

Produced by



The WorldFish Center
Bangladesh and South Asia Office
House 22B, Road 7, Block F, Banani, Dhaka, Bangladesh
Phone (+880-2) 881 3250, 881 4624
Fax (+880-2) 881 1151
E-mail: worldfish-bangladesh@cgiar.org

In collaboration with



The Department of Fisheries
Matshya Bhaban, Park Avenue,
Ramna, Dhaka 1000, Bangladesh.
Tel: (+880-2) 9571696
Fax: (+880-2) 9571696
E-mail: cbfm@dhaka.net

In association with SUJON, ERA



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Text
M.G. Mustafa, Gazi Nurul Islam and A.K.M. Firoz Khan

Edited by
Alan Brooks

Coordination
A.K. M. Firoz Khan

Photo credit
Khaled Sattar- MAP and A.K.M.Firoz Khan, The WorldFish Center

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Community Based Fisheries Management CBFM-SSEA

FISHERIES and LIVELIHOODS

Impact

CBFM approach addresses the key issues of improved and sustainable management for poor fishers

Bangladesh is endowed with enormous inland fishery resources; approximately 28% of the total area of the country is floodplains, contributing significantly to the national inland fisheries production. An estimated more than 2 million full-time fishers are directly employed in capture fisheries, while another 12 million people are dependent on fisheries-related activities. Overall, the fisheries sector in Bangladesh accounts for 23% of agricultural GDP, 5% of total GDP, and 63% of animal protein intake (BBS, 2006).

Fisheries management in the past was mostly revenue oriented where the richer and influential persons of the society took lease of the water bodies. The government owned waterbodies were leased to the highest bidder as a source of revenue. Poor fishers were practically left out of participating in the process of bidding and thus the management of fisheries. In the *haor*¹ areas most of the land remains under water for approximately five months of the year, rendering potentially good crop land unproductive. However, the only a few poor people were able to work in the fishery as fishing laborers under the restrictive conditions set by the leaseholder. Furthermore, under the leasing system, the temporary owners would over-fish using illegal gears and fishing practices.

¹ *Haors* or extensively low lying and deeply flooded areas of floodplain bounded by natural river levees often now raised by "submersible embankments". They may contain several *beels*. Some of which are perennial. They cover a significant part of greater Sylhet and Mymensingh.





Developing new approach

The management of these resources, based upon a combination of short-term lease access to waterbodies and *Jalmohals* have long been in the hands of a socially and politically privileged individual or a group of people backed by the political parties. Increasingly the government recognizes that resource sustainability and the equitable distribution of benefits to the poor is more important than the revenue generated under the leasing system (and increasingly the revenue is becoming a negligible contribution to the national treasury). To address these concerns in lease based systems and the free-for-all approach in rivers and open floodplains, the WorldFish Center and the Department of Fisheries (DoF), Government of Bangladesh worked in partnership with two non-government organizations (NGOs) and fishers communities to develop new community-based approaches to fisheries management at six pilot water bodies in Sunamganj district.

and Sunamganj Jonokalyan Sangstha (SUJON). The aim of the Project is to promote the sustainable use of, and equitable distribution of benefits from inland floodplain fisheries resources by empowering communities to manage their own resources in Sunamganj district. The project worked in six open *beels* that have been leased out and handed over to CBFM-SSEA organized fishers (Figure 1). The waterbodies vary in size from 2.5 to 78.1 ha. Out of six waterbodies, three were less than 8 ha and the area of the other three was more than 8 ha. The handover of three large waterbodies was done by the Memorandum of Agreement (MoA) with Ministry of Land (MoL) and Ministry of Fisheries and Livestock, (MoFL), while the other three were included in to the project by the CBO through direct bidding from local land administration.

