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# Outcome journal

Contributions of aquaculture to  
higher income and quality of life



**Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD)**



# Outcome journal

## Contributions of aquaculture to improving income and quality of life for small-scale producers in Bangladesh

Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD)

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Photo credit: Md. Sheikh Farid

## Sowing seeds

### Creating examples to replicate

Fish are an important part of Bangladeshi culture and diet. Bangladesh ranks among the top five freshwater fish producers in the world. Fish are abundant in the thousands of rivers, ponds, lakes and seasonal floodplains across the country. They are a major source of protein for people living near these waterbodies. In Bangladesh, many households depend on fish farming for their livelihood. By growing fish in homestead ponds, households have a consistent supply of nutritious fish and can sell the surplus for an income.

The USAID-funded Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD) aimed to increase the income of farming households through increased productivity of aquaculture systems. Key activities of the project included developing and disseminating appropriate improved agricultural technology and quality fish seeds to improve livelihoods, food security and nutrition.

#### **Cereal Systems Initiative for South Asia (CSISA) in Bangladesh**

Funded by: USAID

Project Partners: WorldFish, International Rice Research Institute (IRRI) and the International Maize and Wheat Improvement Center (CIMMYT)

Project dates: October 2010 to September 2015

Aim: To enhance income of farming households through increased productivity in the cereal-based agricultural systems in Bangladesh.

### Improved technologies and quality fish seed boost production

The project tested and developed a number of technologies suited to the needs of small and marginal pond fish farmers. For example, good management practices were tested with farmers and fine-tuned so they were easier to adopt. These were supported with adaptive research trials to address problems identified by farmers.

200%  
more production

302%  
more profits by  
adopting improved  
technologies

To improve fish seed quality and ensure a sustainable system of seed production and supply, the project developed quality broodstock and established a breeding center to distribute better germplasm. During 2014, the Tilapia Breeding Nucleus distributed genetically improved brood stock to multiplier hatcheries, benefiting 13,500 farmers.

### Farmer trials: Inspiring others

Often, subsistence farmers in rural Bangladesh do not have the business skills and knowledge to make profit from their fish farm. To demonstrate the benefits of having an aquaculture business, the project ran participatory farmers' trials where interested farmers were selected to adopt CSISA methods. Farmers learned about fish stock management, systematic feeding, pond preparation, record keeping to track incomes and expenditures. Farmers had to adapt to an entrepreneurial mind-set, and were introduced to systems and

processes to help them better understand investment, expenditure, return and profits. These methods and their successes were demonstrated to 25 other farmers and the community.

The results from the participatory trials were impressive. For the average participating farmer, production increased by up to four times and profits increased five-fold. Because of the demonstrated success of the new methods, around 100,000 direct and indirect project participants (farmers) adopted the new technologies and methods.

### Sharing innovations through hubs

Agricultural conditions vary widely across Bangladesh including weather patterns, soil type, crops grown, market opportunities and the method of agriculture. Thus, the project had to adapt technologies to suit the conditions of the areas it worked in. To do this, the project used hubs to serve as focal points for innovation in a specific region.

Hubs typically served an area with similar biophysical characteristics, production systems, advantages, constraints and potential intervention points. This project had six hubs for different agro-ecological zones. Each hub brought together the entire value chain – starting with the seed and ending with the consumer. In each zone, the hubs got the market actors involved. These included private companies and government agencies like input dealers, service providers, agro-processing facilities, equipment manufacturers, public-sector extension and development agencies, universities, local associations, NGOs, and farmer groups.

