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COMMUNITY BASED FISHERIES MANAGEMENT PROJECT (CBFM-2)

CASE STUDIES OF SIX CBFM-2 WATER BODIES

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Case Studies of Six CBFM-2 Water Bodies

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The case studies report on how CBFM-2 interventions have affected aquatic productivity, income, employment and livelihoods in six case study sites, Beelbhora beel cluster (Kishoreganj), Sholuar beel (Narail), Chapundaha beel (Rangpur), Hamil beel (Tangail), Kutir beel (Kishoreganj) and Dikshi beel (Pabna).

LIST OF ABBREVIATIONS AND LOCAL TERMS

ABBREVIATIONS

BMC	Beel Management Committee
BWDB	Bangladesh Water Development Board
BS	Banchte Shekha
CBFM	Community Based Fisheries Management
CBO	Community Based Organization
CNRS	Center for Natural Resources Studies
DoF	Department of Fisheries
DFID	Department for International Development
FGD	Focus Group Discussion
GO	Government Organization
HYV	High Yielding Variety
IRRI – Boro	A high yielding rice variety grown in the dry/winter season.
KII	Key Informants Interview
NGO	Non Government Organization
SDO	Sub Divisional Officer
UP	Union Parishad (Local government administration)
UFO	Upazila Fisheries Officer

LOCAL TERMS

Bazar	Market place
Beel	Lakes or depression in the floodplain
Bauth	A traditional fishing festival (illegal)
Kua	A small ditch made in the water body to attract fish
Jalkar	A term for lease

BANGLA AND ENGLISH MONTH

Bangla months	**English months**
Boishakh	Apr-May
Jaistha	May-Jun
Ashar	Jun-Jul
Srabon	Jul-Aug
Bhadra	Aug-Sep
Ashin	Sep-Oct
Kartik	Oct-Nov
Agrahayan	Nov-Dec
Poush	Dec-Jan
Magh	Jan-Feb
Falgoon	Feb-Mar
Chaitra	Mar-Apr

COMMON FISHING GEARS IN BANGLADESH

Standard Name	**Local name**
1. Gill net	Current jal
2. Seine net	Ber jal, Moshery jal
3. Cast net	Jhanki jal, Toira jal
4. Arbandal/Bana	Local fishing method trap by blocking fish movement
5.Traps	Darki, Chai, Kholsun, Doair, Bason, Dudhi
6. Push net	Thela jal, Phelun, Henga, Ucha
Long line/Hook & line	Hazari, Don, Nal, Dati, Hat, Chip borshi

1. INTRODUCTION

The Community Based Fisheries Management Project-2 (CBFM-2) started in September 2001 with financial assistance from the Department for International Development (DFID) of the United Kingdom (UK) government. It is implemented by the WorldFish Center in collaboration with the Department of Fisheries (DoF) of the Bangladesh govt., and NGO partners (CNRS, BRAC, Caritas, Proshika, Ghoroni, Shisuk, Banchte Shekha, CRED, SDC, BELA and FemCom). The goal of the project is to improve the livelihoods of poor people dependent on inland aquatic resources. More specifically, the project aims to result in the policy stakeholders in inland fisheries in Bangladesh agreeing and adopting a process for policy formulation for pro-poor sustainable fisheries management. Since its inception, CBFM-2 has been working in 117 waterbodies representing four environments; rivers, open beels, closed beels and private floodplains.

The specific objective of this document is to report on how CBFM-2 interventions have affected aquatic productivity, income, employment and livelihoods in six case study sites, Beelbhora beel[1] cluster, Sholuar beel, Chapundaha beel, Hamil beel, Kutir beel and Dikshi beel.

2. METHODOLOGY OF THE CASE STUDIES

The case studies were initiated in January 2005. A checklist was prepared and administered to ensure that the investigation covered different aspects of CBFM-2 activities for all the case water bodies. The Research Assistants of the project were trained to administer the checklists so that variations in obtaining and recording information due to their subjective judgments are minimized. Focused Group Discussions (FGD) and Key Informants Interviews (KII) were held with relevant stakeholders. In addition, cross sections of people in the village were consulted to revalidate the consistency of the information. A team of 4 researchers conducted the necessary FGDs and KIIs. Information and data of the WorldFish Center and associated NGOs were also used to supplement the case studies. The team conducted FGDs with homogeneous groups such as BMC executive members, CBO/BMC general members, female members and micro credit recipients. KIIs were also conducted with respected villagers such as school teachers, UP Chairmen and members, Mosque *imams* and previous leaseholders of the water bodies. The case studies were completed by making several visits to the water bodies, BMCs and villages. The final visits were made during September-October 2005 to update information gaps. Individual case studies, photographs of group discussions, KIIs and AIGAs and audio recordings of discussions and interviews were also made.

