



Perception of fishers about livelihood developmental interventions by various GOs and NGOs in Indian Sundarbans: A comparative study

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ABSTRACT

The Sundarbans, an important biodiversity hotspot of India, is home to many fishers and owing to its ecological importance, Government Organisations (GOs) and Non-Governmental Organisations (NGOs) are involved in fisheries development. In the present study, interventions done by selected GOs and NGOs and how these have brought a change in the fishers' livelihood were assessed using the impact matrix of organisations. Information was collected from 300 respondents from 6 selected blocks employing interview schedule. Respondents were asked to rate their perception of how these interventions brought a change in livelihood assets using a five-point scale. Impact scores were calculated using the weighted average technique and revealed impacts on livelihood improvements. Mann-Whitney U-test was applied to know if there was a difference in perception towards interventions done by GOs and NGOs. The study revealed that interventions like bundh building/renovation, demonstration, housing/road/culvert construction, laboratory cum testing facilities and pond excavation scored higher as part of overall perception whereas, SHGs development accrued highest total score for both GOs and NGOs accumulating five capitals of livelihood. Impact matrix exposed that out of five capitals of livelihood, financial capital had a relatively higher score.

Keywords: Fisheries, Government organisations, Livelihood, Non-Governmental organisations, Sundarbans

Introduction

The Sundarbans, the world's largest mangrove vegetation, is a collage of impenetrable forests, flowing rivers, lush of Sundari (*Heritiera fomes*) trees, a bagful of biodiversity resources, including different species of birds, mammals, insects, reptiles and fishes. It was recognised as an internationally important 'World Heritage' site and 'Biosphere Reserve' in 1989. This unique region has overlapping protected areas, designated under the Wild Life (Protection) Act, 1972 (amended in 2002 and 2006), Core or Critical Tiger Habitat (2007), National Park (1984) and Wild Life Sanctuary (1976). Earlier in 1973, it was declared as the Sundarban Tiger Reserve by the Ministry of Environment and Forests, Government of India (WBSAPCC, 2012; Mahadevia and Vikas, 2012). The Sundarbans spread over an area of 26,000 km², of which around 9,630 km² is in the Indian Territory and the remaining part lies in Bangladesh. Indian Sundarbans occupies 4267 km² of mangrove forest area and 5400 km² of habitable area, encompassing 13 adjacent blocks of 24 Parganas (South) 6 blocks of 24 Parganas (North) Districts in West Bengal (W.B.). It is home to more than

4 million people, consisting of 104 islands, of which 54 are inhabited (DoSA, 2016; Mahadevia and Vikas, 2012). While studying problems and prospects of fisheries in the Sundarbans, Chandra and Sagar (2003) stated that the Sundarbans have been nurturing nearly 90% of aquatic species of the Eastern coast; thus, coastal fishery of Eastern India has a dependency on this region.

With an increasing trend in the fisheries sector of India, people of the Sundarbans also showed an inclination towards this sector for livelihood generation as it provides direct ecosystem products, especially fish and forest produce, as a means of economic sustenance to the inhabitants, among whom, many are fishers (WBSAPCC, 2012).

The main occupational groups in the Sundarbans are fishers, wood cutters/leaves (*golpatta*)/crab and shell collectors (Ghosh, 2017). Fishing has been one of the primary sources of livelihood of the local forest-dwelling population as few fishers have their own agricultural land. Though wild fishing and honey collection have been the major means of livelihood in the Sundarbans, fish farming practices also got instilled in the livelihood options, but

the scenario was changed during post-*Aila* cyclone phase, which hit the island during 2009 (Chakrabarti *et al.*, 2017). As a consequence of this devastating cyclonic storm, increased water salinity had wiped out many freshwater fishes. If this incidence was the 'bane' of *Aila*, different brackishwater fish species got entered during *Aila* as a 'boon', resulting in a hike in fish production during the recent past (Ghosh, 2017).