27,495 farmers received training and technical support over 5 years

6 hubs according to different agro ecological zones

## CSISA-BD working areas (districts)

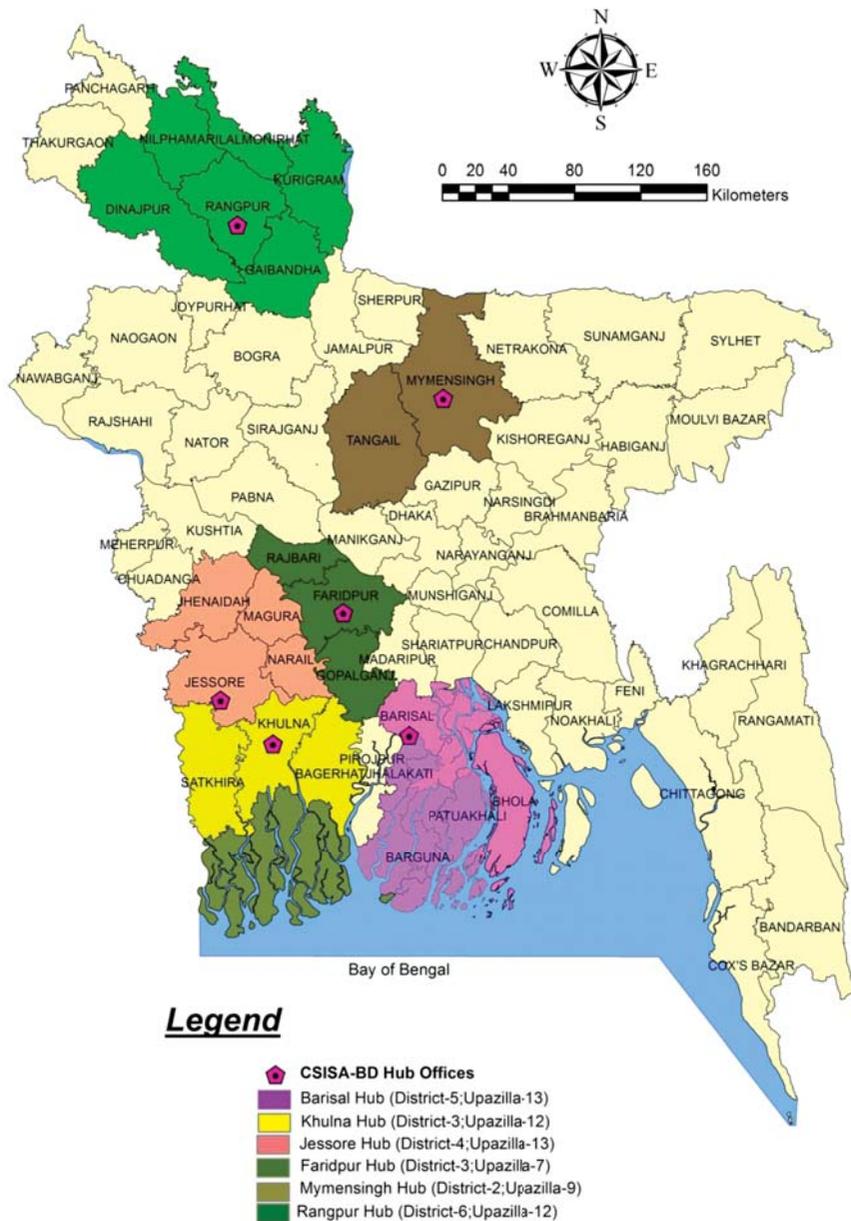


Figure 1. CSISA-BD locations in Bangladesh

## Connecting small-scale farmers with markets

Often, small-scale fish farmers in Bangladesh are not connected to the value chain. Households grow and consume the fish they produce, but have limited access to selling their produce at the market. To support farmers' increased production, the project linked households with the value chain including private sector operators and government agencies. While the farmers found new sources of advice and inputs, private operators discovered a growing market that did not exist before. The integration of households into the value chain resulted in women's improved status in farming households, higher capacity in farmer better nutrition, increased income, a more dynamic value chain and a higher propensity to adopt new technology.

## Empowering women

In Bangladesh, the typical farming household suffers from malnutrition caused by a lack of protein and micronutrients. To combat this, the project trained women to produce nutritious, diversified food including fish and vegetables in and around the household ponds and fallow land. With the increased food production, women could sell any surplus food for a profit. This training proved suitable for women and involved support from the rest of the family. It improved nutrition knowledge and also helped to empower women by involving them in productive roles around households.

**9,672** women trained in improved aquaculture and vegetable production

## Women lead the way

### Homestead fisheries lead to empowerment and better nutrition

Many rural households have ponds and ditches in their homesteads. These ponds, typically smaller than 20 decimals (0.08 hectares), often remain fallow due to a lack of knowledge about fisheries and suitable technology. But ponds, when used to farm fish and grow vegetables on the surrounding dykes, can generate income and provide food for the family's consumption.

To take advantage of these underutilized resources and boost household nutrition, the project trained women in good ways to produce nutritious fish and vegetables.

Women were encouraged to raise nutritious, small indigenous fish like mola in traditional carp polyculture systems. Mola is a prolific breeder and reproduces in natural pond conditions within three months. This fish can be harvested several times with equipment that women can easily operate. Mola is a rich source of micronutrients like zinc, iron, vitamin A and these are often included in the diet of pregnant and lactating women. It also fights against “hidden hunger” among children to improve their cognitive development. Women also learned how to grow orange sweet potato varieties on pond dykes and around their homes. Orange sweet potatoes are rich in vitamin A, which is needed for good health, good vision and growth. The training also included sessions on nutrition and gender awareness.

