



Community Based Fisheries Management in Bangladesh

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ABSTRACT

The Community Based Fisheries Management in Bangladesh aimed to promote the sustainable use of inland capture fisheries by empowering fisher's communities to manage their own aquatic resources. This paper describes the impact of fisheries management performance using data generated under the CBFM project, funded by the Ford Foundation and the UK Government's Department for International Development. Using quantitative indicators of catch per unit area, catch per unit effort, catch per fisher's day, biodiversity index, fishing intensity and destructive fishing ratio at up to 86 project water bodies across the country representing a variety of different habitats was compared with that of existing fisheries management. Estimates of the slope coefficients for each performance indicator were compared among habitat type and between CBFM and control water bodies using ANOVA. Fish production was found to have increased significantly through time at CBFM water bodies. Trends in fish production through time were upwards at 77% of the 64 project water bodies that were monitored for at least three years without data gap. Trends in fish abundance, indicated by annual average daily catch rates by fishers, were also upwards at 72% of monitored water bodies. Changes in biodiversity index with time were found to be positive and significantly greater than in control water bodies. Species assemblages are richer and more abundant at CBFM compared to control water bodies. Trends in biodiversity were also upwards at 70% of monitored water bodies. Considering all management approaches together, the score based performance indicators suggests that a fisher managed approach ensured maximum benefits, and followed by community managed and women managed approaches. In conclusion, community-based fisheries management appears to perform significantly better than the existing management system in Bangladesh. Future projects might choose to place greater emphasis on identifying habitatspecific interventions and arrangement to meet precise management objectives. Existing information sharing networks could support experimentation and learning under future initiatives.

Key words: *Community-Based Fisheries Management, Sustainable, Biodiversity.*

INTRODUCTION

Bangladesh is situated in a gigantic delta consisting of the distributaries of the Ganges, Brahmaputra and Meghna Rivers, and the country is consequently blessed with access to enormous aquatic resources. The country is cross cut with an impressive network of rivers totaling 24000 km (Muir, 2003) and about a quarter of the country is inundated each year (Brammer, 2004). Fishing and farming are the two main economic activities throughout rural Bangladesh and the two activities are intimately integrated; they supplement each other and are both closely linked to, and adapted to the annual cycle of flood and drought allowing people to benefit from the riches of nature.

The old Bengali proverb "*Rice and fish make a Bengali*" underlines the importance of these two resources in the lives of the people of Bangladesh. In the past there were no conflicting interests between the productions of these two staple diet items in fact, they complemented each other. The rice required flooding and flooded fields gave fish habitat to thrive in. If a flood damaged the crops there would be more fish, and if there were less water, the rice grew better.

Bangladeshi farmers have developed about 7 000 rice varieties well-suited to the climate and hydrology of the country (Thrupp, 2000); and hundreds of fishing gears have been designed to secure a share of the multitude of fish available in rivers, *beels* (floodplain depressions) and *khals* (channels) all over the country. The shallow flooding of the rice fields does not disqualify them as fish habitats.

For instance, Rahman *et al.* (1999b) demonstrated that the fish biomass (kg/m³) is actually higher in the shallowest water (1–15 cm) compared with other depths. What is important is the duration of the flood and that the fish can access permanent water during the dry season.

Rapid population growth in the twentieth century, particularly between 1961 and 1981 when birth rates remained high and death rates declined with improved health care, led to an increase in settlements in flood-prone areas, resulting a need to augment rice production in order to feed the people. This was addressed through the adoption of high-yielding varieties (HYV) of rice developed as part of the “Green Revolution” (Thrupp, 2000). The new varieties are not tolerant to flooding and are mainly grown with irrigation during the dry season or in the monsoon with flood control and drainage and require more intensive use of fertilizer and pesticides than was used for the traditional rice varieties.

Preoccupation with agricultural development led to the closure of more than 1000 smaller rivers and canals and the construction of 8881 kilometres of embankments and 7907 hydraulic structures affecting 35 percent of the country (Muir, 2003). The benefit of this policy is that the country now is almost self-sufficient in terms of rice. However, the price is severe degradation of aquatic habitats. Natural dry season wetlands were drained for rice paddies, ignoring that these water bodies are extremely important fish habitats during the dry season when they act as refuges for the individuals that will repopulate the floodplains during the next rainy season. Thus, the chosen development path has been rice instead of fish.

