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Understanding Livelihood Characteristics and Vulnerabilities of Small-scale Fishers in Coastal Bangladesh

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Abstract

Small-scale fishers are considered as one of the most vulnerable communities in Bangladesh but very few studies focused on the livelihood sustainability and vulnerabilities of this professional group. A fieldwork in lower Padma and upper Meghna hilsa sanctuaries identifies different livelihood characters and associated vulnerabilities of the fishers. A conceptual framework known as Sustainable Livelihood Approaches (SLA) has been introduced to analyses the qualitative and quantitative data. The insights of the livelihood strategies provide on small-scale fishers and fisheries management have been explained and explored. Fishers are found solely dependent on fishing, economically insolvent and neglected. In addition, some socio-economic abstractions such as low income, credit insolvency, lack of substitute earning flexibility make them more vulnerable. A number of effective suggestions are elicited from fishers' perceptions, the implementation of which is crucial to ensure livelihood sustainability of the small-scale fishers.

Keywords: Livelihoods; Sustainability; Vulnerability; Small-scale Fishers; Bangladesh

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1. Introduction

Bangladesh is a Riverine and located in the South Asia between 20°34' to 26°38' N latitude and 88°01' to 92°42' E longitude with an area of 147570 sq. km and a population of about 140 million[1]. Inland open water capture fisheries production Bangladesh ranks third and fifth in aquaculture production in the world[2].At present, Bangladesh ranks 4th in the world in tilapia production and 3rd in Asia[3]. 60% of the total Hilsa (*Tenualosa ilisha*) in the world also comes from Bangladesh (Sunny et al., 2019a; Sunny et al., 2017).Hilsa supports 11% of total national production (394, 951 MT) and contributes 1% of the Gross Domestic Product (GDP) of Bangladesh[4,5,6]. Hilsa fishery also support livelihood of a large number (3 million) of small-scale fishers of Bangladesh[4,7,8]. Fluctuations in hilsa catch adversely affect the livelihoods small-scale fishers particularly in the coastal Bangladesh[4,9]. Small-scale fishers are considered as one of the most vulnerable communities in Bangladesh although support about 12 million people directly and indirectly[10]. They live from hand to mouth and are recognized as the poorest of the poor[2,11,12]. Most of the fishers are landless, poor and fully dependent on fishing for their livelihoods. Some socioeconomic constraints like increasing fishers number, low income, lack of alternative income generating activities, loan complexity, piracy and price hike make their life miserable[4,13,14]. Annual per capital income (BDT 2,442) of the fishers is almost 70% lower than the per capital income of the country as a whole[4,11]. Hilsa fishers suffer most among the small-scale fishers due to restriction on catching hilsa during ban period, frequent natural calamities and seasonality[5,15,16,17].

Vulnerability in the literature of both disaster and development, a widely used term has linked to poverty, both as a causal factor and a direct product. It can be defined as the universal level of exposure to risks, shocks, stresses, and food insecurity[4,18,19]. All these factors affect the sustainability of livelihood. A livelihood will be sustainable if it can cope with and recover from stress, shocks, maintain or enhance its capabilities and assets for present and next generation. Livelihood assets could be categorized as natural, physical, human, financial and social capital[4,20,21]. Human capital of the small-scale fishers includes the skills, working ability, knowledge, and good health. Natural capital includes land, water, wild fry, fish, molluscs and all the fisheries products. Fishers' incomes and savings are considered as the financial capital. Physical capital includes house, fishing gear, boat, road and communication system, electricity,

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water supply, sanitary and existing health facilities. Social capital includes credit, relationship and cooperation, cultural norms and sharing of knowledge[1,4].

Shariatpur is a gathered place for small-scale fishers due to presence of both the mighty Padma and Meghna River. The Padma covers Naria and Bhedargaj upazila and the Meghna covers only Bhedarganj. Bhedarganj is blessed with Riverine fisheries resources and the major catches are hilsa, poa, icha, taposhi , bata, pangas etc[4]. For a long time, different types of fishing gears have been used in the sanctuaries of the Padma and Meghna. The intensity of use of any type of gear in the sanctuaries depends on the intensity of target fish population found in the River. Some gears are selected for specific species whereas other use for a number of species during operation. The choice of nets also depends on the case of operation and varies in the different places of the same River[11,22,23]. People of the Riverside particularly depend on hilsa fishing to support their livelihood.

Sustainable livelihood is pre-requisite to achieve the Millennium Development Goals (MDGs)[24,25]. Adequate and precise information on the livelihood characteristics of the target community is essential and decisive for decision making but lack of required information of economically backward small-scale fishers is the major obstacles to the successful development of their livelihoods[1,4]. Considering the above facts, the present study is carried out to assess the livelihood sustainability analyzing different livelihood assets and associated vulnerabilities of the small-scale fishers of the hilsa sanctuary in the Padma and Meghna River.

