

Co-management of the wetlands and it may contribute to the livelihoods of the poor people

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ABSTRACT

The sustainability of open water fisheries in Bangladesh and elsewhere is threatened by increasing fishing pressure, fishing practices, and loss of wetlands. The traditional fisheries management system in Bangladesh is for the government to lease out fishing rights, often to influential persons. This has not limited exploitation to sustainable levels to achieved an equitable distribution of returns. Several projects have tried to establish co-management systems through forming Community Based Organisations (CBOs) and linking these with the concerned government departments

A comparative analysis is made of two water bodies - *Jethua Beel* in Hail Haor supported by MACH project and *Goniar Beel* in Halir Haor supported by CBFM 2 project. To explore the present water body management systems, various participatory methods were followed and fish catch and household consumption data were analysed. This found that though the approach in MACH project comparatively better but the sustainability of co-management and performance of the CBOs in both projects are constrained by a lack of clearly defined benefit utilization, a mismatch between resource scale and management initiatives, and a lack of government commitment.

Goniar Beel has a higher catch per unit area (CPUA) in value terms, although the difference is not significant ($p>0.05$). However, per capita fish consumption was significantly higher ($p<0.05$) for the beneficiaries of *Jethua Beel* taking fish protein much more than *Goniar beel* beneficiaries. There was no significant correlation between CPUA and daily per capita fish consumption ($p>0.05$). This suggests that the management approach and fish production in a water body is not sufficient to contribute to the livelihoods of the poor, other factors such as alternative occupations and access to year-round fishing are more important.

Key Word: Wetland co-management, Community institution, Sustainability, Livelihood

INTRODUCTION

Background

Co-management is a partnership arrangement in which the line agencies, government, local resource user groups and external negotiator (Social Worker etc.) share the responsibilities and authority for the management of a resource (Pomeroy and Williams, 1994). The Government of Bangladesh (GoB) adopted the World Conservation Strategy and has established a new management system in 1988,

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known as “co-management” in which the management task and responsibility are shared between the government particularly Department of Fisheries (DOF) and fishers (IUCN, 2005). Vast inland waters of Bangladesh are, however, vital to millions of poor people, but fish production and species diversity are believed to be declining. Therefore, the per capita protein consumption² particularly fish is not at levels required by consumers (.), The sustainability of open water fisheries is threatened by increasing fishing pressure, harmful gear use, encroachment by adjacent landowners, total fishing by dewatering, and habitat modifications; the agricultural practice and climate change are the external treats. The traditional management is considered insufficiently capable of controlling levels of exploitation and achieving equitable distribution of the resource. The government of Bangladesh is promoting co-management initiative to address the issues, which is responsible for fisheries degradation (IUCN, 2005). CBOs and federations of them for open water body co-management are supposed to be an effective and innovative solution. Ford foundation, United States Agency for International Development (USAID), Department for International Development (DFID) has been financing in the line of natural resource co-management through institutionalization in the community level. The donor agencies had/have launched various projects like Community Based Fisheries Management 2 (CBFM 2), Management of Aquatic Ecosystem through Community Husbandry (MACH) etc with the help of Bangladesh Government.

Rationale of using the two projects

Before 1990's, the government did not pay any attention to the sustainable management of open water bodies rather focused on collection of the revenue from fisheries. After that many projects has launched sustainable fisheries management through establishing institutions (Thompson and Halder, 2007a). This situation creates interest to analyze whether the co-management of the wetlands have had any contribution to the livelihoods of the poor. Both MACH and CBFM 2 projects have demonstrated habitat restoration and conservation measures aiming to bring benefits in terms of higher fish yields and consumption. Both project tried to establish community management of wetland resources, livelihood support, development of community based organizations, and ultimately the establishment of co-management institutions between government and community organizations, although different approaches were used to this end. The two projects were implemented by the Center for Natural Resource Studies (CNRS). During the execution of the projects, CNRS collected large amount of primary data from the project beneficiaries along with secondary data from many different sources.

Lessons learnt

The physical, biological, social, economic, and institutional complexity of inland fisheries in Bangladesh makes the management process very difficult. The participants involved in the co-management process include not only the professional fishers but also farmers, the landless subsistence fishers, local elites and local government. The roles of the participants in the wetland management though varies, however, helps to unite the beneficiaries, form CBO, regular meeting and record keeping of the group, generate fund and savings of the group, ensure accountability and transparency, awareness campaign on do not use harmful gear,

² The daily per capita protein consumption in the study region is about 62g of which 37g from cereal food 14g from non-cereal and only 11 g from fish (Khan *et al.*, 2006) which is less than the national average of daily per capita protein intake, 66.01g (HES, BBS, 1995-96) .

stop illegal fishing, follow closed season, making linkages among respective institutions, conflict mitigation.

In CBFM 2 there were two types of water body ownership systems. In one, the government (Ministry of Land) agreed to reserve over 70 waterbodies for ten years for management by fishers (CBOs) through an agreement with the Ministry of Fisheries and Livestock. Another system in small beels (under 20 acres) that are leased competitively through 3-year leases to youth societies or an individual person, was to work with those groups or locally persuade that the waterbody could be managed by a fisher group/CBO. The later process is limited and less sustainable as the 3 years leasing period gives a short period for communities to benefit and the respective CBOs are more concerned over sustainability of their rights than conserving fish. Moreover, the tie between CBO and line agencies of the government is loose in the later approach.

In MACH the involvement of the local government and line agencies was very strong as both were involved in the processes of water body management. Moreover, there is vice versa accountable system between the CBO and two levels of government (local councils and sub-district administration) in MACH project. In addition to that there is a common and holistic micro finance program present in the MACH approach, whereas the support of CBFM 2 is not unique to the CBOs in terms of micro financing.

In general, the co-management approach to water body management increases fish production, but the livelihoods of the poor beneficiaries depend on Alternate Income Generating Activities as well as the availability of fish round the year and access right to the water body.

Research objectives

- To explore the sustainability of two co-management practices, MACH and CBFM 2, in two sampled water bodies, livelihoods and agro-ecology in Bangladesh.
- To identify and compare the perceptions of co-management practices in MACH and CBFM 2 community using *qualitative* methods with key stakeholders.
- To compare the impacts of co-management practices in MACH and CBFM 2 community using two *quantitative* indicators; CPUE and the fate of aquatic produce (consumption).

Research hypothesis

- The impact of co-management does not differ between the MACH and CBFM 2 approach in terms of the impact on the fishery and/or the community
- Co- management interventions in either site are not sustainable after withdrawal of project support.

Research question

- Are the impacts of co-management different between the MACH and CBFM 2 approach in terms of the impact on the fishery and/or the community approach and /or the fish consumption?
- Are the co- management interventions in either site sustainable after withdrawal/gradually of project support?
- Are there any differences in the thinking of NGOs and community? and

- Have the beneficiaries, particularly the poor benefited from co-management?

MATERIALS AND METHODS

Secondary data including both quantitative and qualitative of the two projects of CNRS namely MACH and CBFM 2 were the basis of the research. The study was conducted in two beels under two haors - *Jethua beel*, Hail Haor, Sreemongal, Moulabhi Bazar and *Goniar beel*, Halir haor, Jamalgonj, Sunamgonj. The two water bodies were considered mainly to assess whether the impacts of the co-management different in terms of the impact on the fishery and/or the community approach and/or the fish consumption during the years 2002-2006. In addition, it was an objective to explore the sustainability of two co-management practices promoted by MACH and CBFM 2 in Bangladesh and the perception of the beneficiaries.

The study area

Management of Aquatic Ecosystem through Community Husbandry (MACH)

The program is working at three sites that are representative of the freshwater wetland ecotypes of Bangladesh. The location of the three sites are Hail Haor site in Moulvibazar District (Northeast of Bangladesh), Turag-Bongshi site in Gazipur District (Middle of Bangladesh) and Kongsha-Malijhee site in Sherpur district (North-west of Bangladesh).

Hail-Haor: Hail Haor, in the Sylhet basin, is located in the anticline between the Balishara and Barshijura Hills to the east and the Satgaon Hills to the west. Water originates from the surrounding 350 small hilly streams (at present only 59 streams are active) and the Lungla/Bilashi River. The project site is located in five unions of Sreemongal Sub-district and in two unions of Sadar Sub-district of Moulvibazaar District. The watershed area of Hail-Haor is about 600 km². The basin water originates from the surrounding mostly hilly watersheds, of which approximately 85% lie in Bangladesh and 15% in India. The wet season area of Hail-Haor is approximately 13,000 ha, whereas the dry season area varies from 3000 ha to 4,000 ha in an average hydrological year with 17 seasonal and 47 perennial beels. The population is approximately 172,000 people (Thompson and Halder, 2007b). The haor is a complex of number of water bodies of them *Jethua Beel*, *Rustompur Beel*, *Cheruadubi Beel*, *62-beel complex*, *Balla beel* etc. were the concern of MACH project.

