

Comparative Bio-Economics of Some Selected Beel Fishery at Kandi Block in Murshidabad District, Adjacent to Bhagirathi River (W.B)

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ABSTRACT: Beels, bundhs and reservoirs are potential resources for augmenting fish production and generating additional employment. These larger water bodies are presently being utilized for fish production by fishermen cooperative societies with financial and technical assistance from the Fisheries Department of West Bengal, and financial assistance from the National Cooperative Development Corporation (NCDC). Due to the sustained efforts of these organizations, the annual productivity of the beels has been raised to a markable amount. Most of the Beels require provision of sluice gates, desilting and deepening of the connecting channels and clearance of the dense weed infestation. There is vast scope to reclaim many of the dead Beels into productive fish farms. Such converted fish farms can be able to produce fish to a large tune, more than expectation. It is a challenging task and to achieve this goal, however, a scientific understanding of the ecological and production management of this water body is imperative. The bio-economic analysis along with prediction modelling will throw light on the future strategy and planning.

KEY WORD: Beel, Wetland Conservation, Livelihood, Productivity Index, Cost analysis

I. INTRODUCTION

Wetlands, as the term implies, are 'Wet' lands that exist because the inflow of water exceeds the outflow for a brief to extended periods of time during the growing season Sharma, (Oomen Mylin 1980). Wetland is a broad term, which encompasses a wide range of inland, coastal and marine habitats sharing the common features of temporary or permanent, freshwater or shallow coastal waters. The Ramsar Convention (1971) defines wetlands as areas of marsh, fen, peat land or water, whether temporary or permanent, natural or artificial, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tides does not exceed 6 meters. For regulatory purposes under the Clean Water Act (1974), the term wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adopted for life in saturated soil condition (Bhaumik, U. 2002). There are 2167 natural fresh water wetlands covering 1.5 million hac areas; 65, 253 man-made fresh water wetlands covering 2.6 million hac area; 27,403 inland and coastal wetlands covering 7.6 million hac areas (Sugunan, V.V. 1995).. Inland wetlands receive water from precipitation, snowmelt, river outflow, surface overland flow, ground water discharge, lake seiches, and seepage from streams, lakes, ponds and irrigation systems. Most natural wetlands functions as a result of or closely related to wetlands hydrology. Wetlands food-chain, fish and wildlife habitat value, nutrient cycling, sediment trapping, socio-economic values, sites for research and education, heritage and even aesthetic values are tied to the source, velocity, frequency, timing and quantity of water. Besides these, wetlands play a significant role in global cycling and geo-chemical balance of carbon, nitrogen and sulphur. Wetlands form an integral component of the Ganga and Brahmaputra river basins which are seasonally inundated by the overspill from the main

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river channel (Srivastava and Bhattacharjya, 2003). These wetlands generally possess high potential for in fish production and where the topography allows; provide a 'collection sink' for the fish produced in the flooded catchments areas (Vass, K.K., 1989). Fresh water wetlands are **Boars, Beels, Jheels, Ox-bow lakes and Floodplain** (Yadava, Y.S. 2004)).The beels act as breeding and nursery grounds for a number of riverine fishes including Indian Major Carps (IMC). For example, studied conducted by the Central Inland Capture Fisheries Research Institute (CIFRI); Barrackpore, for the past 15 years have shown that fish yield from West Bengal beels can be raised to 1,000 - 1,500 kg / ha / year (Sugunan et. al., 2000). Thus, we can see the potential resources that formulate sound management norms for sustainable development and optimal utilization of these beels to increase fish production for improving the socio-economic status of the beel users. These wetlands serve multi-purposes and are essential for meeting the livelihood and various religious and social needs of the local communities. Apart from being an important source of fisheries, they form the lifeline supporting agriculture, post-harvest operations, navigation, animal husbandry and a host of other economic activities (Ghosh, S.K. 2004).

II. MATERIALS AND METHODS

The present study was carried out to evaluate the present Socio-Economic analysis of some selected Beel fishery at Kandi Block in Murshidabad District, adjacent to Bhagirathi River in W.B.. A random sampling of four Beel society (**Kandi/hizole Beel, Rambhadrapur Beel, Nobindoba Beel**) and from each Beel ,officer in charge & farmers were interviewed to fulfil the purpose. Total No of farmer Engaged in these beels is 414 in number. Total area of the beel in kandi block is 1981.48 Ha. Number of farmers interviewed is 25. The study was made during 2013-14. Data collection were made by two ways; collection of existing data (secondary data) such as published literature, books, research articles and maps etc. of institutions. The present status, current problems and related legislation were collected from the literature survey. The collection of new data by filling of questionnaires was carried out. The collected data are later analyzed statistically through SPSS 13.0 software.