2. Materials and Methods

2.1 Study sites

The study was conducted in the fishing communities of Char Bhaga union in Bhedarganj upazila under Shariatpur district (Figure 01).The upazila was located in between 23°08' and 23°24' north latitudes and in between 90°23' and 90°36' east longitudes. Reasons behind selecting the communities were presented below-

- The suitability of the area to meet the study objectives
- Location on the bank of the lower Padma River and access to Meghna River
- Presence of fish landing center (Mach ghat) to fishing community.

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- Availability of very poor, ladless fishing communities.
- Involvement of large number people in fishing.
- Indiscriminate use illegal fishing gear.

Figure 01: Map of the Study area

2.2 Formulation of questionnaire

To identify the fishers' socio-economic condition a scheduled interview were conducted for gathering information about fishers' demography, health, sanitation, household, income, credit, savings, literacy and land ownership etc. A structured questionnaire was designed by following De Vaus [26] that also included socio-economic parameters, the living and survival strategies to understand fisher's condition.

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2.3 Questionnaire interviews (QI)

Random sampling method was adopted for questionnaire interviews. There were almost 90 fishermen randomly selected for interviews from the study area. They were interviewed by their houses and Riversides only when they were available and per interview were taken almost half an hour by each fisher.

2.3.1 Focus group discussion (FGD)

Participatory Rural Appraisal (PRA) tool as FGD was used in this study. Focused group discussion was conducted towards the fishers in order to find out socio-economic condition and existing fishing systems.

2.3.2 Cross-cheek interviews

Upazila Fisheries Officers (UFO) and other associated personnel were selected for cross-check interview

2.4 Secondary data collection method

The data was collected from various secondary sources to complete the study. Various scholarly articles and relevant literature were quoted from relevant technical and newspaper reports. All of these aggregated data were comprehensively reviewed; synthesized and relevant data were used in this study.

2.5 Data processing, analysis and presentation

Interviews and data from FGD were coded and inserted MS Excel (Version 2016) for processing and analysis of tables, figures etc. for results presentation. The Department for International Development (DFID) sustainable livelihoods framework[1,20] was applied to shape the qualitative and quantitative data.

2.5.1 Sustainable Livelihoods Approach (SLA)

Livelihood become sustainable when it could cope with and overcome stresses, shocks, and maintained capabilities and assets for present and future generation[1,4]. The concept of a ‘livelihood’ combined together the critical factors that affect the strength and weakness of

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individual or family survival strategies[27]. The fishers had more or less various type assets as defined by the DFID sustainable model which could be classified as human, natural, financial, social and physical capital[28]. The sustainable livelihoods framework as whole can reflect the risk that the poor might be very vulnerable, the assets and resources that could help them to improve and survive, and the policies and institutions that affected their livelihoods[20]. The SLA framework showed that in different context, the constraints of different livelihood assets were achieved that were consolidated following different livelihood strategies.

3. Results and Discussion

3.1 Social profile of the fishers

Socio-demographic status of the fishing communities was quite different from the other professional communities. There were 1500 people lived in 185 households (HH) in the Charvaga village. Among 185 HH, 102 HH±2HH (mean ± standard deviation) were intensively involved in fishing and 83 HH±3HH were involved both in fishing and small business. Most of the fishers (84%±2%) provided hired labor and had no fishing net and boat of their own. All the fishers lived below the poverty line. The percentage of extreme poor (land size 0 decimal), poor (land size <5 decimal) and moderately poor (land size >5 decimal) was 25%±3 %, 51%±4 % and 18%±1 % respectively (Table 1). There were 130 nomads and 30 gypsies living in this area. The nomadic families stayed here for six to seven months in a year and worked as day laborers in their own areas for the remaining five to six months. Among the locals, only the men fishers were found in fishing but gypsy women were seen fishing in the Padma River. Women of fishing communities were not self-reliant. Women had less decision making capacity in their family and had to depend on their male family members. Community people were at risk due to natural disasters as well as low income and lack of employment which hindered livelihood sustainability. Livelihood means the ability, resources, assets and activities that are needed to make a living[1,4].The livelihood assets of the fishers could be categorized as human, natural, financial, social and physical as defined by the DFID that indicated the actual socioeconomic status of this marginalized vulnerable community[4,29].

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Table 1: Social profile of the fishers

Variable	Status	Mean (± SD)
Population	Total number	1500
House hold	Total number	185
	Number of exclusive fisher	102 (2)
	Number of other	83 (3)
Gipsy	Number of HH	30
Nomad	Number of HH	130
	Temporary period (month)	6 (1.2)
Land size (decimal)	Extreme poor	0
	Poor	<5 (0.5)
	Moderately poor	>5(0.5)
Women's decision making capacity	Yes	1%
	No	99%
Climatic hazards affect daily life	Yes	95%
	No	5%

3.2 Livelihood assets of the small-scale fishers

3.2.1 Human capital

3.2.1.1 Fishers' type and fishing duration

A large number of fishers used to fish in the Padma sanctuary and adjacent Meghna River. Fishers could be classified into three groups based on their practice named as professional fishers, seasonal fishers and subsistence fishers. Professional fishers depended on fishing almost round the year for their livelihood. Seasonal fishers caught fish only a particular time of the year which kept them engaged in other income generating activities to support their life. Subsistence fishers caught fish mainly for their home consumption to meet family demand and sold remaining (if have) to add money in family income. They study found 55.5%±2% (mean ± standard deviation) were professional following seasonal (35%±3%) and subsistence (55.5±2). Rana et al.[11] found 91% professional fishers and 9% seasonal fishers in the Meghna River.

