Journal of Crop and Weed, 14(3): 25-30 (2018)

Constraints analysis and formulating stratagems for fishers' livelihood development by governmental and non-governmental organizations in Sundarban, India

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Received : 08-06-17 ; Revised : 23-12-18 ; Accepted : 25-12-18

ABSTRACT

The present study was undertaken to ascertain the constraints on fishers' livelihood development in Indian Sundarban from multi-stakeholders view-pointsand formulation of Stratagems, backed by responses from both fishers and experts'. 150 respondents each from GOs and NGOs (total 300) were chosen from the selected blocks of 24-Parganas (North and South) districts by using multi-stage random sampling technique. Through discussion with beneficiaries and officials of different organizations, six broad categories of constraints were identified for Rank Based Quotient analysis. Beneficiaries across organizations were asked to rank their choices as highly severe constraint followed by next. Results of the study showed that Financial problem was ranked first by beneficiaries from both GOs and NGOs and the same was corroborated by the officials too as they sought more funds from different sources. The alteration in ranks of rest of the problems related to Fishery Inputs, Infrastructure, Capacity Building, Political and Social in case of GOs and NGOs indicate that beneficiaries of GOs and NGOs were not dealt in similar manner by these organizations as part of livelihood developmental interventions. Towards a comprehensive plan of fishers' livelihood development in Sundarban, stratagems, consisting of experts' suggestions and remarks have been formulated.

***Keywords*:** Constraint, fisheries, livelihood and Sundarban

A famous Bengali proverb goes that "*Joley Kumir, Dangai Bagh*," means 'tigers are on land and crocodiles are in the water' and perhaps, it is best suited with Sundarban. The aristocracy of Sundarban lies in the presence of the Royal Bengal Tiger. But on the other side of a same coin, there is another Saga of Sundarban, which is poverty driven, constituent of backward regions with frequent occurrences of different natural adversities and calamities. People of this region face hurdles and find the probable means of securing lives and livelihoods with enormous endurance. The concept of sustainable livelihood is increasingly important in research about regional development, poverty alleviation, rural agriculture development and rural resource management.In this context, many Governmental Organizations (GOs) and Non-Governmental Organizations (NGOs) have been intervening in different areas of fishers' livelihood development in the Sundarban region as poverty is multidimensional, it can be reduced by increasing people's livelihood assets such as social, physical, human, financial and natural (Omonona and Oyinleye, 2011).

Climate change is a global concern and Sundarbans is a vivid example of it, leading to submergence of many Islands of Sundarban into sea. Devastating cyclonic storm, *Aila* placed the conventional line of livelihood at stake in Sundarban region. The nature of different agricultural crops was changed due to increased soil salinity. Due to the region's natural environmental imbalances, flora and fauna are facing a serious threat from the reclamation of land for agriculture and settlement, cutting down of mangroves for timber and fire wood, setting up of fisheries in the rivers, canals, and creeks, excessive fishing throughout the year, indiscriminate collection of prawn seedlings, and the poaching of animals of commercial importance (DISHA, 2009).

Apart from these, there are other constraints which can directly or indirectly hamper the livelihoods of the fishers in Sundarban and one of the probable ways to get these constraints mitigated is by livelihood developmental interventions by different GOs and NGOs through inputs distribution, infrastructure development, capacity building, sanitation facilities, afforestation programmes, climate change initiatives *etc*. especially, for the fishing communities. But there are several issues too which can restrict the smooth interventions of GOs and NGOs, resulted in the hampered lives and livelihoods of the fishers in Sundarbans.

Studies by Reza *et al*. (2015), Pandey *et al*. (2014), Gupta and Dey (2014), Nandi *et al*. (2014), Pravakar

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et al. (2013) revealed different constraints, faced by the fishers in undertaking fish farming in their respective study areas but the constraints related to organizational interventions (GOs and NGOs) on fishers livelihood development from multi-stakeholders view-points are scarce and least known. In this background, the present study was undertaken with objective to study the constraints on fishers' livelihood development and formulation of Stratagems, backed by responses from both fishers and experts'.

