirror carp brood stocks: Improvement of Mirror carp seed quality through cross breeding program among better quality brood was an initiative taken by the project. Breeding was performed using milt of good male brood to fertilize eggs of female of different origin in order to improve genetic diversity of the existing common carp strain.

Testing and demonstration of GnRH use instead of gonadotropin: Testing and demonstration of use of the hormone GnRH analogue instead of gonadotropin (pituitary gland extract) was carried out in 6 hatcheries. This improved the survival and quality Indian major carp eggs collected from the Halda River.

Mobile hatchery for improvement of Halda river egg collection system: The Halda River is Bangladesh's main source of wild Indian Major Carp seed. Fry from this river is costly and in high demand. The traditional system of egg collection and incubation was observed to result in low levels of hatching and survival. To improve the survival of collected eggs, the project designed and constructed a pilot mobile mini-hatchery, for the Anchurighuna Fishermen's Association. It consists of an elevated water reservoir made from plastic sheet supported by a bamboo frame and placed on elevated land. DoF officials (DFO, PD, AD, UFO, Field Assistant and support staff) were directly involved. A total of 7, 18 and 6 incubators were installed in Anchurighuna private fish hatchery, Shahmadaripur government fish hatchery and Modonaghat government Anchurighuna mobile fish hatchery, respectively. About 6.5 kg hatchlings were distributed to six government and private farms and organizations. Spawn quality and quantity improved outstandingly with reduced mortality rate which fishermen appreciated highly. Fisherman became interested to have their own mobile mini hatchery, by using commercially available plastic water reservoirs kept on bamboo frame.

Pilot milt bank establishment:

The overall objective of the milt bank is to improve the quality of fish seed and demonstrate its biological and economic advantages.

The specific objectives are:

- Similarly to livestock gene banks, facilitate short term preservation of milt for large scale commercial use in hatcheries
- Establish a single pond stocked only with male breeders of best quality and supply milt to commercial hatcheries for improving genetic quality of produced fish seed
- Demonstrate the feasibility of rotational cross breeding of distant hatchery stocks by exchanging preserved milt, instead of transportation of live males

Establishment of research and demonstration farms:

Two research and demonstration farms established at Nowapara, Jessore. The specific objectives of establishing these are:

- Measuring project impacts on fish seed quality Checking the quality of seed produced by different hatcheries
- Identifying performance differences in between existing strains (Tilapia, Rohu etc.)

ALGAE PURE SEED PRODUCTION LAB:

Algae are utilized in aquaculture to provide nutrition for the early larval stage (zoea and mysis) of shrimp. The major sources of pathogens found in shrimp hatcheries are sea water, brood and live feed (algae, and artemia). Among these, sea water can be treated and filtered, and brood and artemia can be washed to make them pathogen free, but to make algae pathogen free it is necessary to use pure algae seed. Unfortunately in Bangladesh, there are no sources or labs from which to obtain pure algae strains. Presently all hatcheries use strains which are passed from one hatchery to another and which may be contaminated with bacterial pathogens, and thus contribute to the spread of pathogens from one hatchery to another. To avoid these problems the project has established an algae lab for pure strain production so that hatcheries can obtain pure strains at the lab which will be under production from the next phase of the project.

3.7. Training and Knowledge Management

The Project has designed a training unit to train staff as well as different types of stakeholders including forward and backward linkages at field level and also the project has taken initiatives to train staff on project implementation and monitoring & evaluation. The training unit organized and facilitated a total of 12 training, workshops, as well as ToT programs for field level staff in order to enhance their capacity to train up project beneficiaries. The ToT includes carp and shrimp farming management, commercial aquaculture and dike cropping management, carp hatchery and nursery management, fish culture in ponds and dike cropping management, shrimp farming management, cage culture management. All the technical staff of the Khulna hub participated in a technical meeting with shrimp experts from India on development of some new initiatives for the commercial shrimp component. A total of 63 training/workshop session were organized in Jan - Sep 2012 for staff as well as project beneficiaries on 35 subjects like brood management for quality seed production, orientation on basic aquaculture, carp hatchery management, carp nursery management, Mono-sex tilapia hatchery management, orientation on Mola culture and brood management, pond fish culture and dike cropping management, Tilapia Mono-sex seed production and culture method, shrimp nursery management and carp hatchery manual development, good aquaculture practice, shrimp nursery point management, training on standard operation protocol (SOP) screening management, water quality analysis, use of microscope and assessing sex reversal performance of tilapia etc.

Beside these, the project has organized 5 cross visits both home and abroad to participate in the training on carp hatchery management, Sea bass and shrimp farming, tilapia hatchery management, commercial tilapia hatchery and grow out technique of commercial fish culture at Natore district, Shing, Magur, koi, tilapia culture in Mymensingh district, and Mono-sex tilapia hatchery, nursery, culture management.

Some of training materials developed

In addition, the project M&E and Training unit jointly organized 8 orientation sessions on Introducing and sharing a data collection questionnaire. The project organized 2 workshops for better understanding and better implementation of project interventions on finance, administration and HR issues. Ten linkage building workshops including aquaculture stakeholders were organized.
The project ensured 291 trainees in participation, including 44 females (15%) in the training programs. Trainees comprised 51 hatchery owners/operators, 38 nursery owners, 21 WorldFish staffs and 181 PNGO staff. Total of 45,627 project clients includes 49% female participated in 13,256 training sessions.

For building capacity and skills, project provided technical information and training materials (flipcharts) among all of the PNGOs field staffs to facilitate field training for farmers. The training unit developed and printed 423,000 leaflets on household aquaculture, fry trading, nursery managements and cage culture. The unit also prepared and printed 300 flip charts on household aquaculture, 400 flip charts on shrimp farming. Ten types of stickers were designed and printed 15,500 copies (Table 8).

Table-8: Training materials developed during October 2011 to September 2012

Training/Workshop/Others	**No. of training/session**
Technical training for hatchery and nursery development	31
Cross Visit (Abroad)	4
Cross Visit (Home)	3
Workshop on finance, Admin & HR	1
Workshop to build linkages among fry traders and stakeholders	10
M& E Training	8
Planning Workshop for 2nd phase	1
Staff's Capacity Building Training	12
Farmers group sessions	13,256
Trained project beneficiaries	45,637
Number of manual for staff training (hatchery, nursery, PNGO staff and WF staff)	5
Number of manual for farmer training (Shrimp, carp and tilapia)	3
Flip chart (Fish 300 and Shrimp 400)	700
Stickers 10 types	15500

Training/Workshop/Others	No. of training/session
Leaflets (household fish 300,000; commercial fish 50,000; shrimp 50,000; nursery 10,000; cage 3,000 and patilwala 10,000)	423,000

3.8. *Gender*

Gender issues have a determining role in setting the project success indicators. Gender awareness training will improve the participation of women in fish farm management activities and intends to enhance women's decision making role in this regard. Improvement of Nutrition intake is one of the major focuses of the project. Women (pregnant and lactating mothers) are the main target group to reach this end. The household aquaculture component of the project works with the small scale low-income group. This is determined by pond size (average 15 decimal). This household level poverty reduction intervention is headed by women. The pond, dyke cropping, homestead gardening-intervention methodology is managed by the women (89% of the total group members are women). More than 20 thousand women are already working with the project at the end of first year. Five thousand women are culturing an indigenous species called 'Mola fish' which is rich with iron, zinc and vitamin A. These women are participating for the first time in an income generating action related to improved aquaculture. This process has begun to develop their capability, increase skill and knowledge and link them with output market relations and open windows to entrepreneurship. In commercial cage fishing is going on in group based approach (10 in a group). Group members, of which the majority is female, are reinvesting their income from the cage harvest.