III. RESULT AND DISCUSSION

The Beel Fishery plays an important role towards the socio economic status and livelihood generation for a large number of rural people at Kandi block in Murshidabad district. The present dissertation gives a spectrum of information, identification of important input variables, threats and the required management and socio-economic status of farmers for the sustainability of Beel Fishery of West Bengal, particularly at Kandi block in Murshidabad District. In specific, the data on **physico-chemical parameters** were collected from the farmers maintained by their technicians. Total 414 farmers engaged in the **fishing** in beel fishery, among them 261 people belongs to yong age group, 184 people are educated up to primary level, 336 people are fully depends on the beel as it is the main income source of them, 226 farmers belongs to schedule cast group, 241 farmers are involve in the fishing up to 9 to 14 hours. The collected data on **salinity**, in Kandi is 1.43 ppt, The collected data on **pH**, in Kandi is 7 which is very good for growth of fish because The optimum pH for good growth ranges between 6 and 7. The collected data on **D.O** in Kandi is 5.77 mg/l. It is depicted the bivariate inter-correlation among all the variables (average value calculated for 1 Ha area, in all the cases). The collected data on **construction** in Kandi construction is Rs 6000 in 2012 and Rs 7100 in 2013. On **electric installation** in Kandi is Rs 335 in 2012 and Rs 390 in 2013. The collected data on **Equipment** in station is Rs 2264, but in the year 2013 the expenditure is Rs 2857. The collected data on **Watchman shed** in station is Rs 1489 in 2012, but in the year 2013 the expenditure is Rs 1725. The collected data on **Lease amount** in station is Rs 11648 in 2012, but in the year 2013 the expenditure is Rs 12417. The collected data on **Liming & Manuring** in station is Rs 13461 in 2012, but in the year 2013 the expenditure one is Rs 14780. The collected data on **Chemicals** in station is Rs 4120 in 2012, but in the year 2013 the expenditure is Rs 5164. The collected data on **cost of seed** in station is Rs 36153 in 2012, but in the year 2013 the expenditure is Rs 38571. The collected data on **Fuel charge** in station is Rs 98 in 2012, but in the year 2013 the expenditure is Rs 115. The collected data on **Electricity charge** in station is Rs 570 in 2012, but in the year 2013 the expenditure is Rs 620. The collected data on **Labour charges** in station is Rs 3824 in 2012, but in the year 2013 the expenditure is Rs 6024. The collected data on **Annual Maintenance and Repairing Cost** in station is Rs 571 in 2012, but in the year 2013 the expenditure is Rs 648. The collected data on **Miscellaneous Cost** in station is Rs 173 in 2012, but in the year 2013 the expenditure is Rs 208.

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Table 01: Average Economics of Beel Fisheries in Kandi during 2013-14- Schedule Depicted on Average Farm Size of 1 Ha- 19500 Fingerling/Ha

Sl. No.	Particulars	2012	2013	Comments
A.	Capital Cost	Amount (Rs.in thousand)	Amount (Rs.in thousands)	
1	Construction	6538.462	7197.802	
2	Electric installation with electrification equipments(net,handi,boat etc)	335.1648	390.1099	
3	Miscellaneous	2351.648	2857.143	
4	Watchman shed	215.9341	255.4945	
5		1489.011	1725.275	
6	Total Capital Cost	10930.22	12425.82	

