

A Research On
Fisheries Resources and Livelihoods of Fisher Community and
Possible Future Management of Beel Bakar, Monirampur,
Jessore, Bangladesh

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Message from Executive Director

Being a riverine country, Bangladesh maintains a great volume of water by its different channels like river, *beel*, *haor*, *baor*, lake and so on. *Beel* is one of the ancient types of water body in the context of Bangladesh. Although, the significance of *beel* resources are huge, the existing situation doesn't fit with its ancient beauty in many perspectives like human caused degradation, climate change, mismanagement in river system etc. But Ulashi Sreejony Sangha (USS), a non government development organization initiated to work for the improvement of the *beel* and *beel* dependent fishermen and farmers with the support of CSRL-Beel Campaign Group and OXFAM. CSRL is a national alliance of around 250 organizations representing diverse; mostly all the bionetwork of our country which emphasis on ensuring rural livelihoods through poverty reduction to achieve three goals of agriculture, climate change and trade. Among the eight local campaign groups (Haor group, Beel group, Plain land group, Char group, Coastal group, Barind group, Madhupur group, Hill group) Beel Campaign Group is an efficient one targeting to conserve *beels*.

This study represents the present and past status of Beel Bakar, Monirampur, Jessore, Bangladesh which includes biodiversity, socio economic condition of adjacent fisher folk and farmers and management issue in variable degree. As this study will reveal the complexities associated with the *beel*, USS is accountable to deal with this in CSRL approach. To conserve *beel*, it is obligatory to concern about the peoples dependent on its common resource. It influences the livelihood pattern as well as their life style. The analytical approach of this paper can contribute to categorize the possible intervention in the study area. This study can also make a step forward in Beel Campaign Group's activity by picking up the common scenario and some specific picture of *beel* in this southern delta.

Since 2008, USS is working in 13 districts with 24 *beels* as the Lead NGO of Beel Campaign Group. But the cooperation of all the partners, made this network a successful one. In 2012, the *Beel Bachao Andolon* (Save the beel movement) starts with the Beel Convention which created some new dimensions for the working pattern of this network.

Acknowledgements

Thanks to the fishermen, small farmers, landless and other beel dependent people living around the Beel Bakar for their long term involvement and vision for enjoying benefit in future too though in a challenging situation.

Research team likes to express cordial thanks to USS for giving a scope to conduct this study under CSRL approach. Appreciate Oxfam for supporting the main program for which this investigation was also made possible.

Gratitude also goes to OXFAM in Bangladesh for supporting USS in beel movement and the protection of beel dependent people's rights.

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List of Acronyms

CSRL	Campaign for Sustainable Rural Livelihoods
BWDB	Bangladesh Water Development Board
DoF	Department of Fisheries
DoE	Department of Environment
USS	Ulashi Sreejony Sangha
DSS	Dipshikha Sangastha
FGD	Focus Group Discussion
KII	Key Informants Interview
TRM	Tidal River Management
LGED	Local Government Engineering Department

Executive Summary

Among all the types of water bodies existing in Bangladesh, *beel* is obviously a fascinating one due to its biodiversity and ecological importance in local and national perspective as it contains and passes significant amount of water connecting with river channel which ultimately goes to the sea. *Beel Bakar* is a small *beel* in the southern part of Jessore District of Bangladesh. This study initiated to narrate the existing situation of the aquatic biodiversity of the *beel* along with identifying the past and present water management system, the socio economic aspect of the *beel* dependent fishermen and possible future status. This study was conducted by mix group discussion, focus group discussion, key informants interview, direct observation and household survey. Once this *beel* was rich in biodiversity and important for local fisheries. Though a considerable part of the *beel* and its floodplain is under gher culture, still there is scope to ensure protection and to enhance livelihoods of fisher community. In spite of the degradation of natural habitats of fishes, still 19 species of fishes are observed in the studied *beel* as well as some non fish organisms like snail, crab, mussel, frog, migratory and native birds. Diversity in fishing gear has come to a short list as gher culture is being encouraged in some extent. Most of the fishermen's income varies between 100-200 BDT only. Maximum fishermen live in semi concrete house and most of them have debt to bank or cooperatives. Experts and local fishermen both suggested to ensure the access of real fishermen in Beel Bakar and Mukteswari river to improve their circumstances. Excessive gher culture practice and possession of non fishermen over the water body are also the main constrains for this *beel* which has been disclosed from this study.

1.0 Introduction and Background

Beel is referred to large water surface water body that accumulates surface runoff water through internal drainage channel ^[1]. *Beels* and wetlands have not yet received proper attention in our country. According to DoF magazine 2013, in the 2011-12 fiscal year *beel* fisheries provided 85,208 Metric Ton natural and culture fish production where production is 746 kg/ha. This plays a significant role in fulfilling the demand of SIS (Small Indigenous Species) and other viable species. These fisheries aspect connects directly with the livelihood of a huge number of fishermen and other peoples living by the *beel*. Livelihood of real fishermen is immersed with debts, sorrows and many social and economic restraints. Though there are few initiatives but they are not adequate and in many cases not practical due to influence of vested people and as those approaches are not participatory. Usually *beel* dependent people are two types: farmers and real fishermen. Former one is based on individual property ownership pattern whereas later one is based on common property management. Value wise paddy is produced more in the *beel* compared to production of natural fisheries. Price wise value of fish produced from the *beel* exceeds the value of rice production. Again cost for agricultural activities is huge thus net benefit is very marginal compared to its investment whereas the cost of management and harvest in natural variety is very low compared to its nominal investment. Naturally produced paddy is safer than the cultured one.

Beel is often considered as wasteland that can be grabbed, encroached and altered as a whole or major part by destroying the ecosystem. Poor people usually do not have any say against the wealthier people who are usually pro-active in the introduction of new techniques including aquaculture. The fishermen are more neglected.

