All the aquaculture farms are overflowed due to heavy rain and monsoonal flood in Nagarghata, Satkhira

Resilient Farming: Satkhira Fish Farmers Embracing Sustainable Practices to Mitigate Flood Impacts

In 2024, Bangladesh experienced several floods across the country. One such instance occurred in September of this year when continuous rainfall over the course of four days and the breach of an embankment of the Betna River at Satkhira caused a sudden flood. As a result, at least fifty villages in three unions across two upazilas were flooded. All told, 6,000 *gher* (fish enclosures) and 1,500 ponds have been swept away, while fields of Aman rice, Aush rice, and various vegetables have been flooded. Additionally, Satkhira's fisheries and agricultural industries have sustained damage that was estimated to be worth BDT 700 crore (around USD 60 million).[1] This flood had occurred for the first time in 13 years, due in large part to the unplanned dredging of the Betna River, which caused the embankment to break down and flood the entire land overnight.[2] This has left Satkhira's villagers marooned for over two months.

[1] Satkhira faces 700C loss in fisheries, agriculture| Dhaka Tribune

[2] SOS from southwest: Severe waterlogging causes widespread misery in four districts

With Satkhira situated on the southwestern coastline of Bangladesh, it is especially susceptible to the effects of climate change. This area is situated near the Bay of Bengal and borders the Sundarbans, the largest mangrove forest in the world. The landscape of Satkhira is characterized by low-lying, marshy terrain interspersed with rivers, canals, and tidal floodplains, rendering it particularly vulnerable to environmental hazards. Major climate risks to the settlements of Satkhira include recurrent cyclones, tidal surges, monsoon floods, waterlogging, and saline water intrusion. The increasing salinity in soil and water has been diminishing agricultural output and jeopardizing freshwater resources, including freshwater aquaculture. Villagers of this region, especially in Satkhira, encounter monsoon floods that inundate the land for prolonged durations and impair agriculture as well as aquaculture farming practices on an almost annual basis. Consequently, livelihoods that are predominantly dependent on aquaculture face perpetual threats.

In keeping with its coastal identity, Satkhira is a region renowned for its extensive freshwater fish farming and shrimp cultivation activities, which support the livelihoods of numerous families. In recent years, however, these approaches have become increasingly confronted by environmental issues, such as tidal surges or flooding. One response to this is that, in addition to conventional pond-based fish farming, the majority of farmers in this region incorporate aquaculture with agriculture, utilizing the water from fishponds to irrigate their crops, and practice integrated farming in the form of climate smart agriculture-aquaculture practice. In Bangladesh, shrimp farming encompasses a significant expanse, with estimates indicating that over 1.5 million hectares are allocated to shrimp aquaculture across the country. This should come as no surprise since Satkhira's landscape is defined by an abundance of coastal lands and brackish waters that are ideally suited for shrimp farming.[3] Unfortunately, this land use entails vulnerabilities due to cyclone, flood, and other threats.

[3] Aquaculture practices in Bangladesh: A synopsison prospects, productivity, and problems

"All of a sudden, we found water in the household late at night. I woke up with deep anxiety and hopelessness thinking about how to protect the fish in the gher (enclosed waterbody for farming fish), and subsequently, we lost all our fish as well as the hope for a prospective life. All fish were flushed away within a few hours and the entire union went under water", said Biswanath Biswas, a villager of South Nagarghata in Nagarghata union, Tala upazila, Satkhira. Two years back, he invested BDT 400,000 (USD 3,480) in fish farming in a leased *gher*. However, this investment was arranged through loans, and he is now faced with the need to pay back the interest on that loan on top of the loss of his investment. Moreover, Bishwanath lost BDT 40,000 (USD 348) worth of vegetables that grew at the dike area of the *gher* when the water level increased, reaching heights of up to seven feet.