Rice cultivation and fishing provide the two food staples in Bangladesh; the two activities are well-suited to complement each other.

OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

1. To identify the community based fisheries management system of Bangladesh
2. To find out challenges of community based fisheries management of Bangladesh.

METHODOLOGY OF THE STUDY

Study area: The study was conducted in Bangladesh.

Study design: The study was documentary analysis type. Some case studies were also conducted.

Sources of data: Data were collected from secondary sources mainly. Data were collected from books, journals, research report, internet etc.

Data analysis: Collected data were presented as table, graph etc.

RESULTS AND DISCUSSION

Case Studies

During 2011, we visited ten CBO-managed water bodies in four different regions of Bangladesh; Tangail, Comilla, Mymensingh, and Kishoregunj - covering a variety of water bodies, including beels, rivers and haors. A list of the CBOs and projects is provided in an appendix. Even in this small sample we found significant differences in hydrological and social conditions that resulted in very different structures of community-based fisheries management (CBFM). Some of these variations were related to differences in physical and hydrological conditions but some were unrelated (in other words not all variations had a function). The case studies, together with the secondary literature, strongly suggest that leasing and other property rights matter for economic and social outcomes. We also found strong support for our analytical framework identifying different problems that property rights need to address in Bangladeshi fisheries. There is clearly scope for improving the design of CBFM arrangements by examining existing experiments from the perspective of multiple problems as

well as multiple social goals. This requires a more explicit and informed discussion of competing social goals and of trade-offs. It is understandable that equity and anti-poverty goals have implicitly received priority in Bangladesh, but the importance of investment is likely to become more important if the country wants to use fisheries as a driver of economic growth and poverty reduction. It is in this area that answers have to be found and some of our case studies suggest directions in which progress can be made in the future.

Tangail

Five of our CBOs were located in the Tangail region. Two were CBOs managing parts of rivers, which are clearly open water bodies. Three were managing beels that were semi-closed, but with important differences in their underlying property rights. One was a beel on khas or government land that was leased to the CBO; the others were on khas land encroached by private owners and were now in an intermediate stage of de facto privatization. The owners in the latter cases still had to cooperate to set up a management committee to organize fishing when their lands got temporarily flooded every year to become temporary beels.

As we would expect in open water bodies, the two river management committees did not attempt to restrict the rate of catch on the stretch of river that their leases entitled them to manage. The CBOs in both cases provided coordination services and simply charged a share of the catch from fishermen. They claimed their main task was to enforce the non-fishing periods, maintain the fish sanctuaries and to resolve conflicts but their incentive to do this was not very clear. The CBO management committee was relatively small in both cases, and charged 25 per cent of the catch from its members and 50 per cent from non-members. Restricting and regulating the entry of fishermen (rather than their catch) was an important function to resolve conflicts. Prior to the organization of fishing rights by the CBO, poor fishermen particularly from the minority Hindu community had to make informal payments to powerful protectors. They were much happier with a more formal system of “taxation” and protection. The catch was declining in the rivers over time for the reasons discussed earlier, but the fishermen were not worse off because the price of fish was also increasing. The CBOs received significant support from an NGO (the CNRS) when they were being set up and CBO members accept that without its help they would not have been able to sustain their organization.

The first and most successful of the three beels in the area is called Charonbeel and is a khas (publicly-owned) beel of 104 acres leased by the government to the project. This beel gets seasonally connected to 850 acres of floodplains surrounding it. The CBO includes 227 members from 6 villages. The management committee was set up with a lot of assistance from an NGO as there was an earlier cooperative in the area which was a front for powerful individuals to lease the beel. This was a semi-closed water body and as such the CBO’s strategy, as expected, was not to restrict fishing but simply to charge for the right to fish. There was no change in the organization of production, and the fishermen operated as individuals. The collection of revenue was subcontracted to a rotating team of three who collect dues for a ten per cent commission. The other main functions of the CBO are to maintain sanctuaries and enforce the restricted seasons. The CBO also carried out a limited amount of fish stocking on a seasonal basis, paid for by the revenues collected.