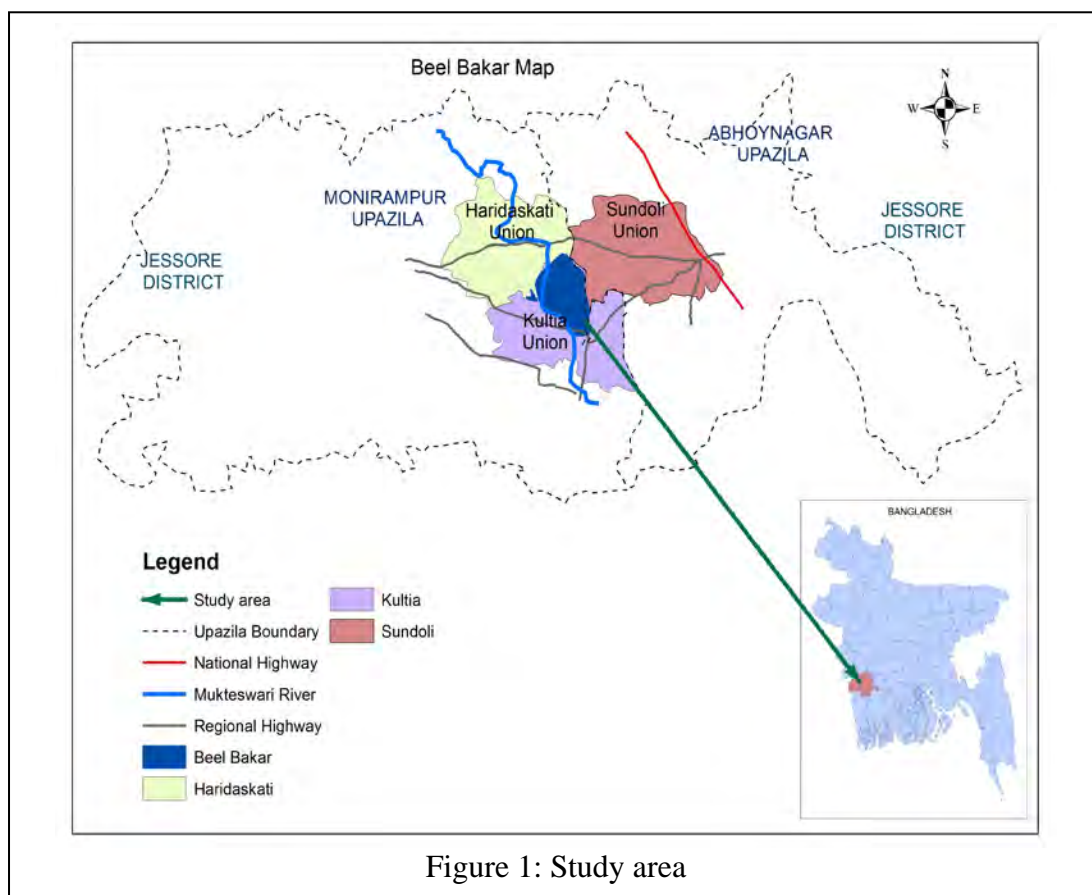
Many parts of the floodplain of the *beel* have been converted to gher (a small confined area mainly used for aquaculture but sometimes agricultural product during dry season). There are benefits and detriments of gher fish culture over the natural fisheries and agriculture. Direct income and scope for employment are available there, thus some people manage ghers and living better life but their number is very few. This system has led to negative impact on the environment too.

Livelihoods of the real fishermen of this *beel* dependent are very measurable. Some of them tried to adjust with other work but could not cope very nicely. Only few fishermen were able to take lease of land and doing fish culture. Most of the fishermen still prefer that they get an ensured access of the Mukteswari River which is their last resort.

In the *beel* and wetland which suffered inundation, water logging for longer period, triggered artificially for introduction of the natural systems by culturing various fish species. But aquaculture or gher fish culture becomes a practice for the influential. This study was conducted within very short period but intersected different quarter of the people including fishermen to know the changes, how it occurred and what is the present situation of the resources and people and future possible management for this *beel*.

2.0 Location and Area of the Study Site

The *Beel Bakar* is one of the important *beel* under the *Beel Dakatia Beel* Cluster and one of the first *beel* under the Mukteswari River system. The *beel* is situated mostly north of the Moshihati Bazar and south of the Monirampur-Abhoynagar road. The Mukteswari River runs through it from north to south and western side of the river belongs to Monirampur Upazilla (sub-district) and eastern side is under Abhoynagar Upazila. Haridashkati and Kultia are two unions (group of nearby villages) in which the *beel* is. To choose this *beel* as study site is relevant in this way that, it represents the maximum *beel* of Jessore-Khulna region and having similar ecosystem pattern, but it needs several interventions which should be come out from this initiative. Moreover, geographically it is a very important *beel* as it has people connected with both Monirampur and Abhaynagar Upazilla of Jessore district.



With present changed situation, it is difficult to identify the *beel* area though major part is reasonably deep and goes under water during wet season. In dry season water remains in the river and canals and also in low depressions. The floodplain and catchment area is quite big. It is estimated that the *Beel Bakar* is having an area of about 1750 Hectors including its floodplain.

