Cooperation, Conflicts and Sustainability in Community Managed Fisheries in Bangladesh

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Introduction

The extensive nature, importance and critical situation of inland fisheries in Bangladesh are well known. The four million hectares of openwaters in Bangladesh are among the word's richest and most complex fisheries. The rivers, beels (lakes), baors (oxbow lakes), haors (large deeply flooded depressions), and floodplains support some 260 fish species (Rahman 1989). About 80% of rural households catch fish for food or to sell (this study), and fish contribute about 60% of animal protein consumed (BBS 1997). However, the many "miscellaneous" small fish caught from the floodplains by poor people have been neglected in official statistics and policies. Small fishes are the accessible and preferred food of poor people and are good sources of micro-nutrients (Flood Action Plan 16 1995; Thilsted et al. 1997).

Fish habitat destruction by roads, embankments, drainage and flood control, and natural siltation, along with overfishing, have been commonly cited as causes of the deterioration of the country's fishery resources (Hughes et al. 1994; Ali 1997). The National Water Policy (Ministry of Water Resources 1999) has recently emphasized reserving wetlands for fish in a reversal of past trends. However, past fishery policies have discouraged local institutions for fisheries protection and sustainable management.

Since late 1995 a partnership of Bangladesh Department of Fisheries, five Non-Governmental Organizations (NGOs) - BRAC, Caritas, Proshika, Banchte Shekha and CRED, and ICLARM has worked with fishing communities in 19 waterbodies in Bangladesh to establish local user management institutions under the Community Based Fisheries Management (CBFM) Project. The partnership approaches, experiences and obstacles encountered are discussed in detail by Hossain et al. (1998). To support the work of DOF and the NGO partners, ICLARM has a coordination role and has been responsible for research activities.

The Project was designed as an action research project to test and assess alternative models of government-NGO-fisher collaboration for the management of inland fisheries of Bangladesh. It built upon two earlier projects entitled "Experiments on New and Improved Management of Openwater Fisheries" (1987-1990) and "Improved Management of Openwater Fisheries" (1991-1994) (Ahmed et al. 1992, 1997). The emphasis in the CBFM project is to develop a framework for community-based fisheries management, and to ensure more sustainable exploitation of openwater fish resources for future generations (Hossain et al. 1999).

Specific objectives of the project are to:

- promote an equitable distribution of fisheries benefits within communities;
- develop additional sources of income to compensate communities that reduce fishing effort and to enhance incomes during the lean season;
- enhance fishers' human capital through training and adult literacy courses;
- develop an integrated systems view of human community - fisheries resources relationships;
- build on local institutions, traditional practices and ecological knowledge to regulate access to, and patterns of exploitation of, the fisheries; and
- generate and disseminate policy-relevant information to foster debate and advocate policy change.

The inland fisheries of Bangladesh in general, and those selected for the CBFM project in particular, differ in physical characteristics (rivers, seasonal wetlands, lakes); in property rights (open access, community rights, group control of state property); and in the co-management arrangements introduced (multi-stakeholder committees and exclusive groups of fishers). Government and NGO support was intended to empower fishing communities and to provide the incentive needed for the inhabitants of several villages in each site to cooperate in conserving and enhancing their fisheries.

The CBFM project has worked in ten rivers, three seasonal wetlands (beels) and six permanent lakes (beels and oxbow lakes). All substantial fisheries are state controlled "jalmohals" and have in the past been managed through for revenue by being leased out for one or three years to the highest bidder, in some experiments to license fishers were undertaken by Department of Fisheries (DOF) from 1986 onwards. All ten of the rivers where CBFM has been active, along with other rivers, were declared free of revenue collection and open access resources in September 1995, but two subsequently reverted back to a system of DOF licensing fishers and collecting revenue from them. Of the three seasonal wetlands one comprises private land that is inundated in the monsoon when the people of the surrounding villages have common fishing rights, but fish left in privately owned ditches after the monsoon are then private property. The situation is similar in the other two wetlands in the monsoon, but these include areas of jalmohal in their centers that retain water year-round. The fishing rights to these jalmohals have been transferred via DOF to a network of fishers organized by the partner NGO into groups who pay for the lease. These groups include all people fishing for an income, they take management decisions through a committee, but fishing for food by other people from the same villages is accepted. The permanent beels have much less private land around their fringes. In these cases the jalmohal has been transferred from Ministry of Land to Department of Fisheries, and the latter ensured access for a set of fishers organized in groups by a partner NGO on payment of revenue. The fisher groups have actively managed these lakes and invest in stocking fish each year.