The members provided a very rational explanation for why further investments to raise net output were not forthcoming. First, they said that a significant increase in net output would attract the attention of more powerful neighbours. The CBO members, being relatively poor, had insufficient power to protect extra incomes from the attention of the rich. Their low current incomes were therefore more secure, and they were even fearful of losing control of the water body if there was a significant increase in its net output. Indeed, more powerful landlords around the beel area had already tried to encroach on the khas land by taking out pattans or leases. These were only revoked after the NGO assisted in taking the case to the local land administration office. Secondly, the members explained that further improvements in net output would require significant investments in building earth mounds and culverts to control the water, together with significantly greater investments in stocking. They simply did not have the financial resources, and their members were too diverse in terms of their incomes to agree on contributions to an investment fund. This is an

example of how the organization of production on an individual basis can affect the incentives to invest. The fishermen had an excellent understanding of the constraints that needed to be overcome to solve what we described as the investment-enabling appropriation problem, and they could also explain why their CBO could not solve this problem.

The two other beels in the area faced a different set of problems. Katora Beel was a small seasonal beel of around 27 acres that formed on land that had effectively become privately owned as a result of encroachment. The encroachment process typically involves individuals taking out pattans or leases of khas (public) land and with the support of the local administration this effectively allows them to treat the land as private land over time. The land is used for rice farming and also becomes a seasonal beel that is semi-closed and connects to a floodplain of 400-450 acres. The CBO, constituted as a cooperative society, owns a small amount of land on which it maintains fish sanctuaries and it enforces seasonal fishing bans. As with other CBOs in the region, it allows individual fishermen entry for a share of the catch. The physical characteristics of this water body make the construction of seasonal barriers prohibitively expensive for the CBO members. In addition, there were conflicts within the CBO. The region has depressions called dobas where fish congregate and these areas remain inundated even after the flood season. The owners of the land where the dobas are located have the sole right to harvest these fish after the beel has receded and their incentive is to harvest all the remaining fish, leaving no restocking for the next season. The average income of the CBO members is too low to pay for effective stocking and so the CBO only uses free fingerlings provided by government hatcheries. The members understood the investment problem very well and suggested a solution, which was to pay the doba owners a fee for not exhausting the entire fish stock, but they lacked the resources even to do that.

The last beel, Poshna Beel was not doing well at all and everyone agreed that the problem here was the absence of investment. The CBO was barely active since the water body was not currently lucrative. Ironically, the physical characteristics of the water body were such that relatively moderate investments in earthworks and sluice gates could effectively close the water body. According to local fishermen, this water body was therefore potentially more lucrative than Katora Beel if the investments could be financed. The problem of dobas (which also existed here) was, according to the fishermen, potentially easier to solve. Local fishermen suggested a 60-40 split of the net profit of the fishery between doba owners and others as a way of aligning incentives for both types of landowners to conserve the fish for the next season. Since with closure the fish would remain in the water body even during the flood season, the doba owners would profit from not exhausting the stock entirely, thereby reducing the cost of restocking. Thus, in this example, the fixed-technology appropriation problem would become easier to resolve if the investments in infrastructure to close the water body could be organized.

Comilla and the Enterprise-Based CBO model

The next two projects are variants of a very promising enterprise-based community management model which was developed in the Daudkandi region of Comilla. Shisuk (pronounced Sheeshook), an NGO with a focus on education and health, took the lead in developing this model from the mid-1990s. The enterprise model comes closest to providing a community-based answer to the investment-enabling appropriation problem and over time it is also making some progress in addressing the production organization and monitoring problem. The key feature of the enterprise-based model is that the land underlying the water body is privately owned and the owners come together to form a company based on shares. The land is rice-growing land for part of the year and then gets flooded and becomes suitable for aquaculture. Shisuk has evolved a model with a well-worked out structure. Shares are issued to raise capital for infrastructural investments, and additional working capital is borrowed from banks. The model is evolving but at the time of our investigation, 27 per cent of net income went to pay a rent to the landlords proportional to their land holdings, 3 per cent was earmarked for social welfare and 70 per cent was split between the management committee (which gets around 10 per cent), dividends (usually around 50 per cent), and reserves. Landlords with dobas are paid extra. Twenty per cent of the initial shares were subscribed by Shisuk and the rest by landholders but there was a limit to the number of shares any particular landholder could buy. In

addition, all landlords were only given one vote and only landlords who were local residents could be shareholders. The management committee was elected by the shareholders and decided on investments and fishing times. Guards were hired to monitor theft but the entire community was also engaged in monitoring as their houses lie around the boundaries of the water body. The management committee could and did impose fines on unauthorized fishermen or for the use of banned nets. The community aspect of this model is that a significant amount of collective action is required to build the trust and cooperation for this model to work, and this involves landowners of different sizes but also other stakeholders in the region. However, it is also an enterprise model in the sense that rights are structured in ways that make it easier to solve both the investment problem and the production organization problem in consistent ways. For instance, wage labour was used in this model to a much greater extent and any anti-poverty impact was achieved through rising wages and the availability of fish in the local markets rather than through ensuring access to fishing for individual poor fishermen.