Considering the facts of ecological importance, enormous potentialities in the fisheries sector and socio-economic backwardness of the Sundarbans region (DoSA, 2016; Mahadevia and Vikas, 2012; WBSAPCC, 2012), many Governmental Organisations (GOs) and Non-Governmental Organisations (NGOs) have been intervening in different areas of livelihood development through inputs distribution, infrastructure development, capacity building programmes, sanitation facilities, afforestation programmes and climate change initiatives, especially, for the fishing communities in the Sundarbans (Ghosh *et al.*, 2017). Gradually (since the year 2000), the Sundarbans became a place of activities for different NGOs with international and national reputation along with GOs. As per Adams (2001), NGOs were accepted as significant contributors to the developmental process by governmental and official agencies.

In this context, it is imperative to evaluate the changes in livelihoods of the people of the Sundarbans as a result of different developmental interventions by both GOs and NGOs. Sometimes different agencies assess impacts of their own interventions but the target group-specific changes with reference to fishers are scarce. Thus, the present study was conducted with the objective of assessing the perceived changes in fishers' livelihood assets due to different interventions done by select GOs and NGOs.

Materials and methods

Out of 23 districts of W.B., 24-Parganas (North) and 24-Parganas (South) districts were considered as the locales of the study as these two districts are prime constituents of the Indian Sundarbans. Out of 19 blocks under the Sundarbans region (during 2015-16), Sagar, Gosaba, Namkhana, Kakdwip and Basanti from 24 Parganas (South) and Hingalganj from 24 Parganas (North) were selected on the basis of having a higher concentration of fishers/beneficiaries of developmental interventions carried out by different organisations.

An initial pilot study revealed that seven NGOs, namely, Tagore Society for Rural Development (TSRD), Socio-Economic and Ecological Development (SEED), Sabuj Sangha, Paribesh Unnayan Parishad (PUPA), Vivekananda Institute of Biotechnology (VIBT) (a branch organisation of Sri Ramkrishna Ashram, Nimpith, West Bengal), Sundarban Dream, Nature Environment and

Wildlife Society (NEWS) have been intensely working on the fishers' livelihood and climate change issues in the Sundarbans region by covering maximum numbers of beneficiaries under different fisheries and agri-allied programmes.

Among Governmental Organisations, Department of Fisheries (DoF), Govt. of West Bengal, Sundarbans Development Board, Govt. of West Bengal, ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI), Barrackpore and Kakdwip Research Centre of ICAR-Central Institute of Brackishwater Aquaculture (KRC-CIBA), Govt. of India have been working towards fishers' livelihood development. Out of these, the seven NGOs and three GOs, namely, DoF, Sundarbans Development Board and KRC-CIBA, were selected.

Perceived impacts of interventions by GOs and NGOs during 2012-13 to 2014-15 were assessed for this study as the World Bank funded Integrated Coastal Zone Management Programme (ICZMP) was operational during this period and the NGOs were working as facilitator organisations of the Government of West Bengal, which was the main implementing agency of ICZMP in Sundarbans region. Under ICZMP, a set of common interventions were simultaneously carried out by different GOs and NGOs in different areas of Sundarbans for ensuring a uniform reach/coverage.

List of beneficiaries who had availed benefits of intervention related to fisheries development during the year 2012-13 to 2014-15 was collected from different organisations. A population was formed by the total number of beneficiaries enlisted for each organisation. From the population, 20% of respondents, those who have been continuing fishery activities and maintaining contacts with the concerned organisation, *i.e.* GOs/NGOs were selected by using simple random sampling without replacement technique for ensuring uniformity in selection. Consequently, a total of 150 respondents, each from GOs and NGOs were chosen from the selected blocks using a multi-stage random sampling technique with proportional allocation. Thus a total of 300 respondents were considered as the sample size for the present study (Table 1).