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Professional and seasonal fishers were known to go fishing both day and night. Subsistence fishers were only seen fishing during the day. The average fishing time was recorded for Professional fishers 12±2 hours, 15±2 hours for seasonal fishers and 4±1 hours for subsistence fishers. Average fishing duration of the fishers of the Meghna River was recorded15 hours in a day (24 hours) [11].

3.2.1.2 Marital status and family types

Marital and family background was important to assess socioeconomic status, live to sustainability and disaster susceptibility. The study identified 55%±2.2% (mean ± standard deviation) were married following unmarried (40%±1.4%) and divorced (5%±0.4%). There were no oppressed persons in the study area. Family type varied from joint to nuclear. It was found that 30%±1.5% of the people lived with joint families and 70%±4.2% lived with nuclear families in this region. The nuclear family was very popular due to its abundance of movement and economic opportunities, better clothing, better education, and women authority. The family size was 5±1.1persons in nuclear families and 10±2.2 persons in joint families. 5.1±2.11 members in nuclear families and 10±2.05 members in joint families of the fishers of the Padma River in 5thhilsa sanctuary of Bangladesh was reported earlier[4]. Another study found that 78% had average 5, 14% had 3 members while 8% had 9 members in their family among the fishers of the Padma River in Rajshahi region which also reflected the findings of this study.

3.2.1.3 Age distribution and fishing experience

The age structures of the fishers were an important indicator in taking decision and maintaining a profitable fishing operation. 40%±3.2% (mean ± standard deviation) of the studied areas was in the age group of 41-50 years. It was found that 20%, 20%, 10%,10% and 0% of fishermen were belong to age group in 21-30,31-40, 51-60, and 61-70 years respectively. The result showed that 41-50 years age group was considered more active due to their physical strength and young generation was less interested in fishing. The finding of the study was merely similar with another earlier study who reported most of the fishers in 31-50 years age group in their study respectively in the Padma (in 5thhilsa sanctuary), Padma (outside the hilsa sanctuary), Meghna and Kirtonkhola River [4,11,30]. The average fishing year was 15±3 years with a minimum of 2.5 ±1.2 and a maximum of 17±3 years

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3.2.1.4 Religious status

In the present study 100% of the fishers was Muslim as the entire population of this village was Muslim. Religions and castes played a vital role in fishing and trading of small-scale fishers. Currently the involvement of Hindus in fishing in the Padma sanctuary was increasing.[4]

3.2.1.5 Educational and literacy status

A minimal educational background was necessary for success in the use of natural resources of Padma sanctuary but the state of education in the study area was not so good. Majority of the small-scale fishers were either illiterate or only can sign. Fishers were classified into four groups based on their level of education. Among the fishers 50%±2.5% (mean ± standard deviation) had no education (illiterate), 30%±1.5% could only sign, 10%±0.2% had primary level (class 1 to 5) and 10%±0.2% had secondary level education (class 6 to 10). Poor socioeconomic status (55±1.5), early fishing involvement (30±1.4), unavailability of educational institution in the surrounding areas (15±0.4) were the main responsible factors of low literacy rate. A previous report mentioned 88% fishers were illiterate[31].

3.2.1.6 Nutritional status

The nutritional status of the fishers was not satisfactory. Fisher's families did not have appropriate knowledge about the nutritional quality of food and the importance of balanced diet[1,4]. 68.5±3.3 (mean ± standard deviation) did not eat enough and nutrition sensitive meal three times a day. They sold their fish to get more money. Their main diet is only vegetables with rice most of the times (25±2) in a month that induced malnutrition and disease susceptibility. Same scenario was also found health and nutritional misery among the marginal fish farmers of Barisal region[4,32]. Common diseases of the small-scale fishers were headache (75±5), flu (68±5) and fever (54± 5).

3.2.2 Physical capital

3.2.2.1 Housing and infrastructure

In the study area, houses of the community were of two main types named as katcha-houses and semi pacca houses. Katcha-houses were made of bamboo spill and tin with mud flooring and semi pacca- made of wood and tin with cement floor. In this community 90%±4.5% (mean ± standard deviation) of housing structures were kacha, and only 10%±0.5% were semi pacca.

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Road and transportation system was not developed. There was only a local road to communicate with upazila and district city. The status of other roads which were used in local communication among the communities was very poor.