At the end of the project, 9672 women had received training and 6922 households had received orange sweet potato (OSP) vines. The project distributed mini-packs of vegetable seeds too and linked with vegetable seed suppliers.





Evaluation of the training shows that women's involvement in homestead production systems empower them to provide better nutrition for their entire family and earn an income. On average, for every woman that participated in training, their household fish production increased by 234% from an initial 1449 kg per hectare to 4835 kg at end of production cycle. Fish production was supplemented by mola, which recorded a growth of 302 kg from nil during the same time. Of this, about one-fifth of the fish and half of mola were consumed by the family. They also consumed more than half the orange sweet potato and about 40% of the vegetables they grew.

Income from the fallow ponds was minimal before WorldFish intervention. But after the training and adoption of technology, income increased remarkably. Some farmers, who were not directly trained, had also adopted this technology after seeing friends and family using it.

The results show that these homestead women-centric interventions helped improve household nutrition and income and empower women to be more involved in household decisions.



Photo credit: Md. Sheikh Farid

Over **3x** increase in average fish production in homestead small ponds

**6,922** households provided with orange sweet potato vines



Photo credit: Keshob Roy

# Magic in ghers

## Realizing untapped potential the key



Photo credit: WorldFish

### Food shortages drive growth in gher farming

Jhantu Halder is no different from the thousands of other farmers in Khulna district of Bangladesh. Like his neighbors, this middle-aged man from Potiabandha village, Phultola sub-district, is a gher farmer. A gher (comes from 'gherao') is an enclosed low-lying field with high and broad dykes, often used to raise tiger shrimp (locally called bagda).

Jhantu began gher farming 18 years ago on 0.37 hectares, which has since expanded to 2.36 hectares, including some leased land. Like Jhantu, many farmers have converted their land to ghers. In saline zones, up to 80% of land is now ghers and 60% of freshwater zones. Over the years, the rapid adoption of gher farming was triggered mainly by severe food shortages caused by high salinity in the soil and chronic water logging.

"Gher farming was a blessing for us as it took away hunger and poverty. We are doing much better than before. But it is still far from reaching full potential due to lack of technology," says Jhantu.

### Saltwater and freshwater ghers

There are two types of ghers, developed in response to climate change effects like salinization in the coastal region of Bangladesh. Saline water ghers mainly produce bagda, some fish integrated with rice. Innovative farmers have also developed freshwater gher systems where prawns and some fish are produced with rice.

Ghers are a diverse farming system that yields several crops — rice, fish and vegetables — and offers substantial profits in the form of high value shrimp. Farmers produce boro rice from December to April, freshwater prawn (locally called galda) and fish during the remaining months, and vegetables all year round. Exports of shrimp from ghers contribute significantly to the national economy — shrimp is among the top five export products of Bangladesh. Gher farming is crucial for poverty alleviation, employment generation and food security. Although mostly concentrated in southwest Bangladesh, there is potential for freshwater ghers to expand and be adopted widely across the country.

### Barriers to increased production

With the introduction of more efficient cultivating practices, income from ghers could increase four-fold. But, many barriers need to be overcome. These include farmers' lack of knowledge, support services, research and development, policy support and institutional linkage. A few of the technical hurdles include: unplanned construction, inadequate water supply, effects of climate change (river erosion, floods, more frequent cyclones and storm surges), and poor quality of inputs like fries and feed.

Farmers have little grasp of the necessity of proper stocking density, optimum inputs or proper feeding. They believe the higher the density, the more the yield. Double cycle production is virtually absent and just a handful of farmers prepare their ponds before stocking. Only a few farmers nurture their post larvae until juveniles





Photo credit: Dilip Kumar Chowdhury

in a nursery before releasing them in the enclosure, which is also called the 'grow out system'. While there is some feeding practice for galda – a mixture of rice bran, boiled rice, wheat bran, broken wheat, oil cake, soybean meal, pulses and snail mussels – random, irregular and sometimes excessive feeding leads to water pollution, diseases or mass mortality. However, this low yield could easily be doubled with better management. This would require scientific management and techniques to challenge prevailing practices that limit production potential.