Livelihood impact assessment

Assessing the impacts of different developmental interventions is a common practice being followed in various organisations. It helps to ascertain the status of lives and livelihood of targeted people. Livelihood pentagon, as explained by Morse *et al.* (2009), is a diagrammatic presentation of five capitals of livelihood with their associated components *i.e.*, *Natural capital* (land, water, forests, air quality and biodiversity), *Human capital* (education, skills, knowledge, health, nutrition

Table 1. Sampling scheme

State	West Bengal, India										
Area	Sundarbans (19 Blocks)										
District and Block	District-I: 24 Parganas (South) Block: Gosaba, Basanti, Kakdwip, Sagar, Namkhana District-II: 24 Parganas (North) Block: Hingalganj										
Name of Organisation	GO			NGO							
	DoF	SDB	KRC	TSRD	SEED	Sabuj Sangha	PUPA	VIBT	Sundar-ban Dream	NEWS	
	<i>20% of total numbers of beneficiaries (universe) of each Organisations</i>										
Number of Respondents	100	30	20	30	20	20	20	20	20	20	
	150			150							
	Total: 300										

and labour power), *Physical capital* (roads, buildings, shelters, water supply, sanitation, energy, technology and communications), *Financial capital* [savings (cash as well as liquid assets), credits (formal and informal) and monetary inflows] and *Social capital* (social claims, social relations, affiliations and associations). The concept was borrowed from the Sustainable Livelihood Framework (DFID, 1999).

For measuring ‘the perception of impacts’ a tool was formulated adopting the standard methodology. Initially, a group of related variables were identified and an ‘item pool’ was created. Thereafter, validity of the selected items were measured through Judges’ rating and items, which were scored more than 75% were considered for inclusion (Hardesty and Bearden, 2004) in the measurement tools for pilot testing. Further, an interview schedule was prepared with reference to different interventions and classified under five major components namely, Fishery inputs, Infrastructure development, Capacity building, Financial assistance and Others, in consonance with five livelihood capitals given in Table 2.

The study used an *ex-post facto* research design. Respondents’ perceptions about the changes over the stipulated period were considered for the study with respect to selected variables associated with livelihood. Memory of the respondents in this regard acted as benchmark/control in delineating perception of changes in selected variables. A similar approach was adopted in National Demonstration Programme, where Farmers’ memory was considered as control (Prasad, 1987). After-only design was used as farmers are the best judge to depict the changes that happened in their livelihood (Basu, 1997).

A five-point Likert scale was used to record the perception of respondents regarding changes made by the interventions on different livelihood capitals, with 1 point as very low and 5 point as very high. Weighted average scores were calculated for scores obtained from different variables used in measuring the perceived impacts of fishers’ livelihood developmental programmes. Weighted average is an average computed by giving different weights to some of the individual values. For computing

the weighted average of a set of values, we need to have a corresponding set of weights. Here scores of 1, 2, 3, 4 and 5 respectively were used as weights for a set of values (Bonfietti and Lombardi, 2012). Further, the ‘Overall Perception of Impact’ across livelihood capitals with regard to different livelihood developmental interventions were also recorded on a five-point continuum and weighted average scores were calculated accordingly for further interpretation. The perceived Livelihood impact score was computed based on weighted average using the formula:

$$W = \frac{\sum_{i=1}^n w_i X_i}{\sum_{i=1}^n w_i}$$

where, W = Weighted average; n = Number of terms to be averaged; w_i = Weights applied to X values and X_i = Values

The Mann-Whitney *U*-test is useful when we intend to know if two independent sets of data show a significant overall difference in the magnitude of the variable we are interested in. The test assumes only an ordinal level of measurement since it is based on the ranking of scores. In the present study, it has been used to test the H_0 : there is no significant difference in the highest impact scores of different parameters of fishers’ livelihood interventions, undertaken by GOs and NGOs, respectively (Siegel and Castellan, 1988; Ghosh and Sharma, 2014). This comparison has been made to empirically understand the relative strengths of GOs and NGOs in respect to different livelihood developmental interventions with a purpose to suggest specific interventions to GOs and NGOs corresponding with their strengths. This would supplement the future livelihood development plans with higher efficacy.