3. SCOPE AND ORGANIZATION OF THE SYNTHESIS REPORT

The report is a synthesis of case studies carried out in six project water bodies:
(i) Beelbhora Beel cluster, Pakundia Upazila, Kishoreganj District (floodplain beel, PNGO - CNRS),

[1] Depressions in the floodplain forming lakes, often varying in size with the season

(ii) Sholuar beel cluster, Sadar Upazilla of Narail District (floodplain beel, PNGO - Banchte Shekha),
(iii) Dikshi Beel, Chatmohor Upazilla of Pabna District (open beel, PNGO - Caritas),
(iv) Kutir Beel, Kotiadi Upazilla, Kishoreganj District (intermediate between open and closed beel, PNGO - CRED),
(v) Hamil Beel, Modhupur Upazila, Tangail District (closed beel, PNGO - Caritas), and
(vi) Chapundaha Beel, Pirganj Upazila, Rangpur district (closed beel, PNGO - BRAC).

In addition to background information on the water bodies, the report looks in detail at the leasing history of the waterbodies, livelihood options in the villages, formation of community based organizations (CBOs) and beel management committees (BMCs), the status of fisheries management, micro credit and alternative income generating activities (AIGAs) and livelihood improvement through micro credit. The report also covers achievements, lessons learned, threats and challenges and implications for sustainability of community based approaches to fisheries management.

4. LOCATION AND LEASE STATUS OF WATER BODIES

Hamil beel and Dikshi beel were included in the first phase of the Community Based Fisheries Management Project (CBFM-1) meaning that they have been under community management since 1996 and 1997 respectively. The CBOs at both beels were established and trained by the NGO Caritas using a Fisher Managed Fishery (FMF) approach[2]. Management of Hamil beel was handed over to a corresponding Beel Management Committee (BMC) in June 2005. At the time of the case study, management of Dikshi beel was also ready for hand over, but the process had not been completed.

The other four case study sites were introduced in the second phase of the project with community based management being introduced in 2002, except for Kutir Beel where it was delayed until 2003. All the second phase CBOs are still supported by their respective NGOs. The CBO at Kutir beel was set up by the Center for Rural Environment Development (CRED) following an FMF approach. The CBOs at Beelbhora beel were supported by the Center for Natural Resources Studies (CNRS) following a Community-Led Fishery (CLF) approach. The Sholuar beel CBO receives support from Banchte Shekha (BS) and also follows a CLF approach. The CBO at Chapandaha beel is managed by BRAC (Bangladesh Rural Advancement Committee) following an FMF approach.

Dikshi Beel, Hamil Beel, Kutir Beel and Chapandaha Beels are government water bodies and subject to lease, meaning that an annual fee must be paid by whoever is entitled to fish in them. Beelbhora beel and Sholuar beel are classed as private floodplains meaning that there is no annual fee to be paid to the government although access may be dependent on payments to local landowners. Annual lease values were Tk 53,600 for Hamil beel, Tk 42,350 for Dikshi beel (including Reach-1 and Reach-2), Tk 12,974 for Kutir beel and Tk 83,459 for the Chapandaha beel. Payments of lease fees for all the beels were up to date for the Bengali year 1411 (2003/2004). These leased beels were handed over from the Ministry of Land (MoL) to the DoF

[2] Explain FMF vs. CMF vs. WMF

for 10 years. Subsequently, the DoF handed them over to the CBOs set up by the partner NGOs. Under a Memorandum of Agreement (MOA) signed between the CBOs and DoF, the CBOs have tenure over the waterbodies for a period of 10 years as long as the lease fees are paid regularly and beels are managed properly.

Table 4.1 Basic information of the six waterbodies under study

Name of the beel	Upazila	Area (ha)		Year of CBFM Joining	Lease Period (Yr)	Lease Value (Tk)
		Max	**Min**			
Hamil	Modhupur	25	20.68	1996	10	53,600
Dikshi	Chatmohor	250	2	1997	10	42,350
Beel Bhora	Pakundia	600	300	2001	N/A	N/A
Sholuar	Narail	1120	20	2001	N/A	N/A
Kutir	Kotiadi	18	9.71	2002	10	12,974
Chapandaha	Pirganj	90	2	2001	10	83,459

Source: (WorldFish Center documents)

5. MANAGEMENT OF WATER BODIES

5.1 Previous management

Prior to CBFM-2 intervention, management practices at all government owned water bodies were revenue orientated. They were leased out to the highest bidder, usually for a period of three years. But in practice the beels remained under the control of local elites and elite controlled fishermen cooperatives or their leaders for long periods of time. The beels were often sub-leased to second and third parties who used their power and position to exploit real fishers. One form of this was where fishers had to work for the leaseholder as laborers. Another was where fishers were required to surrender 50% of their catch to the beel leaseholder as an access fee. The result was extractive beel management without regard to the preservation of resources for the future with inevitable consequences for fish biodiversity and declining production. Privately owned floodplain beel management also tended to be exploitative with little regard for future stocks.