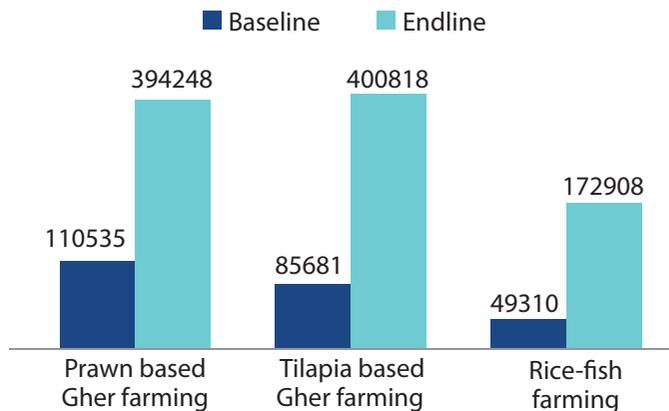
yield of 723kg per hectare. Production of golda rose up to 640kg/ha from 232kg/ha along with carp fish. Farmers saw their profit margins grow significantly — 257% in fresh water and 146% in brackish water ghers. Farmers that switched from golda in response to problems with exporting to two-cycle tilapia farming in fresh water ghers also realized very good production and competitive gross margins.

**179%**  
gain in shrimp yield

Like Jhantu Halder, Aklima along with her husband, Abdul Halim, have been able to change their livelihood by adopting improved technologies. Their adoption of this approach to gher farming has certainly helped them to increase the volume of production as well as to reduce the cost substantially. As a result, Aklima and her family have made a profit of approximately USD 335 by selling fish and vegetables at a higher margin than before in addition to the remaining pond and its fish having had an estimated value of more than USD 187.

Better knowledge and confidence of the farmers led to better gher preparation, post-larvae nursing and stocking density. Besides stock management, farmers began strategic feed management by either purchasing feed pellets or utilizing homemade ingredients to avoid waste and water pollution and reduce their dependence on snails. Given that farmers adopted the new technologies, it is likely these practices will endure and continue to spread, providing farmers with substantial production and profit increases.

**257%**  
increase in profits  
adopting improved  
practices in freshwater  
gher



**Figure 2.** Gross Margin of Freshwater gher (BDT ha-1) 1USD = BDT 78

### New technologies boost productivity

Considering the factors of low productivity in ghers, the project began with designing suitable technologies based on a research-in-development approach. These were tested by farmers, who provided feedback on potential problems, which was followed up with participatory research. Selected farmers took part and suggested tweaks until the package was fine-tuned for easy adoption. These tested technologies were then disseminated through exchange visits, farmer field days and workshops. Other institutions were also explored for further dissemination of the adapted technology.

Results show that during the production year, adoption of the technology lead to an almost three-fold production increased in freshwater and brackish water ghers. Brackish water ghers added 179% to their shrimp