The perception of constraints related to different livelihood developmental interventions for fishers under the categories of Financial, Capacity building, Political, Fishery inputs, Infrastructure and social were recorded on a five point continuum and those were ranked on the basis of their respective weighted average score. Spearman rank order correlation was performed to assess the association

Table 2. Livelihood interventions with sub-points

S. No.	Interventions
A	Fishery inputs distribution
i	Seed
ii	Feed
iii	Fertilisers
iv	Equipment (Hundies, net <i>etc.</i>)
v	Insulated box
vi	Moped/cycle/ <i>matsyajan</i>
B	Infrastructure development
i	Pond excavation (man-made)
ii	<i>Bundh</i> building/renovation
iii	Watch tower
iv	Street light
v	Fish markets
vi	Store house
vii	Ice plant
viii	Fish processing plant
ix	Demonstration centre
x	Laboratory cum testing centre
xi	SHGs and Cooperatives/Offices
xii	Housing/roads/culvert
xiii	Tube well
xiv	Bridge/Jetty
xv	Sanitation facilities
C	Capacity building programmes
i	Training
ii	Workshop
iii	Campaign
iv	Awareness programme
v	Sensitisation programme
vi	Consultancy services
vii	Demonstration
viii	Health Camps/Reproductive Child Health Programme
D	Financial assistance
i	Credit facilities
ii	Loans
iii	Subsidies/Incentives
iv	Special packages
v	Old-age pension
vi	Fish crop insurance
E	Others
i	Licensing (for the fishers)
ii	Distribution of biometric card to the fishers
iii	e-registration of boats
iv	Undertaking disaster management Interventions
v	Undertaking greening programme

between constraints of both GOs and NGOs in terms of their ranking.

It is to mention here that Kumaran *et al.* (2019) conducted a study on impact analysis of “Rainwater harvesting-based production system models”, namely, “land shaping for aqua-agri integration”, “brackishwater pond-based polyculture” and “paddy-cum-fish farming” towards enhancing livelihood security at Kakdwip and Namkhana blocks of South 24 Parganas District of West Bengal.

Livelihood impact matrix

Scholtes *et al.* (2003) highlighted the importance of impact matrix. This is an effective tool which helps organisations to convert strategy into action. To develop this matrix, the livelihood capital scores impacted by different organisations were placed in a matrix to portray the comparative positions of the intervening organisations in achieving the changes in fishers’ livelihoods.

Results and discussion

Socio-economic background of the respondents

The socio-economic profile is an indicator of an individual’s or family’s economic and social position in relation to others and this profile of fishers would enable the organisations (GOs and NGOs) to devise different livelihood developmental programmes in light of their specified socio-economic and livelihood needs. In connection with the different socio-economic parameters considered for the present study, the results showed that the majority of respondents (67%) were middle-aged, ranging between 31-60 years of age. Agriculture was mostly preferred (78.33%) among the options of primary occupation and fishery was the first choice among majority of respondents (76%) as a secondary occupation. Though Agriculture was mostly preferred as a primary occupation with a major share in food supplement by the respondents, it would not suffice the subsistence requirements due to their small or marginal landholdings and vulnerabilities associated with floods or cyclones. Thus, they opted as well as prioritised fisheries as their alternative livelihood option in the study area. As part of financial capital, 74.67% were found to have an annual income within ₹50,000 to 1 lakh, which could be categorised under middle-income group. Human capital reflected an intermediate level of education coupled with high skill in agri/horti farming with an average experience of 11.08 years. The average size of water bodies, possessed by the respondents was found to be 1.37 *bigha*. All respondents had their own in-house toilet, which is indeed an attention-invoking indicator under physical capital. A total of 29.33% of respondents possessed fishing nets, followed by hundies (15.33%). As far as the human capital was concerned, all the respondents attended training programmes followed by 60% respondents had undergone demonstrations and 52% took part in campaigns.

Perceived impacts of different organisational interventions on fishers’ livelihood development

Weighted average scores for all livelihood capitals are presented in Tables 3 and 4, respectively.