Community Based Fisheries Management-2 (CBFM 2)

The project has organized about 23,000 poor fishing households around 11 beel-clusters and 37 individual beels representing a range of different habitat types and located in four regions Sylhet, Mymensingh, Jessore and Rangpur comprising 11 districts throughout Bangladesh. The 11 clusters comprise 87 beels and the total number of beels is 124.

Halir Haor: Halir Haor, in the Sunamgonj basin but in greater Sylhet region, is located in the Jamalgonj Sub-district of Sunamgonj district. Water originates from the mainly crossing the territory boundary of India. Monsoon rain is the main source of water through different canal and a major river Boulai that originates from the Meghalay State of India and crossing about 8km in its' way and finally passing through the north-west side of the Halir Haor. The Boulai River ultimately met with

the largest river, Surma, of Bangladesh at south-west edge of the Halir Haor. Another big Haor named Shanir Haor is located just opposite side of the Halir Haor i.e., the said river passes in between two Haors. In monsoon the total become a set of water body. The project site is located in one union named Beheli in Jamalgonj Sub-district. The wet season area of Halir Haor is approximately 9429 ha, whereas the dry season area 5658 ha in average hydrological year. The haor is a complex of number of beels of them *Goniar beel*, *Kajuduba beel*, *Dhighli beel*, *Anda beel*, *Kewta Beel*, etc. were the concern of CBFM 2 project.

The study is main concern of *Jethua Beel* of Hail Haor under MACH project and the *Goniar beel* of Halir Haor under CBFM 2 project. *Jethua Beel* located east position of this haor. It is about 8 km far from the UZ headquarter. Jainka Nadi makes connectivity between *Jethua beel* and Gopla River which passes through in the middle position of Hail Haor. Another canal named *Jethua* make a connectivity between Haor and *Jethua beel*. However during monsoon beel and haor become a sheet of water body.

The *Goniar beel* is located at north side of Bangladesh, Jamalgonj Sub-district, Sunamgonj District

It is under Halir Haor and located north-east position of this *haor*. It is about 4 km far from the UZ head quarter. During monsoon beel and haor become a sheet of water body.

The area of *Jethua Beel* is about 67.95 hectare (MACH, 2006) and the *Goniar beel* within the CBFM 2 project is about 10.56 hectare (CBFM 2, 2004). The difference of the size two beels is high but the commanding area during monsoon is almost same. The management body of both water bodies is formed with the group of people who are living in the adjacent villages of two water bodies. The involvement of the number of villages is higher in *Jethua Beel* (6 villages comprises 1550 hhs) than *Goniar beel* (1 villages comprises 200 hhs). Nevertheless, in calculation the unit viz. per acre, per capita etc. is considered in both cases of production of water bodies and consumption of beneficiary (MACH, 2006 and CBFM 2, 2004).

Data Coverage

Primary data and sources: The primary data has been stored which covers the fish production of the two comparable water bodies, formed institution's strength, weakness, opportunities, and threats. In the process of data collection different survey methodologies like focus group discussion (FGD) and personal contacts using checklist are employed to assess the context.

The primary data sources are the 'Process Mapping' exercise (figure 1) with project staff and CBOs and concern line agencies, the record book of the respective CBOs/local level institution, recall of key respondents of the stakeholder group viz. the CBO members, fisher group, villagers of the beneficiaries' villages, project staff, local government, the official of line agencies, and the senior officials of the different organizations concerned with the project. In data collection it



Figure 1: Process mapping with the CBO (L), UFO (M), Project Staff (R)

was in consideration that the respondents were in different categories like gender groups, ages and social wealth classes.

Secondary data and sources: Each project has data both quantitative and qualitative stored electronically along with printed copy. The data were collected from the various reports, personal contacts and email corresponds with the available sources viz. relevant offices and project staff and website. The data were collected on the following aspects -

Regular Household Consumption Monitoring (frequency and sample size); Catch Monitoring (sample and frequency); History of fish conservation unit is set up under the project; Fishing practice; Management strategies; CBO information; Linkages with the line agencies; Mechanism of Alternate Income Generating Activities (AIGA); Case studies; Future strategies from the project itself and project direct beneficiaries

Monitoring System

Community Based Fisheries Management 2

Fish Catch: Fish catch assessment has been taken place twice in a month for each of the sites. Data editing, coding and entry have been performed on a regular basis. Data collection had been started since May 2002.

Household Fish Consumption: A household level fish consumption monitoring was being continued on a regular basis in a sample study village, named Putia, located in the impact area of the *Goniar beel* comprising 48 HHs totally of which 30 HHs were monitored. Household consumption monitoring at household level has been started from November 2002. The design was intended to cover the social classes viz. poor fisher household, poor household, moderate poor fisher household, moderate poor household and better off household and they were sampled in proportion to their presence in the villages. The fish that each household planned to eat that day were weighed before cooking by species as far as possible. The regular HH monitoring systems were twice in a month. (CBFM 2, 2003)

Management of Aquatic Ecosystem through Community Husbandry (MACH)

Fish Catch: The data had been collected since April 1999 till to project end. For avoiding any biasness, the field biologist collected data from different locations at the monitoring location. For each gear type at least three fishing units were monitored. If there were more than 30 fishing units of one particular gear type operating in a day, data was collected from not less than 10 percent of the operating fishing units. Irrespective of catch data from individual fishing, gear use by all types of fishing units in operation were counted during the catch monitoring day. This is the effort for that day. At the end of the day a list of fishing units by gear type was prepared. In order to accommodate for possible temporal variations in a single month the sampling intensity was set at a 10 days interval and accordingly data was collected three times a month from the selected location.

Household Fish Consumption: Fish consumption data had been collected from a total of about 35 households of Uttar Baruna village located encompassing the Jethua Beel. The design was intended to cover the social classes viz. landless, marginal farmers, small, medium and large farmers, (the social classification is drawn based on the census data considering the variable cultivable land ownership) and they were sampled in proportion to their presence in the villages. Household fish

consumption monitoring started from September 1999. Data was collected at three-day intervals from the sample households. The fish that each household planned to eat that day were weighed before cooking by species as far as possible. (Halder and Thompson, 2006)

Analytical procedure

Fish catch and consumption data: The fish catch can vary spatially, temporally on the basis of the ecological condition of the habitat. In order to incorporate these variations and to monitor parameters the monitoring locations, habitats, total catch, types of gear, and seasonal variation is considered during analysis. Catch per Unit Area (CPUA) and Catch per Unit of Effort (CPUE) has been analyzed along with above mentioned parameters. In the household consumption, data is analysed whether there are any significant difference between the per capita fish consumption of the villagers surrounding the mentioned two water body. The four years data is analyzed both for catch and HH consumption for the designed study, Table 1. For detecting the significant at 95% confidence level, the General Linear Model (GLM) is used using the SPSS V 12.0.

Table 1: Years description of Catch Monitoring and Household (HH) Consumption Monitoring

Comparing years	Catch Monitoring	HH Consumption Monitoring
Year1	August'02- March'03	November'02- April'03
Year 2	April'03- March'04	May'03- April'04
Year 3	April'04- March'05	May'04- April'05
Year 4	April'05- March'06	May'05- April'06

Note: Year1 is incomplete year due to used both projects have common available data of mentioned period.

Some clarifications

Catch Per Unit of Effort (CPUE): The average catch in kilograms (kg) per unit of gear per hour of operation, or alternatively the average catch in kg per fisher per day of fishing.

Catch Per Unit of Area (CPUA): The annual catch in kilograms (kg) per unit of area. Apart this monthly CPUA also consider during analysis.

Per Capita Fish Consumption: The fish consumption per person per day.

Institutional arrangement: The projects, however, developed local organizations that helped engage, inform the resource users holistically. These local organizations also implement project activities and develop rules of management for the wetland. The following issues are criticized to see whether the approaches of the said two projects are adapted familiarly which are-

- Processes of group formation in different tiers (community level, cluster level, Apex/regional Regional level and central level)
- Processes of linkages with the local government, line agencies and CBOs
- Different stakeholder involvement in the co-management intervention
- What different stakeholders thought was happening and then seeing what happened in reality.
- Is there a difference between what NGO groups think happened and what people living in the communities think happened

- Saw the participation and influence of the CBOs that particularly have a real role in the livelihood of the resource users
- Impacts of Alternate Income Generating Activities (AIGA) to reduce the fishing pressure on the resource and on livelihoods of those involved

RESULTS

The results are divided into two major parts such as WB management process and biological impacts that impacted on livelihoods of beneficiaries. The management process covers the institutional arrangement in line of bottom up approach and the trend of sustainability which will be discussed. The biological part i.e., catch per unit area, catch per unit effort and per capita consumption is analyzed and gave recommendation by analyzing the present and future situation to some extent.