# From south to north

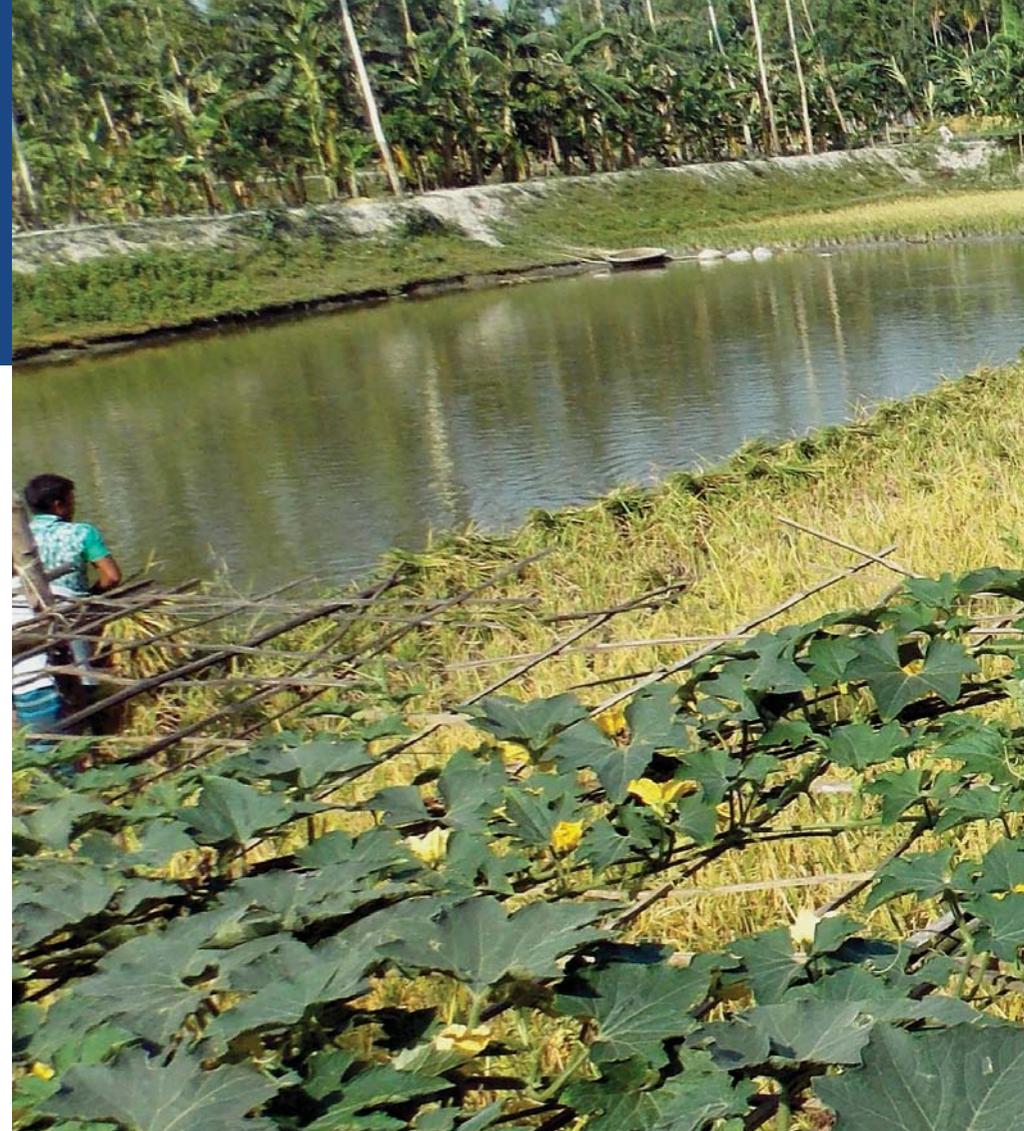
## New gher farmers blaze the trail

Trailblazing farmers from Mithapukur, Rangpur, north Bangladesh, have adopted the gher system of integrated rice fish farming, which is popular in the south for cultivating shrimp and prawn. What started as an exchange visit for a few CSISA-BD farmers, unexpectedly turned into a spread of gher technology from the south to the north.

**7 to 300**  
increase in ghers in  
the northern districts  
since 2013

A few farmers from Rangpur were approached for an exposure visit to Jessore to observe how ghers are managed. Once back home, all seven replicated what they had seen and soon began their own ghers. They practiced two types of gher-based technologies in Rangpur — carp polyculture with vegetables on dykes and carp-tilapia polyculture with vegetables on dykes. Their ghers were successful within a short time. Soon their neighbors followed suit. With people witnessing how ghers can increase yields and profits dramatically, the new system caught on rapidly.

This innovation exchange could result in a spread of ghers to an estimated 20,000-25,000 hectares of low lying areas – virtually revamping the face of agriculture in the region. The potential of integrating aquaculture with agriculture has been widely recognized as a means of improving the use of inputs, diversifying output and economic opportunity, and enabling small holder producers to maintain and strengthen livelihoods.



The gher system incorporates the production of high-yielding rice varieties with fish and prawn. In freshwater ghers, rice is grown in the winter season (boro) and freshwater fish and prawns are raised in the monsoon (aman). The systems were initially built in flood prone areas where rice could not be grown otherwise. Rice-fish farming is already a popular practice in the low-lying areas of northwest Bangladesh. The rice field is a rich and productive biological system that can produce fish in addition to the rice. By



Photo credit: Md. Sheikh Farid

**20,000-25,000**  
hectares of low lying areas where  
ghers can be replicated

adopting the gher farming system, northern farmers could better use their resources and earn more income.

gher-based technology is adopted throughout the north, fish production can be increased significantly. Already, rice-fish technology is shifting from traditional practices to better technology and inputs, a combination of appropriate fish species, and use of larger fingerlings and feeds. The continued spread of gher technologies will help many more farmers achieve increased production and higher profits.

Northern parts of Bangladesh still have a deficit in fish production and consumption. WorldFish experience shows that if this

# Three ways to go

## Trials show benefits and risks in each system

Fish farmers often have to make many decisions about their production, harvest and marketing methods. What species should I grow? What type of feed should I use? Which technology should I use? For entrepreneurial fish farmers, making the right choices is key to maximizing their profit.

Up to **12** tonnes of fish per hectare

To help farmers answer these questions, the CSISA-BD project established on-farm trials with 403 farmers. The trials were created to test and fine-tune the technologies to boost farmers' confidence.