In this paper the pattern of cooperation and conflicts is used as an indicator of the development and likely sustainability of community management institutions. Additional evidence on the fish catches from these waterbodies and the welfare of households in these communities is included as an indication of the overall sustainability of the resources and livelihood systems that these institutional arrangements seek to sustain.

Community management arrangements

Table 1 summarizes the institutional arrangements in these 19 waterbodies. In the six relatively smaller (average 36 ha) closed beels the limited number of participants (average 96 households) obtained exclusive use rights, elect their leaders and cooperate extensively among themselves in a relatively intensive management system of stocking fish, guarding them and sharing equally in harvesting and income.

Table 1. Institutional arrangements in the CBFM Project by waterbody type.

Attribute	Closed beel/baor (6)	Open beel (3)	River (10)
Maximum size (ha)	36.5 (16-58)	300 (250-400)	482 (40-1,620+)
Number of villages	4.8 (2-7)	8.7 (3-14)	11.8 (5-17)
Total households*	1,267 (250-3,560)	1,142 (355-2,100)	1,322 (530-2,220)
NGO participants	96 (60-135)	325 (215-509)	324 (37-1,155)
Property rights	Public jalmohals, in each the NGO participant fishers pay revenue for exclusive fishing rights.	Two are public jalmohals where NGO participants pay revenue for fishing rights. One is private land - a seasonal common fishery in the monsoon.	All public jalmohals: 2 under NFMP - licensed fishers have exclusive access; 1 leased by a fisher cooperative as a "fish sanctuary"; 7 open access.
Management committees (BMC or RMC)	4 BMCs, BMC never established in one site, one BMC lost lease and broke up in 1999.	3 BMCs.	9 RMCs on paper but only 4 have made any rules for fishing.
Membership	Only leader(s) of each NGO group.	Only leader(s) of each NGO group (2). Group leaders (female), male fishers, landowners, NGO staff and local council member (1).	NGO group leaders, other fishers, local elites, FAD owners, DOF and local administration, NGO staff and local council members.
Executive posts	Elected by general members	Elected in one, decided by NGO in 2.	Decided by DOF and NGO, but non-functional in all but one.
Fishery management decisions and rules by MC	In 5 fingerling purchase, closed season, guarding, rotational harvesting, sharing of income, taking loan to meet collective costs.	Sanctuary delineation and protection (2), habitat re-excavation (1), closed season (2), gear restrictions (2).	Sanctuary (1), fish culture in pen (1), limit fishing grounds and try to rotate fishing (3), several have committed to not use "harmful" gear but not enforced.

*Note: * approximate figure from household census, note that some additional villages make use of some waterbodies.*

In three open beels/wetlands (average area 300 ha in monsoon) an average of 325 households were organized into NGO-supported groups. The wider community of farmers and landless people are also stakeholders, either owning land and *kuas* (catch-ponds) in the floodplain or depending on free access to fish for food in the monsoon. Two arrangements were tested: management decisions made by a committee representing only NGO-organized fishers, and decisions made by a committee representing all stakeholders. In all three beels a wider consensus was achieved resulting in local fish sanctuaries and voluntary closed seasons.

The 10 river sections are substantially larger (average 480 ha excluding floodplain) and the NGO partners have organized on average over 300 traditional fisher households at each site into groups. However, the change to open access policy means that cooperation has been limited to the NGO-organized fishers (only part of the fishing community) over operational rules such as rotating fishing between teams within a gradually narrowing area.

Cooperation and conflicts

Overview of conflict and cooperation

The complexity of inland fisheries in Bangladesh and the often strong competition for control over these resources and the benefits (income and resource rent) that flow from them (Toufique 1999), mean that conflicts of various types are common. It was expected that CBFM and the local management committees that were developed by the project would help to improve cooperation among fishers and the wider community and that conflicts could be mediated. Interactions between fishers, between fishers and other resource users, specific interactions between fishers and others over control of the fishery through leasing, interactions between local administration and fishers, and three-way interactions between fishers, NGO partner and government (DOF) were documented for each waterbody. The interactions documented indicate the extent that CBFM Project activities and related factors have provided incentives to cooperate (Table 2).