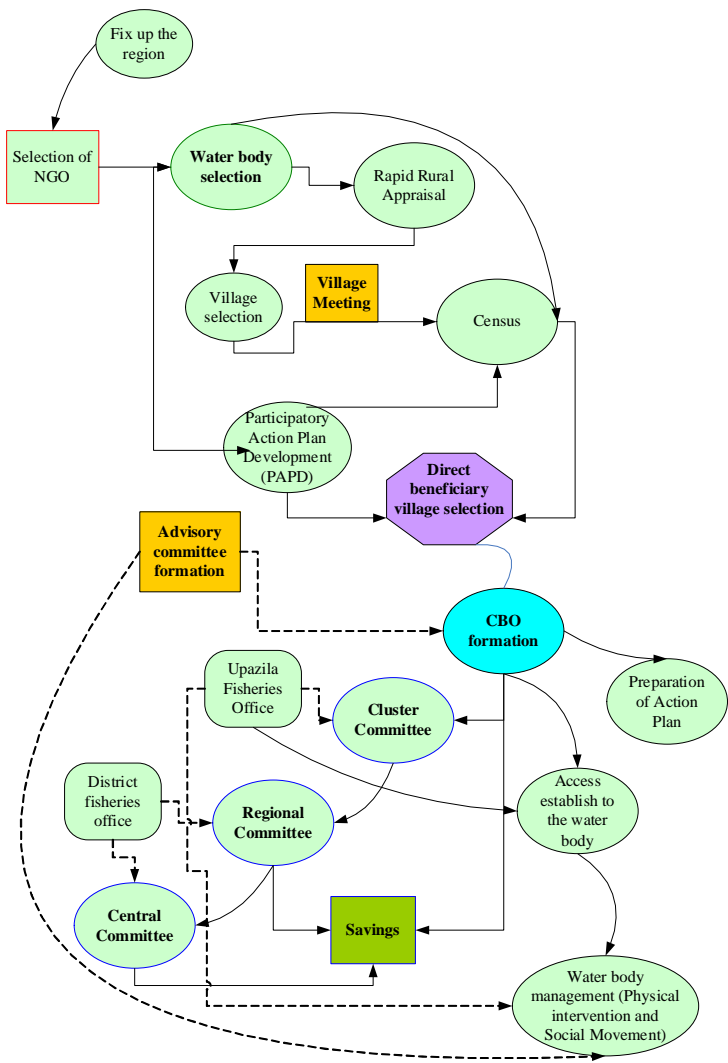
Process Variation in Approach

The best management practices promoted in both projects were i) co-management of natural resources ii) sanctuary development and iii) alternate income generating activities among resource users. The areas were the same but the mode and extent of addressing the components varied between two projects (Annex 1).

The different stages of MACH management structure including horizontal and vertical linkages. A set of steps and rules in CBO formation is found under both projects, figure 2. In the MACH project the number of representatives in the General Body (GB) of CBO of each WB resource user villages is equal and the composition of the GB is- resource users (fishing, aquatic plant collectors etc.), poor, female and elite in MACH approach. The number of the member in the GB is open and the composition of the member's is fisher and female under CBFM 2 project. There are also an executive body in the CBO in which a certain percentage female members is required in MACH project but there is no mandatory probation of female members in the CBFM 2 project. The difference is found- there is a Cluster Committee in the CBFM 2 project with the one representative of each CBO in an upazila. Such type of structure is absent in the MACH project. However, there is an Apex Committee with the one representative of each CBO in MACH project based upon site irrespective of Upazila or district. This is similar little bit with the Regional Committee of the CBFM 2 project with the one representative of Cluster Committee. There is a Central Committee with the representative of the Regional Committee under CBFM 2 project which is absent in the MACH approach. In both projects there is an advisory body with the UP members. Apart from this, institutional arrangement there is a strong linkage like proposal regarding water body management submission to the UFC and approved as well, technical support from the UFC etc. between CBO and UFC³ in MACH project which is almost absent in the other project (Annex 1).

³ Upazial Fisheries Committee (UFC) composition: Upazila Nirbahi Officer (president), Upazila Fisheries Officer (member secretary), Agriculture officer, Cooperative officer, Social welfare officer, Assistant Commissioner of land, Upazila engineer, Chairman of concern UP(s) and one representative of each CBO.

**CBFM 2- Institutional Arrangement
Process Mapping Tool**



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**MACH- Institutional Arrangement
Process Mapping Tool**

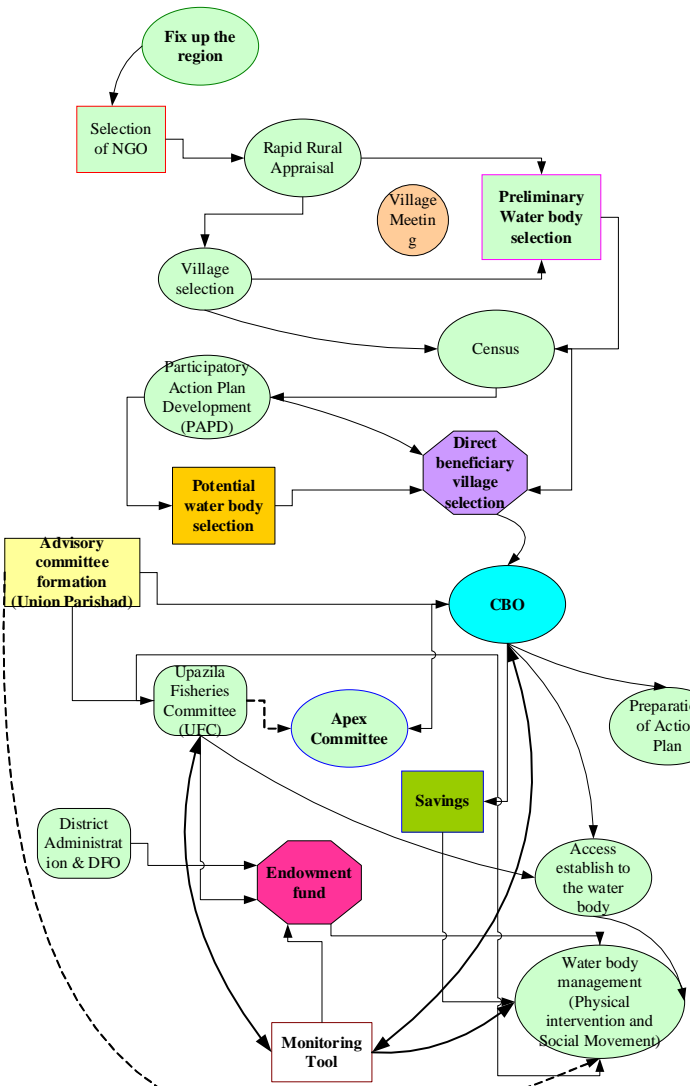


Figure 2: Institutional Arrangement of CBFM 2 and MACH project Water body selection and resource management practice

It was found in the selection process that respective government departments and client of CBFM 2 jointly made a priority list of WB and how the prioritized water body would be implemented. The WB selection process by the MACH project was more participatory than CBFM 2 as the probable WBs were identified in consultation with the community people, local government and line agencies.

In both projects, CBOs took decisions on any issues and approve in the general body meeting where more than 50% members of general body have to be attended for taking further action of that particular issue. The mechanism of approval any hardware activities viz. WB re-excavation, sanctuary set up/operation & maintenance, connectivity development, plantation etc. are more formal (linkage with Local Government, LG) in MACH approach than CBFM 2. The CBO of MACH has to submit a proposal⁴ to Upazila Fisheries Committee (UFC). In the quarterly meeting of UFC, all submitted proposals discussed and analyzed critically, paid field visit if necessary, send to proposal client office then approve it. After withdrawing the project support i.e., March 2008, the UFC will approve future submitted proposals. The CBO received funds from the UFC from the interest of endowment fund. After completing the work the concerned government officials visited. In CBFM 2, the CBO only take a written permission from the UFO to start the work. In addition to that there is no endowment fund for the CBO of CBFM 2 rather the CBO will use the profit of WB for resource management. The CBFM 2 water body has been managing with the profit amount of that particular water body. In late 2006, MACH has developed and has been practicing three monitoring tools viz. Report Card and Fish Assessment Tool for the CBO and checklist for the UFC. The objective is for the local institutions to be able to assess the sustainability of the project approaches particularly fish production status and the functioning of the institutional arrangement. Such types of tools are not developed under CBFM 2 project. (Annex 1)

Consciousness, capacity and collective action of the CBOs of Jethua and Goniar beel

Introducing co-management within fisheries is basically the institutional change. However, the issue is that clearly defined rules, participation and what type of conflicts would be addressed and how resolved it and agreements made on different activities are given priority in communicative and collaborative process in the change of institutionalisation (Viswanathan, *et. al*, 2002).