As part of overall perception of impact (Tables 3, 4, and 5), interventions like *Bundh* building/renovation,

Table 3. Livelihood scores of interventions by NGOs for fishers' livelihood development in the Sundarbans

Parameters	Average Livelihood Impact Score of Non-Governmental Organisations						Overall Perception of Impact
	Financial	Human	Natural	Physical	Social	Total	
Awareness Programme	0.00	4.40	0.00	0.00	4.40	8.80	4.40
Training	4.31	4.31	0.00	0.00	0.00	8.62	4.31
Health camps	4.22	0.00	0.00	0.00	4.22	8.44	4.22
Demonstrations	4.18	4.18	0.00	0.00	0.00	8.36	4.18
Laboratory cum testing facilities	4.17	0.00	0.00	0.00	0.00	4.17	4.17
Pond excavation	4.08	0.00	0.00	4.08	0.00	8.16	4.08
SHGs development	4.06	4.06	0.00	4.06	4.06	16.24	4.06
Sanitation facility	0.00	0.00	0.00	4.06	4.06	8.12	4.06
Bundh building/renovation	4.05	0.00	0.00	0.00	0.00	4.05	4.05
Housing/road/culvert	0.00	0.00	0.00	4.03	4.03	8.07	4.03
Seed	3.94	0.00	0.00	0.00	0.00	3.94	3.94
Greening programme	0.00	0.00	3.93	0.00	0.00	3.93	3.93
Tube well	0.00	0.00	0.00	3.90	3.90	7.80	3.90
Bridge/Jetty	0.00	0.00	0.00	3.90	0.00	3.90	3.90
Credit facility	3.90	0.00	0.00	0.00	0.00	3.90	3.90
Feed	3.86	0.00	0.00	0.00	0.00	3.86	3.86
Fertilizer	3.77	0.00	0.00	0.00	0.00	3.77	3.77
Equipment	3.72	0.00	0.00	0.00	0.00	3.72	3.72
Campaign	0.00	3.71	0.00	0.00	0.00	3.71	3.71
Disaster management interventions	3.71	0.00	3.71	0.00	0.00	7.42	3.71
Workshop	3.70	3.70	0.00	0.00	0.00	7.40	3.70
Moped/cycle/matsyajaj	3.60	0.00	0.00	0.00	0.00	3.60	3.60
Consultancy services	3.60	3.60	0.00	0.00	0.00	7.20	3.60
Loan	3.30	0.00	0.00	0.00	0.00	3.30	3.30
Sensitisation programme	0.00	3.23	0.00	0.00	0.00	3.23	3.23

Table 4. Livelihood scores of interventions by GOs for fishers' livelihood development in the Sundarbans

Parameters	Average Livelihood Impact Score of Governmental Organisations						Overall perception of Impact
	Financial	Human	Natural	Physical	Social	Total	
Laboratory cum testing facilities	4.80	0.00	0.00	0.00	0.00	4.80	4.80
Insulated box	4.60	0.00	0.00	0.00	0.00	4.60	4.60
Moped/cycle/matsyajaj	4.60	0.00	0.00	4.60	0.00	9.20	4.60
Housing/road/culvert	0.00	0.00	0.00	4.57	4.57	9.14	4.57
Bridge/Jetty	0.00	0.00	0.00	4.54	0.00	4.54	4.54
Seed	4.50	0.00	0.00	0.00	0.00	4.50	4.50
Feed	4.50	0.00	0.00	0.00	0.00	4.50	4.50
Old-age pension	4.50	0.00	0.00	0.00	4.50	9.00	4.50
Demonstration	4.47	4.47	0.00	0.00	0.00	8.94	4.47
Pond Excavation	4.23	0.00	0.00	4.23	0.00	8.46	4.23
Equipment	4.20	0.00	0.00	0.00	0.00	4.20	4.20
Bundh building/renovation	4.00	0.00	0.00	0.00	0.00	4.00	4.00
Credit facility	3.87	0.00	0.00	0.00	0.00	3.87	3.87
Biometric card	3.80	0.00	0.00	0.00	3.80	7.60	3.80
Sanitation facility	0.00	0.00	0.00	3.73	3.73	7.46	3.73
Tube well	0.00	0.00	0.00	3.45	3.45	6.90	3.45
Awareness Programme	0.00	3.43	0.00	0.00	3.43	6.86	3.43
Training	3.42	3.42	0.00	0.00	0.00	6.84	3.42
Fertilizer	3.37	0.00	0.00	0.00	0.00	3.37	3.37
Workshop	3.37	3.37	0.00	0.00	0.00	6.74	3.37
SHGs development	3.34	3.34	0.00	0.00	3.34	10.02	3.34
Greening programme	0.00	0.00	3.34	0.00	0.00	3.34	3.34
Street light	0.00	0.00	0.00	3.33	3.33	6.66	3.33
Licensing	3.23	0.00	0.00	0.00	3.23	6.46	3.23
e-registration of boats	3.14	0.00	0.00	0.00	3.14	6.28	3.14

