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# *Bangfish Policy Brief*

## *Upgrading pangas and tilapia value chains in Bangladesh*



By: Sultan Mahmud, Professor and Dean, Faculty of Fisheries, Patuakhali Science and Technology University, Bangladesh.

Niels Jørgensen, Associate Professor, Department of Agriculture and Ecology, University of Copenhagen, Denmark.

The objective of the DANIDA-funded Bangfish project (2015-2019) is to improve economy of freshwater fish farmers in Bangladesh. Remedies for achieving a higher profitability to the farmers include implementation of a better water and fish quality and acquisition of data on value chain functioning, on market potentials and on quality management. The overall aim is to achieve green growth through upgrading value chains for farmed fish in the aquaculture sector.

### **Water quality and fish production**

Bangladesh has one of the World's largest aquaculture production and it accounts for 56% of the fish production in the country. Freshwater fish from aquaculture farms, lakes and rivers constitute the dominant protein source in Bangladesh. Popular cultivated fish species are carps, pangasius, Nile tilapia and barbs. Water quality in the fish ponds has a decisive impact on growth, welfare and consumer acceptance of the produced fish. In an attempt to ensure a high water quality, some of the activities in the project focus on providing best possible environmental parameters for the fish production. Environmental challenges to the water quality are intense algal growth due to eutrophication, blooms of toxic cyanobacteria (blue-green algae), presence of fish pathogens and toxic metals, such as arsenic, from the pond sediment. The metals originate from natural degradation of the Himalayan Mountains. An additional to these challenges, microbial compounds with earthy and woody off-flavours can taint the fish, and consumers occasionally claim that the fish produced in ponds have an unpalatable taste and flavour.

Potentially, there is large international market potential for fish from Bangladesh, especially of pangasius and Nile tilapia, but freshwater fish produced in Bangladesh often have a yellowish flesh, in contrast to the white flesh in fish, e.g., produced in Vietnam. Previous attempts to export Bangladeshi fish, e.g. to EU, has failed, primarily due to the yellowish flesh colour.

In the Bangfish project, relations between water quality and fish quality are studied by two PhD students who are enrolled at the Patuakhali Science and Technology University (PSTU) in southern Bangladesh and at University of Copenhagen (UCPH) under the double degree arrangement. The students have supervisors at both universities.

The research in the PhD studies is divided into three phases. In phase 1 (2016), water and fish were collected in different fish farms during summer 2016 in the south-western part of Bangladesh to obtain preliminary information on water and fish quality. Analysis at PSTU and UCPH of the collected material showed an occasional abundance of toxin-producing cyanobacteria, a relatively low content of toxic metals in fish and the pond environment, presence of bacteria indicating fecal pollution and of potential fish-pathogenic bacteria, and off-flavour producing microorganisms. Analysis of the fish generally demonstrated a high quality of the flesh, although off-flavours were detected in some fish. Unfortunately, the long local transport time from pond to laboratory in Bangladesh and between PSTU to UCPH resulted in fish that were partly destroyed due to high temperature.

In the ongoing phase 2 in 2017, a full fish growth season from January to August is followed in farms in Bogra (western Bangladesh) and Khulna (southern Bangladesh). The two locations were selected due to the different sources of water. At Bogra, the main water source is rainwater, while river water with a variable salinity (due to intrusion of sea water) is the water source at Khulna. The collected water and fish samples will be analyzed at UCPH in autumn 2017. Based on the achieved information from this phase, a multi-parameter experiment will be conducted in 24 experimental ponds at PSTU. Here, effects of various environmental conditions (water treatment, enrichment with probiotic bacteria, salinity changes, eutrophication, and toxic metals) on fish growth and viability will be tested in 2018. Also, breeding of pangasius with white flesh (imported from Vietnam), relative to the presently used pangasius, will be examined. Based on results from these tests, recommendations for changes of the present breeding practices will be given.

### **Bangfish partner institutions**

Bangfish was initiated in 2015 by Department of Food and Resource Economics and Department of Plant and Environmental Sciences, University at Copenhagen, as the principle project partners in Denmark. In addition, partners from other universities and research institutes in Denmark, Norway and Germany are associated with the project.

In Bangladesh, the project responsible partners are Department of Aquaculture, PSTU, Department of Economics and Sociology, PSTU and Department of Agricultural Finance, BAU.

### **Bangfish education and training**

A total of six PhD students are engaged in the project and are enrolled at both PSTU and UCPH. As mentioned, two of the students examine water and fish quality while four students study economic aspects of the fish production. In addition to analysis of collected material, all PhD students take courses in advanced aspects of their PhD research topics, as well as in general topics, such as manuscript writing and ethical aspects of science, while at UCPH. As for the water quality part of the project, researchers from Denmark will provide training of PhD and MSC students at PSTU in fish diseases, analysis of algal pigments, microbial water quality parameters, and analysis of biological toxicity of metals. However, due to the present security situation in Bangladesh, it has been decided that these courses may in part be given by training the Bangladeshi PhD students at UCPH, and that they pass on the knowledge to Bangladeshi students at PSTU.

## **Bangfish Expected outputs and outcomes**

The main expected outputs of the entire Bangfish are:

- To identify major biological and chemical parameters that reduce water quality in pangasius and tilapia farms;
- To provide practical recommendations on implementation of a better fish and water quality;
- To identify and analyze the functioning of value chains and how they are governed;
- To identify new market potentials and improve logistic systems for a better fish quality;
- To provide recommendations on upgrading of value chains through handling barriers;
- To identify costs/benefits for the fish farmers by improving the water quality improvements;
- And to identify best practices and optimal management at farm level to improve productivity.

Further information on the Bangfish project can be obtained from associate professor Max Nielsen (main project responsible) at [max@ifro.ku.dk](mailto:max@ifro.ku.dk) and associate professor Niels O. G. Jørgensen (water quality responsible) at [nogj@plen.ku.dk](mailto:nogj@plen.ku.dk). In Bangladesh, project responsible professor Sultan Mahmud can be contacted at [sultanmahmud77@yahoo.com](mailto:sultanmahmud77@yahoo.com).



Fish pond in village in the Patuakhali area. The pond is used for multiple house hold purposes.



Large fish ponds near Mymensingh in northern Bangladesh. The picture was taken during a visit by project leaders and participants from Denmark and Bangladesh in 2015.