In the past, conflict among the fishers was a regular and continuous phenomenon that acted as the barrier for their own development. One instance we have found in case of *Goniar beel* area was that before starting the project one influential group controlled it illegally without maintaining effective fishing rules. The WB is recorded government property called *khas* land but that society treats this WB as a trust/common property. Therefore, after monsoon, the traditional full-time fishers had no access rights. The project tried to improve awareness of the problem and formed a CBO with villagers who showed overwhelming interest to the project approach. Meanwhile the traditional society made a petition to the government that this was their trust-property and finally the issue was solved in the court after one year. The formed CBO was very much conscious so that project finally could bring the *Goniar beel* in the management. In case of *Jethua beel* the project had faced social barrier

⁴ Proposal: Papers included application, budget, meeting resolution, Community Action Plan (CAP)

like the NGO will be breakdown the traditional conservativeness. Now the beneficiaries are united to manage the water body under the umbrella of the *Jethua Unnayn Sangathan* (The name of the CBO).

Relationships among different local institutions/NGOs

CBO vs Sub-district authority: The opinion of *Goniar beel* CBO was that the Sub-district/Upazila fisheries officer (UFO) was mostly present willingly during fish harvesting of the water body. CBOs are cautious of their relations with DoF officials, who they perceive are habituated with financial malpractice. During discussion the respondents agreed that they entertained government officials. The requirement for representation in a monthly cluster meeting by the UFO is often ignored. After withdrawing the CBFM 2 support (February'07), CBO did not continue meeting with the DoF. Moreover, the CBO members were not updated with such approach.

In case of *Jethua beel* CBO there have been no such instances of financial malpractice by government official in *Jethua beel* area but commitment to the WB by the government has been poor so far. The meeting frequency of UFC is quarterly. All sorts of decisions regarding *beel* management taken in the meeting need 7-8 months for approval. The CBO submits proposals for respective WB management to the UFC which are then approve it in the subsequent meeting. After May'07, the concerned UFC did not call on the quarterly a meeting due to a gap between MACH project and UFC were created. However, the CBO submitted their proposal and were waiting for the money otherwise the CBO can not start the hardware activities. The high official of the client requested (gave pressure) then UFC called a meeting.

CBO and UP: The UP is the local government. The respective UP chairman and members are the advisors of the both CBOs. The CBO representative of *Jethua Beel* attends in the monthly meeting of UP where raise different types of WB related issues, constraints as well as probable solutions. They have been taking help from the concerned UP to mitigate the conflict. Although, the *Goniar beel* CBO had effective roles in conflict mitigation of another CBO vs illegal fisher, the UP were not informed/invited to mitigate the conflict though the UP is the advisor of these CBOs.

Community Based Organization (CBO) with Other NGOs:

Since the CBFM 2 and MACH project ended Both CBOs participate in a network of fisheries and floodplain related CBOs facilitated by a team of NGOs and researchers (Improved Floodplain Management through Adaptive Learning Network, IDRC, 2006-2008; Integrated Floodplain Management Project, Research Into Use Programme, DFID, 2008-2011).

Another project named LEAF, Livelihood Empowerment and Agro-forestry Project, of CNRS have been working in the *Jamalgonj* sub-district under *Sunamgonj* district since March 2005. The *Goniar beel* CBO welcomed the project and have been working with the project where CNRS is the acting NGO (implementing agency) now. LEAF always tries to introduce the adaptable technologies in the AIGA using their local resources and indigenous knowledge.

Capacity building

Resource mobilization to generate fund: The maintenance of the sanctuary every year involves cost. Both CBOs have the capacity to some extent for *katha* setting in the sanctuary (Figure 3). The WB only the fund source of *Goniar beel* CBO whereas the *Jethua* CBO have the two sources of fund viz. one is water body and another is endowment fund.

Fund utilization: In case of *Goniar beel* audit system the CBO pay 17% money of their profit to the audit department where as there is such system in case *Jethua beel* audit system. The mechanism is appreciable as the service provider is awarded with the money. Moreover, the *Jethua beel* CBO members do not get any sort of financial benefit from the resource management where as the CBO members of *Goniar beel* have such type of scope. This sort of scope depends from which department the CBO is registered. However, the issue is that as there is scope of benefit sharing among CBO members of the *Goniar beel* so that the present bank balances only BDT 2724.00 but the balance of *Jethua beel* CBO is BDT 428,801.00.



Figure 3: A managed fish sanctuary with signboard and flag, water hyacinth

Conflict Mitigation: Both CBOs of the two study projects have had roles in conflict mitigation in the community level. Overall the assessment myself is that the capacity for this role of the *Goniar beel* CBO is a little bit more advanced than in the *Jethua beel* CBO. The initiative actually depends on how many and what types of the issues is faced in the community level. On the other hand, the *Jethua beel* CBO keeps a good involvement of the local government, UP, to mitigate the conflict which is absent in *Goniar beel* CBO.

Achievement of the CBO: The maturity of the *Jethua* CBO is 3 years more than *Goniar* CBO whilst the site has been getting one year backstopping support on a small scale from the MACH project. Apart from the *beel* management (project has direct support in this regard) the *Jethua* CBO has no significant instances of social movement apart one relief operation (it is also the initiative of the project). On the other hand the *Goniar* CBO directly or indirectly has some instances of social movement viz. “the engine boat safe a life of fisher and a pregnant woman”. CBO helped a poor member with money for his treatment purpose.

Credit Operation: The MACH project (*Jethua beel*) has another wing of credit operation among the members of the different groups apart the water body CBO. 60% CBO members are the members of that credit operating groups called Resource User Group (RUG). There are 7 RUGs in the 6 villages of *Jethua* WB’s area. This group’s outstanding money is BDT 997420.00 and own savings is BDT 322456.00. The credit operation has been running smoothly. However, the CBFM 2 project (*Goniar beel*) had been encouraging the CBO members for savings and credit operation. They are not perfectly sensitized on how to operate the credit

program smoothly whilst there is no established audit system. Before ensuring this, the project has been phased out.

Fish Catch

Catch Per Unit Area (CPUA): The two main indicators are considered viz. Catch Per Unit Area (CPUA) in kg/ha, Catch Per Unit Effort (CPUE) in kg/person/gear/day to draw conclusion of the fish yield of the said WBs. Common monitoring periods are considered⁵ for comparing two WB's yield. Although CPUA has fluctuated among years but the data suggests it is increasing (Table 2). The catch depends on the area of water coverage and timing of the annual monsoon floods.

Table 2: CPUA (kg/ha) of two study context /WB

Year	Jethua Beel	Goniar Beel
Y1	137.06	123.44
Y2	102.47	114.60
Y3	230.7	178.05
Y4	199.41	284.93
Average	167.40	175.76

Data Source: MACH and CBFM 2

In the *Goniar beel*, the increasing trend of fish production in different year is apparently better than *Jethua beel*. During Y4 the yield of *Goniar beel* is increased dramatically which is similar to the yield of Y3 of *Jethua beel*.

The CPUA among years and between WBs no doubt varies but the GLMA declared that the variation is insignificant ($p>0.05$). However, intervention year has impact on fish production; the data is combined for both water bodies by intervention years, the best fitted model explaining 82% of variation in CPUA in terms of intervention year and water bodies.