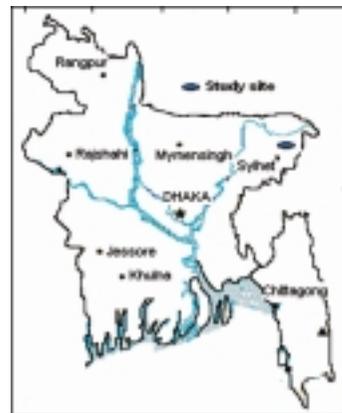


Figure 1. Location of the study area

About the CBFM-SSEA Project

Partners and location

The Community Based Fisheries Management in South Southeast Asia (CBFM-SSEA) project under the WorldFish Center has received funding from the International Fund for Agricultural Development (IFAD) through a Technical Assistance Grant (TAG-531) and in collaboration with partners: DoF; and two NGOs: Efforts for Rural Advancement (ERA)

Table 1: Waterbodies status and area by types

SL	Name of water body	Type	Upazila	Lease value Taka/ha (2002)	Beel area in hectare			Lease status
					Average	Min	Max	
1	Chitlia beel Group Fishery	Open beel	Bishawambarpur	7,878	3.93	1.50	12.00	Water bodies or <i>Jalmohals</i> < 8 ha transfer from Local Government
2	Lomba beel	Open beel	Bishawambarpur	16,000	2.49	1.21	4.05	
3	Chital Moishakuri	Open beel	Bishawambarpur	8,333	5.39	4.05	8.01	
4	Chatol beel	Open beel	Sunamganj Sadar	2,874	12.00	2.00	49.00	Water bodies or <i>Jalmohals</i> > 8 ha transfer from Ministry of Land
5	Nainda beel	Open beel	Derai	2,227	16.00	12.00	30.00	
6	Soma Nodi	Open beel	Derai	896	78.07	30.00	300.00	

Project Objectives

The overall objectives of the project were to generate improved inland fisheries management policies in the partner country governments and NGOs resulting in more sustainable, equitable and participatory management of resources for improved livelihoods of fishers in the selected deeply flooded areas of Bangladesh and Vietnam.

Project goal

The goal of the project was to sustainably improve the livelihoods of poor people dependant on inland water bodies and floodplains fisheries. To this end, the project aimed to fulfil three target outputs:

1. developing and testing community based fisheries management approaches and assessing the impacts, sustainability and scope for expansion of these approaches in more deeply flooded inland fisheries in Bangladesh and Vietnam;
2. identifying, testing and assessing mechanisms to coordinate and link local community management within larger fishery and wetland systems; and
3. informing and influencing all fisheries policy stakeholders about improved management approaches.



Project Location

The CBFM-SSEA was implemented in specific deeply flooded environments where inland fisheries are important to poor people's livelihoods. In Bangladesh, Sunamganj is very rich with these kinds of waterbodies located in the deeply flooded area of the "haor basin". This area is abundant in aquatic resources with huge potential for enhanced management. Agriculture is not prominent in Sunamganj area due to extended flooding and is vulnerable to flash flooding. Compared to many other areas the communities within the haor basin are relatively poor and heavily reliant on the wetland areas for their livelihoods. The lease money of smaller waterbodies was higher than that of bigger *Jalmohals*. There were conflicts over access to the resources and high lease money of particularly the open *beels* indicated that the fishers did not get enough incentives to participate in management.

Links with the CBFM-2 project

Although the activities of the project were limited to six sites, the analysis and interpretation were not thematically isolated to only the SSEA water bodies. Synergies existed with the much larger CBFM-2 project funded by DfID which tested fisheries management approaches at 116 sites of four main water body types. This improved the entire learning process and fisheries management approach to development.

Project Activities

The CBFM-SSEA project performed different activities to improve fishers' livelihoods through fisheries management. The responsibility for management of specific water bodies was transferred to the community based organizations (CBOs) formed by partner NGOs. Apart from fisheries management measures CBOs received different support from the project like institution building knowledge, networking with other CBOs in the similar field, access to finance and capacity building training. The key activities included -

- ◆ For CBO members training in fisheries management, credit management, leadership development, gender balance and empowerment, and finance and accounting. Over the duration of the project, a total of 863 trainees (including 175 women) received training in these areas. In addition basic training was provided to all trainees on health and hygiene practice.
- ◆ Awareness development and message dissemination activities were also important in CBFM-SSEA. More than 10,000 people received messages on fisheries management through posters, leaflets, rallies, courtyard meetings, miking, signboards, message boards, video shows, and T-shirt and cap distribution. In addition, several local level workshops and seminars were organized by partner NGOs to sensitize local elite and other influential people.
- ◆ The Project linked CBOs with national and regional CBO networking fora to share knowledge on fisheries management and other livelihood options.
- ◆ Community centers were built in three project areas to facilitate better coordination and cohesiveness within the groups and improve their relationships with local communities as some of these centers were also used as schools and for other social events.
- ◆ Group savings were accumulated by members as part of the organized fisheries management in CBFM-SSEA.