5.2 Current management

One of the main aims of community based resource management is to reverse the trend towards exploitative management. When water bodies are brought under CBFM management, concerted efforts are made by the partner NGOs (PNGOs), the WorldFish Center and DoF to convince everyone in the community that there is a better way to manage aquatic resources. The CBFM-1 project was able to demonstrate that groups of fishers could manage water bodies in a sustainable manner. The CBFM-2 project extended this approach to more waterbodies and included additional measures to further improve sustainability. Physical interventions included cleaning of aquatic weeds in choked up water bodies, the excavation of part of water body as fish sanctuaries which would hold water through-out the year and the opening up of channels connecting waterbodies to rivers and canals to facilitate fish migration. Improved fish stocking protocols were established for closed beels, with clear recommendations on the number and type of fingerlings to be released according to the suitability of the water bodies. The use of destructive gears was restricted and discouraged and a ban on fishing during the breeding season was introduced. In addition, micro credit was made available to enable fisher households to develop

alternative income generating activities making it easier for them to observe the closed season in project water bodies.

6. LIVELIHOOD OPTIONS IN THE PROJECT VILLAGES

6.1 Land tenure system

In the villages around the beel areas, four different types of land tenure apply; owner-operator, owner-cum-tenant operator, tenant-operator and mortgage-operator[3]. Across all areas, there is wide variation. In many cases, the landowner tends to cultivate the land himself in areas where land is productive. Around 30 to 65 percent of the households are owner-operators in the study areas. The next most important class is owner-cum-tenant operators who range from 15-60 percent of all households. Mortgage operators constitute 7 to 40 percent. The mortgage-operator arrangement appears to be increasing rapidly at present whereas share cropping appears to be decreasing. Full tenancy ranges from 3 to 35 percent of the households.

Table 6.1 Land Tenure System in the villages around the waterbodies (% of households)

Name of waterbody	Owner-Operator	Owner cum Tenant	Tenant	Mortgage Operator
Beelbhora	65	15	4	16
Sholuar	30	60	3	7
Hamil	30	50	10	10
Chapundhah	45	20	12	23
Kutir	30	20	35	15
Dikshi	35	15	10	40

Source: Individual case studies of water bodies

6.2 Occupational Distribution

In terms of occupational pattern, farming was the most important of all the economic activities in the study areas constituting about 50% of all households in the villages in 4 out of the 6 waterbodies. The exception is Dikshi beel where the number of farming households was reported to be about half of that observed in other areas. Labouring was a common occupation (30-32%) in Beelbhora, Chapandaha and Dikshi beel whereas Hamil beel at 80% had by far the greatest number of households with labouring as the main occupation. Fishing as the main occupation was highest (25% of all households) in Sholuar beel, second highest in Dikshi beel (20% of all households) and least in Hamil beel (2% of all households - nobody is a fulltime fisher in Hamil beel as fishing is restricted for 6 months). Households depending full time on fishing ranged from 2 to 25 percent. Business, as an occupation, ranges from a minimum of 5 to a maximum of 15 percent. Service constituted 1 to 6 percent. Dikshi has about 5 percent households who are engaged in fish culture.

Table 6.2 Occupational Pattern in the villages around the water bodies (% of households)

[3] definitions of tenure systems

Name of waterbody	Farming	Labouring	Fishing	Business	Service	Fish culture	Others
Beelbhora	50.00	31.25	6.25	6.25	6.25	-	-
Sholuar	55.00	9.00	25.00	5.00	6.00	-	-
Hamil	12.00	80.00	2.00	5.00	1.00		
Chapundhah	50.00	30.00	8.00	6.00	6.00		
Kutir	55.00	10.00	10.00	15.00	2.00		8.00
Dikshi	28.00	32.00	20.00	10.00	3.00	5.00	2.00

Source: Individual case studies of waterbodies

7. COMMUNITY BASED ORGANIZATIONS

7.1 Formation of BMC

The formation of community based organizations (CBO) has been the crux of the CBFM-2 process. The approach was based on that tested in CBFM-1 where the project, with the assistance of an NGO partner would identify groups of poor fishers to assume management of project water bodies. These CBOs, although set up under the supervision of PNGOs needed to be able to survive on their own after the end of the project.

The different NGOs used a range of approaches towards the identification of CBO members and organizing representative committees within CBOs and linking CBOs together. All the water bodies in the study had a Beel Management Committee (BMC). In the case of Beelbhora cluster, there was a two tier structure with Village Committees (VC) supplying representatives to the BMC.

The BMCs were made up of a President, a Vice President, a General Secretary, a Treasurer and other general members. The current number of members is shown in table 7.1. In case of Beelbhora, which was organized with a community managed approach, the 15 VCs and the BMC were formed with a range of different types of stakeholders including fishers, landless, farmers, women, businessmen, local elite, kua owners and freedom fighters. In each VC there is an executive body comprising 7-19 members.

The BMC of Sholuar beel was formed with a total membership of 38 (currently 32; 3 died and 3 dropped out) and an executive body of 17 members. There are also 15 groups of micro credit beneficiaries but it was not clear how are they are linked to the BMC.