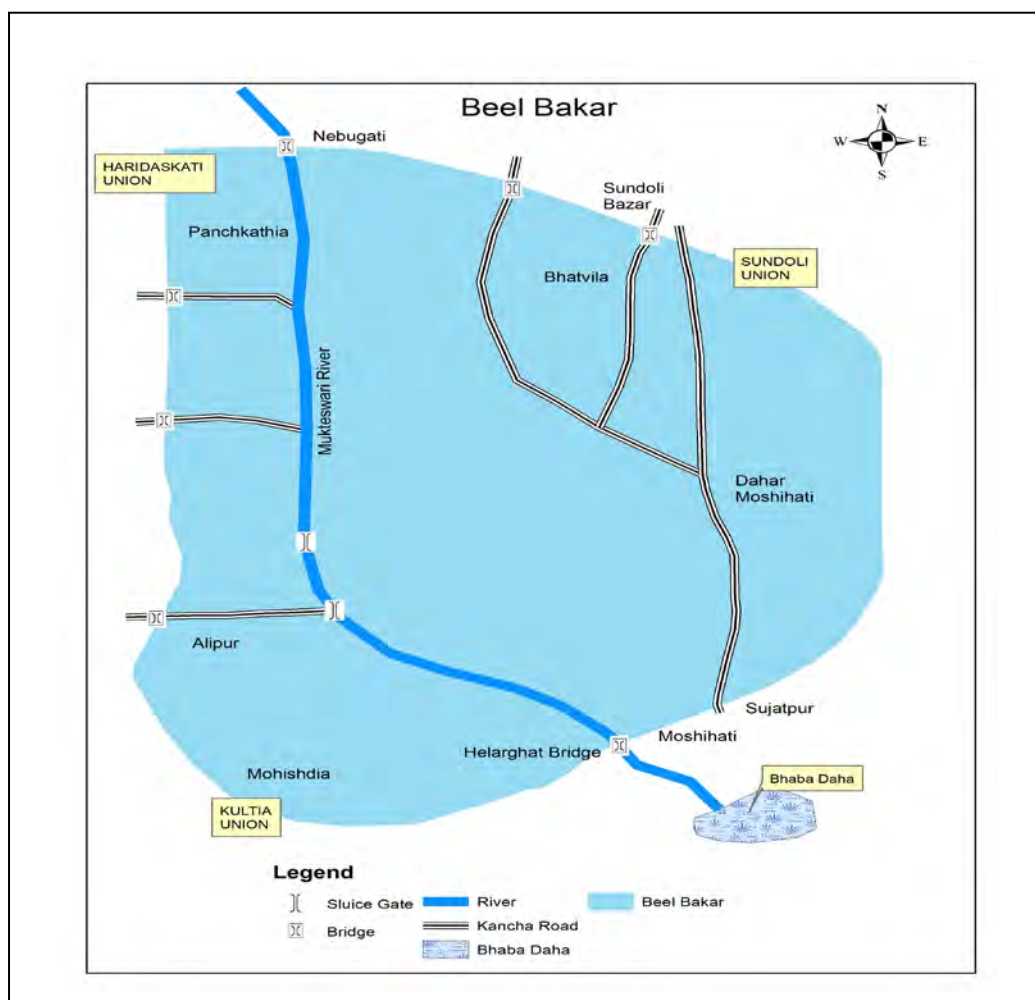


Figure 2: *Beel Bakar* covering the surrounding area of Mukteswari River

3.0 Objective

Main objective of this research work is to find out present situation, state of the livelihoods of real fishermen in the context of converting the floodplain to the fish culture gher. To depict the real picture of the *beel* dependent people's life and to practice proper documentation of campaign activity are also core objectives to conduct this research. This paper can be used as an advocacy tool in the study area to expand CSRL's campaign and to implement Comprehensive Agrarian Reform Program.

4.0 Approach and Study Methodology

Considering the short duration of the study and limited data, effort was given to gather information and to make an assessment for future possible management interventions. It is expected that this short investigation may be applied to an action research for this area in future. Following approach and methodology were used for collection of information and data:

FGD
Key Informant Interview
Direct observation and
Household Survey

Three FGDs were conducted with local fishermen and two with farmers. Another mix group discussion with diverse professions was also accomplished to get some discrete data. Six KII were performed respectively with two social workers, a teacher and lastly two gher owners. Forty fishermen's households were surveyed to know their socio economic condition in present days. To get proper data from this survey, question about their daily income pattern, family size, age group, alternative income source, ownership of land, house hold type, diet, loan, sanitation, drinking water, mobile phone use, medical service and some property related information were gathered which eventually resulted in a portrait of fishing community's life in study area.

5.0 Issues and Challenges

A. Major issues and challenges are:

- For long term context, general issues are water management related to tidal river basin. Once upon a time water logging was a serious problem for this *beel* and surrounding other *beel* areas.
- Due to construction of huge number of gher, for non gher operators and for the fishermen in particular major issue is changes in land use.
- In the context of aquatic environment, the food chain and natural fisheries propagation has been interrupted seriously.

B. Issues In General

Issues of present practices in general

1. Gher culture and impact of using unhygienic food on fish biodiversity of *beel* and fishermen
2. Threat to human health and to fish biodiversity

Limiting factors for propagation of *beel* fisheries in the studied *beel*

Gher system is the main barrier for the propagation of *Beel* fisheries and maintaining fish biodiversity. For this, proper management cannot put in place. Introduction of different interventional tools and activities cannot be established like fish sanctuary, habitat restoration and swamp forestry development.

Each gher has its own boundary and it stops regular water flow and also restricts flow of nutrition. So, fish cannot move in a natural manner. Sometimes it cannot reach its breeding ground.

The over population of some aquatic weeds also help to fall the water quality and eventually the fish propagation. This is associated with making the water stagnant and transparent which is a resultant of excessive man made intervention.

State of conflict and possible resolution: Fishers and farmers

Usually conflict remains within this two professional groups. Surprisingly, in this site there is no conflict between them. This is because traditional fishers are cornered so much that society does not count their sayings. On the other hand, farmers are also cornered by fish culturist.

State of conflict and possible resolution: Fishers and aquaculturists

Fishermen are silent but do have long term conflict with gher fish culturist. This is because they are grabbing most of the floodplain where fish grow. Encroachment to the river is also alarming. Many side canals are interrupted by ghers such a way that fish movement, breeding, grazing are hardly possible. Fishermen are not in a position to raise their issues in front of the fast growing fish farmers and outside investors as it appears that there is no issue. It is apparent that, more serious conflict or contradiction is going to take place between environment and the present trend of development.

***Beel* Fisheries and Fishermen's Livelihoods**

Every *beel* needs to maintain its open water fisheries for ensuring livelihoods of traditional fishermen. Control of the resources should not go to the person who has the control over resources other than *beel* also. Khas boundary needs to be demarcated and encroachment needs to be stopped.

Fish fry release and future access status

Fishermen claimed that the Fish Fry Releasing in open water by the line agency is being diverted by the influentials to their fish ghers instead of open *beel* and rivers. They demanded that program should be implemented in the river. If the non fisher gher owners make excuse that there is no open water any more then why that fry is not released to the ghers managed by fishermen. They feel that, they are to get the benefit of that program not by non fisher gher operators.

A matter of concern also envisaged that situation has come to such a position that in case fish fry is released in the river, the influential may capture the position or restrict real fishers in managing resources in the river. Thus, there may be a risk of losing the ruminant accessibility of the water body.