Through the CBOs, efforts were made to keep the interest for building stakeholder group capital at a low-level. The savings were held in accounts in the commercial banking sector. Group members were encouraged to invest in outside fishing, where appropriate. Two types of revolving funds were allocated to CBOs from the Project: the revolving welfare fund for lease value payment and stocking; and a micro credit fund for alternative income generation. CBOs also agreed to pay the lease fees in return for control over management of the water body.

During its 5 year duration, the ownership of six inland floodplain water bodies was transferred to organized fishing communities comprising 505 persons (including 81 women). Working in partnership with two local NGOs, the Community-Based Organizations (CBOs) adopted responsibility for the management of their fisheries resources and implemented a variety of fisheries management interventions including:

- Observing closed fishing seasons during mid-April to mid-June each year with a view to improve the ecosystem productivity in terms of the self regeneration capacity of the water body.
- Installing fish sanctuaries and maintaining closed areas (around fish sanctuaries) to enhance biodiversity.
- Controlling harmful fishing practices (e.g. dewatering, fencing) and the removal of destructive fishing gears (e.g. monofilament gill nets, mosquito nets, Set bag nets) that capture juvenile fish.
- Placing controls over fisher access and fishing effort to protect fish and recognition of longer-term fisher or community use rights.

These interventions were expected to increase fish abundance, biodiversity and fisheries yields by reducing destructive fishing activities and levels of exploitation on juvenile and adult fish during critical periods of the year.

To further enrich our understanding of the impacts of alternative income generating activities (AIGA), the role of women and the distribution of benefits, small research grants were allocated to a university based nearby in Sylhet (see box below for findings).

Key findings from small grant research studies under CBFM-SSEA project:

Collaborative research with the Department of Economics, Shah Jalal University of Science and Technology, Sylhet, Bangladesh has contributed to the development of community based fisheries management in *haor beel* habitat.

- Bakth and Kazal (2007) carried out studies on Awareness and capacity building in fisheries management: Analyzing the impact of CBFM training in Sunamganj area of Bangladesh. The studies revealed that the AIGAs have a significant positive impact on household annual non-fishing income.
- Findings from another grant research on "Role of women in community based fisheries management" in the *haor* area of Derai, Biswambarpur and Sunamganj Sadar revealed that the empowerment index of female participants was higher than the average empowerment level and much lower for non-participant women. The status and quality of participation of women in CBFM-SSEA was assessed by constructing an empowerment index based on fifteen variables. Taking into account the role of women in CBFM it was shown that occupation and membership were always significantly related to women's empowerment. Overall, the impact of the CBFM on female participants was positive for participation of women belonging to the vulnerable groups (Rakib and Kazal, 2007).
- Cost-benefit analysis of CBFM-SSEA revealed that the distribution of income benefits before joining with CBFM (before) and after joining CBFM (after) of direct beneficiaries was found to be very close. The distribution of benefits of changed income before and after varied between different sites. The impact was positive for the distribution of income after because inequality was reduced for both direct and indirect beneficiaries. For example, the average annual income increased by 34.78% for direct beneficiaries and 25% for indirect beneficiaries at Borolekha district (Islam and Kazal, 2007).

Project Results and Impact Assessment

Due to the high degree of variability, drawing statistically robust conclusions from six sites over three years is difficult. The CBFM-2 project has generated more compelling results based on statistical analysis (Halls and Mustafa, 2006a, 2006b; Mustafa and Halls, 2006). However, it is possible to comment on the facts, trends and observations for the six locations which give an insight to the performance of these adopted approaches.

Project assessment was done through a baseline study carried out in 2002 and an impact study carried out in mid-2006. The impact survey covered by the baseline study sampled 300 households at six project

waterbodies. Household monitoring on fish catches and consumption of different items was carried out on three consecutive days in a month over the three complete years (36 months in 2002-2005). Both livelihood survey and household monitoring survey results were analyzed according to household type (poor and moderately poor fishers, poor and moderately poor non-fishing households and 'better offs'). Fishing activity was observed for four days per month, per site and gear surveys involved a regular spot survey for a sample of gear in operation, and the total catch from each gear type. Gear census covered the number and types of gear operating in the study sites. Species wise catch statistics for each gear type was recorded.