Table 7.1 Status of CBOs and their membership

Name of waterbody	No. of CBO members	No. of executive committee members	Status of CBO registration	Name of registered CBO
Beelbhora	20-35 (in each VC)	7-19	Yes	Fifteen VCs registered in different names
Sholuar	38	17	Yes	Sholuar Beel Unnayan Samity
Hamil	175	18	Yes	Hamil Beel Bohumukhi Samajvittik

				Samabaya Samity Limited
Chapundhah	49	9	Yes	Dharmadas Motshyajibee Samabaya samity
Kutir	172	14	Yes	Jalalpur Bohumukhi Samabaya Samity Limited
Dikshi	336	7	Yes	Dikshi Beel Bohumukhi Samabaya Samity Limited

7.2 Leadership, capacity building and institutional strength

The case study team found that leadership in most of the BMCs is good. The committees conduct meetings regularly, write resolutions of the meetings and maintain reasonable record keeping. They have considerable unity among themselves. Generally, decisions taken by the committees are obeyed by the members. Training was given to BMC members and general members to develop their skills in terms of management and AIGAs. Training on waterbody and sanctuary management, conflict management, group management, accounts management and AIGAs were given to all the BMCs by the WorldFish Center, DoF personnel, Youth Development Department and other facilitators. This training has contributed considerably to the leadership, skill and capacity development. However, not all of the trainees learned equally. Training on management given to BMC members has certainly contributed and helped develop the skills and capacities of the presidents, secretaries and treasurers.

Leadership skills in Beelbhora are very apparent. Three VCs have introduced micro credit programmes using their savings and money earned from group katha harvests. This initiative has now started to benefit some of the CBO members. Other VCs have now planned to introduce such programmes as they feel this is a way to earn something for the CBOs as well as provide benefits to their members. Three CBO members were given loans for grocery shops and have switched over from fishing to grocery (see Beelbhora case, for details). The process has saved borrowers from paying loans to Mohajons (traditional money lenders) at exorbitant costs.

Chapundaha BMC has introduced an exemplary rickshaw-van distribution programme to provide benefits to the poor of the community as well as to earn income for the BMC. They have so far distributed 32 rickshaw-vans. Two van pullers have already repaid the money in installments and become owners of the vans.

Other BMCs have been less successful in building up capital, only being able to keep a portion of the proceeds from harvesting from common kathas. The fund situation of Sholuar and Dikshi BMCs is poor whereas Kutir BMC has some funds in its account.

Although the institutional aspects of CBOs in 5 of 6 waterbodies were reasonably good it was found that there was poor CBO management and performance in Dikshi beel. There appeared to be distrust and disunity in the BMC and amongst CBO members. The main problem seems to be the existence of two under ground extremist parties (Bahini and Sorbohara) who threaten the BMC leaders.

The BMCs are in general, in a position to control the use of destructive gears and get fishers to comply with the banned fishing period. Nevertheless, complete control could not be established.

On average, 75% of destructive gear use has been controlled in Hamil, Kutir, Beelbhora and Sholuar beel. Compliance level to the banned period is also good in these water bodies. Compliance to fisheries rules and regulations is however, highest in Chapundaha beel. On the other hand, it is frustrating in Dikshi. It was reported that some members often violate rules and regulations and use destructive gears like current jal and ber jal in the water body. There were also complaints made against the BMC saying that committee members were also involved in these illegal activities. Although the BMC of Dikshi beel could not control illegal bauth fishing the intensity was reduced to some extent.

Community awareness is quite good in Beelbhora, Chapundaha and Sholuar. Key informants are also aware of CBFM-2 activities to some extent. They have also watched the folk shows organized by the project. The communities in Dikshi, Hamil and Kutir have less awareness of CBFM-2. There was no evidence of posters, billboards, etc in the communities of these beels. However they were found in Beelbhora, Chapundaha and Sholuar beel. School children as well as youths, particularly in Beelbhora, were also found to be aware of CBFM-2 activities undertaken by the BMCs and NGOs, The control of illegal bauth fishing at Beelbhora provides a clear case of CBO empowerment. Training provided by the project has contributed significantly to improve their skills in terms of reading and writing abilities (all water bodies). Some are now capable of maintaining CBO's record keeping while others have been empowered to write meeting resolutions. The impact of training on skill development of the Dikshi BMC was considered to be below average. On the other hand, AIGA training proved quite fruitful in all the beels.

8. SAVINGS, REVOLVING LOAN FUNDS AND CREDIT

8.1 Savings and revolving loan funds

Each BMC and VC opened bank accounts to keep project money and members' savings. Also most of the VCs and BMCs have kuas which raise additional funds. The current fund status is shown in table 8.1.

Interest-free revolving loan funds were transferred from the project to the PNGOs for distribution among the CBOs with the aim of making improvements to the water bodies, for purchase of fingerlings and for payment of lease fees. They were not given to Beel Bhora and Sholuar beel as these are private floodplains. After the waterbody has been harvested, these funds are supposed to be retained for the following year.