MATERIALS AND METHODS

Out of 19 districts of West Bengal, 24-Parganas (North and South) districts respectively were considered as the locale of study as these two districts are prime constituents of Indian Sundabans. Out of 19 blocks underSundabans region, five blocks namely, Sagar, Gosaba, Namkhana, Kakdwip and Bassanti from 24 Parganas (S) and one block namely, Hingalganj from 24 Parganas (N) were selected for the present study. The selection was on the basis of higher concentration of fishers-cum beneficiaries of different organizations. From the list of beneficiaries, 150 respondents each from GOs and NGOs were chosen from the selected blocks by using multi-stage random sampling technique with proportional allocation. Thus a total of 300 respondents were considered as sample size for the present study.

Constraints related to different livelihood developmental interventions for fishers from the points of both Organizations and its' Beneficiaries were recorded through Snow ball sampling technique(Katz, 2006). Later, the constraints were categorized under different sub-heads, namely, Policy, Capacity Building, Scientific farming, Inputs and Infrastructure for better comprehension. The list of constraints was further validated though a preliminary discussions held with experts/officials/key informants.Rank Based Quotient (RBQ) (Sabarathnam and Vennila, 1996) was used to rank the six major categories of constraintsin order of the perception of the most severe constraints followed by the nextand Kendall's Coefficient of Concordance (W) (Siegel and Castellan, 1988) was used to ensure the degree of consensus among respondents in ranking those constraints. It was also attempted to develop a suggestive model for effective interventions for fishers' livelihood development by different GOs and NGOs in Sundarbans. Suggestions were collected from different officials and experts concerned with the field of Sundarbans with special reference to fisheries. In this context, the enriching suggestions of Padmashree Tushar Kanjilal, a renowned activist in Sundarbans, were documented in 'results and discussions' section.

Rank Based Quotient (RBQ) was calculated with the following formula as given by Sabarathnam and Vennila (1996)-

Rank Based Quotient (RBQ)

$= \Sigma [F_i (n+1) - i] \ / (N \times n) \times 100$

Where,

F_i = Number of respondents giving the particular point at i^{th} rank.

$i = i^{th}$ rank.

N = Total number of respondents.

n = Number of topics

For computing W, following formula, as given by Siegel and Castellan (1988) was used-

$$W = \frac{\sum_{i=1}^{n} (R_i - R)^2}{N\left(N^2 - 1\right)/12}$$

Where,

W = The degree of association among respondents in ranking the programme topics

R_i = Average of the ranks assigned to the topic

R = The average (or grand mean) of the ranks assigned across all topics

N = Number of topics being ranked

n = Number of respondents

$N (N^2-1) /12$ = Maximum possible sum of the squared deviations, i.e. the numerator which would occur if there were perfect agreement among the k respondents.

RESULTS AND DISCUSSIONS

As seen from tables 1 and 2, Financial problem was ranked first by beneficiaries from both GOs and NGOs and the same was corroborated by the officials too as they sought more funds from different sources. These two tables also show the ranks of rest of the problems related to Fishery Inputs, Infrastructure, Capacity Building, Political and Social. Alteration in rank of other constraints for GOs and NGOs indicates that the beneficiaries of GOs and NGOs were not dealt in similar manner by these organizations (Table 3).

The hypothesis that beneficiaries were applying the same standard in ranking the constraints was tested by analysing the significance of W, using test of large samples as given by Siegel and Castellan (1988) and the same method was applied in a study by Ghosh and Sharma (2014). The value of Kendall's Coefficient of Concordance (W) can vary between 0 to +1. It was found that W were 0.58 for GOs and 0.51 (table 1 and table 2) for NGOs, which reveals the degree of agreement among the beneficiaries in ranking the constraints. From this, it can be interpreted that beneficiaries were applying the same standard in ranking the constraints.