IMPACT ON FISHERIES

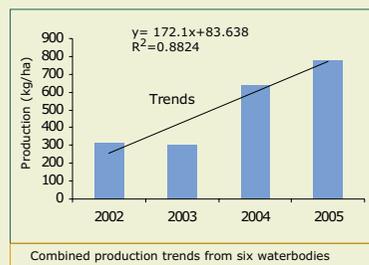
a. Fisheries benefits and sustainability through increased fish production:

Water body production trends

Annual fish production (Kg/hectare) at six waterbodies between 2002 and 2005 increased on average by 59% per year. For each water body, annual fish production per hectare per year increased on average by 99%, 40%, 150%, 25%, 67% and 7% for Chatol *beel*, Chatal Moishakuri, Soma nodi, Lamba *beel*, Nainda *beel* and Chitlia *beel* respectively. Combined production trends from six water bodies are shown in figure 2. Improvements in yield were linked to increases in fish abundance. Annual fish production (harvest records from *beel* management committee (BMC) and fish catch monitoring) also increased in 2005 by 99%, 144%, 373%, 115%, 153% and 23% for Chatol *beel*, Chatal Moishakuri, Soma nodi, Lamba *beel*, Nainda *beel* and Chitlia *beel* respectively compared to the baseline year in 2002. In contrast annual fish production decreased in 2005 by 27% for Shialmara *beel* (control) compared to the baseline year in 2002.

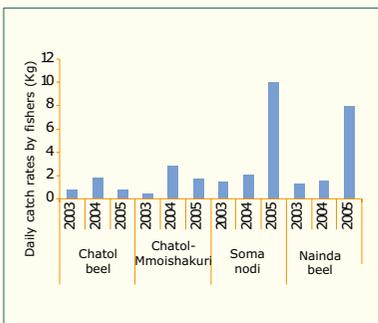


Figure-2: Combined production trends from six Waterbodies



Using survey data collected by participating fishing communities between 1997 and 2005 and supporting studies, the CBFM-2 project recently found that trends in capture fish production through time were upward for nearly 70% of the 52 project sites that were monitored annually for at least three years.

Figure-3: Annual average daily catch rates (kg) by fishers in four open beels



Daily catch rates by fishers:

The production of four open *beels* also appeared to be improved under community-based approaches. Using survey data collected by participating fisher communities between 2003 and 2005 trends in annual average daily catch rates by fishers increased by 12%, 72%, 70% and 68% for Chatol *beel*, Chatal Moishakuri, Soma nodi and Nainda *beel* respectively. Annual average daily catch rates by fishers are shown in figure 3. There are 505 members (including 81 females) directly involved in the project and who might have been benefited.

b. Biological trends

Species richness is one of the important indicators for positive changes of biodiversity. Fishing communities reported catching species of fish which they had not seen for some time i.e. some species (*Labeo gonius*, *Notopterus notopterus*, *Ompak pabo*) reappeared in the catches which were recorded as endangered species or were reportedly absent in the waterbody for long time. Increases in fishing abundance also reflected a biodiversity measurement using the Shannon-Weiner Index (H'). Trends in biodiversity were upwards for Chatol and Chatol-Moishakuri and no change for Soma nodi whilst, Nainda *beel* showed a slight (2%) downwards trend in biodiversity.

c. Fishing intensity and the changes in Gill net area:

Fishing intensity: These modest but important increases in capture fisheries production also appear to be sustainable. Improvements in fish abundance were strongly linked to reductions in fishing intensity and destructive fishing activities. The annual trend in fishing intensity (number of gears) was downwards by 9% for Chatol *beel* and slightly upwards by 6% and 7% for Soma nodi and Nainda *beel*. In contrast, annual trends in fishing intensity were upwards by 119% for Chatal Moishakuri *beel*.