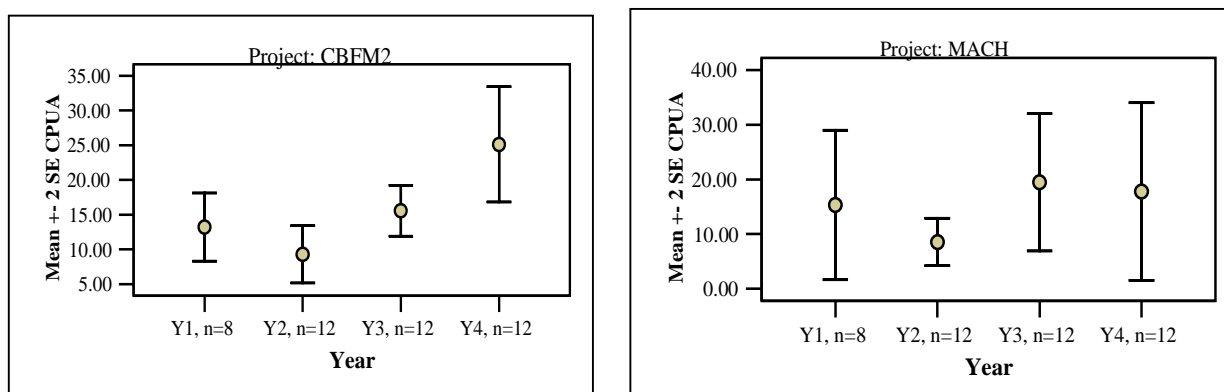


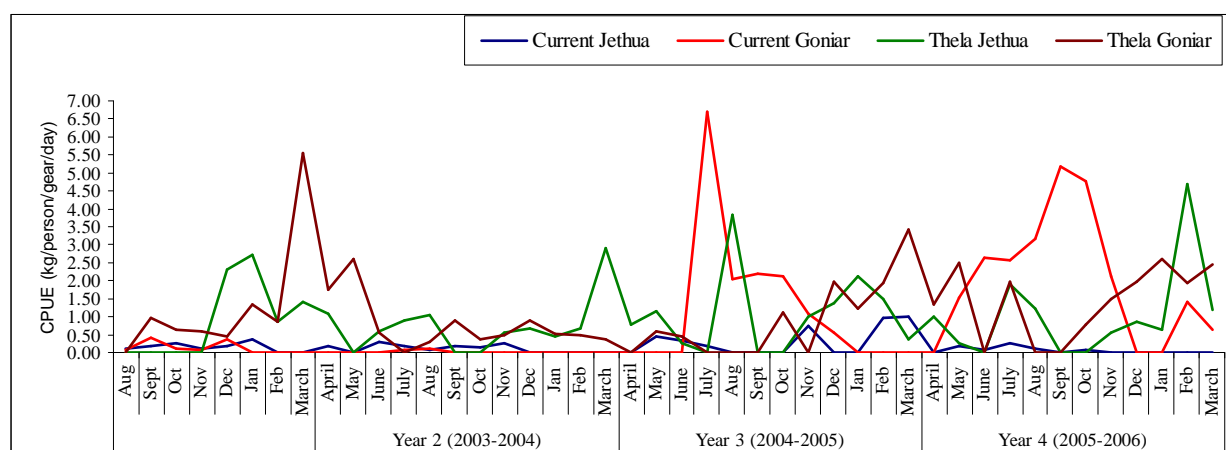
Figure 4: Mean of CPUA (kg/ha) of months with std. error as a function of time (yr.) of two WBs

The figure 4 shows the dispersion of the data, CPUA by month. There is more stable dispersion in the CPUA of *Goniar beel* (CBFM 2) then *Jethua* (MACH) over the in intervention year.

Catch Per Unit Effort (CPUE): To understand better the fishing trends in these two WBs requires analysis by gear type i.e., CPUE (kg/person/gear/day). The fishers uses various gears like seine net, lift net, cast net, various traps, hooks, long line, push net and current net.

⁵ Y1= August 2002-March 2003; Y2= April 2003-March 2004; Y3= April 2004-March 2005; Y4= April 2005-March 2006

Nevertheless, Current and Push (locally called *Thela jal*) net is prominent used gears among all in terms of frequency and number. However, the major catch is done by using seine net (locally called *Ber jal*) and lift net (locally called *Veshal jal*). It is found from the monthly CPUA that the dry season produces the main production (Annex 2) coinciding with push net fishing, Figure 4. Usually the uses of the Current *jal* mainly depend on water volume and retention of the basin. The figure 5 tells us the water volume and retention of *Goniar beel* was in better condition over the year so that the CPUA/per year of *Goniar beel* is higher than *Jethua beel* (Table 2).



Data Source: MACH and CBFM 2

Figure 5: CPUE (kg/person/gear/day) of different months of two WBs

Fish Consumption

Per capita fish consumption depends on the availability of the fish. The analysis is drawn only comparing among the common months of the two project periods⁶. There is an inverse situation is found i.e., the CPUA (Table 2) of *Goniar beel* is higher than *Jethua Beel* but the per capita consumption (Table 3) is higher in *Jethua beel* area.

The increasing trend of fish consumption in good condition for both WBs due to the CPUA increasing trend also has found, Table 3. This is might for the blessing of water body management system so far.

However, the statistical test reveals that the increasing trend of CPUA not only contributes in the per capita fish consumption rather other associated factors may be involved. The following Table 4 proves the insignificant relationship between CPUA and per capita fish consumption in different

Table 3: Per capita fish consumption

Year ¹	Jethua Beel	Goniar Beel
Y1	60.26	53.49
Y2	61.15	45.83
Y3	65.05	55.73
Y4	56.58	54.76

Data Source: MACH and CBFM 2

Table 4: Correlation between CPUA and per capita consumption

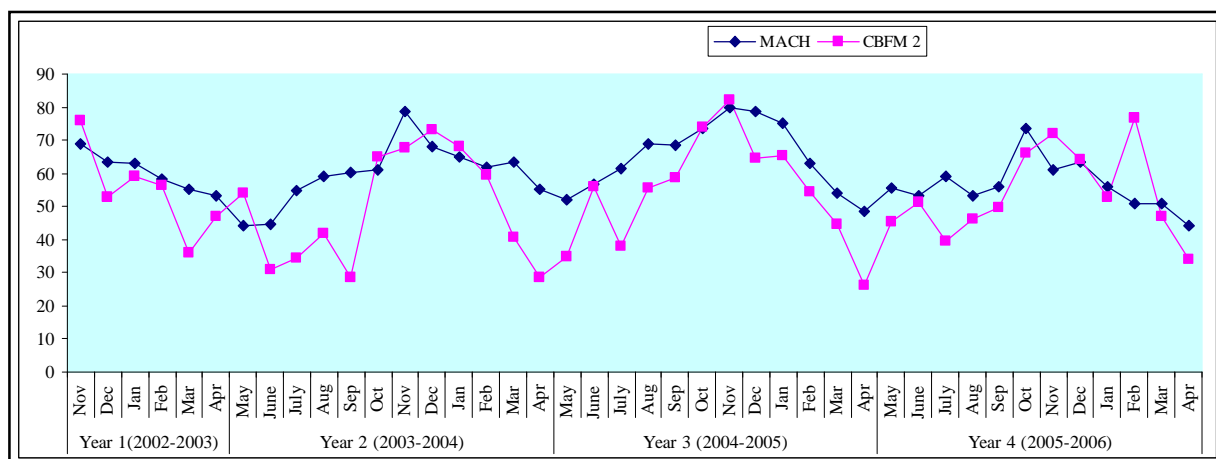
	In years	In months
Pearson Correlation	0.23	0.059
Sig. (2-tailed)	0.58	0.600
N	8	82

⁶ Year: Y1: Nov'02-April'03, Y2: May'03-April'04, Y3: May'04-April'05, Y4: May'05-April'06

years whilst months.

Nevertheless, the consumption variation is found in each intervention year between two sites but it is not significant ($p > 0.05$). The data is combined for both water bodies by intervention years, the best fitted model explaining 80% ($R^2 = 0.799$) of variation in per capita consumption in terms of intervention year and water bodies.

Per capita fish consumption in different months is varied. The high consumption is found from October to January (Post monsoon) and low is found March and April (Early monsoon), Figure 6.



Data Source: MACH and CBFM 2

Figure 6: Per capita fish consumption by month, CBFM 2

The over all consumption not differed significantly in terms of intervention years and WBs but it is highly significant in terms of months since $p \text{ value} < 0.05$. This reflects there is a heterogeneous per capita fish consumption situation among beneficiaries over the year between two studies WBs.

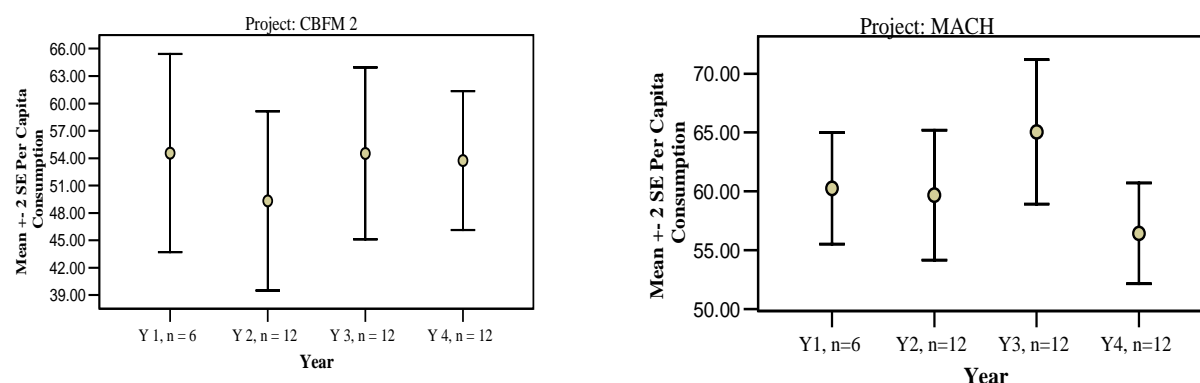


Figure 7: Per capita consumption of months with standard error as a function of time (year) for two WBs

Moreover, the SE indicates differences between individual consumption i.e., the dispersion among the beneficiary's fish consumption is high in *Goniar beel* context which is low in *Jethua beel* context, Figure 7.