Climate change

This project is working in an area that is vulnerable to natural disasters. The impacts of climate change are expected to increase in future, which will have an effect on the frequency of natural disasters as well as on other effects of climate change such as an increase in temperature, changing rain patterns and increased saline intrusion due to sea level rise. The project is adapting aquaculture management practices to the specific conditions in southern Bangladesh. Better aquaculture management skills and increased income will make the farmers less vulnerable to sudden shocks and will increase their resilience to future climate change.

4. FINANCE

The finance team of the project is comprised with Finance Manager, Procurement Officer and 4 regional Admin and Accounts Assistants. There is a dotted working relation between project, WF Dhaka and WF Head quarter finance team. To track the expenditure we used quick book at Dhaka level and SAP at Head quarter level. The project has followed WF and CGIAR financial and procurement policies beside this we also complied USAID and GOB regulations. With the help from USAID, WorldFish and PNGOs have spent 94.24 % of total project budget over the period October 2011 to September 2012 ***(Table-9)***

Table-9: Budget and expenditure details:

Project No : EEM-G-00-04-00013 -00
Project title : IARC Food Security and Crisis Mitigation II Grant: Modification 12
Donor : USAID
Period : October 1, 2011 through September 30, 2012
Reporting Period : October 1, 2011 to September 30, 2012
Grant : USD 5,000,000
Reporting Currency : US Dollar

	Original Budget	Revised Budget	Total expenses	Balance as on Sep 30,2012	Remarks
	U$	U$	U$	U$	
ICLARM - Bangladesh FtF (AIN)					
Personnel	775,000	891,250	804,752	86,498	COP & PM JSR were not on board full time
Equipment and Supplies	326,225	267,000	238,464	28,536	Some office equipment was not procured
Travel	330,000	228,000	228,296	(296)	
Workshop and Conference	160,000	146,000	137,028	8,972	
Training technology and Dissemination	1,000,000	1,027,000	998,991	28,009	
Field Costs/Research	700,000	726,000	661,956	64,044	Some of the nutrition activities deferred
Publication	5,000	5,000	5,349	(349)	
Communication	55,000	55,000	48,445	6,555	
Contractual	650,000	655,975	646,891	9,084	
Organizational Overhead	930,025	930,025	876,338	53,687	
Coordination	60,000	60,000	60,000	-	
Grant Administration Fee	8,750	8,750	4,856	3,894	
Total	**5,000,000**	**5,000,000**	**4,711,366**	**288,634**	

5. ANNEXURE:

5.1. Component-wise: Key activities and results: (By output)

Sl.	Major Outputs	Key achievement and results
1.	***Component-1: Fish and shrimp seed improved***	
1.1.	Set up facilities and logistics for project operation in 20 districts of Jessore, Khulna, Barisal and Faridpur regions	• Five stakeholder and consultation meetings and four partnership meeting were conducted. • Eight implementing partners were selected (DoF, BFRI, BFRF, BSFF, Save the Children, CODEC, Speed Trust and IPAC). • Four regional offices (Jessore, Khulna, Barisal and Faridpur) and partner offices (CODEC and SpeedTrust) were established, equipped and facilitated with computers, internet, furniture, photocopiers, freezers, etc. • Purchased chemicals and hatchery input microscope for training and research, chemicals and apparatus for algae lab at Cox's Bazar and deep tube well for demonstration and research at Jessore. • Eight brood transportation tanks were built and other accessory equipment was procured. By using traditional transportation big brood transportation is not possible. This technology helped to reduce mortality, safe transportation. Long distance brood transportation is now possible for the technology which significantly changes the business • 40 ventury tube/Oxygen injector and 40 Aeration Towers were built and distributed to all of the hatcheries. By ventury tube this technology proper oxygen level and requirements was ensured which leads to enhance gonadal development and improved fertility. Hatchery is getting quality spawn and reduced maturation time. Which also ensure the needs late night oxygen deficiency, earlier hatchery was facing severe problems. Oxygen tower helped tremendously increase dissolve oxygen level and reduced CO2. It has increased the production volume, improved fertility and hatcheries are getting better results, which has positive impact to investors. Especially silver carp hatching has been improved much. • 13 HACH kits and accessories as inputs were distributed to the hatcheries to provide support Technical Specialists and Hatchery Technicians. The kits are being used to measure water quality parameters which help the project technical experts to provide effective and right technical advices and suggestions to the users regularly. • 1140 vial of ovulin hormones, alternative of PG, were supplied to the hatchery owners at Jessore and Faridpur. • 65 Dissolved Oxygen meters for all hatchery owners and Technicians were supplied to measure DO in the pond water. • 51 Refract meters were supplied to shrimp hatchery owners. • 11 microscopes were supplied to Specialist for disease identification. • 48 electronic and 80 spring balances were distributed to hatchery for weighing the spawn and essential chemicals. • Plankton net, hand centrifuge, petri dish, Secchi disk were distributed to hatchery and nursery owners.
1.2.	Distribution of existing and imported improved strains of Rohu, Catla,	• MoA's were signed with selected 38 carp and 18 tilapia hatcheries in Jessore, Barisal and Faridpur; and 14 shrimp hatcheries in Cox's Bazar.