Table 8.1 Current status of savings and revolving loan funds

Waterbody	BMC Savings (Tk)	Group Savings (Tk)	Revolving loan fund (Tk)
Beelbhora	104,614	N/A	-
Dikshi	3300	188,620	51,000
Kutir	63,880	63,880	50,000
Sholuar	13,560	135,960	-
Chapundaha	51,037	51,037	266,956
Hamil	174,348	N/A	231,651

8.2 Volume of micro credit funds

Microcredit was provided to CBO members through the PNGOs in all the study sites except Beelbhora cluster. It was being used for a varety of AIGAs including farming, goat rearing, cow fattening, cow rearing, fish farming and net making. The amounts disbursed were Hamil beel - Tk. 658,938, Dikshi beel – Tk. 623,022, Kutir beel - Tk.570,000, Chapandaha beel - Tk.238,000 and Sholuar beel – Tk 800,000.

Although Beelbhora cluster did not have any micro credit programme by the PNGO, three VCs had initiated their own micro credit programme with their own funds from member subscriptions and incomes from group katha harvests. Although few Beelbhora beneficiaries had been given loans they tended to have made good use of loans and have made timely repayments.

In Chapundaha, the BMC has introduced a rickshaw van distribution programme. They have so far distributed 32 vans amongst the poor of the community. The recipients are required to pay Tk 10 per day or Tk 300 per month for 11 months when they should become the owners of their vans. So far two pullers have paid their instalments and become owners of the vans. They now have a much better life with their earnings.

8.3 Micro credit and its role on livelihoods and fishing

The availability of microcredit for AIGAs has provided additional income and employment opportunities. It has helped households to acquire assets such as land, livestock, poultry and in some cases resulted in educational improvements for the children and better food security.

Shefali of Dikshi beel borrowed a total of Tk 9,000 in three instalments (Tk 2000, Tk 3000 and Tk 4000) from the CBFM-2 microcredit programme through the PNGO Caritas. With the loan, she purchased a sewing machine and some goats. She also invested in egg selling and wheat-paddy business. After repayment of loan, she made a profit of Tk 15,000 in the 1st year from the sewing machine and egg business. She made another Tk 4200 cash profit from sale of goat kids, and still has 4 more kids worth Tk 5000. Her business is running well. She is using part of the income for family needs such as children's education and medical treatment for her husband. She has a business capital of Tk 20,000, in addition to the assets she already owns. All these have contributed to her comfort and providing essentials such as improved food and better clothing.

Basonti, also from Dikshi beel, borrowed Tk 2000 and leased a pond for fish culture. She made a profit of Tk 4000 at the end of the year. After repaying the loan, she again took Tk 3000 and leased another pond. Subsequently, she repaid the second loan and took loan for the third and fourth time in 2000 and 2001 respectively. Incomes from the ponds have allowed her to lease 5 ponds altogether, lease 2 bighas of agricultural land and buy a cow. In addition, she renovated her house with improved roofs and walls and added a new room and a slab latrine. She can now afford to send her kids to school. Her husband is no longer a full time fisher. With the additional income opportunities, her husband is able to observe the banned fishing period.

Morom Ali from Kutir beel was involved in full time fishing. He then took a loan of Tk 2000 and bought a second hand rickshaw that increased his daily income from Tk 40-50 to Tk 120-150. After repaying the loan within a year, he took another loan of Tk 4000, sold the old rickshaw and bought a new one. With the earnings from the rickshaw, he has leased 20 decimals of land where he produces different crops. With the added income his wife got involved with poultry and goat rearing. Morom Ali bought a bull for fattening which he sold for Tk 6000 after 3 months. These additional activities have allowed Morom Ali to spend less time in fishing - he now catches fish only 2-3 times a week for consumption only.

Rehana Begum of Sholuar beel took a total of three loans from Banchte Shekha amounting to Tk 19,000 (first Tk 3000, then Tk 6000 and 3rd loan of Tk 10,000). She repaid the first two loans on time and the third loan is currently being used for cow fattening. She buys cattle, fattens them for three to four months and then sells them for profit. This provides earnings of around Tk 800 per month. She is now planning to buy a piece of land with her savings of Tk 24,000.

Similarly, Mala Rani took 3 loans from Banchte Shekha totalling Tk 20,000 that she used for the repair of boats, purchase of land and buying a cow. With the land purchased, her husband got more involved in farming than enaged in fishing activity. He is particularly busy during the *boro* (rice variety) season. Such alternative income opportunities helped reduce fishing pressure which is one of the main objectives of the project – reducing fishing pressure with alternative income generation activities (AIGAs). .

Fazar Ali, a full time fisher at the Dikshi Beel, used to earn only Tk 50-60 a day until he borrowed Tk 4000 in 2002 and started fish trading. With this, his net earnings increased to Tk 200-300 per day. Having repaid the first loan, he took a second loan of Tk 5000 and his net earnings have again raised up to Tk 350-450 a day. Now he does not need to catch fish from the beel anymore. He has also helped his brother to switch from fishing to fish trading. Through AIGAs, many of the CBFM beneficiaries like Fazar Ali, have already moved to different alternative income sources that are contributing towards reducing fishing pressure.