Changes in Gill net area: Gill net is widely used in the inland fisheries in Bangladesh and was significantly representative of the *haor*

beel habitat. The sustainability of fish abundance or biodiversity assumes that relative fishing effort during the fishing year remains approximately optimum from one year to the next. Estimates of an effective fishing area for the gillnet fishers has showed downwards trends in three of four monitored sites and considerably upwards trends at control site. Chatol *beel* showed a greater increase in gill net area but this was significantly less than the control site (Shialmara *beel*). Gill net area is the average area of net sampled during study period (Table 2). Fishing pressure has clearly increased at the control site. It can therefore, be concluded tentatively, that the increases in fish production in project water bodies, were not a result of increased fishing pressure, but represented a real increase in water productivity.

Table-2: Changes in gill net area in five open beels

Name of waterbody	Year	Average Gill net area (m ²)	Change on baseline (%)
Chatol Beel	2002	259.9	
	2003	No data	
	2004	381.1	+46.63
Soma Nodi	2002	423.1	
	2003	No data	
	2004	174.8	-58.69
Lomba Beel	2002	607.9	
	2003	843.6	
	2004	321.9	-47.05
Nainda Beel	2002	214.6	
	2003	207.1	-3.49
	2004	No data	
Shialmara Beel (control site)	2002	218.1	
	2003	348.8	
	2004	614.7	+181.84

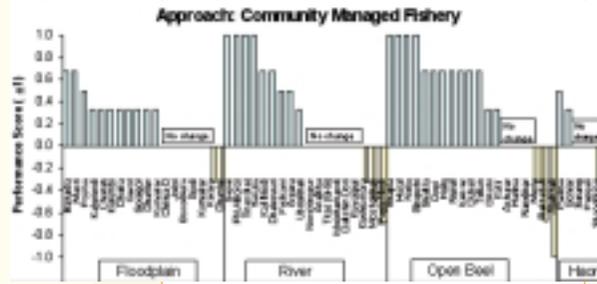
In CBFM-2, project trends in fish abundance, indicated by annual average daily catch rates of fishers, were also upward at 72% of monitored sites, with an average increase of 9% for *haor beel* habitats. Simultaneously trends in biodiversity in the CBFM-2 project were also upward at 70% of monitored sites. The results of the monitoring confirmed that at the majority of CBFM-2 as well as CBFM-SSEA sites biodiversity increased. Fishing intensity and destructive fishing practices both declined at more CBFM-2 sites than they increased. Fishing intensity for *haor beel* habitat declined on an average by 30% per year.

d. Resources management performance score

The CBFM-2 project has provided compelling evidence that the community managed fishery approach is effective for a wide range of different inland water body types in Bangladesh. A site score comprising the trends of all fisheries management performance indicators² (CPUA, CPD, GNCPUE, DFER, DPUA and H') was calculated for each community managed water body and compared among different habitats (Figure 4). The relative frequencies of these upwards and downwards trends indicated that CBFM-2 activities yielded benefits at 90%, 84% and 80% of the CBFM-2 water bodies managed by Fishers, Community and Women respectively. However at control sites only 37% of sites had improvement and these were mainly in large floodplain sites. Community Managed Fishery approaches have been introduced in greater Sunamganj district under the CBFM-2 project as well as the CBFM-SSEA project and fishery management performance scores shows comparatively better in Floodplain, River and Open *beel*

habitats respectively. However, experimental or adaptive approaches to management will be required to determine which are most important. In conclusion, community-based fisheries management appears to perform significantly better than the existing management regime in Bangladesh.

Figure 4: Plot of water bodies score comprising the trends of fisheries management performance indicators compared among different habitat through community management approach.



Estimating Maximum Sustainable Yields (MSY)

The use of widely used catch effort models often applied for estimating MSY for marine fisheries does have its limitations when applied to inland water bodies. However, due to the large size of *haor beels* an estimation of MSY was calculated using four models (Table 3). Using CBFM-2 time-series data for *haor* habitat similar to six CBFM-SSEA sites the Fox model ($Y = E \exp(a + bE) + c$, where Y is annual multi-species (aggregated) yield, E is the annual fishing effort, a , b and c (or Y_{max}) are the fitted parameters, and ϵ is a log-normally distributed random error) predicted a maximum yield (MY) of 439 kg per hectare per year at corresponding fishing effort (E_{95}) 856 days per hectare per year respectively. Other models predicted yield ranges less than the

actual over the project period, which indicated that fishing communities had fully exploited one of the four monitored project sites. Proper management and sustainable utilization of *haor beel* resources in Bangladesh is suffering as a result of the lack of appropriate information on fishing effort. Sustainable management of *haor beel* habitats could be promoted through maintaining fishing effort (E_{95}) less than 856 days per hectare per year.