Sl.	Major Outputs	Key achievement and results
	Tilapia, Pangas and prawn to public and private hatcheries/centers	• Seven brood sources (Natore, Bogra, Bhola, Durgapur, Dumoria and Koatchandpur) were identified considering good sources of quality brood. • 29,892 kg of improved strains (brood) of *Rohu, Catla and Mrigel* stocked to 38 hatcheries in Jessore, Faridpur and Barisal • Setup two trial research stations for Tilapia and Carp fishes at *Matsho Kanon* Hatchery at Nowapara, Jessore. To ensure quality, production performance and reapplication of technology later. • Good quality Carp seed were collected from Halda River. Of them 150,000 (estimated) seed were transferred into DOF hatchery Koatchandpur and Patuakhali, rest of the 60,000 seeds transferred into four private hatcheries (*Mukteshwari Matsho* Hatchery and *Rupali Matsho* Hatchery at Jessore), two hatcheries at Barisal and one nursery at Faridpur to establish future brood bank of Carp fish. • Performance monitoring result shows 80% of the hatcheries followed the project recommended improved technologies ***(Annexure-14)*** • 3.2 kg (species name mainly Rohu, Catla, Mrigel, and some other wild species) seed collected from Halda and stocked in Koatchandpur and Yousuf nursery at Jessore in order to use as future stock of brood • 2.6 kg Rohu spawns collected from Noakhali and at present 217000 Rohu fingerlings was stocked in 3 nurseries (Makibur, Afil, Tutul) at Jessore in order to use as future brood stock • 50,000 fingerlings Jamuna river collected from Faridpur region office and stocked in nursery at Jessore in order to use as future brood stock • In order to use as future brood stock, 1.5 kg spawn collected from Padma River and stocked in Mawla fish hatchery of Mr. Yousuf ale's nurseries at Jessore. Additionally 32,000 seeds are stocked in 2 nurseries at Jessore • 8,000 mirror carp seeds collected from Natore and Jessore and stocked in 4 nurseries at Jessore • 11,000 improved silver barb seeds from BFRI stocked in 2 nurseries to use in next phase • Three Mono-sex Tilapia gene banks are set up with 8 cohorts from Jitra, Malaysia are stocked in research and demonstration station at Prembag gate, Avaynagor, Jessore, government fish seed farm, Jessore and BFRI, Jessore.
1.3.	Distribution of existing and imported improved strains of Rohu, Catla, Tilapia, shrimp and prawn to public and private nurseries/centers	• 204 carp nurseries selected in Jessore, Barisal and Faridpur and Khulna. • 50 shrimp nurseries were selected in Khulna region to develop the sources quality of seeds • Produced and distributed total 10,272 kg spawn (Rohu 4858 kg, Catla 672 kg, grass Carp 315 kg, silver Carp 2,247 kg Mrigel 1741 kg and common carp 5kg) to project and non-project nurseries • 7 kg of spawns of mirror carp milt distributed to 11 nurseries and 40 kg of mirror carp fries were distributed to project farmers • Hungarian mirror carp milt from Jessore preserved and cross breeding was done successfully in Barisal and spawn distributed to 8 nurseries in Barisal regions. • 4 nurseries stocked with common carp fry in Barisal. • 848 million fingerlings (Jessore 675, Barisal 86 and Faridpur 87) produced

Sl.	Major Outputs	Key achievement and results
		during Jan-Sep 2012. • Collected 25,000 Tilapia fries from BFRI and distributed to *Anik* Tilapia Hatchery, golden Thai, Nowapara complex at Jessore to make brood stock for use in future
1.4.	Capacity building for staff and hatchery technicians	• Basic needs were identified and training planning was done • 5 trainings were conducted in Jessore for staff capacity building • 7 trainings were conducted for capacity building of hatchery technicians and operators in Jessore, Barisal and Faridpur • Delivered one day training for 10 Tilapia hatchery owners for improving farm management and production technology. • For learning and enhance skills, one cross visit for 10 hatchery owners from Jessore and another for 25 hatchery owners, nursery owners and farmers from Barisal were organized to see Mono-sex Tilapia seed producing hatchery, nursery and farmers' ponds at Mymensingh. They also visited BFRI facilities and office located at Mymensingh. • Delivered 14 need based trainings to project and PNGO staff on M&E, Tilapia culture and cage culture management • Training materials (flip chart) and sampling equipment (*Secchi* disk) distributed to all of 68 MYAP staff under Barisal region • WorldFish organized two 2-days training sessions on administration, finance and human resource managements at Jessore and Khulna for all WF project staff • Four abroad training and cross visits were made on carp and shrimp hatchery and sea bass culture management in Thailand and Vietnam. • Refresher training has started: 1 refresher trainings on 22 Tilapia hatchery owners/operators and 2 refresher trainings on pond fish culture and dyke crops production for 194 (69+125) field staff organized • 10 linkage building workshops were organized in four regional office areas • Three in-country cross visits was made to nature and another one was made to Mymensingh to learn Shing, Magur, Koi, Tilapia farming by field staff and farmers during this quarter • 51 hatchery owners were participated in a training on water quality analysis, use of microscope and assessing sex reversal performance of Tilapia which was organized at Jessore • Two trainings was organized for 21 shrimp nursery owners at Jessore and Bagerhat
1.5.	Importing improved *Jayanti Rui* and Tilapia	• DoF is in process to sign documents to import Jayanti Rui and Tilapia. Project has fixed up plan to import in 2nd phase.
1.6.	Supporting implementation of hatchery certification systems	• Next phase
1.7.	Increase awareness, availability and use of PCR tested shrimp PLs	• BCCP, a consulting firm was made field visits to design communication strategy for FtF-A in early January 2012 • Following need assessment BCCP designed communication strategies

Sl.	Major Outputs	Key achievement and results
		• Placed two bill boards, 276 signboards in hatchery, demo pond and road sides to circulate important messages on quality shrimp and fish seed and improved fish culture • Two PCR labs-Pranti and BFRI in Cox's Bazar are being used and supported by the project to ensure quality by testing PLs • A documentary on benefit of use virus free shrimp PL in ghers and this was aired 22 times through national television channel (BTV) and broadcasted 122 times through Bangladesh Betar with the support of BCCP • Distributed 8,000 stickers to PCR lab for labeling virus free shrimp seed at the facility in order to branding the services • 69 brood samples were tested. Among them 33 samples were found to be WSSV negative and 36 were found to be WSSV positive. • 263 Nauplii samples were tested and among them 64 samples found to be WSSV negative and 199 to be WSSV positive • 74 PL samples were tested. Among them 67 samples found to be WSSV negative and 7 were to be WSSV positive • A total of 243.5 million WSSV free quality PLs were delivered to FtF aquaculture, GHERS, G2 and Other farmers and traders
1.8.	Impact monitoring and evaluation equipped	• Formed M&E team with a combination of an M&E Manager, four M&E Officers and one Data Analyst. • Developed Performance Monitoring and Evaluation Plan (PMEP) and Detail Implementation Plan (DIP) documents to ensure monitoring systems. • Developed a study protocol for baseline and performance monitoring • One hatchery registrar book, three hatchery performance monitoring forms and daily nursery operation record book, one Farmer's pond record book and 3 farmer performance monitoring forms were prepared and used. • Performance data collection from project hatcheries, nurseries, demo and farmers was done to track progress made against the set targets on quarterly basis. This is a continuous process as part of performance monitoring mechanism. • Developed four databases on client profile/selection, regular performance monitoring, hatchery linked nursery and small traders/patilwala using customize MS Access based software for project data mining and analysis to ensure data quality following USAID suggested Data quality Assessment (DQA) measures. • M&E and project staff were trained on the PMEP and result management systems. • Developed project dash board, initiated a project website for internal use • Project baseline survey was conducted on through a third party consulting firm Data Management Aid in September 2012; analysis and report will be available in October to November 2012 • Situation analysis on study on Carp Seed was completed by third party (Innovision consulting farm) in 1st quarter. Another Value Chain study on Shrimp, Prawn, Tilapia and Sea bass was conducted; the final draft report will be available in October 2012. • Submitted three quarterly reports to donor