9. FISHERIES MANAGEMENT

Ensuring improved water body management was the main argument towards getting the Ministry of Land to hand them over to the Department of Fisheries for implementing the CBFM-2 project. The fisheries management activities of the project were intended to enrich fish and aquatic biodiversity, protect endangered species, improve water body productivity, reduce or stop harmful fishing practices using destructive gears, ensure compliance to the ban on seasonal fishing and establish fish sanctuaries.

9.1 Aquatic Biodiversity

Fish and aquatic biodiversity, in general, prior to the project intervention was on the decline but due to compliance of fisheries management it appears to have improved in all the water bodies. For instance, in Kutir beel biodiversity has improved and production has increased drastically after clearing water hyacinth cover from the surface of the waterbody. Similarly, water hyacinth

and grass cover cleared by the beneficiaries at the Chapundaha beel initially, has improved the productivity and biodiversity of the beel. In each of the waterbodies, the number of species in the catch has increased following CBFM-2 intervention. Some of the endangered species have also reappeared.

Table 9.1 shows that in all the waterbodies, the number of species has increased during the project period. In the two CBFM-1 water bodies Hamil beel and Dikshi beel, the number of recorded species increased from 17 and 25 respectively in 1997 to 25 and 51 by 2004. In Dikshi beel the number of species has more than doubled in 7 years.

Similar increases in fish diversity have also been evident in Beelbhora cluster, Chapandaha beel, Kutir beel and Sholuar beel since adopting the community based fisheries management approach. The figures for Kutir beel are less clear with an apparent increase followed by a decrease.

Table 9.1 Species diversity following CBFM-2 intervention

Year	*Hamil Beel*	*Chapandaha Beel*	*Kutir Beel*	*Dikshi Beel*	*Sholuar beel*	*Beelbhora Beel*
2002	24	20	43	44	23	51
2003	26	40	52	35	36	60
2004	25	31	43	51	47	67

Source: (PNGOs' data; WorldFish Catch monitoring and FGDs with BMCs)

The CBOs have also successfully reintroduced endangered species in Beelbhora, Kutir beel, Sholuar beel and Chapandaha beel. Moreover plant diversity has also increased with the observation that aquatic weeds like shapla, shaluk and lotus leaves are now abundant in project water bodies (Kutir and Belbhora).

9.2 Reappearance of endangered species

It is very encouraging that after CBFM interventions, some of the endangered fish species have been recorded in different project water bodies. They have reappeared in many of the project sites.

Table 9.2 Endangered species found in CBFM-2 waterbodies

Local name	Scientific name	Dikshi	Hamil	Chapandaha	Kutir	Sholuar	Beelbhora
Khali-koi	*Badis badis*	+					
Chanda	*Chanda nama*	+		+		+	
Lal chanda	*Chanda ranga*		+				
Gozar	*Channa marulias*	+			+	+	
Cheng	*Channa orientalis*	+	+	+		+	
Bata	*Labeo bata*		+			+	
Calibaush	*Labeo calbasu*	+		+	+		
Goina	*Labeo gonius*			+			
Boro baim	*M. armatus*		+			+	

Titputi	*Puntius ticto*	+	+		+		
Sharputi	*Puntius sarana*				+	+	
Meni	*Nandus nandus*	+					+
Foli	*Notopterus notopterus*	+			+	+	+
Kani Pabda	*Ompak bimaculatus*	+			+		+
Modhu Pabda	*Ompak pabda*						
Gang Magur	*Plotosus canius*	+			+		
Guzi Ayre	*Mystus Bleekeri*						+
Boal	*Wallago attu*						+

(WorldFish Center: Catch Monitoring; CNRS and PNGOs' information).

9.3 Establishment of Sanctuaries and physical works at the water bodies

As part of improved fisheries management, the establishment of sanctuaries is considered one of the major achievements. A sanctuary is considered a safe haven for fish and other aquatic life where fishing is completely banned. The actual area of the sanctuary varies depending on water body type. It is usually demarcated by red flags and often accompanied by a near-by billboard.

As part of project interventions, so far a total of 164 sanctuaries have been established in 117 water bodies of the project in 22 districts of the country. Out of these, two sanctuaries were established in Hamil beel, 3 in Dikshi beel, 1 in Kutir beel, 14 in Beelbhora cluster and 2 in Sholuar beel whereas Chapandaha only has a temporary fish shelter. The establishment of these sanctuaries is intended to preserve biodiversity, protect fish and increase fish production by allowing broodfish to survive through the dry season.

In order to restore fish habitat, physical improvements to the waterbodies have also been made including re-excavation, establishing connectivity with canals and rivers (in Beelbhora), establishing a temporary iron fence (bana) to protect fish from escaping (in Chapandaha) and Kua excavation. In addition to benefiting the fisheries, these activities have also provided a source of income to the project beneficiaries as they took part in this habitat restoration work.