In general there at least as many examples of cooperation as of conflict in each type of interaction in closed beels (where defined sets of fishers have exclusive control) and in the open beels (where management by a defined set of NGO-supported fishers and by a wider community-based body are both being tried). In all but one of these beels there has been strong cooperation within the fishing community. The exception is a baor where local musclemen had a strong financial hold on the fishers and by their local power and threats prevented the fishers from taking support from the partner NGO. However, cooperation within the fishing community is not enough when they must convince the land administration to give them preferential control over a fishery. Elections have resulted in divisions among the fishers, but further elections give a chance for others to try their hand and the benefits of accountability and equality appear to outweigh the disputes in these valuable fisheries.

In the rivers there are more examples of conflict than of cooperation. In a number of cases competition was heightened by the lifting of leases and consequent open access policy. This has resulted in encroachment of open river areas with *katas* (brushpiles used as fish aggregating devices) made by neighboring landowners as a means of controlling small deeper areas of the river where relatively high value fish can be caught. Local influential people have also attempted to take control of previous river jalmohals by having them declared closed waters (and thus making them leasable again). There are also a number of cases of conflicts between fishing villages over fishing grounds in rivers, often this arises at the previous boundaries of jalmohals. However, there are a few good examples of cooperation from local leaders that has helped to resolve such problems: in mediating over fishing ground disputes, in resisting the threat of loss of free access when outsiders have tried to gain control of rivers, and to establish a sanctuary in one river. Generally this has occurred because the fishers and local elites found a common interest in protecting a local fishery.

Table 2. Different types of cooperation and conflict that have occurred during the CBFM Project (numbers of waterbodies where interaction was recorded in parenthesis).

Interaction	Closed beel/baor (5)	Open beel (3)	River (10)
Fisher-fisher			
Cooperation	Stocking (5) Closed season (5) Guarding against outsiders (5) Harvesting (5)	Sanctuary (3) Closed season (2) Exclude outsiders (2)	Exclude outsiders (4) Rotate fishing grounds (2) Against outsiders leasing (2) Paying revenue (1) Resisting tolls (1) Sanctuary (1) None (4)
Conflict	Old v new leaders (4) Full time/traditional fishers v other fishers (2)	Old v new leaders (1) Faction sub-leasing (1) None (1)	Between villages over fishing grounds (4) Leaders v others (3) Traditional v other fishers (2) Tolls and subleases (2) None (1)
Fishers-other user			
Cooperation	Permit poor to fish for food (4) Permit abstraction for irrigation (1) None (1)	Permit poor to fish for food (3) Farmers - water management (1)	Local fishers employed by kata owners (5) Permit poor to fish for food (2) With local leaders (1) Permit poor to cut peat (1) None (1))
Conflict	Nearby landowners (2) Poachers/anglers (2) Pollution (2) Water abstraction (1) None (1)	Farmers - water management (3) Ex lessee (1)	Kata construction by rich (6) Water abstraction (3) Farmers block khals (1) Fry collectors (1) Peat extraction (1) None (1)
Fishers-administration (mainly over access rights and over attempts to lease out to non-fishers)			
Cooperation	Local administration (2) DOF (1) None (2)	District admin (excavate) (1) Union council (2)	District admin (2) Local admin (1) Union council (1) DOF (1) None (5)
Conflict	District admin (auction) (2) Town council (1) DOF (1) None (1)	Local leaders (1) None (2)	District admin (2) DOF (tolls) (2) DOF (1) Ministry of Land (1) None (4)
Fisher-NGO-DOF/GOB			
Cooperation	DOF+NGO+fishers v outsiders and other government agencies (5)	NGO-DOF-fishers over fishery management plans (3)	DOF+NGO+fishers for conservation (3) DOF+NGO+fishers v Freedom Fighters over rights (2) DOF+NGO+fishers v MOL (1) DOF+NGO+fishers v moneylenders (1) None (3)
Conflict	Old fisher leaders + DOF v NGO and participants (2) None (3)	DOF+leaders v NGO+women (1) Politician v local admin+fishers over sub-lease (1) None (1)	Old fisher leaders + DOF v NGO and participants (4) Local admin+katas v NGO+fishers (1) None (5)

Notes: one baor is omitted from the analysis as it was controlled by a politically connected "student" group throughout the period.