Sl.	Major Outputs	Key achievement and results
		• Designed study protocol and plan for a GPS mapping; it will be starting in the next quarter • Supporting communication and documentation unit to track result and writing case and success stories

Component-2: Key activities and results: (By output)

Sl.	Major Outputs	Key achievement and results
	Component-2:- Household aquaculture	
	2.1. Program start-up	• The project signed Strategic partnership agreement with Save the Children beginning of the project for implementation with PNGOs. The selected PNGOs are CODEC and SpeedTrust. • 12,000 households (7000 Codec, 5000 SpeedTrust) were selected in the Barisal region. • Partner NGO IPAC has selected 3 Upazilas as working areas at Bagerhat district • 8,000 households were selected under 7 Unions • Two batches of training conducted for 64 PNGO (IPAC) staff on 14-21 March 2012 • Training budget and farmer support may differ depending on NGO implementation strategy. • Five ToTs were provided to 92 male and 35 female PNGOs staff to provide training to household farmers on dike and homestead vegetables cultivation
	2.2. Household nutrition and income from integrated homestead fish and vegetable cultivation increased in MYAP target groups (Barisal)	• 568 farmer groups (25 members per group) were formed to provide training and management supports. (25% all female, 1% male, 74% mixed, 82% of group members female). • 96 household demo ponds (64% female main operator) were established and stocked fingerlings. On average each demo pond received 60 fingerlings per decimal (40m2) and 200 kg feed depending on pond size (19.5 MT total). Pond preparation was a requirement and was paid for by the household. Each demo pond owner keeps records in the pond record book, final results will be analyzed. • Average stocking size 80 gram (4.8 kg/dec). At test netting after 180 days the standing biomass was 20kg/dec. After 210 days the target net production of 12kg/dec will be exceeded. • Selected 4,334 poor farmers having < 50 decimal owned land and given input support from project. Support consisted of Tk800 fingerlings from 104 selected nurseries and (1,500,000 fingerlings total). 3000 HH received 390 kg seed (Bean 300kg, bottle gourd 60kg and cucumber 30 kg) of late summer vegetables. 22 HH received fencing net for pond flood protection. • Each farmer group will received four training sessions on improved fish culture, technology and farm management. Three sessions have been completed. Average Tk 40 was provided to each member per session for food. • During early 2013 final production in household ponds will be assessed.

Sl.	Major Outputs	Key achievement and results
1.9.	Household nutrition and income from integrated homestead fish and vegetable cultivation increased in IPAC target groups (Khulna).	• 320 farmer groups (25 members per group) were formed to provide training and management supports. (99% of group members female). • 64 household demo ponds (90% female main operator) were established and stocked fingerlings. On average each demo pond received 40 fingerlings per decimal (40m2) and about 160 kg feed depending on pond size (10.0 MT total). Each demo pond was provided fencing net (8500 yards total). Pond preparation was a requirement and was paid for by the household. Each demo pond owner keeps records in the pond record book, final results will be analyzed. • Average stocking size 150 gram (6.0 kg/dec). At test netting after 180 days the standing biomass was 18kg/dec. After 210 days it is expected that the target net production of 12kg/dec will be exceeded. • 8000 HH received 400 kg vegetable seed (bottle gourd, bitter gourd, country bean, sweet gourd). • Each farmer group will received eight training sessions on improved fish culture, technology and farm management. All sessions have been completed. Tk 30 was provided to each member per session for conveyance. • During early 2013 final production in household ponds will be assessed. • Identified 22 corporate sales points and 11 fingerling suppliers to establish linkages with farmers for quality fingerlings and other inputs
1.10.	Refinement and increased adoption of Nutrient Dense Fish (NDF/SIS) production technologies and improved nutritional status of producing households	• One Mola fish or small *Nutrient Dense Fish* (NDF) source at Patuakhali and 2 ponds at Barisal were identified. Identified 50 farmers as sources of Mola fish at Bagerhat • Conducted an orientation session on Mola fish transportation for 90 PNGO staff • Stocked 3,412 kg of Mola fish into 4,881 household ponds. (average 100gr. per dec). Through this initiative project will increase production of Nutrient Dense Fish (NDF) production in the target areas. • Awareness on nutritional benefits of Nutrient Dense Fish (NDF) was included in regular farmer group sessions

Component-3: Key activities and results: (By Output)

Sl.	Major Outputs	Key achievement and results
2.	***Component -3 : Commercial Aquaculture***	
2.1.	Expansion of commercial aquaculture in the southern region	• Consultation meeting with potential partners were conducted • Farmer selection criteria was set, shared and maintained. • 38 depots were selected and MoA signing completed • 103 field staff were hired by partner shrimp depots to promote extension services to farmers • Set up four Aquaculture Service Centers under Khulna region (two at Bagerhat and other two at Satkhira) aimed to provide technical supports, business development services, advice and training to the farmers.

Sl.	Major Outputs	Key achievement and results
2.2.	Productivity and profitability of shrimp culture increased	• 35 shrimp depots were selected from Khulna, Bagerhat and Satkhira districts • 20,012 shrimp farmers were selected from the Khulna, Bagerhat and Satkhira district • Formed 765 farmer groups to facilitate training and support for as sustainable manner. • 72 shrimp demo ponds were selected and set • 50 shrimp nurseries were finalized from a list of 58 nurseries • Delivered 7236 training sessions for the grouped shrimp farmers on improve farm management and practices where ensured attendance about 86% participants. • 997 informal need based and refresher training sessions were conducted • Stoked with virus free shrimp seeds into all of shrimp demo ponds at Khulna region. Demo ponds will be show case as the learning and technology sharing points for the farmers. • 27.38 MT shrimp feed was distributed to 69 shrimp demo ponds
2.3.	Productivity and profitability of commercial pond-based aquaculture increased	• PNGO staff was oriented on FtF-Aquaculture project, farmer selection process and M&E requirements • 5,000 fish farmers were selected from Barisal, Khulna and Faridpur regions • Formed 201 commercial farmer groups to facilitate training and support as sustainable manner. • Distributed 260 cages into river based among 260 farmers (128 male and 132 female) forming 25 groups • All cages were stocked with 252,175 Mono-sex Tilapia fry (90,000 in Khulna, 80,000 at Faridpur, 75175 in Barisal and 10000 at Jessore). To see production efficiency, 1,200 *Sarputi* stocked in 100 cages in Barisal region. In 2nd cycle again 9,000 Mono-sex fry were stocked in 10 cages at Jessore. • One super intensive Pangas farm chosen to work in next year • 61 commercial demo ponds were (Faridpur 20, Barisal 20, Jessore 11, Khulna 10) supported. • Stocked carp seeds in all of 154 nursery ponds in project areas • Identified 12 Carp nurseries to supply quality Carp fingerlings to the farmers at Bagerhat • Delivered 1389 training sessions for group commercial carp farmers on improved farm management and practices in all regions. • Distributed 41,400 Hungary Mirror Carp fries to the farmers and beside 45,200 fries were stocked at Bagerhat for distribution • Distributed 4.0 MT floating feed (8.66 MT in Barisal) among 260 cage farmers • Conducted 36 group training sessions on cage culture where participated 132 female and 128 male cage farmers • In the cycle total 12,700 kg tilapia was harvested from 50 cages at

Sl.	Major Outputs	Key achievement and results
		Khulna. Around 1170 Kg tilapia harvested from 10 cages at Jessore
2.4.	Commercial culture of new brackish water species established	• Several discussions held with Universities and BFRI • One brackish water species (Tengra) based hatchery Mangrove Hatchery and Fishery was selected for improving its capacity to promote commercial brackish water species. • A Memorandum of Understanding (MoU) has been signed with Bangladesh Fisheries Research Forum (BFRF) to do research among others on Commercial culture of new brackish water species. Even a value chain study will be done in next quarter to see the scope of expansion. • 5 non-project farmers and one project farmer stocked 0.3 million Tengra seeds in ten ponds. • With the assistance of the project the hatchery has produced eight batches of Tengra seed amounting total 3.6 million seeds with survival rate is 80-90 percent.

