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Feasibility of Bhetki and Rupchanda Hatchery Establishment in Coastal Region of Bangladesh

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Executive Summary

Bhetki fish is commonly cultured in Thailand, Malaysia, Vietnam, Singapore, Indonesia, Hong Kong and Taiwan in both brackish and fresh water ponds as well as in net cases in coastal waters. Because of high market value, it has become an attractive commodity of both large and small scale aquaculture enterprises. But the major constraint of its expansion in Bangladesh is inadequate supply of fish fry. In Bangladesh, the only source of Bhetki fry is the wild, which is not enough against the demand. A reliable source of seed supply may be hatchery. But there is no hatchery for Bhetki and Rupchanda fry production in Bangladesh. Thus despite huge demand for Bhetki and Rupchnada fish in Bangladesh, it is not yet possible to culture adequately, because of lack of fish fry. Keeping these issues in view, this study has conducted with the objective of assessing the feasibility of establishing Bhetki and Rupchanda hatchery in the coastal regions of Bangladesh. This paper has been prepared based on the information collected from 195 respondents through questionnaire survey, 11 focus group discussions, 9 key informant interviews and researchers' observations. Data were collected in the last week of July 2017.

There is culture as well as capture practice of Bhetki fish in Bangladesh. But there is no practice of Rupchanda culture in this country. Rupchanda production in this country is fully dependent on capturing from the sea. Lack of fingerlings and absence of technical knowledge are the most important reasons for not having culture based production of Rupchanda in Bangladesh. There is a huge demand for Bhetki fish fry due to wild is the only source. Of the total respondents more than 90 percent mentioned high demand and the rest mentioned moderate demand for Bhetki and Rupchanda fish. The reasons are this fish is more delicious than fresh water fish, inadequate supply compared to demand, high nutritious value and exportable in foreign countries. There is also high demand for Bhetki fish fry. About 93 percent of the respondents expressed their interest to culture Bhetki fish in their own land collecting fish fry from hatchery. But yet there is no hatchery of Bhetki fish fry in Bangladesh. Due to the absence of Rupchanda culture, respondents did not express their interest on demand for Rupchanda fish fry. Since there is no hatchery of Bhetki fish fry in Bangladesh, supply of Bhetki fish fry is fully depended on collection from wild source, which is not adequate compared to demand. Overall, only 25 percent of current demand can be fulfilled by total collection of fish fry.

The highest gap of supply over demand has been found in Satkhira region followed by Barguna and Cox's Bazar. The highest percentage of respondents mentioned river as the main source of Bhetki fish fry, which is followed by estuary, nursery, sea, gher and few from Thailand.

Major constraints of establishing Bhetki hatchery in Bangladesh are lack of brood fish, high mortality rate mainly because of cannibalism, lack of commercial feed, lack of investment capital, lack of knowledge and skill on artificial breeding of Bhetki, lack of nursery, lack of required machinery, lack of nursery entrepreneurs and lack of medicine. There is no wide variation among the constraints in three regions under the study. Along with constraints there are lot of opportunities for establishing Bhetki hatchery in Bangladesh. These are availability of land for establishing hatchery in Cox's Bazar and southern part of Bangladesh, huge demand in the local market, availability of required saline water, suitable climate, opportunity to earn foreign currency through exporting Bhetki, positive attitude of public and private institutions, appropriate water temperature, appropriate level rainfall and available human resource. Moreover, Bhetki hatchery establishment is an environment friendly activity, because it will reduce natural catch of Bhetki and its fry. As a result, it will create balance in environment.

Constraints of establishing Rupchanda hatchery are lack of knowledge on artificial breeding of Rupchanda, unavailability of Rupchanda hatchery, lack of commercial feed, lack of investment capital, lack of nursery entrepreneurs, lack of machinery, lack of brood fish and expensive medicine. It has also been informed by the scientists of BFRI that fecundity level of Rupchnada is very low compared to Bhetki. As a result, for Rupchanda hatchery more number of brood fish will be required. Fecundity level of Bhetki is about six million and survival rate of Bhetki fish fry is about 30 percent. Though the survival rate of Bhetki fish fry is high, but one eats another that increases mortality rate. There are also opportunities of establishing Rupchanda hatchery in Bangladesh like Bhetki hatchery. It has been informed by the FGD respondents that Kalatoli to Teknaf of Cox's Bazar is suitable for hatchery establishment.