DISCUSSION

The discussion part is covered the impact of the institutional arrangement of the CBO and the biological impact of the of the water bodies. A comparative analysis also discussed here with giving recommendations.

The management approach of two projects

MACH approach demonstrated co-management and participatory processes for planning, implementation and monitoring for sustainable wetland resource management. Realizing that a reduction in fishing is likely to be a critical part of reviving the wetland fisheries, the project has identified alternative income generating opportunities⁷ for existing and potential fishers and others directly dependent on wetland resources. In addition to physical interventions to restore wetlands, emphasis has also been placed on developing local institutions to sustain best practices through bottom-up approach ensuring participation of the people of various wealth statuses. The project is supporting communities and local government in the planning and sustainable use of natural aquatic resources (MACH, 2007).

CBFM 2 followed the following three approaches are:

1. Fisher managed fishery - forming groups among the fishers for using each water body and then a committee or organization representing these groups and taking management decisions;
2. Community based fishery - participatory approach at the community level. Fishery managed by the community where participatory planning with different stakeholders is followed by forming a water body management committee according to the suggestions of all stakeholder categories;
3. Women managed/led fisheries - ensure participatory planning involving the whole community/all stakeholders, with groups formed with women (may be mixed with men and women), and the women group members take a lead in resource management (CBFM 2, 2003).

In this study, it is found that there are horizontal and vertical linkages among stakeholders of the projects which are coincided with the project approach. The *MACH* co-management approach is more structured than *CBFM 2*, aiming to ensure the accountability and transparency of the CBO's activities. The World Fish Center (undated) explained that the major challenge of any project is ensuring the key institutions that are truly sustainable in the complex rural societies. There are many examples of failure, where CBOs soon collapse once project support is discontinued. The similar tendencies were appeared in the both of the projects. There is a provision that the Upazila Fisheries Department will look after the CBO after phasing out of the *CBFM 2* project. Ideally, the sustainability of the approach would be improved if there were established contacts with the government department prior to the phasing out of the project. Any department/institutions should have a good with the local institutions (CBO) as NGO projects are time bound. The paper agreement is not sufficient to make a good linkage among the stakeholders of the project rather

⁷ AIGA: Homestead Gardening, Poultry and duck rearing, Beef fattening, Milky cow rearing, Handicraft, small and middle trading, net and boat purchasing, etc.

learning by doing the process is best practice. The MACH process appears to be better in this respect than the CBFM 2 process. Another recent project named Community Based Sustainable Management of Tanguar Haor Program (CBSMTHP) has been implementing at Sunamgonj district follows the MACH approach in the co-management approach for the Tanguar Haor resource management. In addition to that this project also takes the learning from the CBFM 2, SEMP project.

The hardware activities as described by i.e., connectivity develop among water bodies, re-excavation of the *beel*, plantation etc., are, however, important event of the project. The issue is that the whole process in MACH takes 7-8 months to start the hardware activities which are 3-4 times more than CBFM 2 approach. One CBO of MACH will get BDT 75-80 thousand annually from the endowment fund⁸ if they submit the proposal irrespective whatever the bank balance the CBO have. The CBO will use own funds for the WB management if the budget of work crosses the limit of endowment fund. Another thing, there is no clear instruction of CBO to use own fund for CBFM 2 approach. In both processes there is no clear set up rule (either imposed or following participatory method) to use the CBO fund to address other social issues viz. sanitation, education, health, emergency operation etc. In MACH project, the disbursement process of endowment fund is lengthy that has to be reduced. After a certain bank balance the CBO cannot apply for the endowment fund but the approval have to be undertaken if needed any management activities of their WB. In that case the endowment fund will gradually be increased. The UFC will take decision how they can use this unutilized endowment fund. In this situation the UFC could develop any other CBO for resource management of another WB in the same Upazila or administrative area.

The capacity building of the CBO

The geographical position of the study context *Jethua* and *Goniar beel* is apparently same. Both WBs are perennial and managed water bodies. Once upon a time both WBs were affected adversely by poor management. In particular some influential persons in society had operated for their own interest without following the fishing rules. Therefore, the resources viz. fish production, species, and aquatic plants had greatly degraded. The traditional fisher living surrounding the WBs were united whilst not sensitized about natural resources so that there was no local level platform to stand against the influential persons to manage the natural resources properly. However, two projects had launched with a common views to safeguard the fisheries through a co-management approach.

There need major changes in institutions and organisations, in attitude among fishers and government, and in information bases for empowering co-management (Pomeroy and Viswanathan, 2003). In the study projects the sustainability of the linkages with the government agency is also not satisfactory in both projects. After withdrawing the CBFM 2 support (February'07), CBO did not continue meeting with the DoF where the responsibility to call the meeting is vice versa. After May'07 the concerned UFC under MACH project did not call on the quarterly a meeting. The UFC approve the proposal if the CBO submit their proposal for the water body

⁸ Endowment Fund: The fund which is deposited in the schedule bank for the further maintenance of the water body by the project with the signatory DFO and DC. The concern CBO will submit the water body management proposal to the respective Upazila Fisheries Committee (UFC), then scrutinize the proposal and approve in the UFC meeting.

management particularly hardware activities. If it is late in process the CBO waits for the money otherwise the CBO can not start the hardware activities. This suggests that the processes set up to maintain project activities are not being sustained. This is an alarming situation for the project what the UFC will do after phasing out the project.

The civil society are scared about UP as the transparency and accountability at UP level is yet to be established i.e., the good governance is mostly absent in this space. The UP is a well-established and recognized local government of 150 yrs old of our country so that any project should not have any avoiding tendency rather should try to ensure the good governance of the UP and make good linkages with other service providers viz. department of fisheries, agriculture, co-operative society etc. The process of working collectively viz. community and UP may contribute somehow in the good governance issue of UP.

However, the strength of linkages with other NGOs of these CBOs may be but an important issue to understand. For example the CBO of *Goniar beel* received a new technology of sanctuary management that hopefully potential to improve fish production. Moreover, the new project helped this CBO to be institutionalized properly. Such type of arrangement is absent in *Jethua Beel* CBO area. If any project launch in this area, the government should advise those acting NGO (s) to address these CBO for improving their livelihoods through co-management practices.

The careful utilization of funds is very important. Both CBOs have practice to take any decision and approve as well in the general body meeting. Cashier keeps records properly and there is audit system from the respective government department. There should have a limitation to take share from the profit of the WB rather should keep a buffer amount of money in the account for meeting up the need in terms of WB management.

Conflict management system was taken into consideration to guide conflicts towards constructive rather than destructive results. Conflict management is a non-violent process that promotes dialogue and negotiation at the community level for Community Based Natural Resource Management (CBNRM) (Babbitt *et al.*, 1994). Overall the assessment myself is that the capacity for this role of the *Goniar* CBO is a little bit more advanced than in the *Jethua* CBO. The initiative actually depends on how many and what types of the issues is faced in the community level. However, virtually the *Jethua* CBO keeps a good involvement of the local government, UP, to mitigate the conflict. Jesper Raakjær *et al.*, (2002) told in many countries viz. Laos, Malawi, Thailand and Zambia government plays an important role in conflict resolution and resource management. This is really most welcome if mitigate the local level problems with the involvement of the local government, UP, that reflects so far to the co-management practices of the WB management.

The most important limitation of both projects is that the resource management aiming to increase the fish production consequently will increase the fish intake but other livelihood support like sanitation, infrastructure development, education, health, motivational activities etc. are not addressed by either CBO. The co-management approach of the WB does not contribute in the livelihood of the poor people apart only increasing animal protein intake.

Both water bodies are now resource full so that the returns from them are significant. The project should have strategies to address the social issues along with the water body management by using the partial fund of the profit of their resources; otherwise the co-management of the WB will remain sub-optimized in terms of livelihood support of the poor.

Although MACH RUGs have substantial funds and capacity for alternative livelihood support, but we did not establish effective revolving funds for livelihood support in the CBFM 2 project CBOs including *Goniar beel* CBO. Co-management of a water body alone cannot improve the livelihoods holistically, rather fund generation and revolving properly will increase the fund dramatically.

As per agreement under the projects between Ministry of Land and Ministry of Fisheries and Livestock, waterbody use rights were reserved for CBOs for 10 years, but this was not followed in the CBFM 2 study site. There the traditional leasing for 3 year periods continued, and is now affected by new rules in 2010. However, both CBOs are little bit confused whether the present lease system will be continued in future (an example in the following box-Real Instance). Property rights refer to general recognition that someone can use a resource – “the capacity to call on the collective to stand behind one’s claim to a benefit stream” (Bromley, 1991). Thompson (2004) opined that if a open water body is not handed over to the beneficiaries under a project framework who are living surrounding it then the target fishers cannot resist outsiders (non target people) from fishing within the area.