Bishwanath mentioned that he was aware of methods for adapting climate resilient practices, for example, installing filter nets around the water bodies. He has learned these new practices and approaches from the monthly village group meetings on improved aquaculture practices organized by the organization Agrogoti Sangstha as part of the B-PEMS AugroJatra Climate Change Project. Prior to the flood, he had installed filter net surrounding his small pond but didn't invest to protect fish in the large *gher* as he didn't anticipate the water level would increase to such extremes. The unwillingness happens among the farmers, because by installing filter net around the large *gher* to enclose the waterbodies may create an obstruction to the walkways and the net installed may also hamper the dike vegetation. Now, though, they look forward to learning alternative techniques to cope with these types of hazards.

As part of its resilience strengthening activities, the B-PEMS AugroJatra Climate Change Project has been working with farming and fishing communities in climate-vulnerable areas to promote improved agricultural and aquaculture practices. The project is supported by the U.S. Department of State (USDOS) and is being implemented by Winrock International, along with six partner organizations, including Agrogoti Sangstha.

In another instance of a community facing increasing climate challenges, this year around 140 participants of the AugroJatra project from the low-lying areas in Khesda union, Tala upazila became trapped due to flood induced water logging, as all the *ghers* of these households went under water. They were unable to protect their fish stock, even after installing the filter nets around the boundary of the *gher*. Due to rising water levels in an unusual pattern, they were unable to save their fish in their *gher* this time, even after installing nets.

Geeta Biswas stands in the flood waters that ruined her crops and swept away her fish

Furthermore, almost all the families lost their income from dike vegetation, which is one of the major alternative income sources. *"I'm afraid of this prolonged flood as all our cultivable land is still under water. The water may not drain down before the Boro rice plantation season - how can we survive in this crisis?",* asked Geeta Biswas. Geeta invested BDT 27,000 (USD 235) to release fish fingerling at her *gher* a month back; however, she lost all her assets as well as vegetables, which cost around BDT 87,000 (USD 757). In addition, she was not even able to fire her stove to cook as both the kitchen and her house were underwater.

Fortunately, some were able to apply the techniques they had learned to limit their losses. Nagarghata's Chinta Mondol (above mentioned Biswanath's wife) saved more than 80% of their fish by following the advice to enclose their pond by using filter net. Conversely, her neighbors who did not use filter net as fencing remain unsure about whether their fish have been swept from their ponds or not as they await the subsiding of the flood waters. In addition to highlighting the value of filter net, Chinta's participation in the monthly village group meeting on improved aquaculture practices organized by Agrogoti Sangstha also enlightened her on topics such as the standard

stocking density of fingerling, better feed management strategies, how to keep records for pond activities, and other useful techniques.

Biswanath and Chinta show their pond and fishnet, which saved the fish from being carried off with the flood

Recently, her pond was selected as a demonstration plot by the AugroJatra project, which provided inputs to grow fish by following improved practices. Just 15 days before the flood, Chinta installed the filter net for her 40 decimals pond where she used four filter nets. That netting safeguarded her livelihood and provided an example of good practices to the other villagers.

By the numbers, installing the filter net round the pond costs BDT 6,000 (USD 52), and the net lasts for at least two years. This means, for each culture season, the depreciated cost for installation of filter net is BDT 3,000—all for an investment that protected her fish worth BDT 60,000 (USD 522). This goes to show that embracing these types of adaptive practices is more than just a survival mechanism for aquaculture farmers, especially those who live in the low-lying flood prone areas like Satkhira and could be an essential step toward a sustainable and hopeful future.

Although there are significant losses and difficult challenges, learning from Chinta Mondol's practice showed that there is a way forward for the farmers who own small ponds. Small-scale fish farmers may fortify their livelihoods against the inevitable effects of climate change by embracing low-cost sustainable techniques. The farmers of large *gher*, however, are unable to protect their fish from the adverse effect of climate events and face huge loss. The limitation of this technology needs to be improved.

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