B.	Variable Cost	Amount (Rs.in lakh)	Amount (Rs.in lakh)	Comments
1.	Lease amount	11648.35	12417.58	
2.	Liming and manure (Fertilise and productivity purpose)	13461.54	14780.22	
3.	Chemicals (weed infestation)	4120.879	5164.835	
4.	Cost of seeds	36153.85	38571.43	
5.	Cost of feed	0	0	
6.	Fuel charges	98.9011	115.3846	
7.	Electricity charges	570.3297	620.8791	
8.	Labour charges	3842.857	6024.725	
9.	Medicines	0	0	
10.	Annual maintenance and repairing cost	571.4286	648.3516	
11.	Miscellaneous	173.0769	208.7912	
	Total Variable Cost	70641.21	78552.2	
	Total Input (capital cost + variable cost)	81571.43	90978.02	

a) 2014: Total Production: 14.61538 quintal

Sl no	Species name	Production (in quintal)	Rate@/Qnt	Amount (in thousands)
1	Rohu	4.78022	12000	57362.64
2	Catla	3.571429	14000	50000
3	Mrigal	2.197802	10000	21978.02
4	Bata	2.197802	10000	21978.02
5	American rohu	1.868132	7000	13076.92
Total Output				164395.6
Profit : (output-input)				73417.58
P.I: output/inputX100				180.698

b) 2013: Total Production: 12.66484 Quintal

Sl no	Species name	Production (in quintal)	Rate@/Qnt	Amount (in lakh)
1	Rohu	4.67033	11000	51373.63
2	Catla	3.516484	13000	45714.29
3	Mrigal	2.087912	9000	18791.21

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4	Bata	1.373626	9000	12362.64
5	American rahu	1.016484	6000	6098.901
Total output				134340.7
Profit : (output-input)				52769.27
P.I: output/inputX100				164.69

From (Table 2), which represent the Correlation matrix considering all the variables under consideration, the results are depicted in the following manner. Firstly, considering the correlation between **Stocking** with other variables, there exist a significant high positive correlation with equipments, total capital cost, moderate positive correlation with watch man, low positive correlation with construction, electrification, high negative correlation with Miscellaneous, total variable cost, total input, total output, lease amount, cost of seed, moderate negative correlation with liming and manuring, chemical, fuel charge, electric charge, annual maintenance and repair, profit and low negative correlation with labour charge, and Miscellaneous. Secondly, considering the correlation between **Construction** with other variables there exist a significant moderate positive correlation with watch man, total capital cost, annual maintenance, profit low positive correlation with equipments, high negative correlation with electrification, Miscellaneous, Chemicals, Fuel charges, Labour charges, moderate negative correlation with Cost of seeds, Electricity charges, Total Variable Cost, Total Input, low negative correlation with Total Output, Miscellaneous, equipments. Thirdly, considering the correlation between **Electric installation** with electrification other variables there exist a significant moderate positive correlation. Fourthly considering the correlation between **Equipments** with electrification other variables there exist a significant high positive correlation. Fifthly considering the correlation between **Watchman shed** with electrification other variables there exist a significant high positive correlation. Sixthly considering the correlation between **Miscellaneous** with electrification other variables there exist a significant high positive correlation with Total Capital Cost, high negative correlation with Lease amount and other variables. Seventhly considering the correlation between **Total Capital Cost** with electrification and other variables there exist a significant high positive correlation with Lease amount and other variables. Eighthly considering the correlation between **Lease amounts** Cost with electrification other variables there exist a significant high positive correlation with other variables. Ninthly considering the correlation between **Liming and manure** Cost with electrification other variables there exist a significant high positive correlation with Chemicals and other variables. Tenthly considering the correlation between **Chemicals Cost** with electrification and other variables there exist a significant high positive correlation with Cost of seeds and other variables. Eleventh considering the correlation between **seeds** with electrification and other variables. Twelfth considering the correlation between **Fuel charges** with electrification and other variables there exist a significant high positive correlation with Labour charges and other variables. Thirteenth considering the correlation between **Electricity charges** with other variables there exist a significant high positive correlation with Miscellaneous and other variables. Fourteenth considering the correlation between **Labour charges** with electrification other variables there exist a significant moderate positive correlation with Total Variable Cost, Total Input, and low positive Miscellaneous, total out put, low negative correlation with Annual maintenance and repairing cost, Profit. Fifteenth considering the correlation between **Annual maintenance** and repairing cost with electrification other variables there exist a significant high positive correlation with, moderate positive correlation with Miscellaneous, total output, low positive with correlation with Variable Cost, Total Input. Sixteenth considering the correlation between **Miscellaneous** with electrification other variables there exist a significant high positive correlation with Total Variable Cost, Total Input, Total Output, moderate positive correlation with profit. Seventeenth considering the correlation between **Total Variable Cost** with electrification other variables there exist a significant high positive correlation with Total Input, Total Output, and low positive correlation with profit. Eighteenth considering the correlation between **Total Input** electrification other variables there exist a significant high positive correlation with Total Output, and low positive correlation with profit. Ninetieth considering the correlation between **Total Output** electrification other variables there exist a significant high positive correlation with profit.