As part of the trials, farmers were given one of three systems to test – (1) carp polyculture, (2) carp-shing polyculture, or (3) pangas-tilapia-carp polyculture. The results showed clear advantages and limitations significant to entrepreneurs.

Carp polyculture, already a popular farming practice, had the highest return on investment. Initial investment is low and the return is high, but farmers barely managed to double the stock based on the CSISA production methods. Farmers found an investment of BDT 100 (USD 1.28) resulted in sales of BDT 244 (USD 3.12).

The pangas-tilapia-carp system had the most dramatic increase in yield and income. Fish production increased by about 351%, from

2.78 metric tons to 12.55 metric tons per hectare, but profit lagged at about BDT 92 (USD 1.18) for every BDT 100 of investment. This system has great potential for vertical extension and scope of investment – an imperative for food production and higher profits.

Like pangas-tilapia-carp, the carp-shing system also showed it could be a good choice for businessmen. Despite being capital-intensive, this method fetches good profits at BDT 117 (USD 1.50) for BDT 100. The system has profound significance for commercial fisheries.

To maximize the potential of these systems, it is critical that the entire value chain is functioning well. This includes availability of quality fish seed and feed, and a functioning distribution and marketing system.

As part of the project, WorldFish worked to integrate value chain actors into the farmers' networks with great success. Beneficiaries realized people were providing services and selling goods that they needed, while market actors realized there was a new niche in the market with much potential.





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পরিয়াল সিস্টেমস ইনিসিয়েটিভ ফর সাউথ এশিয়া ইন বাংলাদেশ  
অংশগ্রহণমূলক মাঠ গবেষণা (Participatory Adaptive Trail)

কৃষিকর্মীদের বিকল্প হিসেবে সূর্যমুখী খৈল ও ভুট্টা ব্যবহার করে গলদা চিংড়ির খাদ্য উদ্ভাবন  
Development of freshwater prawn feed using sunflower cake and maize as replacement of fishmeal for gher farming in Southwestern Bangladesh

সমিতি- মোঃ হারুন মোল্লা ও মোঃ মাসুদ বিশ্বাস  
গ্রাম- ধোপাখোলা, ইউনিয়ন- জামিরা, উপজেলা- ফুলতলা, জেলা- খুলনা  
স্বত্বস্বত্ব- ওয়ার্ল্ডফিশ, খুলনা হাব



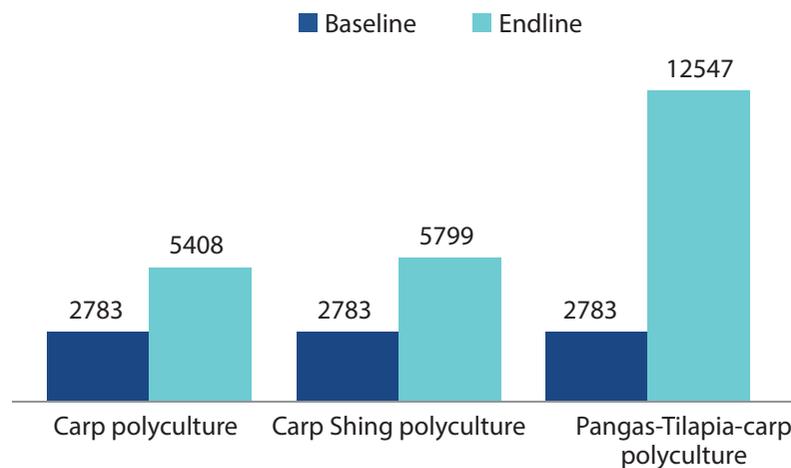



Photo credit: Md. Shah Mamunul Ahad





Photo credit: Md. Nahiduzzaman



**Figure 3.** Production of pond aquaculture technologies (kg ha<sup>-1</sup>)

Given a clear demonstration of which method is appropriate, it becomes easier for different groups – whether small farmers or affluent businessmen – to choose the most appropriate type of polyculture. Combined with a well-functioning value chain, farmers have great potential to maximize production and profits.

# As you sow, so you reap

## Quality fish seeds the key to higher production

The key to achieving good fish production hinges on quality seeds and good management practices. Private sector hatcheries play an important role in fish production as seed suppliers. But most hatcheries ignore basic genetic principles and regulations, which leads to poor quality seed. The absence of a quality seed production systems, particularly in hatcheries, is a major concern.