The lease period of the *Goniar beel* (CBFM 2) is going to end after March-April '08 and of *Jethua beel* is already ended during March –April 2006. The CBO of *Jethua Beel* still has been controlling (unauthorized) the water body but the timing of negotiating the lease has passed (2 years) without agreements. Moreover, the both CBOs are not familiar with procedures for lease negotiation from the government apart the project present system.

Effective partnerships of public and private sectors can only be facilitated if roles of the various players are clear and agreed upon by everyone. It is strongly recommended that public and private sector institutions in the country should work together for effective delivery of improved fish production (Acosta *et. al.*, 2006). It is quite impossible to establish a better co-management system if the administration is reluctant to manage the water body through the local institutions like CBO. Good governance at the local administration level is a prerequisite otherwise any sorts of co-management mechanism will not be sustained

Impact of fish

Both projects had careful monitoring program to quantify the impacts of the fisheries. Fishing catch, species, effort, fishers, time etc were recorded following pre-settled monitoring system. Both studied water bodies namely *Jethua beel* of MACH project and *Goniar beel* of CBFM 2 project had co-management approach with different mode though the ground space, level, CBO, is same. The CBO maintained some fishing norms viz. WB re-excavation if necessary, sanctuary set up, closed season, ban harmful gear, stopped de-watering, etc. Here the closed season is one of the important issues as if fisher cannot fish for 2-3 months (April-June) then alternative

mechanisms to support them are critical. The MACH project were addressed this issue for each CBO but the CBFM 2 were not addressed in all CBOs. Considering the closed season the MACH project tried to ensure AIGA through forming different groups called RUG among the *Jethua beel* beneficiaries (of six villages). On the other hand there is no AIGA activity from the project end among the *Goniar beel* beneficiaries.

It, however, is fairly confident that the increasing trend of the fish yield is a direct result of program interventions such as sanctuaries, excavation, ban harmful gear and closed seasons during the fish breeding period. Such types of initiatives were possible due to the commitment of direct beneficiaries as they are now united in a platform like CBO.

In calculation only capture fish is considered for CPUA and both sources of fish viz. capture and culture fish is considered for per capita consumption. There is no culture pond in the encompassing area of *Goniar beel* but the situation is reverse in the *Jethua beel* area. In both areas the consumption is much higher than the national average (national per capita fish consumption is 43g (MACH, 2007)) as it is large fresh water wetland basin. However, another point is that the MACH has an intensive AIGA program so that the purchasing capacity of the beneficiaries is in better position than others. Finally a conclusion could be drawn that the co-management practice of the natural resources is better in *Jethua beel* area which could ensure the high per capita fish protein consumption. Moreover, there is single cropped land in the *Goniar beel* area but double and triple cropped land is found in *Jethua beel* area as there is plain crop land outside Haor basin.

In all three sites the highest quantity of fish was consumed in the post monsoon months (October to December), that is the period when fish catch and availability are at their highest. The monthly variation of fish consumption largely depends on the availability of fish and the purchasing capacity of the people.

The conclusion is that irrespective social classification the animal per capita protein consumption in *Jethua beel* context is better than *Goniar beel* context. The improved and homogeneous fish intake among recipient does not depends only on the capture fish availability in the respective society rather depends also on the scope of income generating activities of the resource user groups/beneficiaries. In CBFM I are, the household income rose on average by 37% for beneficiaries, this was more due to improved incomes from agriculture and small businesses (supported by NGO training and credit) than from fishing. Therefore, only a co-management of WBs can not ensure high fish protein intake rather to some extent a programmatic holistic approach could ensure the high fish protein intake.

CONCLUSION AND RECOMMENDATIONS

In both projects communities appear to hold the concept and perceive significant benefits, nevertheless questions remain over the institutional sustainability of two approaches. It might be needed further support to the CBO for their worthwhile existing. Some good practices or approaches on institutional management may be practiced from other's water body co-management project. In this strategies government of Bangladesh make understand the policy maker of various relevant

development project to address the existing CBOs in the specific project area for the more capacity building of the CBO's. The benefit sharing system among CBO members of the said two water bodies still not in good position, which is the most important issue considering the inclusiveness of the particular CBO in their respective community.

In the co-management approach the local government and administration including line agencies should be more responsive but this is unfortunately limiting in both water bodies. It is quite questionable of the role of local administration more over the government of Bangladesh as the CBOs in both cases are very much scared whether they will get lease the WB further.

The study explore that apparently the variation of water bodies in size does not play a vital role in both the per acre production and per capita consumption as the average production of the *Goniar beel* is higher than the *Jethua Beel* but the consumption of the beneficiaries is higher in the later one area. Nevertheless, the *Jethua Beel* co-management approach virtually is in better position in MACH project. The Co-management practice of the capture fisheries is not only the reason of the high per capita fish protein consumption others associated factors like AIGA i.e., the purchasing capacity of the direct beneficiaries of the WB's must be enhanced.

This study has conducted just immediate after the project period completion whilst MACH has been continuing the support to the project in smaller arrangement after July 2007 till to June 2008. Therefore, giving an interval, may be 2 or 3 years, future study or research might also aim to understand why the approaches of both study projects are successful and why not, perhaps using some case studies and comparing the management activities of CBOs and linkages with the line agencies and performance of facilitating NGOs. Sharing lessons and experiences of other fisheries projects such as the Fourth Fisheries and Community Based Sustainable Management of Tanguar Haor (CBSMTH) that have also employed co-management approaches might help for identifying the best approaches of the co-management.

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ANNEX: PROCESS MAPPING

The selection of key processes, or 'nodal processes', has been achieved using the technique of process mapping. It is essentially a technique for making work visible. Process Mapping produces an 'illustrated description of how things get done, which enables participants to visualize an entire process and identify areas of strength and weaknesses'.

The usual approach is to map a process to identify the current status of a process either management or else, to use this as the basis of analysis and review - in terms of identifying process steps that are the cause of proper management, increasing the fish production consequently increasing the protein consumption and something doing for the betterment of the people's life., bottlenecks, delays, and barriers.

Process Variation Matrix

Steps and how intervened	MACH	CBFM2
Water body selection		
A list of intervention WB finalized prior implementation by the high official of concern GO and NGO department	×	√
Identified existing water body or <i>khas</i> lands in consultation with the local people(RRA), UP, Line agencies	√	×
Rapid Rural Appraisal (RRA)		
Conducted RRA to gather information on different <i>beels</i> of the pre-fixed working zone	√	√
Identified the direct beneficiaries villages mainly 1 st tyre villages	√	√
Census		
Developed a census format and provided the orientation to the local enumerator	√	√
Quality maintained by the project staff and provided feedback accordingly	√	√
Data entry, coding, analyzing, report preparation	√	√
Introductory meeting at UZ and union level		

Steps and how intervened	MACH	CBFM2
Senior project staff and staff from Ministry of Fisheries and Livestock meet with the concern UNO and UP chairman to share the project mission and vision	√	√
Conduct meetings at the UP offices with UP members and community leaders where senior program staff, district and UZ administration officials and staff from donor agency were present	√	√
Time, date and venue were fixed well ahead in consultation with the council members and district administration	√	√
Baseline Survey		
Determined sample villages, households by fisher and non-fisher categories on the basis of census data	√	√
Developed questionnaire and provided the orientation to the enumerator	√	√
Quality maintained by the project staff and provided feedback provided accordingly	√	√
Introductory meeting with the field staff and select 10 members for communication from each responsible village	√	
Talking about Haor with villagers through personal contact	√	√
Courtyard meeting with villagers	√	√
One villager was assigned to inform villagers and paid 70 BDT /day by the project, in association with UP	√	×
A mass gathering in the UP office premises	√	×
Participatory Action Plan Development		
Farmer, Fisher, Women, different professionals and elite were invited and makes 4 groups ac to profession to conduct the session	√	√
Prior fixed date, venue and time in consultation with the participants	√	√
A day long exercise conducted in each group separately but 4 groups simultaneously	√	√
Another day for the final plenary (compilation and decision taking)	√	√
CBO formation		
Identify the village and resource users (from census data)	√	√
Informing the villagers and conduct village meeting	√	√
Villagers identified 10 villagers from each adjacent village of project water body following democratic processes. At least 3 of them are fishermen	√	×
3 female members were mandatory in the general body and 1 female member were mandatory in the executive body; in composition 60% members are resource users, 30% other poor people, 10% local elite.	√	×
There were no hard and fast rule to be a CBO member but members should be fisher, but in the executive body 2 female members must have where 1 female must occupy an	×	√