3.2.2.2 Available fishing gears

Fishers used different fishing gears to catch different fishes. The use of fishing gears also varied from season to season depending on availability of fish.A total of 10 types of fishing gears in 3categories like *gulti jai*(drift gill net), *current jal* (drift gill net), *ber jal* (drift gill net), *pangaissha jal* (drift gill net), *moia jal*(seine net), *mushuri jal*(seine net), *gachi jal*(seine net), *boro chai* (fishing trap), *dar chai* (fishing trap) and *gura chai*(fishing trap) were found in this area(Table 2). Among the gears only gultijal and pangaissha jal were legal and others were illegal. *Berjal*, *moiajal*,*mushurijal* and *gachijal* were used round the year and remaining were seasonal. noticed Nine (9) categories of fishing gears in the Pagla River of Kishoregonj that included gill net, seine net, lift net, set bag net, push net, hook and line, long line, spears and traps were noticed in a previous study[33].

Table 2: Fishing gears used by the fishers

Gear	Categories	Operating man power	Specification	Status	Operating period
Gultijal	Drift gill net	4-10	Mesh size (4.5 cm)	Legal	August, September, January, February, March
Current jal	Drift gill net	2-5	Mesh size (3 cm)	illegal	Round the year
Pangaisshajal	Drift gill net	2-5	Mesh size (5 cm)	Legal	March, April, October, November, December
Berjal	Seine net	4-10	Mesh size (.5 cm)	illegal	Round the year
Moiajal	Seine net	4-10	Mesh size (.5 cm)	illegal	Round the year
Gachijal	Seine net	3-7	Mesh size (.4 cm)	illegal	Round the year
Mushurijal	Seine net	3-7	Mesh size (. 4cm)	illegal	Round the year
Boro chai	Fishing trap	1-2	large in size(mouth 6 ft. in length), exclusively used for large sized	illegal	March, April, October, November, December

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			fish; especially pangas		
Dar chai	Fishing trap	1-2	Small in size, approximately 3 ft. in length	illegal	March, April, October, November, December
Gura Chai	Fishing trap	1-2	Exclusively used for small fish with mouth size of 1 ft.	Illegal	March, April, October, November, December

3.2.2.3 Treatment facility

Medical facilities were also very limited in this area. They didn't have access to medicine and necessary treatment due to the absence of specialized hospital at the nearest distance. Fishers took immediate treatment from quacks. The study found 60% of fishers took allopathic, 20% homeopathic, and rest 20% take herbal and other treatment.

3.2.2.4 Drinking water facility

The study found that 80.2% ±2.1% (mean ± standard deviation) of the fishermen used tube-well water for drinking. Among them 9%±0.2% fishers used their own tube-well, 27%±2.2% used government tube-well, and 60%±2.5% used neighbors' tube-well. Remaining 10%±0.5% of fishers used well or *Indira* (specialized well in Bangladesh) water for drinking, 10%±1.1% of the fishers used ring-well water for drinking purpose. Those who used safe tube well water used it not only for drinking, but also for cooking and bathing. It was reported that 94.44% non-migratory fishers of the Padma River used tube-wells as a source of drinking water while only 10.53% migratory fishers of the Padma River used nearby tube-well water whereas, the greater proportions (89.47%) used River water for drinking and other purposes[24].

3.2.2.5 Sanitary status

The people were aware of sanitary problems and all the people were very keen to ensure safe sanitary facilities and used sanitary latrine. It was observed that majority (102) of the people had katcha (earthen) toilet and 83 respondents had semi-pacca (semi cemented) toilet. They observed

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in the fishers 92% fishers of the Padma River in northern Bangladesh used unhygienic toilet which indicated the poor sanitary status[25].

3.2.2.6 Electricity facility

The power situation in the fishing community was very fragile. Electricity was available to only 30%±3.5% (mean ± standard deviation) people. 70%±6.3% of the people in this community used solar power as a source to illuminate their homes. An earlier study mentioned the opposite findings and observed electricity connection in most fishers' house[10].

3.2.3 Natural capital

3.2.3.1 Land properties

The number of landless fishers was high in the Padma sanctuary. Extreme poor fishers were landless. Poor fishers had <5 decimal and moderately poor fishers >5 decimal land.

3.2.3.2 Biodiversity status

The sanctuary of Padma was situated in coastal region but most of the time the salinity range was close to zero. So, the fish biodiversity of this region was a combination of estuarine and freshwater fishes. The study recorded 71 fish species in the Padma sanctuary area (Table 3). Hilsa (*Tenualosailisha*) was the main commercial species of the Padma sanctuary.A total of 35% of recorded fishes were in cypriniformes, following siluriformes (24%), perciformes (16%),synbranchiformes (6%), channiformes(5%)and clupiformes (4%).Beloniformes, channiformes, osteoglossiformes represented 3% each andcyprinodontiformes,anguilliformes,gasterosteiformes,pleuronectiformes, tetraodontiformes represented 1% each (Figure 2).