The rise of aquaculture has also led to genetic deterioration by way of inbreeding, inter-species hybridization and poor broodstock management. Much of the carp and tilapia seed are currently affected by genetic deterioration. These stocks will continue to deteriorate unless the trend is reversed through proper genetic principles in the fish hatcheries. Although sufficient fingerlings are produced, hatchery fingerlings are of poor quality. As fish seed represents about 30% of the production cost, it makes sense to spend that wisely on good stock instead of skimping and ending up with poor yield.

**1** Tilapia Breeding Nucleus

**27** multiplier hatcheries

**13,500** farmers

Nova Hatchery in Tarakanda upazila of Mymensingh was established in 2007 and turned into a Tilapia Breeding Nucleus (TBN) with CSISA-BD assistance in October 2012. WorldFish scientists designed a simple breeding technique for genetic maintenance of the improved







Photo credit: WorldFish

tilapia stock in the TBN. About 700,000 improved Genetically Improved Farmed Tilapia (GIFT) were produced and sold to 27 multiplier hatcheries as broodstock in 2014. The multiplier hatcheries produced about 135 million fries for grow-out farmers. GIFT is an improved strain of tilapia that was originally developed by WorldFish scientists in collaboration with national and international partners.

Improved seed quality is key to robust and resilient produce. Better genetic quality of fish seed ensures better growth and less risk, which translates into higher income and better livelihoods. This



**Figure 4.** From breeding nucleus to grow-outs

intervention shows the importance of investing in genetic improvement and quality production of broodstock.



# Strengthening communities

## Enabled farmers, trained NGO personnel, engaged government officials and private operators

In 2013, Shahida Reza was struggling to make ends meet. This housewife from Kashiani in Gopalganj district had a hard time feeding her five-member family. Sending her children to school was a far-off dream. Her 12 decimal pond (0.12 acre) did not yield much.

After adopting technologies recommended by CSISA, her pond yield increased six-fold from 50 kg to 315 kg of fish. In less than a year, her situation had turned around and she made a profit of BDT 15,165 (USD 193). She earned another BDT 4,000 (USD 51) from growing and selling vegetables. "I could never imagine it would be worth so much," said an astonished Shahida.

WorldFish helped set up a participatory trial in her homestead pond to demonstrate fish and vegetable production techniques. Shahida was an exemplary farmer and trained 50 women in her village. The government fisheries office recognized her efforts with an award at National Fish Week in 2013.

**27,495**  
farmers given  
aquaculture training

Similar to Shahida, many farmers that received training in better aquaculture methods reaped the benefits of higher production and profits. Capacity

building initiatives were a key part of the CSISA project, which worked across the six hubs to increase efficiency, income and nutrition through better aquaculture technologies. Activities such as

mentoring and training increased participants' knowledge of modern aquaculture, honed their skills and built their confidence to use this new knowledge.

**109**  
partner NGO staff  
members given  
training

The farmer's capacity building process involved a series of activities:

1. Village selection for project implementation
2. In the chosen areas, CSISA facilitators ran focus group discussion to identify a group of interested farmers and assess their training needs.
3. Facilitators held a two-day training course for the group, after which a participatory trial was established with a family selected by the group.
4. After the training, farmers received monthly coaching. As a result, trained farmers were able to identify management issues like liming, fertilization, feeding and partial harvesting by themselves.
5. A year later, the farmers attended a one-day refresher course and had further coaching.
6. Once the crop was ready for harvesting, the project staff held linkage event where businesses and agencies representing the entire value chain were invited. This helped farmers find out about potential vendors while suppliers and businessmen were able to identify potential clients.





কারিগরি সহায়তা: গুয়া...  
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আমাদের মূল্যবান সময়...



Photo credit: Md. Sheikh Farid

49

government officials  
received training on  
seed quality  
improvement

141

market actors attended  
training workshops on  
improved aquaculture

As part of the demonstration at the trial pond, it was mandatory to have fisheries officials conduct at least one session. Thus, farmers became automatically linked with the government, strengthening the potential for direct collaboration in the future. While the hatcheries were among primary targets of producing fish seed, local fisheries officials also provided training on improved fish seed quality initiatives. The long-term benefits were that the hatchery owners and government officials changed their attitude about brood stock development, replacement, and management.

Sufficient capacity among the target population is key to sustainability of a new technique. WorldFish achieved this by building the capacity of all value chain stakeholders, allowing the benefits to continue long after the project has concluded.

## Forging ahead

Combination of context driven research in development and adaptive dissemination strategy with grass-roots involvement meant nearly 90% adoption of improved technologies.



Subsistence farmers often use traditional knowledge handed down through the generations, which is supplemented by experience in the field. Beyond providing food for their family, they don't realize that farming can generate an income. They can be hesitant to adopt new technologies.