Reasons of degradation of fish and fisheries resources including habitat quality

- Role of Insecticide/pesticide in disappearing fish
- Affect of pesticides and fertilizers
- Limiting fish breeding and propagation
- Last gravid fish destroying leaving no fish to breed next year
- Agricultural practices without consideration of fishermen issues

Problems of the Farmers

Major problems are:

- a) Now a days paddy production is good than earlier, but the production cost is comparatively high.
- b) Gher practice makes a large portion of the *beel* busy in fish farming. This hampers the agriculture production of the *beel* area.
- c) Gher operators are rich people, thus expansion of gher farming is replacing small scale agriculture
- d) For the reason mentioned in the previous point, in monsoon many farmers become workless.

Gher culture status, impacts and solution

The rapid expansion of the gher construction should be controlled considering its carrying capacity in the *beel* by maintaining ecosystem functionality. As many people are interested in expansion of gher but a lot of people are now aware of the impacts of this. Solution is needed balancing demand and ecosystem based approach.

Local level planning should come with an outcome of planned zoning of the *beel* with recommended extent and pattern of ghers if needed. Following points may be considered as solution:

- a) Ghers should not be continuous or clusters. There should be adequate intervals.
- b) Ghers should be constructed with appropriate set back distance from the bank of the river or canal.

Local level problem with gher culture

- a) Gher owner hires the labors and guards from outside of *beel* area. People from South (Keshabpur and Monirampur town side) mainly regulate the gher business.
- b) Local people are deprived of the chance of getting employment from gher.
- c) The people, who own the ghers, are not real fishermen. This is why; they don't think of the natural habitat of the fish and kill the unwanted species (natural species) for culture purpose.
- d) Due to gher culture, agricultural production has declined also.

Fish migration and movement status

Fish migration and movement takes place up and downstream of the river and also laterally. Due to intervention and with number of fixed gears and net/bana migration and movement have seriously hampered. Lateral movement and migration also significantly affected due to construction of ghers without any spacing. As grazing area also encroached, number of fish in the river drastically dropped. Few sluice gates are constructed within the *Beel Bakar* but they are not for paddy cultivation but in virtue for the benefit of the gher operators. These sluice gates and gher constructed in front of bridge/culvert restrict not only fish movement but also contribute in changing water management.

Limiting Factors for Propagation of Beel Fisheries in this Studied *Beel*

In continuation of the fact mentioned in the previous section as fish migration and movement has been limited form, breeding of riverine and floodplain fishes hampered. Natural

recruitment dropped due to lack of migration and movement facilitating river/khal length. This has been restricting natural recruitment of fish.

Need for *Beel* Based Water Management Planning

Water management should focus natural fisheries and to some extent for agriculture and least for aquaculture/gher farming. DoE along with Upazilla or District authority should do this planning in participatory manner involving relevant experts. The local level planning should identify and execute how much and which areas of the beel should be identified and take necessary measures to implement it.

Need for *Beel* Based Environmental Planning

Unless *beel* based environmental planning is done in accordance of the fisheries planning, sustainability of the resource management can be worsen especially in the context of climate change. We do have coastal land use planning and even for greater Dhaka city. District Water Resources Assessment made by LGED by engaging number of consulting firm was a good initiative but could not achieve much due to lack of commitment. DoE, IUCN or similar organization should get the power of exercise to do swamp forestry development on land which does not belong to *khas land* (the land that is owned by the government). Thus, redefining *beel* boundary based on ecosystem and supported by or in accordance to ecological boundary is required to revert encroachment trends.

Beel Based Conservation of Fishermen's Rights

In the river dominated areas, fishermen's rights are river based like the marine fishers go to sea and coast for catching fish. Similarly, in the upland areas where scope of fishing in the river is limited but there are number of *beels*, rights of fishermen should be established *beel* based. Thus fishermen should get access to habitat area, resources especially natural fisheries. Not only that, in the age of encroachment rights of fishermen may not be successfully established unless they are involved with the planning process of the resource use of the *beels* and wetlands.

National Context of the Demand

The problems, issues, challenges are little different in this *beel* compared to many other *beels*. But this is very important to know the status and process of changes of this beel as in coming days many *beels* may become like this. For this reason the study findings would be useful in the national context. On the other hand, demand to promote livelihoods of the fishermen is not the demand of this *beel* only but it should be a national demand.

6.0 Base Situation

6.1 Hydrology and Morphological Set Up

The Mukteswari River flows through this *beel*. There are number of *khals* (small pass way of water) and small tributary rivers also. Rain water comes from the upstream through the river and other inlets and rainfall to the catchment are main source of water. Tidal water used to reach the *beel* earlier but due to different interventions it is not reaching. The slope of the *beel* is from the north-west and north-east to the south. Thus southern part of the *beel* and

floodplain are deeper and northern, north-west part are shallow. Few parts of the *beel* are with perennial water and rest is seasonally flooded.

Once upon a time (about 15 years ago even) it had normal *beel* characteristics, later experienced with longer period water logging and recently water logging is over due to TRM process in the adjoining *beel* and downstream part. The *beel* and its floodplain are having later connectivity too apart from northern side. In the downstream it is connected with the same river but a different name called Hari River. Water has to pass through the 21 vent BWDB Bhabadaha sluice gate. Ultimately the water flows to the Sundarbans and to the coast.

6.2 Biological Set Up

As mentioned earlier once the *beel* was full of water based resources along with paddy, wildlife and birds. Bird trapping by poachers was a regular scene which indicates richness of the *beel* in terms of biodiversity. Fisheries were one of the important sectors from which people used to get fishes from the natural sources. Presently, due to change of water management pattern morphology, hydrology and culture pattern have significantly changed. Influential people made ghers for shrimp and white fish culture. Name of fish species are available in the annex of this paper.

Part of the *beel*, specially its floodplain earlier and now supports grazing of livestock. In the natural system, it prevailed much better earlier invited number of migratory and resident birds. This site was also famous for amphibians, reptiles and mammals.

Around 20 fish species are still common ^[2]. In recent past, number of fish species was about 70. Species which are not available now a days are Boal, Pabda, Sarpunti, Magur. snail, crab, kuchia, frog, snakes are still observed in the *beel*.

Fishing gears that were common in this *beel* are Current jal (net), Vasal jal (lift net), Goga jal, Khewla jal, Arende jal, Koach, Kachari, Khuni, Charo, Nesa, Borsi, Gaze, Pata, Chari etc.

