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Culture-Based Fisheries and Pen Culture Technologies Enhanced Income of Tribal Fishers in Bamuni Beel, Assam

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Abstract

Culture-based fisheries and pen culture technologies demonstrated in Bamuni beel, Assam through community participation to support income and livelihood of local tribal fishers. Little or no supplementary stocking was practiced in the beel, resulting in low fish production and modest net annual income to the community members during 2019-20. Advanced carp fingerlings @ 3,000 no. ha⁻¹ were stocked in the beel during October, 2020 for development of CBF. CIFRI-HDPE pens (3,000 m² area) were installed in the beel and stocked with carp fingerlings @ 3-9 no. m⁻² during February, 2021 and reared for 6 months. A total of 13.52 tonnes of fishes were harvested from the beel during 2021-22. The revenue generated was shared by the 65 tribal fisher families receiving an annual net income of Rs. 44,763.00 per family. Adoption of CBF and pen culture thus led to 117% increase in total fish production and 153% increase in net income for the local fishers compared to that in 2019-20. This can be replicated in other similar region with similar technological interventions.

Background Information

Floodplain wetlands in Assam are locally known as *beel*, covers 1,00,815 ha water area (Das *et al.*, 2009), which constitute one of the major fisheries resources in the state with maximum production potential of 2,000 kg ha⁻¹yr⁻¹ (Sarkar *et al.*, 2021). However, average annual production from these resources are 206.4 kg ha⁻¹ from beels without supplementary stocking regime and 455.2 kg ha⁻¹ with supplementary stocking, which is significantly lower than the annual potential (Yadav *et al.*, 2021). This reflects improper or lack of adapting scientific management practices in *beels* (Das *et al.*, 2017). Among available management options, enclosure culture (pen & cage) and culture-based fisheries (CBF) developed for floodplain wetlands (*beels*) of Northeast India by ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI), Regional Centre, Guwahati remains popular choice for production enhancement (Das *et al.*, 2018). As part of outreach activities initiated by ICAR-CIFRI under leadership of Dr. B.K. Das, Director, ICAR-CIFRI, Barrackpore and guidance of Dr. J.K. Jena, DDG (Fisheries Science), ICAR, New Delhi under NEH Component, we have demonstrated culture-based fisheries (CBF) and pen culture in Bamuni beel, Assam through community participation to support income and livelihood of local tribal fishers.

Bamuni beel (N 26°18'91'' and E 91°45'60'') is a closed floodplain wetland of lower Brahmaputra valley located in Kamrup district, Assam, Northeast India. It is a small beel having 16 ha water spread area and is roughly oval in shape. The water depth in the beel is 2.5-3.7 m in monsoon which gets reduced to 1.5-2.5 m during winter making it suitable for

both pen culture and CBF. A total of 65 plain tribals (Bodo) households of Bamunigaon village under Bezera Development Block depend on the beel for meeting their nutritional and livelihood needs. Prior to 2006-07, the beel supported purely capture fisheries and was annually leased to private parties for quite low amounts (Rs. 15,000.00-20,000.00 per month). A periphery bundh around the beel was constructed by ARIAS Society, Govt. of Assam during 2006-07 under World Bank funded ARIAS project, which was further strengthened under AACP project of ARIAS Society during 2011-12. Little or no supplementary stocking was practiced in the beel, resulting in low fish production (6.29 tonnes) and modest net annual income to the community members (@ Rs. 17,692.00 per household) during 2019-20.

Institutional Intervention

Bamuni beel was selected to demonstrate CBF and pen culture (Figure 1) through community participation. The demonstration programme was executed after conducting two awareness programmes on the subject followed by supplementary fish seed stocking programme in the beel proper on 19th October, 2020 (Figure 2) and pen



Figure 1: CBF and pen culture demonstration in Bamuni beel



Figure 2: Fish seed stocking in beel proper for CBF in Bamuni beel on 19.10.2020

culture using CIFRI-HDPE pens on 23rd February, 2021 (Figure 3). A total of 48,000 no. advanced fish fingerlings (@ 3,000 no. per ha) comprising of Indian major carps (*Labeo rohita*, *Labeo catla* and *Cirrhinus mrigala*), minor carps (*Labeo bata* and *Labeo gonius*) and exotic carps (*Cyprinus carpio*, *Hypothalmicthys molitrix* and *Ctenopharngodon idella*) in the beel for CBF in consultation with the local community. CIFRI-HDPE pens (3,000 m² area) installed in the beel were stocked with carp fingerlings (@ 3-9 no. per m²) and fed with CIFRI-CAGEGROW floating feed (28% crude protein, 5% crude fat and 3 mm size) by the participating fishers for production of table fish as additional income. The fisher community under the banner of Bamuni Beel Development Committee (BBDC) followed the technical guidance provided by us. Fishes were reared for a period of 6 months in pens with higher survival and growth. Two coracles were also provided to the fishers for using in beel (Figure 4).



Figure 3: Fish seed stocking in pens in Bamuni beel on 23.02.2021



Figure 4: Coracle distribution to the fishers of Bamuni beel on 24.02.2021

Success Points

Bigger sized fishes were harvested from pens on September, 2021 (Figure 5) and smaller fishes were released in the beel proper. The major harvest of fishes from the beel was done during January, 2022 (Figure 6) and sold on the occasion of Magh Bihu (Assamese community festival) for getting good price (average Rs. 230.00 per kg). A total of 13.52 tonnes of fishes were harvested and sold from the beel during 2021-22. All the 65 Bodo tribal fisher families of the village received an annual net income of Rs. 44,763.00 per family. Per capita fish production (kg fisher-family⁻¹ year⁻¹) increased from 96 kg in 2019-20 to 208 kg during 2021-22, while fish production per unit area doubled from 393.13 kg ha⁻¹year⁻¹ to 845 kg ha⁻¹year⁻¹ over the period.



Figure 5: Fishers with harvest of fishes from pens on 07.09.2021



Figure 6: Bumper harvest of fishes from Bamuni beel on 13.01.2022

Outcomes

Technological interventions of ICAR-CIFRI enhanced fish production of Bamuni beel, and income of 65 tribal fisher families. During 2021-22, successful adoption of CBF and pen culture thus led to 117% increase in total fish production and 153% increase in net income of the fishers compared to 2019-20.

Conclusion

Adoption of culture-based fisheries and pen culture technologies developed by ICAR-CIFRI enhanced income of tribal fishers in Bamuni beel, Assam. Per capita fish production (kg fisher-family⁻¹) and fish production per unit area (kg ha⁻¹year⁻¹) doubled in the beel. The local tribal community expressed their happiness with the enhanced income and promised to continue to practice CBF including pen culture to enhance their income and livelihood. The success story of Bamuni beel can be replicated in other parts of the country with similar technological interventions for enhancement of production, income and livelihood of fishers.

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