Table 3: List of available fish species

Sl. No.	Order	Scientific identity of the taxon with author	Vernacular or local Bengali name	Common or English name
1.	Pleuronectiformes	Brachirus pan (Hamilton, 1822)	Kathal pata	Pan sole
2.	Cypriniformes	*Salmostoma phulo*(Hamilton, 1822)	Fulchela	Flying barb

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3.	Cypriniformes	*Esomus danrica* (Hamilton, 1822)	Darkina	Flying barb
4.	Cypriniformes	*Rasbora rasbora* (Hamilton, 1822)	Darkina	Flying barb
5.	Cypriniformes	*Chela labuca* (Hamilton, 1822)	Labuca	Hatchet fish
6.	Cypriniformes	Aspidoparia morar (Hamilton, 1822)	Morari	River stone carp
7.	Cypriniformes	Megarasbora elanga (Hamilton, 1822)	Along	Bengala barb
8.	Cypriniformes	*Barilius bendelisis* (Hamilton, 1807)	Joia	Hamilton's barila
9.	Cypriniformes	*Osteobrama cotio* (Hamilton, 1822)	Dhela	Cotio
10.	Cypriniformes	*Puntius sarana* (Hamilton, 1822)	Sar punti	Olive barb
11.	Cypriniformes	*Puntius chola* (Hamilton, 1822)	Chala punti	Chola barb
12.	Cypriniformes	*Puntius guganio* (Hamilton, 1822)	Mola punti	Glass-barb
13.	Cypriniformes	*Puntius conchonius* (Hamilton, 1822)	Kancha npunti	Rosy barb
14.	Cypriniformes	*Puntius ticto* (Hamilton, 1822)	Tit punti	Ticto barb
15.	Cypriniformes	*Puntius sophore* (Hamilton, 1822)	Jat punti	Pool barb
16.	Cypriniformes	*Puntius terio* (Hamilton, 1822)	Teri punti	One spot barb
17.	Cypriniformes	Cirrhinus reba (Hamilton, 1822)	Reba	Reba carp
18.	Cypriniformes	Devario devario(Hamilton, 1822)	Baspata	Bengal danio
19.	Cypriniformes	*Lepidocephalus guntea* (Hamilton, 1822)	Gutum	Guntea loach
20.	Cypriniformes	*Labeo rohita* (Hamilton, 1822)	Rui	Rohu
21.	Cypriniformes	*Catla catla* (Hamilton, 1822)	Catla	Catla
22.	Cypriniformes	*Cirrhinu scirrhosus* (Bloch, 1795)	Mrigal	Mrigal carp
23.	Cypriniformes	*Labeo calbasu* (Hamilton, 1822)	Kala Baush	Karnataka labeo
24.	Cypriniformes	*Labeo bata* (Hamilton, 1822)	Bata	Bata labeo
25.	Cypriniformes	*Amblypharyngodon mola* (Hamilton, 1822)	Mola	Molacarplet
26.	Cypriniformes	*Raiamas bola* (Hamilton, 1822)	Bhol	Trout barb, Indian trout
27.	Siluriformes	*Eutropiichthys vacha*(Hamilton, 1822)	Bacha	Schilbi
28	Siluriformes	*Eutropiichthys murius* (Hamilton, 1822)	Muri bacha	Muriusvacha
29.	Siluriformes	*Ompok Pabda*(Hamilton, 1822)	Modhu Pabda	Pabda catfish
	Siluriformes	*Ompok Pabo*(Hamilton, 1822)	Pabda	Pabo catfish

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30.	Siluriformes	*Wallago attu* (Bloch & Schneider, 1801)	Boal	Freshwater shark
31.	Siluriformes	*Silonia silondia* (Hamilton, 1822)	Shilong	Silond catfish
32.	Siluriformes	*Pangasius pangasius* (Hamilton, 1822)	Pangus	Pangas catfish
33.	Siluriformes	*Ailia coila* (Hamilton, 1822)	Kajuli	Gangetic catfish
34.	Siluriformes	*Rita rita* (Hamilton, 1822)	Rita	Rita, Striped catfish
35.	Siluriformes	*Sperata aor* (Hamilton, 1822)	Ayre	Long-whiskered catfish
36	Siluriformes	*Sperata seenghala* (Sykes, 1839)	Guizza ayre	Giant River catfish
37	Siluriformes	*Mystus vitatus*(Bloch, 1794)	Tengra	Stripped dwarf catfish
38.	Siluriformes	*Mystus cavasius* (Hamilton, 1822)	Golsha Tengra	Gangetic mystus
39.	Siluriformes	*Mystus bleekeri* (Day, 1877)	Golsha Tengra	Catfish
40.	Siluriformes	*Mystus tengara*(Hamilton, 1822)	Bazari Tengra	Tengaramystus
41.	Siluriformes	*Clupisoma garua* (Hamilton, 1822)	Garua	River catfish
42	Siluriformes	*Chaca chaca*(Hamilton, 1822)	Chaka	Squarehead catfish
43	Siluriformes	*Pseudeutropius atherinoides* (Bloch, 1794)	Batasi	Indian potasi
44.	Tetraodontifomes	*Tetraodon cutcutia* (Hamilton, 1822)	Potka	Ocellated pufferfish
45.	Beloniformes	*Xenentodon cancila* (Hamilton, 1822)	Kakila	Freshwater garfish
46.	Beloniformes	*Hyporhamphus limbatus* (Valenciennes, 1847)	Ekthota	Congaturi Halfbeak
47.	Cyprinodontiformes	*Aplocheilus panchax* (Hamilton, 1822)	Kanpona	Blue Panchax
48.	Channiformes	*Channa punctatus* (Bloch, 1793)	Taki	Spotted snakehead
49.	Channiformes	*Channa orientalis*(Bloch & Schneider, 1801)	Raga/Cheng	Walking snakehead
50	Clupiformes	*Tenualosa ilisha* (Hamilton, 1822)	Ilish	Hilsa shad
51.	Clupiformes	*Corica soborna* (Hamilton, 1822)	Kachki	The Ganges River Sprat
52.	Clupiformes	*Setipinna phasa* (Hamilton, 1822)	Phasa	Gangetic hairfin anchovy
53.	Synbranchiformes	*Macrognathus aculeatus* (Bloch, 1786)	Tara baim	Lesser spiny eel
54.	Synbranchiformes	*Mastacembelus armatus* (Lacepede, 1800)	Baim	Spiny eel
55.	Synbranchiformes	*Mastacembelus pancalus*	Guchi baim	Spiny eel