Table 1: Rank of constraints identified by beneficiaries of GOs

Constraints	*Fi	i^{th} Rank	RBQ Value
Financial	128	1	99.44
Capacity Building	118	2	91.56
Political	104	3	80.56
Fishery Inputs	91	4	70.33
Infrastructure	49	5	37.56
Social17	6	12.56	
W= 0.58			

Note : *Fi = Number of respondents giving the particular point at i^{th} rank*

Table 2: Rank of constraints identified by beneficiaries of NGOs

Constraints	Fi	i^{th} Rank	RBQ Value
Financial	116	1	90.11
Fishery Inputs	104	2	80.67
Infrastructure	92	3	71.22
Capacity Building	77	4	59.44
Political	71	5	54.67
Social26	6	19.56	
W= 0.51			

Note : *Fi = Number of respondents giving the particular point at i^{th} rank*

Table 3: Comparison of Ranks of constraints identified by beneficiaries of both GOs and NGOs

Constraints	Ranks	
	GOs	NGOs
Financial	1	1
Capacity Building	2	4
Political	3	5
Fishery Inputs	4	2
Infrastructure	5	3
Social	6	6

Apart from these six major problems, some specific problems were reported by beneficiaries of both GOs and NGOs, similar to constraints pointed out by Reza *et al*. (2015), Khatun *et al*., (2013) and Pravakar *et al*. (2013), presented in the table 4.

Based on the constraints faced by beneficiaries, the following points were suggested by GOs and NGOs' officials as well as beneficiaries for successful implementation of interventions by GOs and NGOs with higher impacts.

Stratagems for successful implementation of Interventions by GOs and NGOs with better impacts

Policy

- For disaster management strategies, supervision and good monitoring should be ensured.
- All the NGOs should be intensely involved in more extension and outreach activities.
- Good and advanced marketing facilities need to be ensured so that farmers can sell out their produce soon after it gets harvested.
- Marketing process should be made more transparent by eliminating the middle men.
- More financial supports need to be provided to the farmers by different GOs and NGOs.
- e-tendering systems of different GOs need to be made efficient for smooth and timely delivery of fishery inputs to the fishers/beneficiaries.
- Local manpower has to be involved in the developmental process.
- Development of agri-based small scale businesses like preparation, processing and packaging of turmeric and chilli powder can be a source of income and alternative livelihood option in Sundarbans region.
- Employment generation opportunities should be created by these organizations.
- Block level Fishery Extension Officers should be engaged more in fisheries activities.
- Technologies should be reached to all sections of people.

Capacity building

- Awareness needs to be generated among the fishers regarding prawn seed collection, loan repayment and fulfilling the purposes of providing loans should be ensured.
- Topics of training programmes should encompass all aspects of scientific fish farming and conduct of training programmes should follow the timeliness at par with different aspects/activities related to culture practices. For *e.g*., training programme on induced breeding may be conducted during pre-monsoon period.
- Training need assessment needs to be performed among the farmers on different aspects of fisheries, aquaculture and legislation.
- Training programmes on water conservation and prevention of water loss need to be conducted.
- Staff members of any NGOs should be provided with basic training on methodologies of carrying out any projects/interventions.

Table 4: Constraints faced by beneficiaries of GOs and NGOs

Types of constraint	Description
Fishery Related	○ Toxicity of pond waters caused by died fishes, caused in further fish mortality ○ Least selling price and increased input costs. ○ Disease outbreaks and improper renovation of bottom of bherries, caused in productivity loss. ○ Breeding grounds of many fish species and crabs are being destructed for construction of high drains. ○ Dry fish marketing losing its importance at Sagar and pollution gets intensified. ○ Women, who collect prawn seeds, get frequently affected by water-borne different gynaecological diseases. ○ Fishery was not included under the crop insurance programme. ○ Costs of inputs like lime had been increased as the acidity of soil got raised after devastating aila. ○ Lack of fish marketing skills among farmers and inadequate scopes of fish marketing in the Suundarbans region. ○ Lack of good quality fish seeds available at fair price. ○ Indiscriminate activities alongside the water bodies reduce the availability of wild prawn and fish seeds.
Capacity building	○ Lack of quality, skilled, enthusiastic and dedicated manpower. ○ Lack of learning desire among a section of farmers. ○ Lack of leadership and socio-political qualities among the farmers.
Social	○ Alcohol Addiction among a section of farmers. ○ Bio diversity restoration programmes were not up to the mark and participation was also very less. ○ Emergence of quack in rural areas were in large numbers was a cause of concern.
Others	○ Interrupted and low voltage electricity supply. ○ Irreparable losses of natural resources due to floods. ○ Unavailability of good market value for some varieties of coarse rice, produced in Sundarbans region. ○ Application of chemical fertilizers, caused in acidic soils and losing soil fertility. ○ General infrastructure facilities like schools, colleges, health centres were not built up as per the need of places due to adverse geographic locations. ○ Lack of disaster management strategies, supervision and monitoring.