Table 5. Results of Mann-Whitney U-test

Parameters	Total Perceived Score on Impact		Asymptotic Significance (p) value (2-tailed)	Decision
	GOs	NGOs		
Awareness Programme	6.86	8.80	0.00	H ₀ Rejected
Bridge/Jetty	4.54	3.90	0.00	H ₀ Rejected
Bundh building/renovation	4.00	4.05	0.54	H ₀ Accepted
Credit facility	3.87	3.90	0.00	H ₀ Rejected
Demonstration	8.94	8.36	0.00	H ₀ Rejected
Equipment	4.20	3.72	0.00	H ₀ Rejected
Feed	4.50	3.86	0.00	H ₀ Rejected
Fertilizer	3.37	3.77	0.00	H ₀ Rejected
Greening programme	3.34	3.93	0.00	H ₀ Rejected
Housing/road/culvert	9.14	8.07	0.00	H ₀ Rejected
Laboratory cum testing facilities	4.80	4.17	0.00	H ₀ Rejected
Moped/cycle/matsyajans	9.20	3.60	0.00	H ₀ Rejected
Pond excavation	8.46	8.16	0.00	H ₀ Rejected
Sanitation facility	7.46	8.12	0.00	H ₀ Rejected
Seed	4.50	3.94	0.00	H ₀ Rejected
SHGs development	10.02	16.24	0.00	H ₀ Rejected
Training	6.84	8.62	0.00	H ₀ Rejected
Tube well	6.90	7.80	0.00	H ₀ Rejected
Workshop	6.74	7.40	0.00	H ₀ Rejected

demonstration, housing/road/culvert construction, laboratory cum testing facilities and pond excavation scored greater than 4 for both GOs and NGOs. Distribution of mopeds/cycles/matsavyajans by GOs was perceived as having high livelihood changes with the score of 4.6. On the contrary, NGOs scored 3.6. The reason behind the success of this intervention was continued funding support under Rashtriya Krishi Vikash Yojana (RKVY), which is an additional central sector scheme.

It is evident from Table 3 that interventions of awareness programme, training, health camps, demonstration, laboratory cum testing facilities, pond excavation, SHGs development, sanitation facility, Bundh building/renovation and housing/road/culvert construction, carried out by NGOs were perceived to be bringing bigger changes as the scores were high. As seen from Table 4, interventions of insulated box distribution, moped/cycle/matsyajans distribution, construction of house/road/culvert, bridge/Jetty, seed distribution, feed distribution, providing old-age pension, demonstration, pond excavation, fishing equipment distribution and bundh building/renovation were perceived to bring better livelihood changes.

It is also evident from Table 3 and 4 that SHGs development accrued highest total score for both GOs and NGOs, accumulating five capitals of livelihood. Other parameters such as awareness programme and training found to have higher total score, indicating perceived

impacts on more than one capitals of livelihood. Overall livelihood scores were 3.99 and 3.98 respectively for GOs and NGOs, which showed medium to high change based on Median Split (MacCallum *et al.*, 2012). Mann-Whitney U statistic showed no significant difference between these two, indicating that interventions undertaken by both GOs and NGOs had a similar level of impacts on the development of fishers' livelihood in the Sundarbans region. Results of Mann-Whitney U-test (Table 5) also made it conspicuous that, except Bundh building/renovation ($p = 0.54$), all other interventions were found to have statistically significant differences among GOs and NGOs.