The following sections illustrate the nature of confict and cooperation in each type of waterbody and management arrangement.

Multi-stakeholder cooperation in a closed beel: Rajdhola Beel

Rajdhola Beel is a closed beel of some 53 ha that had in the past been managed by a cooperative society and by individual lessees. Immediately before the CBFM Project started one outsider who owns a fish hatchery business had leased the beel for 3 years for an exceptionally amount (46% more than the previous lease). He managed it by stocking fingerlings, and hired fishers from outside rather than from the traditional fishing community living around the beel. This lessee faced regular quarrels with local fishers over fishing access and fishing for subsistence.

Caritas is a national NGO and one of the CBFM Project partners, at the start of 1996 it organized all the traditional fishers and motivated them. In mid 1996 there was a conflict between the lessee and organized fishers over restrictions the lessee imposed on fishing. The local fishers resisted fishing by outsiders and they held a procession against the lessee and forced him to surrender his lease back to the district administration one year prior to complete of his tenure. The district administration then offered the beel in open bidding for a new lease, even though it was earmarked for management by local fishing communities from 1995 under the project arrangement that DOF would be given responsibility for ensuring that the fishers (supported by the partner NGO) paid government revenue.

The DOF requested the Ministry of Land to abandon tendering. However, the Ministry of Land asked for an evaluation report from the Deputy Commissioner (governor) of the district. The fishers had shown their interest and that they could cooperate with each other in ousting the previous lessee. However, it required further pressure from DOF, and use of the NGO's personal contacts, before the Ministry of Land agreed not to auction out rights to the beel and instead to hand it over via the Ministry of Fisheries and Livestock to DOF. The fishers received a legal document awarding them rights over the fishery on 26 August 1997 after Caritas helped them pay the lease costs through an interest-free loan.

Cooperation among the fishing community was necessary but not sufficient for them to gain rights for this fishery. Ultimately it depended on a combination of DOF, NGO and fishers to convince the government land administration that it did not need to invite bids for the fishery but should favor the fishing community. Unfortunately the Ministry of Land's condition is that the poor fishing community must pay 25% more revenue as taxes for the right to the fishery than the previous lessee paid.

Having gained use rights, the fishing community, which is homogeneous comprising only traditional Hindu fishers, worked together to stock, guard and harvest fish. Some minor differences occurred where leaders made side deals with local anglers to allow them to fish, and the high level of taxes limited their scope to stock fish, but they achieved a reasonable production of about 350 kg/ha in a year. More importantly they successfully held elections for the executive posts and took critical decisions themselves such as stocking fish and operating a nursery pond to reduce costs. However, the government component of the project ended in mid-1999, and in early 2000 the

district administration again tried to auction out the fishing rights to a fisher cooperative that did not comprise the local fishing community. Despite government recommendations that community management continue, no action to formalize this was taken. The fishers, Caritas, and DOF have continued to ally against Ministry of Land. They all stand to gain from continuing the arrangement: DOF as patron of the fishers, the fishers through secure access and profit sharing as opposed to wage labor, and Caritas from continuing the main economic activity of its group members.

Community consensus and compliance with fishing rules in an open beel: Ashurer Beel

Ashurer Beel is a floodplain depression comprising a network of khals (channels) and deeper depressions that form a lake in the monsoon and through which water flows on its way to and from the connecting river. The professional fishers living around the beel were organized by Caritas into 20 groups. Representatives from each group formed a 24-member Beel Management Committee (BMC) in 1997, the four executive officers were subsequently elected by the group members. A workshop was held in May 1998 to discuss and validate some earlier BMC decisions and to agree additional fishing rules and guidelines that the BMC would follow in future. Through the workshop and BMC meetings the following decisions and rules were adopted, and have been followed by the fishing communities:

- Any decision regarding the beel fishery will be taken on a participatory basis. Before a BMC meeting the group leaders who represent each group and sit in the BMC will discuss openly with the group members the agenda and take their opinions which thy must then put forward during the BMC meeting.
- From 1997 making katas in the beel was completely banned. They were owned by fishers who agreed to use the branches to make a sanctuary to protect brood fish.
- Fishing within the 8 ha sanctuary area is completely banned. The sanctuary area was clearly marked and signed and all people have followed the rule. Since the sanctuary is a large brushpile it is not possible to poach there.
- Each fisher group has contributed equally branches and bamboo for the sanctuary in 1997 and again in 1999 as the original materials were rotting.
- To conserve fish stocks, fishing will remain closed from March to July each year. From March to May there is little fishing anyway because the water level is low, but fish breed in these months.
- The fishers agreed not to use harmful gears such as current jal (nylon monofilment nets).
- The fishers decided to place gill nets parallel with the flow through the beel and not cross-wise so that fish migrating through the beel would not be trapped excessively.
- The BMC would punish anyone not following the BMC's rules, and may ban a group member from group membership, and hence fishing in the beel, for breaking the rules.

Sample surveys revealed that in 1997 all participants and non-participants knew of the sanctuary and in 1998 all participants and 65% of non-participants also knew of the closed season. However, about half of the participants and over a third of non-participants knew of breaches in the rules. In 1997 there were no penalties, but after the workshop decisions the BMC has enforced the rules. In 1998, 82% of participants and 50% of non-participants knew of cases where people were caught and had their gear confiscated or were fined. However, it is reported that none of the group members disobeyed any rule so far.

Catch monitoring showed that only 8% of the total annual catch was caught in March-July in 1998. In 1998 total fish catch was estimated at 50 t compared with 32 t in 1997, and catch per unit effort increased significantly ($p<0.05$) for two of the important gears used by professional fishers – seine nets and large lift nets. While catch depends on the gear used access is regarded as being fair now, for example some people who fished regularly in the beel but live away from the beel and had initially been omitted were included in groups as CBFM evolved. Fairness and general acceptance is also apparent because non-group members from the surrounding villages are permitted to fish for food, so long as they obey the rules, although they are not permitted to fish for an income – their catch per unit effort from cast nets and push nets is very low at under 0.2 kg/hour but has also increased with conservation measures.

Conflicts in open rivers and the kata issue

The underlying conflicts involving traditional fishers in most of the rivers are over control of these fisheries through katas. Katas encroach on the open fishing area and accelerate siltation. Katas shelter a wide range of fishes, notably larger species including carp, large catfish, smaller catfish and prawns (collectively 84% of catch in a sample of katas compared with 21% of catch from open fishing in the same rivers, Table 3) that are now rare in the rivers. When owners harvest their katas they do not leave any fish as they enclose the kata with nets and harvest all fish. This has a severe impact on the fish population in the open rivers. General fish catches fluctuate between years but are now mostly small fish. Because of katas, fishers are unable to fish throughout the rivers and they are not even allowed to fish near the katas. Most kata owners hire local fishers to harvest their kata twice in the dry season when other fishing activity is low, most of the income goes to the kata owners, but the fishers are unable to make any direct conflict over katas as they depend on this work in the lean season.

Table 3. Catch from fish aggregating devices and openwater fishing in two rivers.

Type of fish	Kali Nodi 1998		Moisherkandi 1997	
	Open	kata	open	kata
Units sampled (No)	657	15	285	5
Total sample catch (kg)	4,046	1,164	532	246
Carp %	4	11	0	2
Snakeheads and Koi %	0	7	0	3
Small medium catfish %	5	13	3	11
Large catfish %	0	30	7	33
Eel %	2	0	3	1
Miscellaneous medium fish %	5	0	17	0
Miscellaneous small fish %	81	4	52	7
Prawns %	4	25	19	43

Each year the same people build katas in the same area as long as they can keep control of the area. They usually build kata in the river adjacent to their homestead. Kata size varies with the socio-economic condition of the people in the area and the status of the people investing in them. In Kali Nadi most of the katas are less than 0.06 ha whereas in Titas River section G-G they

average 0.3 ha. In some rivers the number of katas is rapidly increasing (Table 4). River Management Committees (RMCs) have been formed for these rivers and are supposed to include fishers organized by NGOs under the project, other fishers, landowners and kata owners, and local leaders and officials, but they have been unable to exert any control over the number of katas except in two rivers.