Component-4: Key activities and results: (By output)

Sl.	Major Outputs	Key achievement and results
3.	***Component 4 - Institutions and Policy***	
3.1.	Sector growth expanded through associations: Bangladesh Frozen Fish Export Association; Hatchery Associations; Producer Associations; Community Based Organizations	• Discussion held at hatchery stakeholder meeting at Jessore to establish a hatchery association for project supports to better brood stock management and seed supply. • Scoping for strengthen the institutional capacity of associations were initiated. One hatchery association has been formed in Jessore. • Memorandum of Understanding (MoU) has been signed with Bangladesh Shrimp and Fish Foundation to conduct need based research and studies and to recommend interventions. • Project has decided and started planning to work with 10 Associations, Business Management Organizations, and Community based Organizations and farmer cooperation for sector growth. • Started dialogue with Carp Hatchery Association at Jessore to strengthened institutional capacity and member services.
3.2.	Operational system for collection, analysis and use of aquaculture statistics	• Support for improved aquaculture statistics reporting is being discussed with FAO • TAPP is undersigning process with Department of fisheries.
3.3.	Established Aquaculture Research Priorities	• Two research stations has been established in order to do experiments on Tilapia and Carp fish
3.4.	Reformed Policy and Regulatory Environment for Future Aquaculture Growth	• Consultant appointed and has started his work • Bangladesh Shrimp and Fish Foundation (BSFF) and Bangladesh Fish research Forum (BFRF) has signed MOU to contribute in this regards.

5.2. Quantitative Achievements by FtF Indicators:

The major achievements of the project in October 2011-September 2012 are outlined below and are based on the Feed the Future Intermediate Results contributing to the overall strategic objective:

5.2.1. Indicator # 4.5.2-2: Number of hectares under improved technologies or management practices as a result of USG assistance

Resource Name	Achievements	Targets
	Pond Area (Ha)	Pond Area (Ha)
Component-1		
Nursery (Carp)	41	
Nursery (Shrimp)	1	
Carp Hatchery	16	
Component -2		
Home Stead Pond	1,100	
Home Stead Pond (DEMO)	11	
Vegetable Land	651	
Cage	0.25	
Component-3		
Commercial Fish	947	
Commercial Shrimp	13,030	
Commercial Fish (DEMO)	13	
Commercial Shrimp (DEMO)	34	
Grand Total	**15,844**	**16,800**

Table-5.2.2.: Indicator # 4.5.2-7: Number of individuals who have received USG supported short-term agricultural sector productivity or food security training

Training type	Number groups	Number of sessions	Total Participants			% Total Participants	
			Male	Female	Total	% of Male	% of Female
Farmers Training	1776	6483	22,959	22,210	45,169	51	49
Capacity building training (field facilitator , hatchery management staff, nurserer management staff, Gov. staff) ref. annex-14.1	-	63	397	123	520	76	24
Total	**1,776**	**6,546**	**23,356**	**22,333**	**45,689**	**51**	**49**

Table-5.2.3: Indicator # 4.5.2-13: Number of rural households benefiting directly from USG interventions (S)

Resource Name	Type		Achievements	Targets
	Male	Female	Number of Farmers	Farmer Number
Component-1				
Carp Nursery	164	47	211	
Shrimp Nursery	50		50	
Carp Hatchery	38	0	38	
Shrimp Hatchery	14	0	14	
Tilapia Hatchery	10		10	
Component -2				
Home Stead Pond	2,152	17,689	19,841	
Home Stead Pond (DEMO)	22	139	161	
Cage	128	132	260	
Component-3				
Commercial Fish	3,469	1,503	4,972	
Commercial Shrimp	17,197	2,805	20,002	
Commercial Fish (DEMO)	47	14	61	
Commercial Shrimp (DEMO)	65	4	69	
Total direct Beneficiary	**23,356**	**22,333**	**45,689**	**45,587**

5.3. Analysis from Performance Monitoring

5.3.1: Spawn production in project hatchery during Jan-Sep 2012

	Kg spawn produced				Number fingerlings produced (million)			
Species	**Barisal**	**Faridpur**	**Jessore**	**Total**	**Barisal**	**Faridpur**	**Jessore**	**Total**
Catla	107	227	338	672	5.35	11.37	16.90	33.62
Common Carp	5			5	0.27	-	-	0.27
Grass Carp	64		251	315	3.83	-	15.08	18.91
Mrigel	148	271	1,741	2,160	11.84	21.68	139.28	172.79
Puti	15			15	1.78	-	-	1.78
Rui	449	541	3,868	4,858	44.91	54.10	386.84	485.85
Silver carp	298		1,949	2,247	17.86	-	116.94	134.80
Total	**1,085**	**1,039**	**8,148**	**10,272**	**85.83**	**87.15**	**675.03**	**848.01**

5.3.2: Training and capacity building programs provided by project in Oct 2011 to September 2012

Name of the training provided	No. of session	Male	Female	Total
Brood Management for quality seed production	3	41	0	41
Hatchery Owners Meeting	1	9	0	9
Orientation on Basic Aquaculture	3	78	33	111
ToT on Commercial Aquaculture and Dike Cropping Management	1	16	2	18
Training on standard Operation Protocol (SOP) Screening Management	2	27	0	27
ToT on Carp Hatchery and Nursery Management	1	17	1	18
ToT on Fish Culture in Pond and Dike Cropping Management	5	91	36	127
ToT on Shrimp Farming Management	1	34	6	40
Training on Carp Hatchery Management	2	32	0	32
Training on Carp Nursery Management	9	252	36	288
Training on Mono-sex Tilapia Hatchery Management	1	10	0	10
Orientation on Mola Culture and brood Management	1	58	16	74
Refresher Training on Pond Fish Culture and Dike Cropping Management	2	50	19	69
Training on Tilapia Mono-sex Seed Production and Culture Method	2	24	1	25
Cross Visit on Tilapia mono-sex hatchery, Nursery ,Culture Management	1	10	0	10
TOT on Cage Culture Management for MPs, Efs	1	20	5	25
Training on Introducing & Sharing Farmer Performance Forms	8	168	40	208
Abroad training on Commercial Tilapia hatchery and Grow out Technique	1	6	0	6
Refresher/ToT on Fish Culture in pond and dike cropping mgt	1	18	8	26
TOT on SIS for MPs, EFs	2	69	23	92
Training on Shrimp Nursery Management	1	33	0	33
Training/Refresher for Mono-sex Tilapia hatchery Owners	1	22	0	22
Workshop on Finance, Admin and HR Issues	1	17	2	19
Workshop on Linkage building among Aquaculture Stakeholders	1	40	4	44
Abroad training on Carp Hatchery Management	1	20	0	20
Abroad training on Sea bass and Shrimp Farming	1	11	0	11
Abroad training on Tilapia Hatchery Management	1	11	1	12
Carp Hatchery Manual Development	1	10	0	10
Cross visit: Commercial Fish Culture, Natore	1	9	0	9
Cross visit: Shing, Magur, Koi, Tilapia, Mymensingh	1	11	0	11
Good Aquaculture Practice	1	101	24	125
Shrimp Nursery Point Management	1	18	0	18
Training of Hatchery Owners on Water Quality analysis, Use of Microscope and Assessing Sex Reversal Performance of Tilapia	1	51	0	51