9.4 Fish production

The fisheries interventions carried out under the project appear to have resulted in increased fish production in the different project sites. In Hamil beel productivity per ha increased from 863 kg to 919 kg in one year. Dikshi beel also shows good improvements. Its production has increased to 927kg per ha in 2004 from 828 kg/ha marking a 12% increase over 2003. In Kutir beel, production increased sharply from only 717 kg/ha to 1978 kg/ha - a 175% increase. The beel was full of water hyacinth and the habitat was quite unfavorable for fish production. After the beel was brought under CBFM-2 management, the PNGO CRED and the corresponding CBO cleaned the water hyacinth cover off the surface to restore the habitat. Kuas were also dug. In addition to the interventions carried out as part of the project, fish production in 2004 may also have benefited from heavy floods during which many stocked species from the surrounding areas were washed into the beel. Chapandaha, Sholuar beel and Beelbhora registered 9%, 19% and 73% increase in production respectively.

Fish production in the waterbodies

Waterbody	Average Area (ha)	Period of production	Total Production (kg)	Production /ha (kg)
Dikshi Beel	126	Jan-Dec 2003	104,425	828
		Jan-Dec 2004	116,802	927
Hamil Beel	20.67	Jan-Dec 2003	17,840	863
		Jan-Dec 2004	19,005	919
Kutir Beel	14	Jan-Dec 2003	10,038	717
		Jan-Dec 2004	27,697	1978
Chapandaha Beel	46	Jan-Dec 2003	17,940	390
		Jan-Dec 2004	19,596	426
Sholuar Beel	250	Jan-Dec 2003	18,659	75
		Jan-Dec 2004	22,208	89
Beelbhora beel	450	Mar '02 to Mar 03	21,006	47
		Mar '03 to Mar 04	36,267	81

Source: (PNGOs' data; WorldFish Center Catch Monitoring data, BMC registers and FGDs)

9.5 Compliance to fishing rules and regulations

It appears that CBOs have been successful in reducing destructive fishing methods such as harvesting by dewatering, the use of kathas, the use of current jal and the use of ber jal. Compliance level to the fishing ban during the breeding season has also improved considerably. The fishers and BMCs expressed that the level of compliance has been quite high, around 70-80 per cent (except in Dikshi beel where it was higher). However, it has not yet been possible to exert full control on the use of destructive gears and fishing during the banned season.

10. DISTRIBUTION OF BENEFITS FROM WATER BODIES

CBFM-2 has made it possible to have incomes from stocked waterbodies (Hamil beel, Chapandaha, and Kutir) equally distributed among the beneficiaries – something which would have been impossible prior to the project. Fishers involved in the harvest of fish in these beels benefit through being paid a cash wage or in kind (through a part of the catch) for regular fishing activities. The fishing is coordinated by the CBOs so that all groups get chance to fish in rotation. Any excess money is deposited in the CBO's bank account. After the final harvest is made, the BMC deducts all the costs of fishing and divides the profit equally among the beneficiaries. This system applies to all the stocked beels under the CBFM-2 project.

Floodplain beels (Sholuar beel and Beel Bhola cluster) are managed in a different way, because of the private ownership of the resources. In general, the level of benefits in floodplain beels is lower than in stocked (closed) beels. However CBFM-2 has ensured that fishers and other stakeholders have clear fishing rights whether they own land or not. This is a significant progress meaning that access to private floodplain beels has been extended beyond the few individuals who used to control the fishing in floodplains. Through this arrangement, the fishers can now have added income from the water bodies.

11. ACHIEVEMENTS

The CBFM-2 project has resulted in a wide range of benefits to fishers as well as to the surrounding communities. The following are some of achievements from the CBFM:

- The CBOs act as guardians for better protection and conservation of water bodies and their resources. The CBO approach to management proved much more effective than the traditional revenue-based individual management approach. The success of community based approach is applicable to all project water bodies.
- CBFM-2 has been successful in developing a sense of ownership among the fishers as they now have the access rights to water bodies which they protect and own collectively.
- Through the establishment of community centers, the long-deprived fishers and community people have been able to have a 'place of their own'.
- Community awareness through folk shows, posters and bill boards helped build constituency in favour of the necessary conservation measures for the water body and its aquatic resources (in all waterbodies at varying levels). In some places (Beelbhora), awareness has been created among school children on fisheries and the aquatic environment.
- Through establishing sanctuaries and kuas, improved biodiversity and increased fish production has been ensured, benefiting the fishers and the wider community.
- Earthworks for re-excavation of waterbodies have improved the habitats for fish production and increased biodiversity and fish production.
- The supply of fish at local markets (hats and bazaars) has increased, allowing people to have more fish at cheaper prices (Kutir beel, Sholuar beel, Beelbhora, Dikshi beel, Chapandaha beel)
- The CBO members have emerged as small-scale fish traders in the local markets (Beelbhora, Dikshi, Kutir).
- Micro credit support has reduced dependence on full time fishing to varying degrees resulting in diversification of income earning opportunities (Beelbhora, Sholuar, Dikshi, Kutir, Chapandaha).
- The income opportunities for BMCs has widened not only through cash and savings but also through other means such as the development of kua fishing, rickshaw van distribution programme (Chapundaha) and also from voluntary contributions (Beelbhora).
- Micro credit has resulted in increased financial income, asset generation, improvement in housing, and livelihood and also helped reduce fishing pressure.
- Water body specific information, such as resource mapping has been carried out at all sites, something which should be of use for policy planners.