Before adopting a new technology or method, they first have to see the results for themselves. They will often wait to make sure the results are replicated for two to three years. They will trial a new technology once it has proven the test of time, allotting a small portion of their land to the new style of cultivation.

This approach is possible for cereals where they can sow a new seed in one corner of their field. But that is not possible in the case of ponds or ghers. Farmers must fully commit to the new technology or management practice by modifying their whole system. This means technology advocates must clearly demonstrate the benefits of a newer, more efficient technology or management approach.

For every farmer tried 4 more picked up the technology

Over the five-year project, CSISA-BD demonstrated new technologies to farmers with great success, leading to substantial adoption of these technologies. Over 90% of farmers directly involved with the project adopted the new technologies. The project had an adoption ratio of 1:3.59; for each direct CSISA farmer, 3.59 neighboring farmers also picked up the new technology. This spill-over helped the project reach around 100,000 farmers indirectly. This is attributed to the project setting up participatory farmers' trial ponds/gher where one interested and enthusiastic farmer was given some assistance to set up the demonstration pond for a group of 25 farmers.

This trial farmer became a constant source of information regarding management techniques for the community. Over time, as the trial farmer's yields and profits increased, so too did the interest of other farmers. This led to farmers organically adopting the techniques used by the trial farmers, without any help or support from project staff.

Another goal of the project was to increase women's empowerment, improve nutrition and boost income. CSISA-BD achieved this by training women in homestead aquaculture activities. With a little support from their families, ensuring the men felt involved and endorsed the initiatives of the female relatives, the women were able to grow vegetables and fish by themselves. This resulted in households having more nutritious food to eat, and earning extra income from selling surplus fish and vegetables. In turn, it helped empower women and gave them a voice in household decisions.

As for aquaculture, CSISA-BD showed the path both for ghers — with rice, vegetables and fish — as well as ponds, with carp, pangas-tilapia, and catfish polyculture. Both paths showed much promise and potential while farmers found it easy to adopt the new technology and adapt their existing practice as the project recommended.

Aquaculture is expanding faster than any other agricultural sub-sector in Bangladesh. There is huge potential for aquaculture to make even greater contributions to food and nutrition security, and increase and diversify the incomes of poor rural households. The main project interventions were wider use of improved shrimp and fish varieties, and better technology along with integrated vegetable farming on dikes. Overall, this contributed to higher household income and food security, and providing more livelihood alternatives.

# Awaiting rich harvests

## Having proven its relevance and efficacy, this project's methodologies can certainly be scaled up

A key activity of the CSISA-BD project was showcasing the results of better technologies using a research in development approach. The aim was to encourage subsistence fish farmers to adopt good practices that could enhance their living standards and livelihoods.

The project focused on appropriate and efficient aquaculture techniques and systems. Farmers themselves demonstrated these to the others and the community to help overcome reluctance and skepticism towards new technologies. Many farmers were impressed with the results of the trials, and adopted the technologies and methods.

The project hoped that the spread of improved practices would continue once it finished. It is difficult to make farmers adopt and practice a new system or technology even with active intervention and persistent persuasion. The farmers would have to be convinced about the efficacy of the new system beyond doubt. They would have to be reassured about their ability to handle the new system with limited literacy and millennia of collective wisdom. The organic nature of adoption during the five-year project, suggests it is likely that the new technologies and techniques will continue to spread without outside intervention.

To further encourage long-term adoption, implementation and practice, the project linked all the beneficiaries to the market. The relevant buyers and sellers were linked with farmers. The market players were introduced to the project beneficiaries to show that

there was a burgeoning market just around the corner.

The quality seed initiative that began by improving broodstock of tilapia proved there was a captive market for quality seeds, and it could be a lucrative commercial enterprise with the right technology and in the right area. At the other end of the value chain, the market players were introduced to the target farmers at the end of their production cycle giving rise to further commerce.

The long-term benefits of this project are likely to be far-reaching and ongoing. Whether implemented in part or adopted fully, the different components individually led to higher yields and income, while all the components together undoubtedly create synergy.

The initiative clearly points out that a carefully thought out program does not need to impose. Demonstrating the benefits with repeated consistency throughout the project cycle was sufficient to triple the of new tools and systems adoption.

A major success of CSISA-BD was encouraging risk-averse subsistence farmers to adopt efficient and appropriate technologies and practices. By scaling up these activities, far-reaching change could be achieved in the lives of small-scale producers across Bangladesh.





*Harnessing research that makes a difference*



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