Name of the training provided	No. of session	Male	Female	Total
WS on Learning, Progress and Future Prospect	1	72	3	75
WS on Linkage Building among Fingerling Trader for Strengthening Capacity and Business	1	51	0	51
Grand Total (No. of individuals participated)	63	397	123	520

5.3.3. Farmer Group Session and Training on Shrimp and HHs Conducted till September 2012

Region/Hubs	Number groups	Number of sessions	Total Participants			% Total Participants	
			Male	Female	Total	% of Male	% of
Khulna	1125	5368	18008	11054	29062	62	38
Jessore	5	5	48	42	90	53	47
Faridpur	80	400	1887	130	2017	94	6
Barisal	566	710	3016	10984	14000	22	78
Total	**1776**	**6483**	**22959**	**22210**	**45169**	**51**	**49**

5.3.4. Consumption status of family members of project household

Food Type	No. of days/month	No. of meal/month (out of 90 meals)	Quantity consumed (Kg/day/capita)
Cereal	29	87	0.47
Small Fish	15	38	0.08
Big Fish	14	31	0.09
Meat	11	19	0.04
Egg (no.)	11	19	0.23
Pulses	14	33	0.03
Milk (liter)	14	36	0.04
Fruits	12	22	0.04
Vegetables	20	54	0.25

5.3.5. Technology and Management Practices by the clients assessed after training.

Technology	% of commercial fish household done		% of commercial shrimp household done		% non-commercial household done	
	Fully	Partially	Fully	Partially	Fully	Partially
Aquatic weed control	59	30	60	31	59	27
Bleaching Powder for water purification	5	2	9	12	1	2
Commercial or Homemade food	34	47	45	28	30	52
Correct density	37	30	32	44	30	39
Fertilizer	58	29	34	46	43	37

Technology	% of commercial fish household done		% of commercial shrimp household done		% non-commercial household done	
	Fully	Partially	Fully	Partially	Fully	Partially
Fish/Shrimp harvest in proper manner	26	26	66	31	15	29
Food System	34	46	25	52	31	44
Improved Juvenile	38	29	17	39	31	28
Lime	55	28	54	43	49	36
Others (if Any)	10	0	33	58	6	15
Participate training	81	10	67	29	69	24
Pond Preparation	32	27	56	29	38	33
Record book keeping	25	11	45	13	16	10
Water change	20	18	42	31	16	9
Water depth	45	35	18	52	50	27
Water quality check	33	30	12	49	19	28
Water quality Management	38	29	22	58	24	33

5.4. M&E document and tools developed

- **PMEP:** Draft PMEP and shared with USAID
- **DIP:** Developed DIP and Share with USAID
- **Baseline Study:** Provide backstopping support and check quality
- **Record Books:** Developed and implemented farmer, hatchery and nurserer record books for improving record keeping systems
- **Value chain study:** coordinate and **o**versee two value chain study
- **Data Quality Assessment:** ensure documentation, process monitoring at Hub level
- **Performance Monitoring Data Collection:** Till Sep performance data was collected and analyzed
- **GIS-Google earth & Dashboard:** GIS based 1000 clients profile update via Google earth is being under development process.
- **Progress Report:** Draft three quarterly progress reports, one annual report
- **Documentation:** Worked with C&D Manager to document as needed
- **M&E Training for staff: provided training and** continue training and orientation at field level on M&E systems and RBMS
- **Research or intervention lab:** Document performance monitoring with Mr. Raj (Case and success story)
- **Case and Success Story:** format introduced and documented cases
- **M&E Guidebook:** Finalize M&E study Guidebook
- **FtF Database: developed a database with** 45,000+ Farmers/clients Profile info shared with hubs
- **Update Central Database:** Data management protocol-SOP guide, linked WFC central database system, enrich with need base data
- **Developed Data management protocol**
- **M&E dashboard**
- **Introduced DQA systems for documenting results**
- **Introduced field observation forms**

- **Field days monitoring forms**
- **Training performance Monitoring Form**
- M&E survey Tools and Questionnaire:

Tools type	Target client
Farmer identification form-1	Farmer, demo farmer, cage farmer, nursery
Farmer basic form-2	
Farmer performance monitoring form-3	
Hatchery identification form-4	Hatchery, Hatchery cum nursery
Hatchery basic form-5	
Hatchery performance monitoring form-6	

5.5. Project communication output *2012*

Paper clippings (Details report in below)

FtF AQUA COMMUNICATION OUTPUT 2012

5.5.1. Print media coverage

Month	Number of coverage	Name of the news paper	Topics
May	1		
April	4		
June	5		
July	22		
August	2		
September	18		
Total	52		

5.5.2. Electronic media coverage

Month	Coverage themes	TV Channel covered
Total 6 in 6 TV channels		
July	Jessore Milt Preservation news	Channel-i Independent Television
	FtF AQ Faridpur program	Diganta Television

		Mohana Television Bangla Vision
	Jessore hatchery based activities	Somoy Television

5.5.3. Installation of Billboard and traffic canopies

Sl. No.	Place of Installation
Total 30 billboards and traffic canopies	
Installed by service provider BCCP	
1.	Foila Bazar
2.	Gollamari
3.	Jhikorgachha
4.	Kalapara Ferighat, Barisal
5.	Kaligonj
6.	Khanjahan Ali Bridge
7.	Kupilmuni.jpg
8.	Lebokhali Ferighat, Barisal
9.	Doratana Bridge
10.	Natullahbad Barisal
11.	Nawapara
12.	Pikegachha
13.	Police line Mor, Gopalgonj
14.	Sankarpur
15.	Satkhira
16.	Shamnagor
17.	Ashasuni
18.	Becotia Ferighat, Pirujpur
19.	Bhangar Mor, Faridpur
20.	Chachrar Mor, Jessore
21.	Chuknagar. Khulna
22.	Dapdapia bridge, Barisal
23.	Faltita Bazar
24.	Faridpur Bypass
Billboard and Traffic canopies installed by other vendors	
25.	Traffic canopy in Dashanir Mor, Bagerhat
26.	Traffic canopy in Traffic corner, Bagerhat
27.	Traffic canopy in LEbukhali, Bagerhat
28.	Billboard on Dashanir Mor, Bagerhat
29.	Billboard Rupsha Bridge, Khulna
30.	Billboard Rupsha Bridge, Khulna