Aquatic vegetation including water lily and other species (kolmi, helencha, hogla pata) are still present but once used to maintain a healthy food chain. This was mainly dependent on non fish organisms as important steps of the food chain and food web. Both terrestrial and water dependent plants and reeds are still found. Pitali which is one of the swamp plant growing widely.

Common birds of this *beel* are Pankouri, Stork, Finge, Shalik, Doyel, Dongur, Vilabile, Bakchu, Ghu ghu, King Fisher etc.

Once the agriculture was with harmony with natural fisheries and wildlife but now it has been transforming to Boro paddy (a native variant of paddy) within the ghers rapidly. Both agriculture and culture fisheries are with rapid acceleration threatening biodiversity and livelihoods of poor people especially the traditional fishermen.

In addition of main cereal crops (rice, wheat) non-cereal crops and vegetables like Pumpkin, Cucumber, Cabbage, Broccoli, Cauliflower, Chili, Kohlrabi, Bitter gourd, Petsai etc. are also seen to be grown by the *beel* areas.

Farmers use chemical fertilizers for crop production. In the studied area, name of fertilizers in order from important are Urea, TSP, Zinc and Potash. Inorganic fertilizers are used in the *beel* are for IRRI crop.

Main crop is IRRI here. But in early days the *beel* was flourished with different vegetables and native paddy variants like Aush, Amon, Boro etc. But due to the introduction of hybrid crops and low production of native crops, farmers became less interested in the production of these crops.

In *Beel* Bakar area no crops were cultivated during 1986 to 2009 due to water logging. From 2010-11 the cultivation was again started. But 75% of the total *beel* remains under water all the year round. BRI 28/IRRI gives production of 20-25 *mound* (a local unit which represents 40 kg) per bigha (42 decimal) land. About 30-35 mounds paddy per bigha is produced with hybrid variety like SL 8, Hira, Sathi, Rajkumar.

Fishes cultured in the gher of *Beel* Bakar are golda, rui, silver carp, grass carp, black carp, common carp, big head, tilapia, mrigel and some other Indian major carps and Chinese carps.

6.3 Social Set Up

The *Beel* Bakar is surrounded by many villages namely Mohishdia, Alipur, Poradanga, Padmanathpur, Parualia, Dharmatala, Panchkathia in the western side and Hazirhat, Nebugati, Kucholia, Sundali in the north. Villages of the east are Dhopadi and Hargacha and in the south Moshihati. There are some villages situated within the *beel* but mostly in its eastern floodplain are Bhatbhila, Danga Mashihati, Dohor Moshihati, Bariadaha, Baje Kultia.

Common people are dependent on agriculture, fisheries, aquaculture and small business mainly. Gher fish culture of the *beel* is mainly controlled by rich and influential people. However, along the catchment boundary especially in the northwest part, medium and small farmers also doing gher fish culture within their small plots.

Fishermen belong to several villages. In Mohishdia village, there are about 65 fisher families in the Rajbongshi para (a cluster of inhabitants) alone. Their livelihoods are under extreme threat and vulnerable due to drastic shrinking of open water to aquaculture. There are many non-traditional fishermen. In wet season mostly all person gets involved in fishing for livelihoods and subsistence in nature.

7.0 Observation and Findings

The present situation of the *beel* is quite complex due to significant changes as water management changed naturally and for man-made interventions since sixties.

7.1 FGD and KII findings

7.1.1 Past and Present Water Management

To support Green Revolution water management interventions were achieved through number of activities in this area also. Construction of 21 vent flap gate type sluice gate known as Bhabadaha Sluice gate was made on the Mukteswari River. Apart from it, numbers of sluice gate for water control were constructed up stream and laterally to adjoining areas. Such structures in the downstream were considered to prevent entry of saline water.

With a longer period impact of stopping tidal water gradually invited deposition of silts and eventually introduced water logging to particular *beel* and later extended over to most of the *beel* and river network of the region. After experiencing bitter experience of longer period waterlogging, with the introduction of Tidal River Management (TRM) concept, remedy was observed. Now like many other *beel*, *Beel Bakar* becomes waterless in dry season. However, conversion of many areas of the *beel* in to gher system limited the return to previous system with a result of inequity of the resources in the form of advantages went to non target people.

Many local farmers suggested that, if water release properly through the Bhabadaha Dam (sluice gate), the situation would be nice. They also opined for an additional option of water to divert to Bhairab River (River near Noapara) through Fultala area. They also suggested for re-excavation of Amdangar Khal and Boyrar Khal. It should be noted that unless excavated soil is properly managed, excavation or re-excavation would bring no good.

7.1.2 Situation of Gher and Aquaculture

As mentioned in previous section, how gher has been changed the morphology of the *beel*. Initially it was done in water logged condition by few people in the *beel* periphery. Later some people introduced it to trap wild fishes. Now there are three types of ghers:

- a) Seasonal ghers, mostly done fish culture in wet season and paddy in the dry season usually without any trench.
- b) Seasonally ghers but mostly with trench so that fish is in considerable part. This type has two different pattern
 - i) Relatively medium and smaller sized
 - ii) Very big in size, mostly combining several plots
- c) Perennial ghers where scope for paddy cultivation hardly available or operators are mostly interested in fish culture.

Apart from gher fish culture, there are number of perennial and seasonal ponds where fish culture is going on. Water retention in the ponds of north-western areas was found poor and suitable for seasonal fish culture.

7.1.3 Status of Fishermen Livelihoods in the Context of Changed Situation

Earning and Debt

Most of the fishermen earn 100 to 200 taka per day only. Thus, monthly average income stands 3000 to 6000 taka which is very poor. They cannot manage to maintain their family not even to meet basic requirements.

Loan becomes a part and parcel of their life due to low income. Threshold capacity to take loan and loan recovery (returning) are also in very measurable position. Before returning a loan another loan is required.

7.2 Household survey findings

Fishermen villages are conspicuous and isolated. Two villages are in the western side, one in the north and others are in the eastern side. It was observed that, in the study area all the respondent fishermen are Hindu and lead a low profile life style, although they have a satisfactory water and sanitary system.