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		(Hamilton, 1822)		
56.	Synbranchiformes	Monopterus cuchia (Hamilton, 1822)	Kuchia	Gangetic mud eel
57.	Osteoglossiformes	*Notopterus notopterus* (Pallas, 1769)	Foli	Bronze featherback
58.	Osteoglossiformes	*Chitala chitala* (Hamilton, 1822)	Chital	Clown knifefish
59.	Perciformes	*Colisa fasciatu*(Bloch & Schneider, 1801)	Khalisha	Banded gourami
60.	Perciformes	*Colisa lalia*(Hamilton, 1822)	Lalkholisha	Dwarf gourami
61.	Perciformes	*Anabas testudineus* (Bloch, 1792)	Koi	Climbing perch
62.	Perciformes	*Chanda nama* Hamilton, 1822	Nama Chanda	Elongate Glass Perchlet
63.	Perciformes	*Parambassis lala* (Hamilton, 1822)	Lal Chanda	Highfin Glassy Perchlet
64.	Perciformes	*Parambassis ranga* (Hamilton, 1822)	Ranga chanda	Indian glassy fish
65.	Perciformes	*Chanda beculis* (Hamilton, 1822)	Chanda	Himalayan glassy perchlet
66.	Perciformes	*Glossogobius giuris* (Hamilton, 1822)	Bele	Freshwater goby
67.	Perciformes	*Rhinomugil corsula*(Hamilton, 1822)	Khorsula	Corsula mullet
68.	Perciformes	*Nandus nandus*(Hamilton, 1822)	Bheda	Mud perch
69.	Perciformes	Brachygobius nunus (Hamilton, 1822)	Nuna Baila	Bumblebee goby
70.	Gasterosteiformes	*Microphis cuncalus* (Hamilton, 1822)	Kumirer khil	Crocodile-tooth pipefish,
71.	Anguilliformes	Pisodonophis boro (Hamilton, 1822)	Bamosh	Rice-paddy eel,

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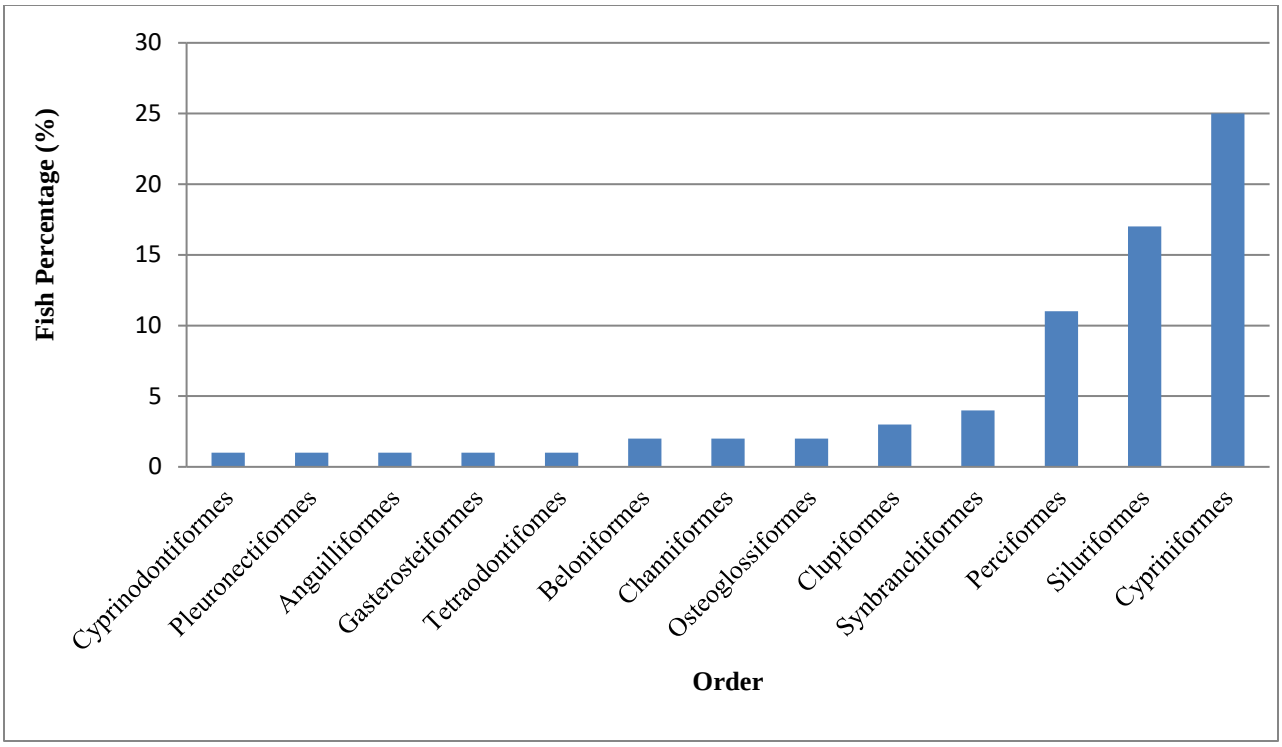