5.5.4. Tinplate setup

Material	Total number
Tinplates	850

5.5.5. TV Commercial

Output	Theme	Airing
01 TV Commercial	On virus free shrimp seeds and good gher management	Aired 22 times on Bangladesh Television from 3 October to 7 October 2012

5.5.6. Radio Commercial

Output	Theme	Airing
01 Radio Commercial	On virus free shrimp seeds and good gher management	Aired 122 times on Bangladesh Betar from 5 October to 9 October 2012

5.5.7. FtF Aquaculture Press coverage

Sl. No	Name of the newspaper	Types of newspaper	News headlines	Publication date
1.	The Daily Kaler Kontho	National	Food and nutrition seminar held	20-Apr-12
2.	The Daily Independent	National	Seminar on improving food, nutrition security	21-Apr-12
3.	The News Today, Dhaka	National	WFC distributes oxygen injection devices to the partner fish seed producers	18-Apr-12
4.	Gramer Kagoj, Jessore	Local	Fish breeding activities held under FtF project	29-Apr-12
5.	Daily Hitobani	Local	Commercial demostration ponds of WorldFish Center at Faridpur	29-Apr-12
6.	Dayli Bangladesh Barta	Local	Commercial demostration ponds of WorldFish Center at Faridpur	30-Apr-12
7.	Daily Shonrl Alo	Local	Inovative initiative to increase fish prodiction in commercial ponds through WFC	7-May-12
8.	Daily Samakal	National	Cages distributed to 40 poor familites at Amtoli	22-Jun-12
9.	Daily Bhorer Ongiker	Local	Cages distributed to 40 poor families for cage fish culture	22-Jun-12
10.	Barisaler Ajkal	Local	Cages distributed to 40 poor families for fish culture	22-Jun-12
11.	Unnayan Sangbad	Local	Cages distributed to 40 poor familites at Amtoli	22-Jun-12
12.	Banglar Bani		Cages distributed to 40 poor families for cage fish culture	22-Jun-12
13.	The Daily Dakshin Bangla	Local	Cage for fish culture distributed among forty poor families in Kalapara	1 July 2012
14.	Daily Ajker Barta	Local	Inauguration of National Fish Week celebration in Amtali	9 July 2012

Sl. No	Name of the newspaper	Types of newspaper	News headlines	Publication date
15.	The Daily Amar Desh	National	Poor families got cage for fish culture	11 July 2012
16.	Daily Matabad	Local	Gathering of the Fish farmers in Amtali	13 July 2012
17.	The Daily Drishtipat	Local	Shrimp culture training arranged in Ashashuni	13 July 2102
18.	The Daily Kaler Chitra	Local	Shrimp culture training arranged in Ashashuni	13 July 2102
19.	Daily Matabad	Local	CODEC organized Workshop with the Fish farmers	13 July 2012
20.	Independent Television	Private TV Channel	News on Milt Preservation by FtF Aquaculture	17 July 2012
21.	Channel-i	Private TV Channel	News on Milt Preservation by FtF Aquaculture	17 July 2012
22.	Daily Ajker Barta	Local	Linkage building workshop of FtF Aquaculture arranged	18 July 2012
23.	Daily Paribartan	Local	Linkage building workshop of FtF Aquaculture arranged	18 July 2012
24.	The Daily Sangbad	National	Gias self sustained by culturing Mono-sex Telapia	25 July 2012
25.	Somoy Television	Private TV Channel	News FtF Aquaculture project at Jessore	25 July 2012
26.	The Daily Matabad	Local	Workshop arranged with Fish Hatchery and nursery owners	27 July 2012
27.	Diganta Television	Private TV Channel	News on FtF Aquaculture programs at Faridpur	28 July 2012
28.	Mohana Television	Private TV Channel	News on FtF Aquaculture programs at Faridpur	28 July 2012
29.	Bengla Vision Channel	Private TV Channel	News on FtF Aquaculture programs at Faridpur	28 July 2012
30.	The Daily Dakshin Barta	Local	Workshop arranged with Fish Hatchery and nursery owners	29 July 2012
31.	The Daily Samakal	National	Workshop arranged with Fish Hatchery and nursery owners	29 July 2012
32.	Bangladesh Sangbad Sangstha	Online	MOU signed for development of sustainable aquaculture	30 July 2012
33.	Daily Financial Express	National	MoU signed for development of aquaculture	July 31 2012
34.	Daily Independent	National	MoU signed for development of aquaculture	July 31 2012
35.	The Daily Sun	National	BSFF joins hand with WFC for sustainable aquaculture	July 31 2012

Sl. No	Name of the newspaper	Types of newspaper	News headlines	Publication date
36.	The New National	National	MoU for development of aquaculture signed	July 31 2012
37.	The News Today	National	MoU signed for development of sustainable aquaculture	July 31 2012
38.	The daily Star	National	WFC, Fish Foundation sign aquaculture deal	1 August 2012
39.	The Daily Manob Jomin	National	WFC, Fish Foundation sign aquaculture deal for development of Aquaculture	1 August 2012
40.	The Daily Ittefaq	National	Daylong workshop at Amtali	4 August 2012
41.	The daily Matabad	Local	Iftaer Mahfil by FtF Aquaculture arranged	9 August 2012
42.	The Daily Kaler Chitra	Local	Monthly coordination meeting of Worldfish held at Kaliganj	28 August 2012
43.	The Daily Alor Porosh	Local	Farmers are benefitted through FtF Aquaculture trainings at Ashashuni	29 August 2012
44.	The Daily Ittefaq	National	Seed fish distributed in Amtali, Barguna district	1 September 2012
45.	The Daily Samakal	National	Seed fish distributed in Amtali Barguna district	1 September 2012
46.	The daily Matabad	Local	Fish seed distributed in six union	1 September 2012
47.	The daily Desh-Janapod	Local	Fish seed distributed in different union	1 September 2012
48.	The daily Janakantha	National	'Feed the Future' US representative team visited southern Bangladesh	2 September 2012
49.	The daily Ajker Barta	Local	Workshop held with Hatchery and Nursery owners	8 September 2012
50.	The weekly Dakshin Bangla	Local	Free Fish seeds distributed among farmers in Amtali, Barguna	9 September 2012
51.	The Daily Desh- Janapod	Local	WorldFish Center South Asia Director visited projects	13 September 2012
52.	The Daily Motobad	Local	Worldfish Center South Asia Director visited projects at Amtali, Barguna	13 September 2012
53.	The Daily Motobad	Local	Worldfish Center South Asia Director visited projects at Amtali, Barguna	13 September 2012
54.	The Daily Purbanchal	Local	Shrimp culture training arranged by FtF Aquaculture	17 September 2012
55.	The Daily Prabaha	Local	Group training arranged at Rampal	21 September 2012
56.	The daily Tathya	Local	Group training arranged at Rampal	21 September 2012
57.	The Daily Tathya	Local	Planned farming is must for more shrimp production	24 September 2012