Religion, family size, age group and daily income

As per household survey, traditional fishermen are mostly Hindu in religion. About 53 percent respondent fishermen household were within 31-50 years old. From 20-30 years old fishermen are 7 percent and 40 percent fishermen are more than 50 years old. Majority of the respondent fisher households (65%) are very poor whose average daily income is within 100-200 taka, above 300 taka per day are 17% only. In following figures the status is clearer. Very big family sizes (more than 6 family members) are 15% where as small household size (1-4 members) is 25%. Medium household size (5-6 members) is 60%.

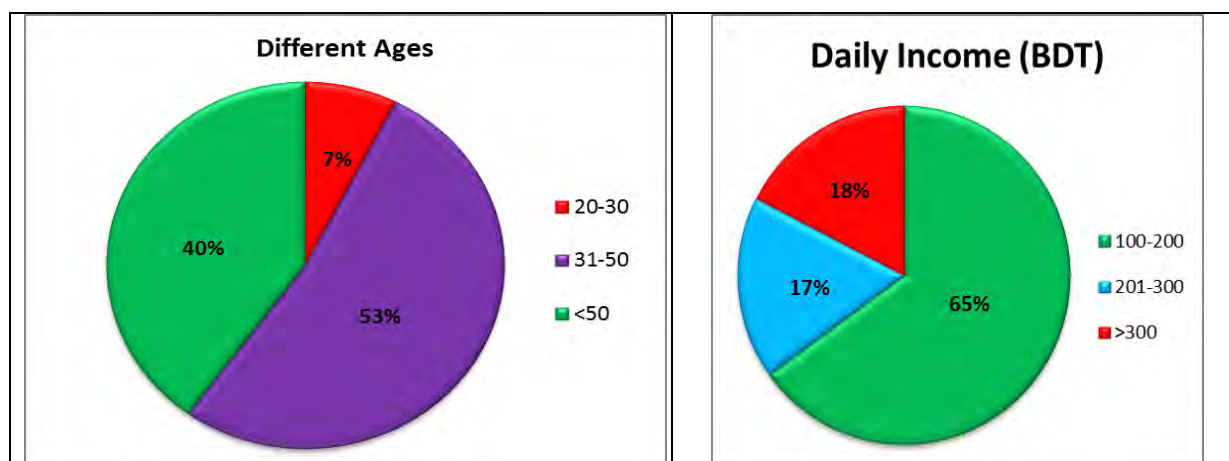


Figure 3: Fishermen age group

Figure 4: Pattern of daily income

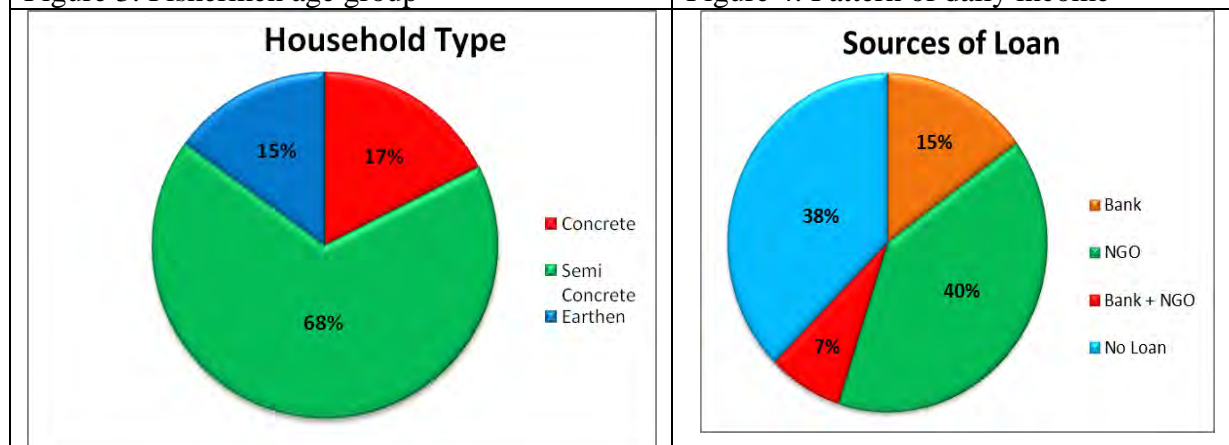


Figure 5: Household house type

Figure 6: Sources of loan

Ownership of land, house type, alternative income source and sources of loan

Earthen houses are of 6 responded household (15%), highest number (68%) fishermen live in semi concrete houses. Only 17 percent (7 respondents out of 40) live in concrete houses. Still good sign that hundred percent responded households having land of their own to construct their house. Pattern of loan is shown in above figure where it is evident that highest percent of loan receiving from NGOs (40%). Other sources are Bank and other cooperatives.

Alternative income source and status of fish and meat in consumption

In rainy season major part of the farmers and local people work in fish ghers and do fishing in little open *beel* portion. In addition to that many of them work as day laborers, rickshaw/van puller etc. Usually they earn 100-150 taka per day. About 93% responded fisher household take fish nearly every day. Only 2% household takes fish a day or two per week. Reversely,

not a single household from responded fisher household take meat every day. Only 38% takes meat occasionally per month.