Initially, management was the collective responsibility of the management committee, but not surprisingly, this proved to be inefficient, and over time the management responsibility was auctioned, with shareholders bidding to take on this responsibility. In the new arrangement, the winners of the auction become the true residual claimants, with landholders and shareholders getting dividend and rental incomes. In principle this can have a positive impact on the production monitoring problem, but how this affects the investment problem will have to be tracked over time. The enterprise-based CBOs in Daudkandi have achieved a significant yield per acre, reporting a yield of 1850 kg/share in 2008, considerably higher than the average for closed water body fisheries (Karim, et al. 2010, 10).

Some special features of the enterprise-based CBO model are important for understanding its relative success in terms of net output enhancement. First, the region benefited from public investments in flood protection that created embankments and culverts and made feasible smaller private investments to create enclosures to control smaller parts of the floodplain as potentially closed water bodies. This meant that large returns were not necessary to justify the investments, and therefore the production monitoring problem did not have to be immediately solved. The economic and political problems of making the productive transformation were therefore significantly reduced. The first stage of public investments took place in the early 1990s with the construction of the Comilla flood protection barrier. Pankauri Fisheries was the first project that began in 1997 with the assistance of Shisuk and its emergence also coincided with the roll-out of CBFM Phase 2. The land covered 1000 bighas (around 300 acres) in 7 villages. The shareholders raised enough capital to build a six kilometre long 'country road' on an embankment that could be used to close a part of the floodplain into a seasonally closed water body. The landlords provided the land because it remained in their ownership and the project paid them a rent for the use of this land. In addition, their other lands went up in value as a result of adjoining the road. Further severe flooding in 2004 led the Local Government Engineering Department (LGED) to undertake the building of further roads and culverts. These, in turn, made additional private investments in developing seasonally closed water bodies feasible. New enterprise-based CBO projects followed. A second important feature was that the underlying land here was privately owned and was effectively leased to the CBO for flood-season fish harvesting, reverting to private rice agriculture in the dry season. As the shareholders can only be resident landlords, someone selling their land is likely to also sell the shares in the project to the same buyer. The projects effectively had an indefinite lease till the shareholding structure of the company was wound up. As a result, the question of the length and credibility of the leases did not arise. If lease agreements for public land are to support similar long-term investments, the leases would have to be long enough to justify the investments.

Other important features of the Daudkandi model became apparent in discussions with CBO members in the projects. The first of the two projects studied in this area was Chargram Fisheries set up in 2003 as part of Shisuk's enterprise-based CBO model. It is a registered joint stock company based on the shareholding principles described above. The water body extends to around 1000 bighas (330 acres) and is effectively closed, controlled by five sluice gates. As the CBO consists mainly of landlords, it includes the most powerful individuals in the locality. The CBO membership and that of the

management committee are important for understanding its implementation capability and why it can operate effectively in a clientelist political settlement. As landholders belong to all parties, the CBO includes a cross-section of elites and its membership cuts across all major political parties. This creates a collective interest within the CBO to keep party politics out as they know that the consequence will be a split in the company and a loss of investments. These characteristics ensure both a high level of enforcement capabilities on the part of the CBO and also a long-term credibility that their management arrangements will not be overturned with a change of government. In fact, the Daudkandi CBOs have been patronized and recognized by both major parties. The fact that the CBO brought together relatively wealthy individuals also meant that its member shareholders could mobilize finances by subscribing shares, and banks were later willing to lend working capital on favourable terms given the balance sheet of the company. Thus, the identity of the residual claimants here met the most important conditions for investment-enabling appropriation problems to be addressed.