Table 3: Model parameter estimates with 95% CI for *haor beel* habitat.

Model	Maximum Yield (kg per ha per year)			E_{95} (day per ha per year)
	MY (Optimum)	MY (upper)	MY (lower)	
Schaefer	612			1108
Fox	439			856
Asymptotic	391	700	259	
Sigmoid	313			

² CPUA - Catch per unit area, CPD - Catch per day, GNCPUE - Gill net catch per unit effort, DFER Destructive fishing effort ratio, DPUA Fisher fishing days per unit area, H'- Shannon-Weiner biodiversity index.

IMPACT ON LIVELIHOODS

Impact on Household incomes

The CBFM-SSEA project clearly shows positive impacts on household incomes. Average household incomes (adjusted for inflation) have increased by 13% over the project period - 2002 to 2006.



Incomes for fishers have increased by 16%, for better-off households there were similar increases (15%), while there was a modest rise in income for non-fishers of 11% in the project area. This indicates that CBFM fishing households have significantly improved their income levels ($P < 0.05$) compared to the non-fisher counterparts over the project period. Remittance is one of the important sources of income for the rich people in the greater Sylhet region that has contributed to overall income increases (table-4).

Table 4: Household average incomes by occupation in the project sites (Taka per year)

Fisher type	Baseline 2002	Impact 2006	t-value
Fisher	33,200	38,487	15.9*
Non-Fisher	31,186	34,732	11.4
Better Off	47,536	54,804	15.3
All	35,233	39,976	13.5**

Note: ** = significant at 5% level of probability ($P < 0.05$); * = significant at 10% level of probability ($P < 0.10$).

Incomes from fishing and other source

As might be expected, *fishing* is the important income source for fishers and in the project fisheries; this has increased by 9%. The limited improvement of fishing income from the project water bodies was due to the fact that all six sample project water bodies were open *beels* (government water bodies or *jalmahals*) and half of them had very high lease values. Field reports show that fishers did not get access to fishing in one of the project water body's over the last three years due to conflicts.

Fishers' average annual income from fishing has increased from Taka 17,923 (US\$ 309)³ in 2002 to Taka 19,492 (US\$ 287) in 2006. Incomes from other non-fishing activities like farming and remittances have also increased significantly ($P < 0.01$) over the project period, suggesting that fishers are moving away from fishing and taking up other occupations. They have reduced income (-10.5%) from wage laboring which is relatively low paid and are engaged in self employment activities i.e. rickshaw pulling (rural transport), trading and rural service delivery activities. It is reported that fishers have gained access rights to the fisheries resources, as they are interested in working in their own area, so that they can undertake fisheries and other employment activities in their area. Rapid agricultural intensification has created local employment opportunities for the poor people and the fishers' income increased from business opportunities and rural transport over the years. In contrast they have reduced income from fish trade (-28.8%), livestock (-15.8%) and other sources (-13.4%). The declining income in wage laboring in CBFM sites indicated that poor fishers have increased their access to self employment activities in agriculture and trading activities which are more secure employment options in their locality. Income sources of fishing households in the project sites are shown in table 5.

³ One US\$ = 58 Taka in 2002 and 68 Taka in 2006; inflation rate 7%.

Table 5: Fisher households average income in CBFM -2002 to 2006 (Taka per household)

Sources of Income	Project		
	2002	2006	% change
Fishing Income	17,923	19,492	8.8
Fish Trade	315	224	-28.8
Service	420	466	81.9
Farm Income	2,216	5,401	143.7***
Wage Labour	8,109	7,254	-10.5*
Business	2,003	3,968	98.1
Rural Transport	445	730	64.0
Livestock	345	291	-15.8
Other	1,032	893	-13.4***
Remittance	205	334	165.3***
All Income	33,200	38,487	15.9**

Note: ***=significant at 1% level of probability (P<0.01); **=significant at 5% level of probability (P<0.05); *= significant at 10% level of probability (P<0.10).