Table 4. Changing Number of Katas in CBFM Project Rivers.

River	1997	1998	% change
Moisherkandi	4	5	+25%
Arial Khan	31	25	-19%
Boyrala	22	51	+132%
Dhaleshwari	90	113	+26%
Kali Nadi	82	86	+5%
Titas Ka	115	120	+4%
Titas G-G	50	50	0%

In the rivers under CBFM Project, 74% of NGO-organized fishers (who comprise most of the traditional fishing communities) own less than 0.2 ha of land. Yet people in this functionally landless category own very few katas, most katas are owned by richer landlords who are not from fishing communities (Table 5).

Table 5. Percentage of katas owned by landless households (less than 0.2 ha).

River	1997	1998
Moisherkandi	100	100
Arial khan	39	20
Boyrala	32	10
Dhaleshwari	14	11
Kali Nadi	38	36
Titas Ka	43	43
Titas G-G	2	2

Moisherkandi River is one exception. The river is has remained under a licensing system (New Fisheries Management Policy) and, supported by the Thana Fisheries Officer, the NGO-organized fishers control the fishery. They have decided on the number of different gears to be operated by the participants, fees to be collected (to meet the governments lease demand) and have permitted groups of fishers to make a few katas for their own benefit, this is coordinated by the RMC.

Conflict resolution in Titas Ka and Arial Kha Rivers

There was a conflict for about 20 years between two fishing villages over rights to fish in the fishing ground on the border of the "Ka" section of Titas River, which also forms the border between two Thanas or sub-districts. The fishers from Shahbazpur and Rajamarakandi filed a legal case against each other in the district court in Brahman Baria. The fishers spent a lot of money trying to get control of this area but to no avail. The problem continued after the CBFM Project started. Meetings were held to discuss the problem in the different fishing villages involving fishers,

other local people, and local and headquarters officials.

It was decided, at the suggestion of the project partners (DOF, ICLARM and Proshika - a national NGO), to form a River Management Committee (RMC) that could be a forum for the fishers and other stakeholders to discuss and hopefully resolve problems. The chairman of Shahbazpur Union Parishad (local council) helped to organize the RMC. He called a meeting in his office where the District Fisheries Officer, Thana Nirbahi Officer (chief administrative officer in a sub-district), both Thana Fisheries Officers, a representative of Proshika and fishers from both villages attended. After discussion in the meeting the fishers agreed on the following:

- since there was no clear demarcation of a section boundary in the river, the fishers from both villages agreed to fish in the areas they understood and agreed to be appropriate and to avoid competing to fish there;
- to withdraw their cases against each other from the district court immediately;
- all fishers would comply with the decisions made in the meeting; and
- the local administration would take legal action against anyone breaking the decision.

It was agreed that if any problem arose the Union Parishad (UP) Chairman would take necessary steps to resolve it

Similarly Arial Kha River has been an open access fishery since before the CBFM Project started. A RMC comprising UP chairman and member, fishers and local influential persons was formed and has successfully motivated fishers and the general community to establish and observe a fish sanctuary in the river. It has also legitimized some fishers cultivating fish in a pen in the river provided it does not hamper movement of boats, and agreed to reduce the number of katas made by non-fishers in the river (Table 4).

In both cases the involvement of local elected leaders (UP chairmen) was critical as they are respected and powerful locally and so are well placed to mediate in disputes and to lead opinion. Their incentive to cooperate with the fishers was their involvement in the RMCs and their identification of the potential for non-controversial benefits for their political and social status.

Assessment of CBFM Arrangements

Criteria and indicators

Three broad criteria have been applied to judge the performance of co-management arrangements: efficiency, sustainability and equity (ICLARM 1996; Hanna 1996). The means of achieving these ends in a community-based approach is based on empowerment of fishing communities through gains in economic power and livelihood security, and increased social status and roles in decision making. Table 6 lists indicators considered at the outset of the project.

Table 6. Performance criteria considered for CBFM Project initiated co-management.