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Table 2: Correlation Matrix for Average Economics (unit 1Ha) comprising all beel fishery culture at Berhampore sub-division of Murshidabad district in connection with Beel fishery during -2013-14

	Construction	Electric Installation	equipments	Watchman shed	Miscellaneous	Total capital cost	Lease amount	Liming and manure	Chemicals	Cost of seeds	Cost of Feed	Fuel charges	Electricity charges	Labour charges	main tenance /repairing cost	Miscellaneous	Total Variable Cost	Total Input	Total Output	Profit	
Construction	1																				
Electric installation	.869	1																			
equipments	.981	.949	1																		
Miscellaneous	.993	.803	.950	1																	
Watchman shed	.774	.986	.882	.692	1																
Total Capital Cost	.988	.935	.999*	.962	.862	1															
Lease amount	.983	.763	.928	.998*	.643	.943	1														
Liming and manure	.553	.893	.705	.448	.956	.674	.389	1													
Chemicals	.474	.847	.636	.363	.924	.603	.302	.996	1												
Cost of seeds	-.745	-.319	-.602	.821	-.155	-.635	-.856	.143	.234	1											
Cost of Feed	.995	.817	.957	1.000*	.708	.968	.996	.469	.385	-.807	1										
Fuel charges	.002	.496	.197	-.119	.635	.155	-.183	.834	.882	.665	-.096	1									
Electricity charges	.937	.987	.987	.888	.946	.980	.856	.809	.751	-.466	.898	.351	1								
Labour charges	-.014	.482	.181	-.135	.622	.139	-.200	.825	.874	.677	-.112	1.000*	.336	1							
main tenance /repairing	.975	.957	1.000*	.942	.894	.998*	.918	.723	.656	-.580	.949	.222	.991	.206	1						
Miscellaneous	.867	1.000*	.948	.801	.986	.933	.760	.894	.849	-.315	.814	.500	.986	.486	.956	1					
Total Variable Cost	.431	.820	.598	.318	.905	.564	.256	.990	.999*	.281	.340	.903	.718	.896	.619	.823	1				
Total Input	.569	.901	.718	.466	.961	.689	.407	1.000*	.994	.124	.486	.823	.820	.814	.736	.903	.987	1			
Total Output	.063	.548	.256	-.059	.681	.215	-.124	.866	.909	.618	-.035	.998*	.407	.997*	.281	.551	.928	.856	1		

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Profit	-.132	.375	.063	-.251	.525	.021	-.314	.753	.810	.759	-.229	.991	.222	.993	.089	.379	.838	.740	.981	1
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** Correlation is significant at the 0.01 level (2- tailed)

* Correlation is significant at the 0.05 level (2 tailed)

Table 3: Correlation Matrix for Average Economics (unit 1Ha) comprising all beel fishery culture at Berhampore sub-division of Murshidabad district in connection with Beel fishery during -2013-14