Figure 2: Percentage of different orders of recorded fishes

3.2.4 Financial capital

Income status

The level of income of a household determined the socio-economic status in a society[35].In most cases, the income of the fishers in Bangladesh was below poverty line[5,11,14]. The earnings of the fishers were comparatively lower than those of other marginalized communities. The average monthly income varied from 3000±255BDT to 7500±495BDT. Fishers in the South and Southeast Asia could be considered as the poorest of the poor[10]. Fishers had very rare alternative source of income for living other than fishing and selling[36]. They rented their labor on the agricultural land or spent time lazily and women raised chickens and ducks on a limited scale. Lack of capital, rearing space and skilled were their main problem faced by the fishers' women (Table 4). Outbreak of contagious diseases also discouraged fishing households to be involved in pet rearing. The study identified the necessity of diversified Alternative Income Generating Activities (AIGAs) to improve the living standards of the fishers.

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Table 4: Existing AIGAs for women and men of fishing households

Existing AIGA	Involvement	Inducing factors	Challenges
Agricultural activities	Man	• Availability of unused land • Source of food and income • Low investment • Less time consuming	• Limited working scope • Lack of modern technology • Lack of communication with Dept. of Agriculture
Sewing	Women	• Need less investment • Women can do by maintaining family • Regular income for day to day life	• Lack of money to buy or repair machine
.Hen rearing	Women	• Source of income • Provide egg and meat for home consumption • Increase savings	• Contagious diseases • Lack of rearing place
Duck rearing	women	• No need of artificial feed due to having vast water resources • Require less monitoring • Source of income	• Contagious diseases

3.2.5 Social capital

Credit operation

The study found 93%±5% (mean ± standard deviation) took loan but the institutional credit facilities were very limited due to lack of resource or property to mortgage. Fishers took loan to

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feed their families and buy fishing equipments (e.g. net, boat, fishing basket etc.) (48%±5%) fishers took loan from the boat owner and money lender (dadondar) and were forced to work round the year in favor of them. The boat owners (38%±4%) took loans from aratdar (middle man) and had to pay repayment by selling fish to aratdar at fixed price and commission rate. Fishers also took loan (52%±4%) from NGOs with high interest. It was observed that fishers took loan from multiple NGOs at a time and repaid the installments of the loansfrom One NGO to another. Among the NGOs Grameen bank, BRAC, ASA, NUSA, SDS were found to work in this area (Table 5).

Table 5: Name of the loan provider NGOs

Name of NGOs	Activities
Grameen bank	Micro-credit program
Bangladesh Rural Advancement Committee (BRAC)	Micro-credit program
Association for Social Advancement (ASA)	Micro-credit program
Naria Unnayan Samitty (NUSA)	Micro-credit program
Shariatpur Development Society (SDS)	Micro-credit program
	Child education program

Vulnerabilities of the small-scale fishers

Livelihood of this community mainly depended on hilsa fishing. Fishers caught hilsa mainly in January, February, May, August, September, October and December but income of fishers varied with seasonality that hampered the normal flow of livelihood. Food scarcity occurred during March and April and natural disasters become prominent during March, April, May and June. People of this community were very prone to natural calamities along with low income and lack of employment opportunities that hampered the resilience strategy to overcome the sufferings.

The main vulnerabilities reported by the fishers were ban periods, inadequate assistance during ban period, increasing fishing pressure, reduction in fish catches, creditor's pressure, weak value chain and poor market facility, loss of fishing equipments especially nets and boats during fishing etc. (Figure 03). Dependency on single profession made fishers' life more

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vulnerable[4,37,38]. Existing conflicts of the stakeholders like boat owner, money lender, also affects the stability of fishers' livelihood and allured to illegal fishing[35,39,40].