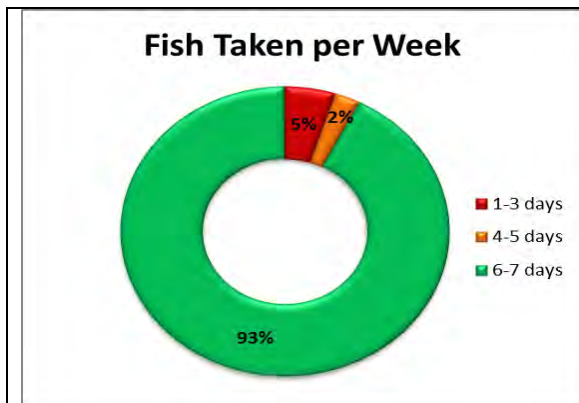


Figure 7: Fish consumption pattern

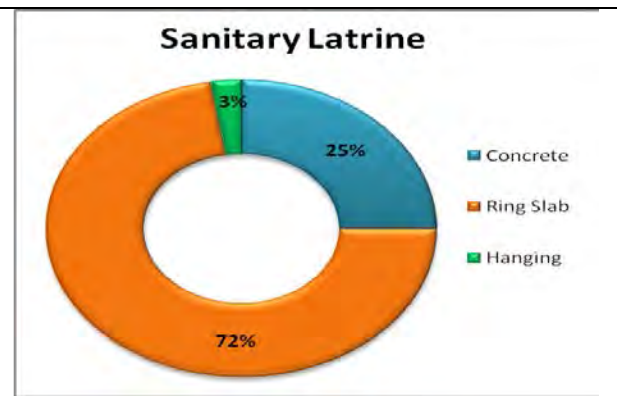


Figure 8: Use of sanitary latrines

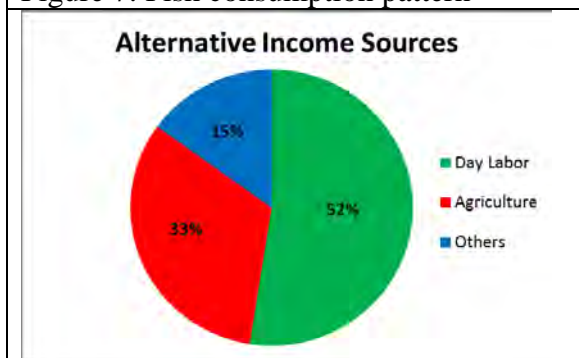


Figure 9: Alternative income sources

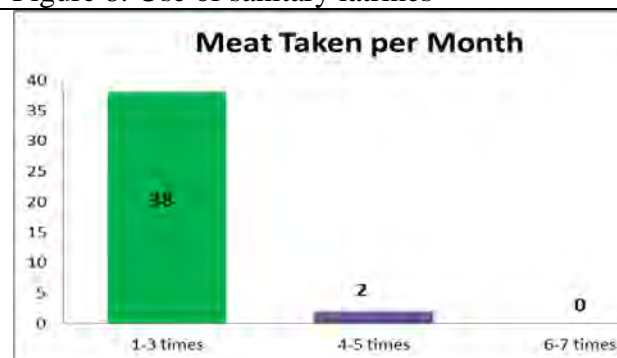


Figure 10: Meat consumption pattern

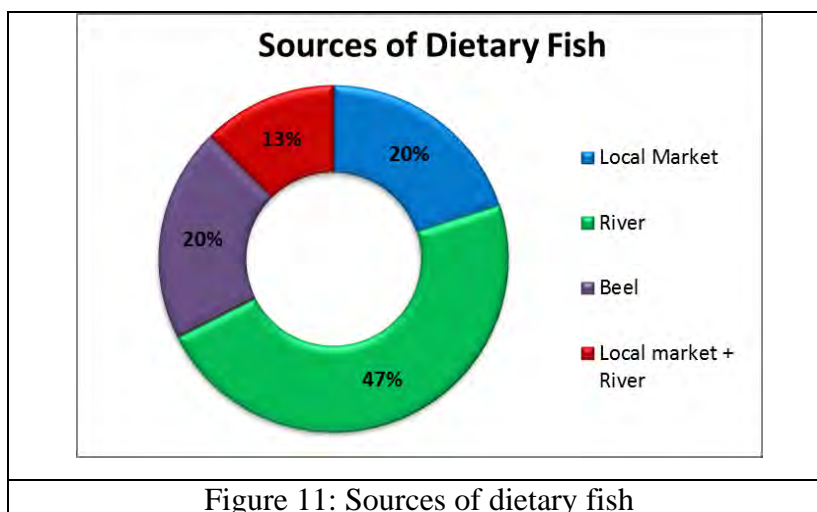
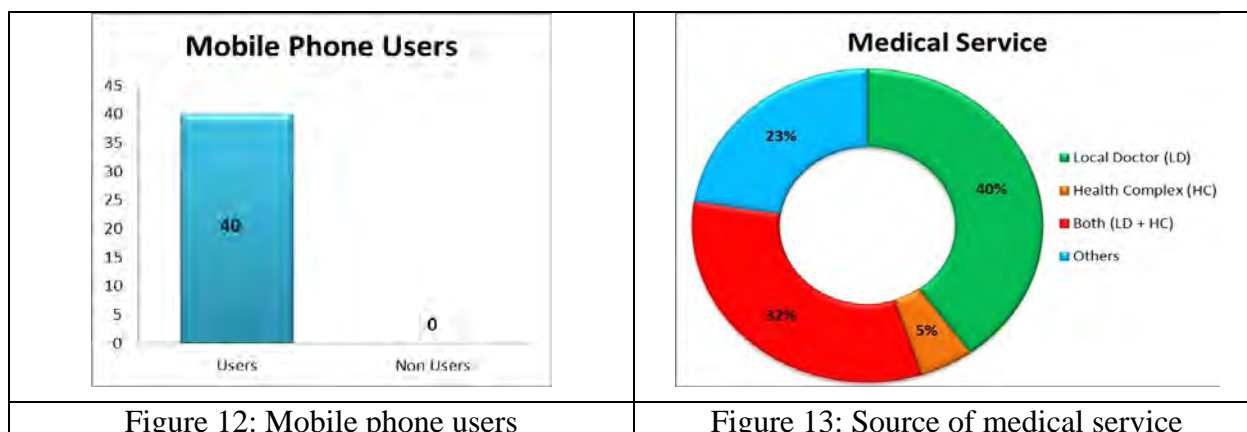


Figure 11: Sources of dietary fish

From Figure 11 it is clear that fish from *beel* in the diet still not diminished. Twenty percent fish in their consumption comes from *beel* but most of them (47%) come from river source.



Status of drinking water, use of mobile phone, sanitary latrine and medical service

It is found that all household use underground water for drinking, no one use water from river or tanks. No one was found from 40 fishermen who did not have mobile phone set.

Most of the household has ring slab toilet, 25% responded household has concrete and hygienic sanitary latrine only. Only 5% house hold uses service of health complex whereas 40% fisher household gets medical treatment from local doctor (usually pharmacy person).

8.0 Proposed Interventions

8.1 Fish Sanctuary by the Fishermen Community

Usually local people in most part of Bangladesh are afraid of conservation as the idea they first get is “Restriction” giving them flavor denying access. Concept of conservation practically means getting resources at a certain level for longer time period instead of higher quantity but for short period.