12. THREATS AND CHALLENGES

Although the overall conclusions are positive, there are certain growing concerns at particular project sites. The Beelbhora cluster is faced with the problem of an upsteam sluice gate which deprives the project water bodies during the boro production season. Measures should be taken to help resolve this problem. Sholuar beel has also been encountering similar problems.

The existence of under ground parties in the Dikshi beel area has caused significant disruption to project activities. It has prevented the BMC from complying with fisheries rules and regulation which ultimately resulted in poor management. The occurrence of illegal bauth fisheries remains a potential threat to the sustainable fisheries management of Dikshi beel and its resources.

On the other hand, sometimes the water level of Kutir beel declines, causing occasional drying up of the water body.

13. LESSONS LEARNED

1. The formation of CBOs provides an opportunity to pro-poor plan for local resource use. Community participation in the planning and implementation of the management of local resources has a good chance of being widely accepted. The existence of CBOs reminds different resources stakeholders that there are norms for resource use. CBOs in CBFM-2 water bodies have been acting as guardians not only for the resources but also for resource planning, conservation and effective use. **Community management appears to be one of the best options for sustainable use of public waterbodies.**

2. The level of leadership skills in a CBO will have a direct bearing on the performance of management. Where leadership is strong and skilled, performance is obviously better. Skill development of leaders should be considered a high priority.

3. The alternative income generating projects undertaken by project beneficiaries provided clear opportunities to strengthen the financial resources of the CBOs. BMCs should see if they can initiate such AIGAs to benefit them and the community.

4. CBFM-2 has opened avenues for BMC leaders to be associated with and linked to local institutions involved in resource planning and management. This has given the BMC leaders a better exposure to how and where things are done and how they can significantly contribute in the process.

5. Physical development of the water bodies results in habitat restoration for fish which has a very positive impact on fish biodiversity and productivity.

6. The existence of CBOs ensures that fishing regulations are complied with. In order for fishing regulations to be effective, efforts should be taken to see that regulations are also complied with in the surrounding water bodies.

7. Production of destructive gears should be stopped at source so that these do not reach the markets.

8. Micro credit generates positive outcomes in terms of earning income, employment creation, asset generation and livelihood improvements. A flexible credit system, for example, lending for between one and three years might be considered in the future.

9. The process of shifting portions of fishing population to non-fishing sectors has started on a limited scale. The effect of micro credit for reduction of fishing pressure is positive but limited – more time will be required in order to have visible positive impacts. Credit should be primarily targeted towards fishers or fishers' families rather than to other community members.

10. Women's participation in project activities is passive in most cases. Their involvement is confined to micro credit receipt and use. The reasons for this passive nature of women participation should be evaluated. Values and norms of the society should be considered while expecting women's active participation in an openwater fisheries management scenario.

11. The partner NGO responsible for establishment and training of the CBOs has a very important role in the whole process of planning to implementation. Where NGO personnel are active, better results are obtained. It is not only the honesty of the leaders that matters, efficient management and literacy are also important.

14. POTENTIAL FOR SUSTAINABILITY

The major objective of this study is to report on the CBFM-2 process, different types of activities carried out by the CBOs and their impacts on the fisheries management of the water bodies and on the livelihoods of the fishers in particular and community in general. The 6 waterbody case studies as well as some individual case studies have been used to highlight the evidence in support of the objective. Major highlights of the case studies are: (i) Formation of CBOs, (ii) Registration of CBOs, (iii) Training for developing CBOs' skills and capacities, (iv) Utilization of the capital formation potential of the groups, (v) The development of linkages between the CBOs and direct and indirect stakeholders, (vi) Establishing fishers' sense of ownership of the waterbodies, (vii) The successful implementation of fisheries regulations (seasonal closure, restriction on the use of destructive gears), (viii) Establishment of sanctuaries, (ix) Fishing habitat restoration, (x) Enhanced productivity of the waterbody, (xi) Enrichment of fish biodiversity, (xii) enhancement of income, and (xiii) Acquisition of minor assets (including pieces of land, addition of rooms, improvement of house and so on). These positive changes may not be uniform for all the water bodies and individual cases but their identification in the 6 case study sites suggests that they can also be expected in other project water bodies.

While the case studies make it clear that visible and invisible positive changes have taken place due to CBFM-2 intervention, the rate of progress varies among sites. The sustainability of these efforts remains a major concern. The project is due to be completed by mid-2006, and efforts are needed to make the CBOs capable to sustain these successes once external support has been withdrawn. The management problems identified, should be addressed immediately to ensure long-term sustainability of the CBOs.

Based on the experience gained in this study, it is expected that efforts of Beelbhora, Chapandaha, Kutir, Hamil and Sholuar beel are likely to be sustained. Dikshi beel requires special attention. It is high time for the PNGO, DoF and the WorldFish Center to see how management at this site can be improved.