In the CBFM-2 Livelihoods survey, households were asked to specify their primary occupation at both baseline and impact surveys. It was found that fishers had shifted away from fishing as their main source of income and were involved in multiple non-fishing productive activities (Livelihood Impact survey 2006).

Expenditure

The study shows that in the project sites fisher' annual expenditure increased on an average by 99%, 43%, 100%, 51%, 69% and 31% on education, health, house materials, livestock, furniture and other materials respectively. This indicates that CBFM project fishers have improved their living conditions over the project period. Similar improvement in quality of life for the fishers was found in CBFM-2 Livelihood Impact Study (2006). Overall household expenditure on food items was 53% in 2002 and 41% in 2006.

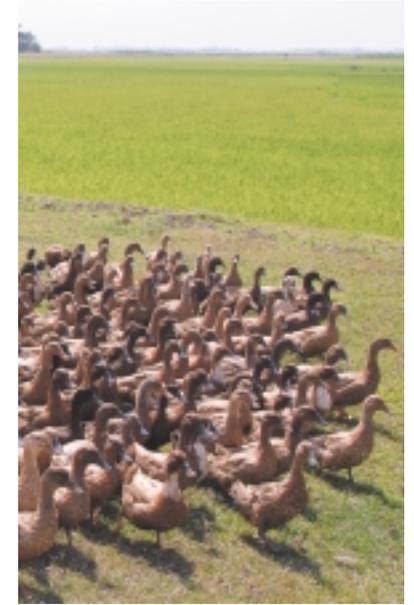
Household expenditure data show that fishers in the project sites have paid their outstanding loans which were taken from others for different purposes. This result demonstrates that poor fishers in the CBFM project sites have improved their financial ability to cope with various shocks and was able to reduce their debt burden.



Household assets

In Bangladesh land is regarded as one of the most important assets. Studies have shown that fishers in project and control sites have slightly increased their land holdings mainly by renting or sharecropping. The increasing land holdings of poor fishers correlates well with the findings that agriculture has become more important for many fishing households.

Fishers have improved their house condition over the years; more households have changed their roofs from thatch or grass into tin or wood. More fishing households have access to water-sealed latrines than those of non-fishing households in the project area. The overall increase in income and NGO's motivational support has contributed to improving their living conditions. Households reported that they have slightly increased their number of livestock and poultry birds. This is an indication that the poor households have better access to productive assets over the last five years of project activities which they can be used for crisis coping strategies during vulnerability and shocks.



Credit

Fishing households have increased their savings as well as received more credit from NGOs over the project period (Table 6). The average amount of credit received by project households was four times higher in 2006 than the amount received in 2002. Other than NGOs, households have received credit from banks and informal sources such as neighbors, relatives or friends. The study has shown that the CBO group members were found to be less dependent on money lenders (*mohajons*) in 2006 compared to 2002, while non-CBO members had not been able to reduce their dependence on money lenders. This may reflect the increased awareness of CBO members to new credit opportunities and livelihood options. Similar evidence was available in the CBFM2 Livelihood Impact Study (2006).



Table 6: Change in savings and NGO credit by household category (taka per household)

HH category	Savings and NGO loans (Taka)	2002	2006	% increase
		Taka/hh	Taka/hh	
Fisher	Savings	118	791	570
	Amount Loan	501	2504	399
Non fisher	Savings	197	523	166
	Amount Loan	692	1577	128
Better off	Savings	54	307	472
	Amount Loan	211	1338	533
Total	Savings	137	587	330
	Amount Loan	520	1902	265

Social assets

The respondents were asked a set of questions about their opinions on changes in community participation and fisheries management issues. A paired t-test was used to compare their ratings on 1-10 point scale on the different questions.

The study found that the responses of the questions indicated that there was been a marked change in relationships and attitudes in project areas over the period 2002 to 2006. The marked differences were in the cooperation with others, level of trust within the community and in the speed of conflict resolution. It was found that

households were able to borrow or lend money in CBFM-SSEA areas more than they were before the project. Conflicts in project areas tended to be resolved through the village court (*Salish*) indicated that their cost of litigation was reduced.

