Photo credit: Peerzadi Rumana Hossain/WorldFish

FACT SHEET
Building climate resilience of aquatic food production systems in Bangladesh

WorldFish

CGIAR

How aquatic food system innovations in Bangladesh can foster nature-positive climate adaptation and climate resilient development in the face of climate change

Background

Climate change is modifying the frequency, intensity and duration of natural hazards, with significant impacts on aquatic food systems (AqFS)[1] in Bangladesh. As climate exposed food systems, AqFS are experiencing economic loss and damage from the variabilities and extremes of climate change, resulting in food, nutrition and livelihood insecurity, as well as social disparity and gender inequity in vulnerable communities.

[1] Aquatic food systems are a complex web of all the elements (environment, people, inputs, processes, infrastructure, institutions, etc.) and activities that relate to the production, aggregation, processing, distribution, preparation, consumption and disposal of food products that originate from wild and capture fisheries, aquaculture and/or cell- and plant-based alternatives emerging from new technologies, and parts of the broader economic, societal and natural environments in which they are embedded. It encompasses the entire range of actors and their interlinked value-adding activities from production all the way to consumption, as well as the outcomes of these activities, including those related to nutrition, public health, food security, social and economic prosperity, and environmental sustainability.

Climate vulnerable regions	Climate issues	Climate impacts	Adaptation interventions	Building climate resilience
Northwest (Rangpur and Rajshahi Divisions)	• drought-prone with seasonal water availability • short culture period because of heat waves • erratic rains and cold spells	• disease outbreaks • increased mortality rate • reduced fish growth and low production affect the readiness, maturity and gonad development of fish in the breeding season • altered timing of spawning because of the short breeding season • migrations and/or peak abundance in the case of open-water fisheries	• genetically improved fish species with higher growth performance, such as G3 rohu and Genetically Improved Farmed Tilapia (GIFT) • production of large fingerlings • better management practices (BMPs) • eco-pond approach involving women in homestead ponds	• shortened production cycle with increased yield and reduced mortality rate • climate smart and nutrition-sensitive fish production at the household level
Northeast (Sylhet Division)	• flood-prone because of monsoons and flash flooding caused by intense rain	• damage to infrastructure on aquaculture farms • fish loss on aquaculture farms • fragmented and degraded fish habitat because of siltation of rivers, canals and wetlands (*haor*)	• climate information and advisory services • community-based climate resilient fisheries management and aquaculture approaches, such as hapa/cage nursing, to produce large fingerlings for stocking after flooding • fingerling production of fast-growing species of improved strains (e.g. G3 rohu, GIFT) alongside small indigenous species • carp–mola polyculture in homestead ponds/seasonal waterbodies	• climate informed decision-making for both operational and strategic planning in advance • nutrition-sensitive fish production with significantly increased production, income and biodiversity • fish production and supply during the dry season
Southwest (Khulna and Barisal Divisions)	• temperature increase • sea-level rise • salinization • tidal surges • cyclones • reduced freshwater flow • riverbed siltation • water logging	• water quality deterioration (rising water temperatures resulting in deoxygenation, acidification and eutrophication) • loss/degradation of habitat • decreased production from disease outbreaks (especially for shrimp and prawn) and obstacles to migration routes and reproduction • changes in timing and levels of productivity across marine and freshwater systems • reduced production of target species in marine and freshwater systems • change in species composition and distribution, especially in coastal areas • damage to infrastructure on aquaculture farms and polders	• diversification of aquaculture production to make it adaptive to salinity and seasonal freshwater availability by using other species like whiteleg shrimp, mud crab, seabass and mullet during the dry season in high saline zones • using freshwater prawn and finfish species during the rainy season in low saline zones • climate services • using the *gher* system approach for rice, shrimp/prawn and finfish production • implementing the cluster approach by using specific pathogen-free shrimp/prawn post-larvae to enhance the input–output market • enhanced management measures for coastal and marine fisheries, like the hilsa management intervention's integrated multitrophic aquaculture in open and closed water systems to produce shrimp, prawn, oysters, mussels and seaweed	• adopting new practices and management measures that take into consideration hydroclimatic conditions for year-round aquatic food production • climate informed decision-making for both operational and strategic planning in advance

Climate vulnerable regions	Climate issues	Climate impacts	Adaptation interventions	Building climate resilience
Southeast (Chattogram Division)	• temperature increase heavy rain • landslides • salinity intrusion • cyclones • tidal surges	• unabated rising water temperatures resulting in deoxygenation, acidification and eutrophication, which are threatening life below water and degrading their habitats • changes in timing and levels of productivity across marine and freshwater systems • clear change in the seasonal abundance of individual fish species • damage to infrastructure on aquaculture farms and loss of fish	• artemia culture in salt bed ponds and value chain development for artemia biomass • artemia biomass diet to replace fishmeal • using artemia cysts as feed to rear crab and marine fish larvae in hatcheries • culturing tilapia and shrimp to diversify production and income • nursing crablets to juveniles for fattening to reduce pressure on wild capture • using regenerative and restorative aquaculture, like aquatic plant (seaweed) and bivalve (green mussel) production • recirculating aquaculture system technology in shrimp hatcheries • enhanced management for coastal and marine fisheries using new ideas of co-management based at landing centers • applying conservation measures, like expanding marine protected areas in collaboration with the government	• using nature-based aquaculture interventions to diversify livelihoods and empower coastal communities where adaptive capacity is low • year-round aquatic food production approach even in high saline zones
Central and North (Dhaka and Mymensingh Division)	• large-scale interannual climate variabilities like heat stress and dry spells	• water quality deterioration because of additional diseases • reduced organic culture area because of a reduction in the natural productivity of the water • fewer suitable areas for major culture species • increased supplementary feeding practices, resulting in diseases and degraded habitat • high mortality rates among fingerlings • poor and uneven growth rates of fish • massive loss in stocks of young fish	• refinement and re-use of surface water for aquatic production • use of innovative systems for year-round production with a major emphasis on using BMPs • production of high-grade large fingerlings from improved fish breeds using hapa nets/cages • emphasis on polyculture using natural and supplemental feeds	• increased efficiency in hatchery operations • application of improved management practices for broodstock, fertilization rates of eggs, and both fry and fingerling production
Strengthening climate resilience by including women and youths across climate vulnerable regions and building their capacity				

Table 1. Climate vulnerable regions along with specific climate risks and adaptation interventions for building climate resilient AqFS in Bangladesh.

Short way forward

To achieve climate positive AqFS in Bangladesh, it is important to develop context-specific adaptation pathway maps based on tipping points, both hydroclimatic and socioeconomic. However, the priority is to close the significant and unjust climate financing gap for this sector, as far more is needed to combat the climate crisis to ensure sustainable aquatic food production and enhance the blue economy. This, in turn, would benefit millions of people, as well as climate action globally.

Authors

Peerzadi Rumana Hossain, scientist, climate change and aquatic food systems, WorldFish (p.hossain@cgiar.org)
Benoy Kumar Barman, interim country representative, WorldFish Bangladesh (b.barman@cgiar.org)

Citation

This publication should be cited as: Hossain PR and Barman BK. 2024. Building climate resilience of aquatic food production systems in Bangladesh. Penang, Malaysia: WorldFish. Fact Sheet.

For more information, please visit www.worldfishcenter.org

WorldFish CGIAR

CGIAR INITIATIVE ON Asian Mega-Deltas