The fixed-technology appropriation problem was not particularly important in this case because the harvest is seasonal and the optimal rate of fishing does not have to be discovered by the residual claimants to allow the stock to reproduce. Seasonal restocking with fingerlings is necessary and adequate capital was available for this. However, given the capabilities and incentives of the management committee, it is likely that it would be able to exercise effective control rights to regulate and restrict the catch if it was necessary. Sanctuaries and fishing restrictions were effectively enforced. However, effective and timely labour management is important for this model. Net output could collapse if there was free-riding behaviour within the production team. This problem was addressed by the use of wage labour or catch-sharing arrangements negotiated by a team management which had both incentives and capabilities to determine who can fish and on what terms. Not surprisingly, team monitoring was more effective in this enterprise-based model, sustaining the net output required by investors. Interestingly, despite the landlord base of the residual claimants, the NGO Shisuk was critical for setting up the CBO. This is because there were many internal conflicts and suspicions that needed to be resolved and the presence of an external arbiter was vital to set up the critical institutional arrangements and to oversee their functioning. The conjuncture of prior public investments in barriers and flood prevention, the presence of private landholders who could pool their lands and invest to construct a potentially closed water body, an effective and committed NGO that could act as a neutral arbiter and catalyst combine to explain why this was a relatively successful CBO model. But this also means that the model may not be relevant for all types of water bodies in Bangladesh.

The enterprise-based model clearly has features that are able to address aspects of the investment-enabling appropriation problem and the production monitoring problem to achieve significant investments and increases in net output. However, the investments required to achieve closed water body conditions were fortuitously reduced as a result of public investments in flood prevention. Further investments are likely to require more effective control over production so that monitoring costs are reduced. This is likely to be necessary to assure adequate returns on further investments. Introducing labour- saving or production monitoring technologies will undoubtedly be criticized and indeed the enterprise model has already been criticized for excluding the poor from free access fishing and for damaging bio-diversity. Shisuk as the advocate of the enterprise model strongly contests these charges, pointing out the rising wages and labour shortages in the area as proof of the poverty reduction that has come from the wealth generation in its fishery projects. It denies that temporarily closed-water body aquaculture of the type it practices has significantly reduced the varieties of fish in the region. Indeed while both sides of the argument may have some factual merit, and even if there are some immediate trade-offs along these lines, the enterprise-based CBO model still needs to be seriously considered as a way of making a significant impact on the constraints on raising net output in Bangladesh fisheries.

Variants of the enterprise-based model have been imitated by a number of fisheries in the area which have not followed the formal company structure that Shisuk advocates. The second project we visited in the area was Bashora Fisheries, which was set up as an informal adaptation of the Shisuk enterprise

model. The water body here was around 300 bighas (100 acres) with 220 landlord- shareholders, but the organization was informal and a registered company was not set up. The management committee was not elected. It was selected by consensus by the landlords to include members of all powerful family groups. Landlords were paid a rent, including extra amounts for dobas and the surplus was divided between shareholders. The hydrology here was not based on sluice gates and so this remained a semi-closed water body. Smaller fish were preserved in three ponds to assist restocking for the next season. The informality here raised questions about the sustainability of the project in case serious disputes arose between landlords or if outside political players attempted to enter the project. Informality may provide easier ways of solving these problems but the organization may also fall apart.

Significant amounts for investing in infrastructure, so its relative success in solving the investment-enabling appropriation problems was less clear. If many individuals are to contribute significant but different sums to an investment fund, a formal structure that recognizes their different shares in the project may be necessary to induce long-term investments. Yet despite the informality, the residual claimants in this case certainly had relatively strong enforcement and financial capabilities. As a result, in terms of solving fixed-technology appropriation problems such as managing dobas and preserving fish for restocking, the informal enterprise-based CBO performed better than some fishermen-based CBOs in Tangail, even when the latter had significant NGO assistance.

Mymensingh

The water body visited here was Kalmeena Beel, a permanent water body of about 86 acres that grows to three times this size in the flood season. The permanent part of the water body is khas but the surrounding land is privately owned with 186 owners. In 1992, a private landlord secured a three-year lease on the beel but the project failed because he could not control theft. In 2007, with support from the Department of Fisheries (DOF), a CBO and management committee was organized to manage the water body. It was similar to the Daudkandi model in that the management committee of the CBO managed the water body and gave returns to the landlords but it was also different because the CBO was not based on share ownership, was not registered, and the rules for dividing benefits were not clearly set out. The absence of share subscriptions meant that it could not raise capital as in the Daudkandi model and internal conflicts led to a breakdown of the CBO in 2009. A new model emerged in 2011 with competing groups of landlords setting up alternative management committees and bidding to get the support of the community by offering higher rents to landlords. The winning bidder would get the chance to form the committee for three years, organize the investments and keep any residual. There is a chance that this model may work but it was too early to tell. The bidder may not be able to deliver the promised rents particularly because investment-based returns are ruled out given the absence of significant investment funds. The local management committee can, however, be expected to be better in managing fixed-technology appropriation compared to private individuals from outside the area who proved unable to control thefts.