Criteria	Indicators
Economic	Improved standard of living for fishers/participants. Standard of living at least no worse for other poorer households.
Empowerment	Greater fisher participation in fishery management. Greater influence by stakeholders over decisions.
Efficiency	Optimal rate of use of fishery. Benefits of institutions exceed costs (i.e. lower transaction costs, more efficient decision making).
Equity	Representation of range of interests (stakeholders). Process clarity - transparent management process. Homogeneous expectations among participants regarding management. Distributional equity: benefits in proportion to costs, or seen as fair by community members.
Sustainability	Stewardship - maintain productivity and ecological characteristics. Resilience of management system to cope with changes and shocks.

Quantitative assessment

To quantify how CBFM Project activities have affected people, respondents from each waterbody (both NGO participants organized for CBFM and non-participants) were asked to rate changes in key indicators using a self-anchored 10-point scale adapted from a method used in Philippines to assess similar coastal projects (Pomeroy et al. 1996). In general significant changes in indicators of empowerment (participation and influence) and institutional efficiency (ease of decision making) were reported in the beels (both closed and open), but the pattern of changes was less clear in the rivers as was to be expected (Table 7). Sustainability (wellbeing) was perceived to have improved mainly in the stocked closed beels probably due to stocking. There was very little sign of any perceived greater improvement in economic condition among NGO participants compared with non-participants, but this is not surprising considering the short period considered.

Among the closed beels distinctions can be drawn between those where Caritas worked from the beginning of 1996 (Hamil and Rajdhala Beels) where significant increases in most scores were recorded, and the beels and baors where BRAC worked from mid-1997. Among the latter, the two beels recorded immediate improvements in decision making within 1997, whereas there was little impact in the two baors where other local influences dominated over the fishers. From 1999 the experiment in CBFM ended in these two baors. Local conservation measures in the open beels took effect after the survey, and in 1997 there continued to be conflicts within the fishing community in one of these beels (Digshi Beel).

The communities using the first four rivers in Table 7 generally reported some significant improvements in participation, especially the NGO participants, although they were not able to take up any clear management plans. Similarly in Moisherkandi, where fishers have retained property rights through licensing but now take decisions through a management committee, there were improvements in empowerment and efficiency. No clear changes, even negative changes were reported in the other rivers, indicating the inability prior to RMC formation of NGOs to address resource management issues. Two rivers are complex. In Ubdakhali River there were previous disputes between fishing villages, and conflicts when outsiders attempted to have the river declared a closed waterbody so that they could lease it (Islam and Thompson 1999). Subsequently it returned to licensing system, but Caritas by only working with one grouping of fishers was not well

positioned to influence decision making or to strengthen the role of its participants. Arial Kha River has the most successful RMC in qualitative terms, but it is led by local influential persons and at the end of 1997 there was no clear improvement in management (after the survey a sanctuary was established but there has not yet been a clear impact of this as the river is also silting up and some katas continued to be made within the sanctuary. Thus the survey is best regarded as a base for comparison in later impact assessment.

Table 7. Respondent assessments of changes in key indicators of CBFM performance assessed through comparison of mean scores comparing 1995 with late 1997.