	Constructio n	El ec tri c in st all at io n	equi pme nts	Wat chm an she d	Mis cell ane ous	Tot al cap ital co at	Lea se am ou nt	Lim ing and ma nu re	C he m ic al s	C os t of se ed s	Cost of Fee d	Fue l cha rges	Elec tri ci ty cha rges	Lab our cha rges	mai nte nan ce /re pai ring cost	Mis cell ane ous	Tot al Var iabl e Cos t	Tot al Inp ut	Tot al O ut put	Pr of it
Constructio n	1																			
Electric install ation	.920	1																		
equipments	.876	.995	1																	
Miscellane ous	.997	.948	.911	1																
Watchman shed	.268	.624	.699	.343	1															
Total Capital Cost	.947	.997	.985	.969	.563	1														
Lease amount	.723	.394	.300	.666	-.472	.463	1													
Liming and manure	.698	.923	.957	.752	.877	.891	.010	1												
Chemicals	.585	.856	.904	.647	.938	.815	-.137	.989	1											
Cost of seeds	-.077	.320	.413	.002	.940	.248	-.744	.661	.764	1										
Cost of Feed	.490	.109	.009	.420	-.708	.184	.957	-.282	-.420	.907	1									
Fuel charges	.516	.810	.865	.581	.964	.763	-.220	.973	.997	.815	-.494	1								
Electricity charges	.997	.947	.910	1.000	.340	.969	.668	.750	.645	.000	.423	.579	1							
Labour charges	.366	.701	.769	.438	.995	.645	-.379	.922	.969	.900	.632	.986	.435	1						
maintenan ce/repairing	.621	.879	.922	.681	.921	.840	-.092	.995	.999	.734	.378	.992	.679	.957	1					
Miscellane ous	.757	.953	.978	.806	.832	.927	.096	.996	.973	.593	.198	.950	.804	.885	.982	1				
Total Variable Cost	.524	.816	.870	.590	.961	.770	-.209	.976	.997	.809	-.485	1.000	.587	.984	.993	.953	1			
Total Input	.578	.852	.900	.641	.941	.810	-.146	.988	1.000	.769	-.428	.997	.639	.971	.999	.971	.998	1		
Total Output	.617	.876	.920	.677	.924	.837	-.098	.994	.999	.738	-.384	.992	.674	.958	1.000	.981	.994	.999	1	

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Profit	.325	.669	.740	.398	.998*	.611	-.419	.904	.957	.918	-.665	.978	.395	.999*	.943	.864	.976	.959	.945	1
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The linear regression equation for the purpose of modelling in the year of 2012 taking **Profit** as dependent variable and other variables; the equation revealed as below:

$$Profit(2012) = -7639.747 + (-6.185x \text{ Electric installation with electrification}) + (.609x \text{ Total Output})$$

The equation clearly indicates that the most important variables (average value calculated for 1 ha area, in all the cases) are Cost of feed and Total Output, where cost of feed has negative impact upon profit and Total Output has positive impact upon profit.

The linear regression equation in the year of 2013 taking **profit** as dependent variable and other variables viz Stocking, Construction, Electric installation with electrification, equipments, Miscellaneous, Watchman shed, Total Capital Cost, Lease amount, Liming and manure, Chemicals, Cost of seeds, Fuel charges, Electricity charges, Labour charges, Annual maintenance and repairing cost, Miscellaneous, Total Variable Cost, Total Input, Total Output, as independent variables. The equation revealed as below:

$$Profit(2013) = 449615.911 + (-1.165x \text{ Total Input}) + (449615.911x \text{ Total Output})$$

The equation clearly indicates the most important variables (average value calculated for 1 ha area, in all the cases) are Lease amount and Total Output. Where lease amount has negative impact upon profit and Total Output has positive impact upon profit.

IV. CONCLUSION

West Bengal State Fishermen Cooperative Federation (WENFISH), the apex cooperative body of the state fishermen cooperatives, with the financial assistance of NCDC – 87 beels comprising an area of 5387 ha are being developed in the district of North 24 Parganas as well as additional areas in Nadia, Murshidabad, Hooghly, Uttar Dinajpur and Dakshin Dinajpur Districts. Utility wise, wetlands directly and indirectly support millions of people in providing services such as food, fiber and raw materials, storm and flood control, clean water supply, scenic beauty and educational and recreational benefits. The FFDA and Fisheries department impart training to prospective beneficiaries and also refresher training for skill upgradation to existing fish farmers. They provide all types of technical help to the beneficiaries. Growth of marginal macrophytes, emergent, sub emergent and floating vegetation cause silting of the beel. Beel is now covered by water hyacinth. Paddy cultivation beside the beel is an age old practice. Though restricted marginal cultivation may enrich beel fertilization, cultivation in the beel will cause organic pollution and gradual filling in these productive beds. Overexploitation compelled with uncontrolled fishing without strictly enforcing the limit of mesh size of the net is observed with great concern. There is a lack of funds to conduct applied research into appropriate technologies for enhancing fish production in reservoirs and beels, as well as a lack of financial and government support. Political aspects are one of the causes of weakness in beel fisheries. Sometime the drainage system of adjacent area which is directly connected with beels is also a cause of weakness of beel fisheries. These larger water bodies are presently being utilized for fish production by fishermen cooperative societies with financial and technical assistance from the Fisheries Department of West Bengal, and financial assistance from the National Cooperative Development Corporation (NCDC).

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BIOGRAPHY



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