Clearly, without landlords forming a shareholding structure their ability to raise money for investments is reduced. The hydrology of Kalmeena also does not allow easy investments. It is a flood prone area and the risk of losing fish stocks to other water bodies is high. The long-term viability of private investments depends on prior government construction of roads and sluice gates. If this were to happen in the future, the emerging CBO model in Kalmeena would be unable to raise the additional internal funds for investment. But the incentives under these circumstances are likely to lead the CBO in the direction of the Shisuk-Daudkandi model.

Kishoreganj Haors

The Kishoreganj area is home to many haors. These large seasonal open water bodies are based on annual floods and they can easily be mistaken for oceans with waves lapping the shores. The technology of even partially closing these water bodies for enabling investments is more limited and more expensive. However, as the water is not very deep in all parts of the water body, it is possible to create closed areas called kops or kathas using wood or bamboo, that allow fish to grow in a loosely controlled environment. More serious investments could create large submersible netted cages to

allow the effective closure of parts of the water body, and also allow intensive feeding. The leasing policy of haors does not however seek to identify potential investors nor provide incentives for significant investments. In the two projects we visited in this area, the leasing regime aimed to help poor fishermen but the outcomes were at best moderate to poor even in terms of the anti-poverty objective and rather poor in terms of investment-enabling appropriation.

The first of the two projects was at Nikli where a 278 acre part of a haor was being managed by a CBO set up under the guidelines of the Fourth Fisheries Project (2002-12). The CBO had 368 member families, not all of whom were fishermen, but they were certainly from the middle to poorer sections of the population. The management committee was also allowed to have non-fishermen individuals on it, and the project had a fifteen-person committee, most of whom were connected to the fishery business, but none were actually fishermen. However, in terms of wealth, they were not the biggest landlords in the area. Half were small landlords and the other half were described as effectively landless. The annual lease paid to the government was slightly over a million takas (around \$15,000) and the management committee's income was based on the sale of fishing rights to fishermen on a 25-75 split of the catch, the larger share going to the committee. On this basis, a net profit for the committee was achieved that was just a little larger than their investment. This was divided amongst the CBO members proportional to their initial investment in contributing to the leasing fee. In fact, the CBO members were collectively only able to raise 70 per cent of the lease (and this provides an idea of their relative poverty), the rest being borrowed from traders who earned a return by buying all the fish from the haor at a discount. In common with all the other cases of CBOs, this one too received significant assistance from an NGO when it was being set up.

Apart from collecting the revenue already paid to the government, the core work of the CBO was, as we would expect in an open water body, to allocate fishing spots and rights, prevent theft from non-paying fishermen, and enforce sanctuaries and fishing bans. However, the sanctuary management required investments that the committee could not afford. The committee did not even have the funds to invest in kops or kathas which cost around 10,000 taka each (around \$150), let alone anything more significant. There had been gradual siltation in the haor reducing the effective fishing area to a quarter of the total. The Fourth Fisheries Project had allocated funds for dredging part of the haor but towards the end of the project only half the allocated amount had been spent. The benefits to the committee should not be confused with anti-poverty measures because a tiny number of poor people were involved both in the CBO and in the management committee. The net return per person for a group of around 350 families on an annual net profit of around fifteen thousand dollars is less than fifty dollars per family. The number of poor families living around the haor is at least another three to four thousand. When CBO members were asked why all the poor families were not included in their CBO they quite truthfully pointed out that their inclusion would make the individual returns negligible.