Sl. No	Name of the newspaper	Types of newspaper	News headlines	Publication date
58.	The Daily Tathya	Local	Planned shrimp farming is must for increased production	24 September 2012
59.	The Daily Anirban	Local	Planned shrimp farming is must for increased production	24 September 2012
60.	The daily Prabaha	Local	Shrimp farming training arranged at Dem and Kalapara	24 September 2012
61.	The daily Tathya	Local	Shrimp farming training arranged at Dem and Kalapara	24 September 2012
62.	The Daily Anirban	Local	Women are advancing to environment friendly shrimp culture at Kapilmuni	25 September 2012
63.	The Daily Janmabhumi	Local	Shrimp culture training arranged at Kachua	25 September 2012
64.	The Daily Patradut	Local	Women are advancing to environment friendly shrimp culture at Kapilmuni	25 September 2012
65.	The Daily Ajkaler Khobor	Local	Women are advancing to environment friendly shrimp culture at Paikgaccha	25 September 2012
66.	The Daily Kaler Chitra		Women are advancing to environment friendly shrimp culture at Paikgaccha	25 September 2012
67.	The daily Patradut	Local	Women farmers have started environment friendly shrimp cultivation in Kapilmuni	25 September 2012
68.	The Daily Kaler Chitra	Local	Women farmers initiated environment friendly shrimp cultivation in Paikgachha	25 September 2012
69.	The Daily Onirban	Local	Women farmers have started environment friendly shrimp cultivation in Kapilmuni	25 September 2012
70.	The Daily Onirban	Local	Planned farming is must for more shrimp production	25 September 2012
71.	The daily Dakshinanchal Protidin	Local	Shrimp farming training arranged at bagerhat	25 September 2012
72.	The Daily Dakshin Anchal	Local	Shrimp farming training arranged at bagerhat	26 September 2012
73.	The Daily Shomoyer Khobor	Local	Environment friendly shrimp training arranged at bagerhat	26 September 2012
74.	The Daily Ajkaler Khobor	National	Women farmers initiated environment friendly shrimp cultivation in Paikgachha	27 September 2012
75.	The Daily Prothom Alo	National	Quality fish cultivation needed to ensure nutrition	28 September 2012
76.	The daily Dakshinanchal Protidin	Local	Shrimp farming training arranged at Kachua	28 September 2012
77.	The Daily Notundin	Local	Environment friendly Shrimp farming training arranges at Bagerhat	29 September

5.5.8. Consultancy reports

- Consultancy Reports from Md. Rafiqul Islam, Ex DG of DOF, Fish Expert
- Consultancy Reports on Improvement on Fish Seed Quality from Francois Rajts, Hatchery Expert
- Consultancy Reports from Ravi Kumar, Shrimp Expert
- Consultancy Reports from Bangladesh Fish and Shrimp Foundation

5.6. Research and Study Reports

- Assessment of the carp seeds value chain in Southern Bangladesh january 2012
- Value Chain Analysis: Shrimp, Prawn, Sea-bass and Tilapia by Innovission

5.7. List of participants to Vietnam and Thailand study tour in 2012

Sl	Name	Phone number	Participant category	Project region
	Team 1 to Vietnam			
1	Bishnu Chandra Malo	01721-156511	Hatchery owner	Faridpur
2	Md. Iqbal Husain	01713-076381	Project staff	Faridpur
3	Md Rafiqual Islam Khan	01715-048189	Project staff	Faridpur
4	Md. Badrul Alam	01556-316640	Project staff	Jessore
5	Muhammad Shohidul Islam Akandha	01712-017314	Project staff	Jessore
6	Uzzwal Kumar Sarker	01916-662393	Project staff	Jessore
7	Md. Mostafa Khan Firoz	01711-390513	Hatchery owner	Jessore
8	Md. Jahidur Rahaman	01711-375413	Hatchery owner	Jessore
9	Mohammad Saifuzzaman	01711-390516	Hatchery owner	Jessore
10	Bhupoti Mondol	01712-115642	Hatchery owner	Jessore
11	Rijaul Hoque	01711-131304	Hatchery owner	Jessore
12	Mesbah Uddin Sheikh	01711-398525	Hatchery owner	Jessore
13	Hossain Md Akhtar	01711-485416	Project staff	Jessore
14	Md Nazrul Islam	01711-576715	Hatchery owner	Barisal
15	Md Mustafizur Rahman	01718-714646	Project staff	Barisal
16	Mohammad Shariful Islam	01712-525377	Project staff	Barisal
17	Mohammed Zakir Hossain	01711-439583	Project staff	Barisal
18	Francois Rajts	01755-086715	Project staff	Jessore
19	Md Nazmul Alam	01714-022517	Project staff	Khulna
20	Mohammad Ashraful Hoque	01712-293485	Project staff	Khulna
21	Md Azahar Ali		DoF staff	Barisal
22	Md Asaduzzaman		DoF staff	Barisal
	Team 2 to Thailand			
23	Md Kamruzzaman	01713-115085	Project	Faridpur
24	Motahar Hossain Sarder		Hatchery owner	Faridpur
25	Abdulllah Al Masum	01712-113424	Project staff	Jessore
26	Md.Sahabuddin		Hatchery owner	Jessore
27	Md. Masudur Rahaman	01730-300038	Project staff	Jessore
28	A.K.M. Aminur Islam		Hatchery owner	Barisal
29	Mohammad Shafi Ullah		Hatchery owner	Barisal
30	Quazi A.Z.M. Kudrat-E-Kabir	01711-218947	Project staff	Khulna
31	Mohammad Azharul Haque	01713-122986	Project staff	Khulna

Sl	Name	Phone number	Participant category	Project region
32	Sudipta Mukheyee	01712-447701	Farmer	Khulna
33	Partho Pratim Debnath		Project staff	Khulna
	Team 3 to Thailand			
34	Neamul Ahsan Chowdhury		Hatchery owner	Faridpur
35	Shovan Khan Sabuz	01743889971	Project staff	Faridpur
36	Mohammod Jillur Rahman	01761571214	Project staff	Jessore
37	Aashish Kumar Roy	01721897472	Project staff	Jessore
38	A.B.M Arman Hossain	01721897472	Project staff	Jessore
39	Md. Aminul Islam		Hatchery owner	Barisal
40	Khan Asaduzzaman		Farmer	Barisal
41	Md. Zamal Uddin	01712118360	Project staff	Barisal
42	Durin Akhter Jahan		BFRI	Mymensingh
43	Md. Shaha Ali		BFRI	Mymensingh
44	Md. Mahbubur Rahman		DoF	Jessore
45	Pronob Kumar Biswas		DoF	Barisal