The study team also confronted with this situation in *Beel* Bakar area. Some of them opined that if conservation effort is taken then where they will catch fish. It seems that all development they have been acquainted is planned and made by officials and imposed to them and the process is not participatory. It was discussed with them in detail and opined that if the planning process of conservation is made by taking their opinion or process, itself allow them to take decision where to conserve, when to and what to. Then they would be happy and that effort certainly benefits them.

It appeared that with full participation of fishermen dependent on the Muteswari River and the *beel* can establish Community Based Fish Sanctuary. They are clear about the concept that if they can harvest the outcome of the conservation then no problem in allowing conservation.

8.2 Fish Habitat Restoration of *Beel* and River

Restoration of fish habitat mainly consists of re-excavation with proper slope and ensuring management of excavated soil. Apart from this, encouraging regeneration of swamp forest to support fish is important aspect of the habitat restoration. Sometime introduction of recently disappeared fish species considered as part of the process.

Though total environment of the *beel* has been marching towards materialistic development, still there is scope for restoration of the river and adjoining floodplain or *beel* part also. If

excavated soil is not used for dyking the river bank that disconnect the dependency between floodplain and riverine fish movement. **This process should be designed and monitored by fish habitat restoration expert and executed by fishermen, local organization and related field agencies. A decision on planning process for maintaining a setback distance for gher making from the river and *khal* even if that is part of private property should come up.** So this habitat restoration should be friendly to the ecosystem and environment to benefit fishermen and local people ultimately. Fishermen should not be treated as competitor to the resources of the *beel* rather it is an advantage of getting service of fishermen at nominal cost in managing resource generation and recommended harvesting process.

9.0 Recommendations

Need to establish rights of the fishermen. Main contradiction with this issue is to ensure the access of real fishermen into *Beel* resource. The non fishermen/ fish businessmen need to be stopped who degrade the natural part of the *beel*.

Number of sluice gates to reduce as impact of sluice gate on fisheries and aquatic environment is enormous. Recommended river stretch for conservational effort (also suggested by fishermen) is Lokhaidanga, Kultia Bridge to Helar Ghat Bridge, Helar ghat to Bandhar Matha and Lohadanga.

Recommendations suggested directly by the fishermen are:

- a) Fisher folk believe that, they have lost possession over the *beel*. Now as their only hope they want the river (Mukteswari) free from all side effects and have the access year round.
- b) They also want to ensure the total fish fries in the river allotted for this area by the Govt. So, that they can harvest/capture them when they are mature.
- c) Govt. released fish should be captured by the real fishermen only.
- d) Access of the non fishermen community need to be restricted in the *beel* and river.

Strongly recommended to keep a setback distance from the river bank to construct gher and also to keep required gap from a cluster of gher to another (not to make continuous) to reduce impact on natural fisheries and aquatic environment.

10.0 Conclusion

In Bangladesh, about 11% populations are involved with fisheries sector and this sector contributes 4.39% to the national GDP ^[3]. This field deserves more attention by both government and private investors to promote the livelihoods of the heroes of these achievements. Through this entire study, this is apparent that *Beel Bakar* desires a better management approach and for its long term effectiveness it should be participatory, mainly with the involvement of local community. Although it lost its diversity in both flora and fauna, the existing species can be conserved by the conservation of *beel*, its floodplain and Mukteswari River. As around 8450 families are directly and indirectly dependent on the *beel*, it is also important on the improvement of livelihood point of view. Gher practice changed the livelihood pattern of a small number of families, but most of them are still neglected.

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- [1] Banglapedia, National Encyclopedia of Bangladesh, Asiatic Society of Bangladesh, 1st edition February, 2004, Dhaka, Bangladesh. Available from URL: www.banglapedia.org
- [2] Rahman, A.K.A., Freshwater fishes of Banglades. Zoological Society of Bangladesh, Dhaka 366pp, 2005.
- [3] Department of fisheries (DoF), DoF Magazine, Department of Fisheries, Government of People's Republic of Bangladesh, Dhaka, Bangladesh. 2013.

Annexes**Annex I: Commonly Available Fish and fishing gears**

Table 1: Commonly available fishes of Beel Bakar

SI No.	Local Name	Scientific Name	Order
01	Puti	<i>Puntius spp.</i>	Cypriniformes
02	Rui	<i>Labeo rohita</i>	Cypriniformes
03	Catla	<i>Catla catla</i>	Cypriniformes
04	Mrigel	<i>Cirrhinus cirrhosus</i>	Cypriniformes
05	Kalbaus	<i>Labeo calbasu</i>	Cypriniformes
06	Bata	<i>Labeo bata</i>	Cypriniformes
07	Shol	<i>Channa striatus</i>	Channiformes
08	Koi	<i>Anabas testudineus</i>	Perciformes
09	Shing	<i>Heteropneustes fossilis</i>	Siluriformes
10	Tilapia	<i>Oreochromis mossambicus</i>	Perciformes
11	Taki	<i>Channa punctatus</i>	Channiformes
12	Tengra	<i>Mystus spp.</i>	Cypriniformes
13	Baim	<i>Mastacembelus spp.</i>	Mastacembeliformes
14	Bele	<i>Glossogobius guiris</i>	Perciformes
15	Mola	<i>Amblypharyngodon mola</i>	Cypriniformes
16	Dhela	<i>Osteobrama cotio</i>	Cypriniformes
17	Kholisha	<i>Colisa fasciatus</i>	Perciformes
18	Chang	<i>Channa gachua</i>	Channiformes
19	Small prawn		
	Non Fish Organisms		
20	Snail		
21	Mussel		

Table 2: Fishing gears used in Beel Bakar:

Gear Name (Local)	Major species caught
Vasal Jal (Lift net)	All kind of fishes (small to large)
Khewla Jal	Punti, Taki, Royna etc.
Goga Jal	Mainly big fishes
Kachari Jal	Rui, Shol etc. (Mainly medium size species)
Khuni	Chingri (Shrimp), Puti etc.
Charo (Fish trap)	Koi, Taki, Gutia etc small species.

Annex II: Photos

Fishermen and their fishing equipments



Water Management Interventions



Riverine Habitat



Beel and Floodplain



Common Property Resources



Agriculture and vegetables



Gher Fish Culture and transportation