Waterbody	General partic.		Fishery partic.		Fishery influence		Fishery decision ease		Fishery wellbeing		Household wellbeing		Household income	
	NGO	Oth.	NGO	Oth.	NGO	Oth.	NGO	Oth.	NGO	Oth.	NGO	Oth.	NGO	Oth.
Closed Beels														
Hamil Beel	S	S	S**	NS	S**	NS	S**	NS	NS	S	S	S	S	S
Rajdhola Beel	-S*	NS	S**	S	S	S	S	S	S	S	S	S	NS	NS
Dum Nadi Beel	S	S	S**	NS	S	S	S**	NS	NS	NS	NS	S	NS	NS
Ruhia Baisa Beel	S*	NS	S	NS	S	NS	S**	NS	S**	S	NS	NS	NS	NS
Shemulia Baor	NS	S	S*	NS	NS	NS	NS	NS	S	S	S	NS	NS	NS
Krishnochandrapur Baor	S	S	S**	NS	NS	NS	S	NS	S	S	S	S	NS	NS
Open Beels														
Ashurar Beel	NS	S	S	S	S	S	S	S	S	NS	S*	S	S	S
Dikshi Beel	S*	S	S**	NS	NS	NS	NS	NS	NS	NS	S*	S	S	S
Goakhola-Hatiara Beel	S	S	S**	S	S	S	S*	S	NS	NS	S*	S	S	S
Rivers														
Kali Nodi	S**	NS	S**	S	S**	S	S**	NS	S**	-S	S**	S	S**	S
Titas River (ka)	S**	NS	S**	NS	NS	NS	-S	NS	-S	-S	S	S	S	NS
Titas River (Gokon-Goshaipur)	S**	NS	S**	NS	S	S	S*	NS	NS	NS	S**	S	S**	NS
Tetulia River	S	NS	S**	S	S**	S	S**	NS	NS	NS	S**	S	S	S
Moisherkandi Bornpur River	S	S	S	S	S	NS	NS	NS	NS	NS	S	S	S	S
Boyral River	NS	S	NS	NS	NS	NS	NS	NS	S	S	NS	NS	S	S
Dhaleswari River	NS	NS	S	NS	NS	NS	NS	NS	NS	NS	-S*	-S	-S	-S
Jari Jamuna-Bachamora River	NS	NS	S**	NS	NS	NS	NS	NS	NS	NS	NS	-S*	NS	NS
Ubdakhali River	NS	-S*	S*	NS	NS	-S	-S*	NS	NS	-S	-S	-S	-S**	-S
Arial Kha River	S	NS	S*	S	NS	-S	NS	-S*	-S	-S	NS	-S	NS	NS

Notes: indicators were scored by the respondents on a scale of 1-10 with 1 and 10 defined respectively as the worst and best conditions that the household could imagine for that indicator.

NS = not significant i.e. $p > 0.05$ and S = significant i.e $p < 0.05$ in t-test comparing mean scores for 1995 and 1997.

** = significant $p < 0.05$ and ** = significant $p < 0.01$ in t-test comparing mean differences in score between these two years for NGO and other households, the symbol indicates the category of household that reported the greater change.*

"-" indicates that the score in 1997 was lower than that in 1995 i.e. a worsening of the indicator.

Sources: 1997 impact monitoring survey.

Conclusions

Starting up community management of fisheries in Bangladesh has been shown to be feasible, but the sustainability of new management arrangements is not yet known. The relevant community is not always easily defined. Government so far has only agreed to grant use rights for fisher communities organized by NGOs for limited periods in the beels. In the open waters the government has not yet recognized formally any right for the users or wider community to limit fishing effort.

In all the closed beels there was three-way cooperation between DOF, NGO and fishers. Internal conflicts among fishers were a regular feature but are part of the process that reduces the power of the few past fisher leaders. DOF tends to ally with past fisher leaders who it has dealt with in the past, while the process of empowering the wider community of fishers undertaken by NGOs develops new leaders who naturally look to the NGO for support. However, outside forces continually try to obtain use rights to these valuable fisheries and this threatens sustainability since government has yet to make a clear long-term commitment to CBFM or leasing fisheries via DOF to fishers organized by NGOs. The land administration and not DOF ultimately controls decisions over property and use rights.

The dominant pattern in the rivers has been conflict, particularly with outsiders who build brush-piles to capture part of the resource or attempt to have the open access policy reversed locally so they can lease the river. Again this pattern of conflict is a direct result of lack of defined property/use rights. In this case the Ministry of Land's open access policy rather than improving the access to fisheries of traditional and full time fishers resulted in increased competition for the resource. Local landowners are gradually wining this struggle, at least in secondary rivers that have fishing grounds close to permanently settled farming villages. Only in one case did the local elected council become actively involved and the management committee established some consensus and implemented a sanctuary.

It is hoped that the current pilot activities will continue, and that the Ministry of Fisheries and Livestock will be able to negotiate with Ministry of Land longer periods of tenure for fisher groups and establish a more transparent mechanism for recognizing use rights of fisher communities in jalmohals. A longer period to consolidate community management, and further pilot work in rivers (based perhaps on greater local council involvement or licensing of fishers), will be needed to work out ways of resolving conflicts and of determining sustainability of both institutions and the resource. Another phase of activities is planned to address these needs and ultimately to influence policies.

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