Scientific farming

- Professionalism needs to be inducted in scientific fish farming practices.
- Technological and improved scientific interventions need to be incorporated in the existing fish farming practices.
- Location and soil profile specific rice and agricultural crops and vegetables varieties need to be promoted to farmers by experts and officials of different GOs and NGOs
- Marketing Information System should be followed from production to selling for ensuring good market price

Inputs

- Fertilizers and others inputs need to be provided concurrently after providing seeds and training programmes on scientific methods of application of fertilizers, dosage and use of farming equipment / machineries should be conducted.

Infrastructure

- Improved hatchery and seed production units need to be developed for quality seed production and capacity building cum training programmes in these aspects need to be organized.
- Block level fish feed preparation and training unit and cold storage, ice plant, kisan mandi, fish markets in closer vicinity, facilitated with good transportation facility need to be developed.
- Scientifically engineered pond excavation and compaction of pond bottom/embankment should be made with precision under Government's supervision and financial assistance and it can be facilitated by NGOs. Durable embankment is crucial for brackish water aquaculture.

Out of many experts' suggestions and remarks, the enriching suggestions of Padmashree Tushar Kanjilal, the renowned activist and 'everyone's teacher' in Sundarbans region are listed below-

- During rainy season, different islands of Sundarbans get inundated and after some days the water gets away. Thus, it is suggested to harvest the rain water as an input for fresh water aquaculture.
- There are many vested beels and stagnant canals/ channels in Sundarbans region remain unused. Thus, it is suggested to make use of these water resources by GOs /NGOs itself through aquaculture by means of water conservation, suitable infrastructure development and capacity building among stakeholders or these may be given to third parties on lease for earning revenues.
- Small scale integrated Agri (Vegetables/Fodder) cum fish culture has a good potential in the Sundarbans region. Thus, farmers can make use of it economically.
- Supply and utilization of brackish water for production of saline resilient fishes should be intensified
- Socio-economic, political and cultural upliftment of people should be ensured for enabling in timidation free thoughts and activities towards self-dependency.

The study highlighted the fact that GOs and NGOs in Sundarbans region undertake project activities and training programmes related to different capacity building programmes on disaster management in fisheries and aquaculture, techniques of climate resilient aquaculture, fishery inputs and supports for mitigating the adverse effects of climate changes and restoring aquaculture practice. However, it is apparent from the study that there is no comprehensive plan of activities or vision regarding the fishers' livelihood developmental interventions in a more diversified manner. GOs and NGOs are taking up of interventions as per the findings/ assignments received rather than having a concrete plan of action with visible impacts on the livelihood of fishers. Steps are needed to have a plan of action in this regard.As part of GOs, there is a dire need to depute adequate manpower for looking after of projects at post-implementation phase and as far as the NGOs are concerned, NGOs staff members need to be undergone foundation trainings/workshops on standard methods/ procedure of implementation of different projects for livelihood development. Moreover, all the organizations have to have a socio-economic and cultural data base of its' beneficiaries before starting interventions on livelihood development for assessing the needs/priorities of target groups (Ghosh *et al.*, 2017). This would ensure better impacts of different livelihood developmental interventions. As many parts/islands of Sundarbans are distantly located and hardly reachable, group awareness programmes would be very much effective to let the inhabitants know about the detailed interventions being offered by different GOs and NGOs especially, for the fishers livelihood development and accordingly,beneficiaries can participate and avail the benefits of those interventions, leading to inclusive livelihood development across different regions of Sundarbans. In this context, a micro-level constraints analysis can be done, considering health hazards and issues of forced migration faced by inhabitants of Sundarbans region.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the support and involvement of Respondents and Concerned Officials of different organizations and funding support of Department of Science and Technology (DST), Government of India for carrying out this study.The authors would alsolike to thank Hon'ble Vice Chancellor, WBUAFS for his support.

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