It is clear that significant anti-poverty measures require a substantial increase in the net output of fisheries assets. Not only is the rent that is earned by the CBO relatively small, the CBO is vulnerable to political takeover and interference, despite the support of NGOs. A previous leaseholder of the haor was allegedly involved in thefts of fish to intimidate the community leaseholders, but he was stopped by the NGO who took legal action. More recently, the Awami League government interfered by appointing the entire management committee using the local government administration instead of allowing an election. As we were talking to this management committee, no further details were available but they themselves described in broad terms what had taken place. They also told us that Awami League youth were trying to directly get leases on linked water bodies through the Land Ministry. As we would expect, management committees composed of poorer individuals are likely to be very vulnerable to political takeover and capture, despite the active resistance of NGOs. In any case, the presence of an NGO cannot be a sustainable long-term strategy. In the end, instead of being anti-poverty measures, these arrangements are more likely to sustain relatively small rent distributions to party supporters of the ruling party in a client list political structure.

The last project visited was the most depressing, but is reported because here an effective CBO had even failed to form, and this must be true for many water bodies. The water body at Kothiadi is a

system of interconnected haors of 50, 400 and 28 acres each. Initially under the CBFM-2 project, there was a DFID-financed attempt to set up a fishermen-only CBO, initially with BRAC assistance. By the time we visited, everyone appeared to have given up on this area. The fishermen were almost all from the minority Hindu community and very poor, but were deeply divided amongst themselves with many factions. When the project began in 2002 a management committee was set up entirely composed of fishermen and they paid the lease amount, but their legality was immediately contested by excluded fishermen. The management committee made the mistake of illegally sub-leasing part of the water body and when the local administration was informed of this, the lease was terminated and allocated to a powerful local group. The management's tasks were as in any other open haor, selling fishing rights on a 75-25 share and earning a return on the lease investment. This was not the end of the story as three competing committees were set up (but accounting between them for only 120-130 poor fishermen in a densely populated area). The competing committees were clearly composed of the more entrepreneurial and ambitious of the poor fishermen, and they apparently spent large sums of money bribing the district commissioner to keep changing the allocation of the leases between themselves. In the end, of course, the fishermen did not benefit at all and even fixed- technology appropriation problems could not be solved.

This was obviously an extreme example of conflicts between rival groups of the very poor failing to achieve coordination. Indeed this is to be expected because these types of CBOs and their management committees only generate relatively small rents by selling access rights. These rents cannot possibly generate a return to all the poor. The effective CBOs are ones where excluded groups accept as legitimate the current management committee's first mover advantage. In the Kothiadi case, these conditions were not met and the conflicts between the poor benefited the local administration and more powerful groups. At the time of our visit, NGOs and donors had abandoned the area to find its own solutions. We suspect that in the many water bodies where there is no NGO presence, the allocation of leases is heavily politicized. Even where poor fishermen's organizations get the lease, in the absence of strong and persistent external assistance from NGOs, the bulk of these relatively small rents are likely to be captured by the powerful in the form of bribes and protection money. The low enforcement capabilities of the poor make these unfortunate observations entirely explicable. The policy conclusion is that even as an immediate anti-poverty measure, some or many of these CBOs are failing because a) they cannot deliver any rents to most of the poor, b) the rents delivered to some of the poor in the successful CBOs are very small and c) in many cases the poor fail to set up CBOs or protect their rents from indirect extraction by the powerful.

CONCLUSION

In addition to private aquaculture, culture-based fisheries continue to dominate many Government actors' visions for inland fisheries in Bangladesh without the required attention to access and property rights arrangements. The link between community participation and culture-based strategies, while laudable in its sentiment, is undefined (Muir, 2003). This attention focuses on a production policy theme, without sufficient attention to access and poverty issues in culture-based fisheries, and more fundamentally diverting resources from addressing the much larger issues of managing capture fisheries well before it is too late. The increases in aquaculture production have only brought marginal benefits for destitute and landless people. Sustaining the inland fisheries is of immense importance in order to ensure the food security of the poorest part of the population. In addition administrative and institutional constraints have discouraged cooperation and a holistic approach to maintaining capture fisheries and the wetlands they depend on. Any stocking should be promoted through means that maximize its sustainability and minimize scope for diversion of funds. For example, developing low cost nursery ponds near to the water body that is under the control of the fisher group. Before deciding on stocking a water body and controlling movement of fish, the potential costs and benefits of alternatives such as habitat restoration should be assessed, and an extensive effort made to work with local fishing communities to understand their priorities and help them organize to address their problems and take up opportunities, of which stocking is but one. In Bangladesh most stocking is carried out with species that are not expected to reproduce, and so fingerlings need to be released each year, making financial sustainability of the group managing the process just as vital as the biological sustainability of the water body and fishery. Projects have tended to take advantage of availability of

fingerlings, without addressing the cash flow problems of fisher groups trying to manage closed culture-based systems. The end result is that poorer members of the society are affected over the long term because native fish stocks have become depleted and the capture fishery has become relatively isolated both within the policy arena and in practice (Parveen and Faisal, 2003).