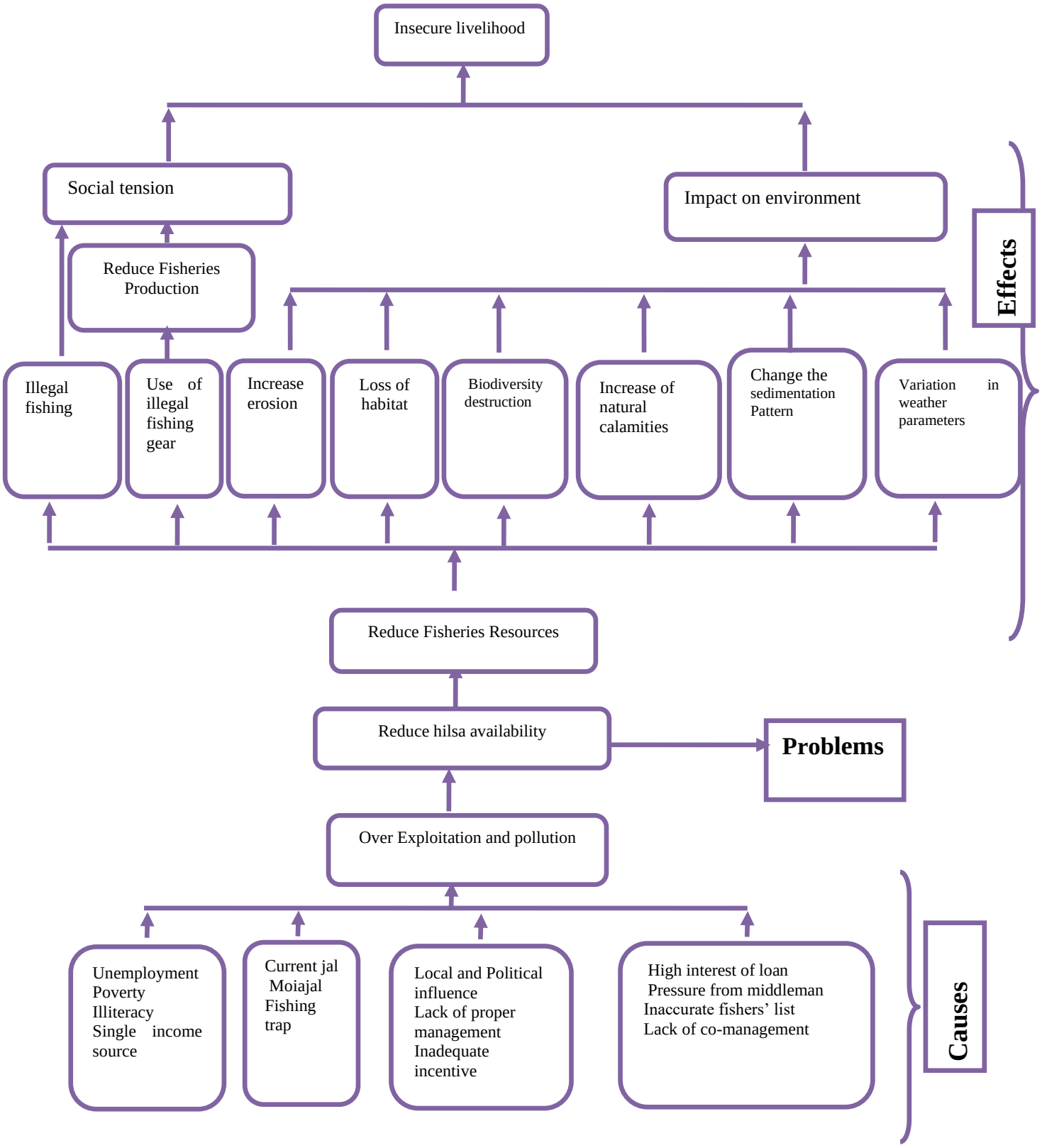

Figure 03: Vulnerabilities of small-scale fishers

Conclusion and Recommendations

In Bangladesh, the small-scale fishers were one of the most vulnerable communities in the society living with extreme rate of stratification, discrimination, social exclusion and economic domination. The pattern of their livelihood and living status was still below of average in the adjacent Padma and Meghna River. They were fully dependent on a single profession, economically insolvent and neglected. In addition, some socio-economic abstraction such as low income, credit insolvency, lack of substitute earning flexibility made them more vulnerable. To make their livelihood status better, some mandatory preamble should be taken. The government needs to ensure adequate assistance specifically financial support during the ban period and other unavoidable crises so that they could continue their profession. Government and affiliated NGOs should arrange training programs and skill developing seminars with knowledgeable and resource personnel for skill development of the fishers. Sustainable co-management, development of aquatic ecosystem, livelihood and vulnerability characteristics needs to be addressed by the policy-makers and researchers.

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