Impact matrix of organisations and livelihood capitals

It is clearly evident from Table 6 that, through the interventions of GOs and NGOs, Financial capital was impacted much in fishers' livelihood with a total score of 332.32 followed by Social (147.51), Human (143.39), Physical (100.85) and Natural Capital (14.81). The results implied that through various developmental interventions by both GOs and NGOs, economic conditions of the fishers in Sundarbans region developed the most.

Constraints and suggestions

Further, the study showed (Table 7) that financial problem was ranked first by respondents of both GOs (4.55) and NGOs (4.42) as they felt the financial assistance remained inadequate to meet fish farming/other

Table 6. Organisational-livelihood capitals perceived impact score matrix

Organisations	Livelihood assets	Perceived Impact Scores				
		Financial	Human	Natural	Physical	Social
NGOs	Tagore Society for Rural Development (TSRD)	33.24	13.23	3.80	24.43	24.70
	Sabuj Sangha	29.20	8.15	0.00	16.00	16.55
	Vivekananda Institute of Biotechnology (VIBT)	42.45	22.55	0.00	3.25	8.40
	Paribesh Unnyan Parishad (PUPA)	45.75	22.40	0.00	8.10	11.85
	Sundarban Dream	12.00	13.00	4.00	4.00	13.00
	Socio-Economic and Ecological Development (SEED)	38.72	13.50	3.71	12.71	17.21
	Nature Environment and Wildlife Society (NEWS)	16.80	20.33	0.00	0.00	8.00
GOs	Department of Fisheries (DoF)	63.70	11.21	0.00	19.94	29.24
	The Sundarbans Development Board	31.86	10.02	3.30	12.42	14.56
	Kakdwip Research Centre (KRC), CIBA	18.60	9.00	0.00	0.00	4.00
Overall		332.32	143.39	14.81	100.85	147.51

Table 7. Constraints identified by beneficiaries of both GOs and NGOs

Constraints	Weighted average		Rank		Correlation coefficient*
	GOs	NGOs	GOs	NGOs	
Financial	4.55	4.42	I	I	0.77
Capacity building	4.11	3.22	II	IV	0.66
Political	3.63	2.39	III	V	0.67
Fishery Inputs	3.31	4.03	IV	II	0.40
Infrastructure	2.46	3.53	V	III	0.88
Social	1.63	1.54	VI	VI	0.87

*Significant at 0.01 level

fisheries activities needs; thus, more funds from different sources was suggested to be sought. As presented in Table 7, scores of constraints related to Fishery inputs, Infrastructure, Capacity building, Political and Social parameters as obtained from GOs and NGOs indicate that the beneficiaries of GOs and NGOs perceived these constraints differently. Results of Spearman rank order correlation revealed that there was high and positive associations (at the 0.01 level of significance) among all the constraints of GOs and NGOs, except Fishery inputs (0.40) in terms of ranking.

As part of this study, GOs and NGOs were suggested to take up the interventions with a concrete plan of action that would ensure visible impacts on the livelihood of fishers. Deputing adequate manpower in GOs was suggested, and for NGOs, staff members were suggested to undergo foundation trainings/workshops on standard methods/procedures of project formulation and implementation. Moreover, a socio-economic and cultural database of beneficiaries is suggested to be made available towards devising and implementing any interventions on livelihood development in light of needs/priorities of target groups which would in turn reflect in higher impacts of those interventions (Ghosh *et al.*, 2018).

The study indicated that fisheries management policies, effective input supply, technical and social

support provided by different organisations have improved the livelihood of fishers. Among the livelihood pentagon, financial capital showed higher score. GOs and NGOs both have resulted in bringing positive changes in the livelihoods of the people, and thus they need to be strengthened. Further, the study has identified the relative strengths of GOs and NGOs in respect to different livelihood developmental interventions, which may be considered as a foundation in devising future livelihood development plans towards higher efficacy. Consequently, specific interventions can be assigned to GOs and NGOs based on their performances. Based on the findings, specific interventions, appropriate agency and targeted livelihood capital(s) can be identified, leading to improvement in the livelihood of fishers of Sundarbans in particular and the approaches may be extrapolated in similar situations where different agencies are striving to promote the livelihoods of people in dire need.

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