Steps and how intervened	MACH	CBFM2
executive position		
Keep resolution on decision	√	√
Regular meeting (monthly, quarterly, annually and special meeting of CBO)		
A date and time is fixed for every month	√	√
A meeting time is fixed	√	√
Notice is circulated prior by the CBO members	√	√
RMO inform the concern project staff well ahead	√	√
Most of the members attends in time	√	√
CBO arrange BDT 50-100 from their fund as conveyance to inform all the members	√	×
All members participate till to end the meeting	√	√
Record Keeping		
The committee members keep records like minutes, accounts, yearly plan, member list etc properly (with the assistance of the project staff)	√	√
Secretary keeps the most of the record book and cashier keeps all accounts related record book	√	√
Training		
Training Need assessment of CBO members	√	√
Develop Training Module	√	√
Fixing up date, venue in consultation with the trainee (CBO members)	√	√
Project partner resource persons (or hired if needed) provided the training	√	√
Provided materials to the trainee	√	√
CBO Registration		
Meet with the official of Cooperative Society (CS) and Social Welfare Department (SWD)	√	√
Comparative analysis on the drawbacks and facilities of the said department to register the CBO	√	√
Applied with proper documents	√	√
Finalize and register CBOs with the CS/SWD/both	SWD	Both
Access establish to the water body		
Ac to prior list land ministry handed over 74 selected <i>beels</i> size over 20 acres to the fisheries dept. and then to CBO; less than 20 acres sizes <i>beels</i> from fisheries dept. to CBO directly	×	√
Water bodies selected through PAPD	√	×
Project takes initiative firstly to get the lease, paid the lease value	Refundable	Non-refundable
Meeting among the RMO members in presence of the project staff	√	√
A resolution on lease taking decision were submitted to the project, LGC and UP	√	×
Identified beels are presented in the LGC meeting and approved by the LGC	√	×

Steps and how intervened	MACH	CBFM2
The list with a proposal goes to ministry of land and livestock and approved after scrutinizing	√	×
The water body/ <i>beels</i> are handed over to the CBO	√	√
Project paid 1 st lease money as loan through a bilateral contract among CBO and Project in a stamp of BDT150.00- non refundable	√	√
RMO/CBO paid the subsequent lease money every year from the WB benefit	√	√
Lease money is given through Bank	√	√
Get WB lease from DC (if WB size ≥ 20 acre)/UZ office (if WB size < 20 acre)	√	√
Water body management		
CBO discuss about the <i>beel</i> re-excavation/ <i>katha</i> setting/plantation around the WB/sanctuary establishment/ in their regular meeting	√	√
Make a proposal for a scheme with the assistance of the project staff	√	×
Submit to the LGC/UFC including their work plan by May of each year	√	×
After scrutinizing, the LGC/UFC send the scheme proposal to the client HQ	√	×
Sub-district engineer visit the scheme area for appraisal	√	×
Approve the scheme, it takes about 7-8months	√	×
CBO mobilize the labor and fixed up the rate in consultation with the UZ eng., project eng. and project staff	√	×
CBO managed directly	×	√
An information board is installed in each scheme site	√	√
UP Chairman and members are the advisor	√	√
Inaugurated in presence of the villagers of the adjacent villages of WB	√	√
Daily 60BDT allowance get 2 PIC members only on working days of hardware activities for supervising	√	×
UP chairman, PIC president and cashier get 450 BDT each in a working month as an allowance for supervising	√	×
PIC and CBO members supervising the activities without any payment	×	√
Formation of Cluster -Networking		
All CBOs of a Sub-district	×	√
One representative from each CBO	×	√
Monthly meeting at Cluster Committee office (Project and CBO joint support)	×	√
Formation of Regional Committee/Apex Committee - Networking		
One/two representative(s) from each cluster committee, size depends on number of cluster of a region	×	√
One representative from each CBO (Project site wise not	√	×

Steps and how intervened	MACH	CBFM2
Upazila)		
Meeting frequency – Quarterly	√	√
Formation of Central Committee		
One representative from each Regional Committee	√	×
Meeting Annually	√	×
Formation LGC/UFC⁹		
Sub-district wise committee	√	×
Officials of line agencies and one representative of each CBO, UFO member secretary	√	×
Quarterly meeting at UZ premises	√	×
Forming of PIC		
Formed a PIC comprising of 5 members	√	×
Among 5, 2 are from GB, 1 from EC, 1 engineer and 1 FO from MACH (after complete phasing out the member will take from EC and GB)	√	×
The size is 5 but the composition is open but GB representative have to have	×	√
Awareness program		
Increase awareness through billboard, street drama, discussion, folksong, meeting, gathering, personal contact, day observance etc	√	√
Safe habitation for birds/plantation		
Take decision in the meeting, make resolution and approve by project/UFC	√	×
Plantation along the bank of different <i>Charas</i> (small streams that feeding the Haor)/surrounding WB	√	×
Form a sub-committee for plantation, 1 member from EC and rest 4 from GB	√	×
Project gave technical support	√	×
Benefit sharing: Trees along with the stream is 75%landowner, 5%UP and 20%RMO; Trees just beside the beel are owned by RMO	√	×
Project initiated once for plantation in surrounding area of some project WB	×	√
Community contributed the organic fertilizer, stick for the plant and guarding	√	Only guarding
Prohibited bird hunting strongly	√	×
Awareness campaigning	√	×
Transparency and accountability		
CBO keeps all sorts of records, bills, vouchers properly and presents in the GB meeting, deposited money in the bank timely	√	√
Training		

⁹ Although there is no UFC in the CBFM2 project but Cluster committee has a provision to organize monthly meeting where concern sub-district fisher officer would be invited and preside the meeting.

Steps and how intervened	MACH	CBFM2
Receives training on plantation, fish conservation, accounts keeping, good governance, gender issue , networking among various institutions	√	√
Training venues are project and CBO office	√	√
EC and GB committee members were the trainee	√	√
Trainee shared all the learning in their meeting to capacity building of others	√	√
Facilitators were the project staff and the official of line agencies	√	√
Implementing Fishing Rules and Regulations		
Maintain close season	√	√
Stop brood fishing	√	√
Stop harmful gear use	√	√
Stop dewatering and total fishing	√	√
Light fishing is also prohibited	√	√
Establishment and maintenance of sanctuary		
Take decision in the meeting with resolution	√	√
Place of sanctuary be fixed prior <i>bee/</i> excavation	√	√
Form a sub-committee of 5 members	√	√
Sanctuary is marked with the signboard and red flags around it	√	√
Buffer zone 150-200 feet area around the sanctuary (prohibited for fishing)	√	√
Endowment Fund		
Project deposited endowment fund with the signatory DFO and DC.	√	×
The interest of the fund provides against any scheme proposal from the RMO	√	×
Introducing some extinct fish species		
Identified the sources of desired fish species	√	√
Project provided this support	√	√
CBOO keeps meeting resolution prior to fish introducing	√	√
Project staff collect the extinct fish species of that particular WB	√	√
Finally introduce the species in presence of the CBO and GO officials	√	√
Develop Monitoring Tool		
Another agency were assigned to develop the tool which would help to assess the sustainability of the co-management approaches	√	×
Sharing with all the stakeholder, FGD	√	×
Process mapping exercising	√	×
Identified the critical path	√	×
Develop tools for the RMO (Report Card and Fish Monitoring tools) and other checklist for the UFC	√	×
Field test and revise the developed tools and finalize	√	×
Provide training to the field staff and SUFO	√	×

Steps and how intervened	MACH	CBFM2
Project staff provided orientation to the RMO members on this tool	√	×
Credit Operation		
Project initiated in some CBOs and rest CBO has own credit operation	×	√
Project introduced credit operation forming RUG encompassing the all project WBs where 60% members are the member of CBO	√	×

Annex 2: Month wise CPUA (ha)

Months	MACH				CBFM2			
	Y1	Y2	Y3	Y4	Y1	Y2	Y3	Y4
January	18.37	8.14	19.16	32.10	15.72	16.22	12.88	22.04
February	68.44	25.79	41.42	93.18	11.24	9.26	12.32	15.28
March	5.31	21.04	79.24	21.62	3.17	2.44	21.80	7.60
April	-	0.87	0.79	3.78	-	3.15	0.00	8.63
May	-	1.03	6.62	2.23	-	1.11	6.63	27.80
June	-	3.52	10.03	4.44	-	1.67	26.94	11.45
July	-	6.18	8.27	3.65	-	4.84	21.36	22.87
August	7.06	6.05	9.15	2.06	11.29	12.65	16.45	34.98
September	4.76	7.74	9.19	19.84	20.30	21.93	14.09	44.09
October	11.59	9.42	8.26	10.07	13.59	14.10	20.29	52.26
November	11.69	6.69	9.82	5.65	25.93	15.08	7.31	21.30
December	9.84	6.00	28.73	0.79	14.56	12.13	17.98	16.62

Data Source: MACH and CBFM2

Y1= August 2002-March 2003; Y2= April 2003-March 2004; Y3= April 2004-March 2005; Y4= April 2005-March 2006