The differences in their perception of participation in fisheries management (conservation, closed season, destructive fishing, fish sanctuary) and compliance with fisheries rules in CBFM-SSEA have improved in 2006, indicating that fisheries are being managed well compared to the non-project control sites.



Enhanced Gender participation

The study found that more female members of fishing households have engaged in fish related activities such as fish processing/drying and making fish traps in CBFM-SSEA sites. However, women were not involved in fishing in the project and control sites as they were not familiar with fishing activities in the capture fisheries in Bangladesh. The women's average income from livestock rearing and laboring during the post harvest period was taka 135 and taka 93 in 2002, the amount was increased to taka 226 and taka 192 respectively in 2006. The results revealed that women were increasingly engaged in income earning activities outside their homes. Several case studies have also shown similar patterns, that female members have improved their livelihoods through different self-employment income earning activities in CBFM-SSEA sites in Sunamganj district.

Evidence from the CBFM-2 study showed similar trends of increased female activity and income generation, and in one of the floodplain sites in Narail district, the women, supported by a woman focused NGO-Banchte Shekha even performed better in fishing activities and have increased income.

Social Impact Analysis - Summary

Household incomes have increased in CBFM-SSEA sites (13.5%) over the four years. All types of households have reduced their fish consumption in 2005 compared to 2003. Although the fish catches have increased over the years, poor fishers are not able to consume more fish. Project households used to a relatively large proportion of their incomes on basic necessities, such as education, household improvements and health care, whereas now they are focussing on receiving support from government and NGOs for things such as: training, homestead area raising, flood protection embankments, plantations, vegetable cultivation, safe drinking water etc.

Fishing incomes of fishers in project sites rose on average by 9%. This means the project has had an insignificant ($P > 0.05$) impact on the fishing incomes in the project area. The main hindrance to the rapid growth of incomes were factors like high lease values, delayed access to the water bodies due to conflicts with the previous leaseholders, encroachment and boundary demarcation. Project participants also received less time to establish fisheries management and other livelihood options within the stipulated time.

All types of households borrowed more money from a range of sources. In households involved directly with the project most of this came from NGOs and non-exploitative sources whereas in control sites there has been a large increase in borrowings from money lenders. This suggests that involvement with CBFM-SSEA made households less dependent on exploitative money lending and more likely to be considered as credit worthy by conventional and formal sources of finance.

The CBFM-SSEA project had a major impact on attitudes of households in project areas. This means the awareness training given to CBO members had the desired effect.

Impact analysis summary and key lessons from the CBFM-SSEA in Bangladesh.

1. The project provided evidence that annual fish production (kg/ha) increased significantly and income levels for households increased through the CBFM-SSEA project activities over the four year period.
2. Although fish production has increased due to more efficient management practices, fishing intensity did not increase proportionately (decreasing at one *beel*), fishing pressure did not increase in 3 out of 4 *beels* (as measured by gill net area used) and some positive (but not conclusive) changes in biodiversity were recorded.
3. Benefits for the poor fishers in the project open *beels* have been limited by high lease values and social conflicts. Further interventions in the open *beels* need to take into account these factors.
4. Access to credit for households in both project and control sites has increased in recent years, and in project sites this was from a wide range of sources, rather than from the credit line project partner NGOs. Fishers are also moving away from fishing to agriculture, thus potentially decreasing fishing pressure on vulnerable stocks. Credit has a part to play in future community managed interventions, however, its increasing availability suggests that the best approach may be to create stronger links between households and existing credit providers (such as NGOs) rather than opening new credit programmes. Awareness programs should also be included as they could provide more access to credit in the future community managed interventions.
5. Community managed approaches require changed attitudes among many of the stakeholders. In the CBFM project this was achieved through personal involvement, training, media activities and folk groups. Any expansion of CBFM approaches should be preceded by targeted awareness programs.
6. The overall picture is that community-managed approaches to fisheries have made a considerably positive impact to the livelihoods of households in most CBFM-2 sites. This supports the strategy of expanding community-managed approaches for the inland capture fisheries in Bangladesh.



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For more information

For further information please contact: Alan Brooks, Regional Director, The WorldFish Center, Bangladesh and South Asia Office, Dhaka, Bangladesh. Phone (+880-2) 881 3250. Email A.Brooks@cgiar.org

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