In order to establish Bhetki hatchery in Bangladesh the required facilities are ensuring availability of brood fish, ensuring flexible credit, production of commercial feed, imparting training to the hatchery operators, ensuring technology for hatchery, ensuring

technical expatriate, providing technical support by public and private institutions, and conducting intensive research and development. Similar facilities and support services will also be required for Rupchanda hatchery establishment. However, ensuring quality domesticated brood fish and modern technology for hatchery; initiative of the Government, especially Department of Fisheries and technical expert are the most important factors for establishing Bhetki hatchery in Bangladesh. According to the respondents' opinions coastal areas of Cox's Bazar, Barguna, Satkhira, Khulna and Bagerhat are the suitable areas for establishing Bhetki hatchery. Technology and other necessary elements can be imported from South East Asian countries like Vietnam, Thailand, Malaysia, China, etc. However, in order to import brood fish from the neighbouring countries, permission from the governments of the two countries will be required. Findings of the survey and acquired scientific knowledge reveal Satkhira and Cox's Bazar are the suitable places for Bhetki culture in Bangladesh.

Establishment of hatchery will increase production of Bhetki fish, which will increase income and consumption. Higher consumption will increase nutritional status of the household members in the region. It will also create employment and increase foreign currency through export. A few respondents mentioned that Bhetki culture may reduce finfish culture, producing fish fry in hatchery may reduce job for the people who used to live on fish fry collection from wild source, and use of medicine in hatchery may have negative impact on environment. In this regard, corrective measures should be taken. Same types of positive and negative impacts of Rupchanda hatchery have also been mentioned by the very few respondents.

Generally Bhetki migrates to the mouths of rivers and estuaries in order to breed. There is one spawning season in the period from October to February. Females carry from 2.3 to 32.2 million eggs and can either shed them all at once or as little as 10 percent at a time. The developing fish tend to stay in the swamps from February to April. After nine months, juvenile Bhetki make their way into freshwater estuaries to further develop. The range of water salinity tends to be greater near the water surface than in the bottom. Standard requirement of water salinity for Bhetki fry is 28 to 32 ppt. The suitable range of water temperature and dissolved oxygen for Bhetki fry are 26-32⁰C and 6.0-8.5 ppm respectively. Establishing Bhetki hatchery, it needs to culture the plankton in a laboratory, which is the feed of Bhetki fry and fingerling.

Generally farmers are culturing Bhetki in the same gher of shrimp due the several advantages. First, Bhetki fish is not consume the shrimp feed or other artificial feed. Second, live tilapia is the main feed of Bhetki, which is less expensive than artificial feed. Third, farmers can sale the remaining tilapia fish at the end of harvesting time. In order to estimate the benefit cost ratio of Bhetki fish culture based on hatchery fish fry, per unit price of hatchery fish fry was estimated based on the opinions of the hatchery and Fisheries experts, because of non-existence of Bhetki hatchery in the study areas. The benefit cost ratio of Bhetki fish culture based on wild source fish fry is 2.65 while the same is 2.70 for cultured Bhetki fish based on hatchery produced fish fry. There is a marginal increase of Benefit Cost Ratio (BCR) of Bhetki fish production for hatchery based fish fry compared to wild source of Bhetki fry. Even though there is a marginal increase of BCR but the impact of hatchery establishment is huge. For example, large number of farmers will start to cultivate Bhetki due to the availability of Bhetki fish fry in the market and the production cost will decrease due to the lower price of fish fry. As a result volume of sale will increase and ultimately farmers will be benefited.

The study recommended: (i) importing brood fish from Thailand or Vietnam for hatchling immediately or fertilize Bhetki fish through technical intervention by injection of sexual kick off medicines, which will drastically reduce the duration of hatchery establishment; (ii) contracting with the trawler men in coastal areas for catching bigger Bhetki of weight more than 4 Kg. from the deep sea that has high probability of being female and male if the weight is 3 Kg; (iii) establishing Bhetki hatchery jointly by PKSF, BFRI and CVASU in Cox's Bazar with the financial and technical support of PKSF, where PKSF may hair a technical expert from Vietnam or Thailand and assign to BFRI and CVASU; (iv) procuring a suitable machine along with orientation training for measuring the sperm and egg of Bhetki; (v) conducting further study on bio-characteristics of Bhetki to know the fertility time, egg delivery time, life cycle of Bhetki fish, etc.; (vi) Cox's Bazar and Satkhira are the most suitable places for establishing Bhetki and Rupchanda hatchery because of availability of required saline in the sea water; (vii) for feeding Bhetki seeds, phytoplankton and zooplankton need to be produced in hatchery; (viii) establishing and implementing strong monitoring system for maintaining proper salinity level in the water, exchanging water regularly and providing proper feed; (ix) establishing Bhetki hatchery first then Rupchanda, because Bhetki

hatchery has been explored more than Rupchanda and Bhetki hatchery technology is available in neighbouring countries like Thailand, Vietnam, India, China, etc.