The attraction of subsidized fingerlings for stocking and profits from stocking that might be controlled through a project-community base tend to result in dependence on DoF-projects and to attract opportunists who are not fishers but see a chance to make money from a new intervention. Subsistence fishers either derived no benefit or were adversely affected by stocking (Thompson, 2005). While stocking of fingerlings, gear bans and seasonal bans on all or some fishing gears were successful technically to conserve and enhance resources it led to exclusion and suffering of poor fishers.

The conclusion is that the entry point for fisheries management should not be stocking which requires a high level of control over the water body, organizational coordination and ability to raise funds (Thompson, 2005). In most water bodies there are less risky options that user communities are more prepared to invest in than stocking; interventions such as sanctuaries and limits on fishing effort that are low cost easy to implement and visible, and cause little or no social conflict, have been found to be more effective and equitable in implementation.

Before deciding on any stocking, careful management planning is needed with the community to identify simpler options and to address rehabilitation of the water body which may have higher capital cost but does not require the community to invest each year in stocking species that do not reproduce in the water body. However, the current lease policy in Bangladesh unfortunately discourages this type of management because normal lease duration is three years, and it may take as long or longer for leaseholders to complete rehabilitation and show results, in which case their investment could be lost to the next leaseholder.

RECOMMENDATIONS

The recommendations of the study are as follows:

1. Pre-determined physical and technical interventions must not be imposed on the community.
2. Before any management intervention costs and risks for the fisher community should be worked out realistically, and it should be widely discussed if costs and risks are acceptable.
3. Reduce the dependence on elites for finance and minimize the need for credit, focus should be on low cost interventions such as sanctuaries and water bodies with low-lease fees and encourage savings and provide support for alternative income-generating activities.
4. All management initiatives and regulations (sanctuaries, closed seasons, screening/ non-screening, gear bans, etc.) should only be implemented in small steps and always be subject to change whenever new information becomes available (adaptive management).
5. Full participation of all stakeholders is necessary to ensure acceptance of rules and management practices adopted in the concerned water bodies. Seasonal impacts of closed seasons and restrictions on fishing can be mitigated through livelihoods components that are part of the work to improve fishery management.
6. Provide training and credit for alternative or additional non-fish related income sources to be linked with the rules and management practices adopted in the concerned water bodies in order to diversify the livelihoods of the people involved and mitigate the seasonal impacts of closed seasons and restrictions on fishing. It may be an advantage to initially work with women instead of men.
7. The entry point for fisheries management should not be stocking which requires a high level of control over the water body, organizational coordination and ability to raise funds and open floodplains should not be stocked.
8. Subsidized stocking should be avoided completely until group cohesion within community-based organizations has been clearly demonstrated and procedures for maintaining transparency and sound financial management are in place and well understood.

9. It is vital that all the costs involved with stocking (fingerling costs, loss of wild fish, etc.) are included in the equation when profitability of stocking is calculated.
10. Fisher groups involved in stocking must have access to credit on favorable rates and help to develop their own revolving funds, for example through NGOs.
11. The composition of fish species in a water body must be known before stocking so the right species and the best sizes of fingerlings to be stocked can be determined. Preference should be given to large fingerlings and species not so vulnerable to predators.
12. Subsistence fishers should be allowed to catch small unstuck indigenous fishes caught with gears that do not or only to a limited degree capture stocked fish.
13. Side canals should not be screened because this affects lateral movements of indigenous fish.
14. Do not remove all floating vegetation including water hyacinth.
15. Permanent water bodies and seasonally flooded land should be connected by reopening side canals and making holes in embankments or fitting them with culverts to improve catches of laterally migrating fishes.
16. The area which permanently holds water should be increased. Crops should be diversified away from rice and towards less water consuming crops.
17. Sluice gates should be opened at the time when juvenile fishes and prawns are abundant outside the gates.
18. Fish passes should be installed where possible.
19. Riparian vegetation should be planted and aquatic and semi-aquatic plants introduced, or reintroduced to improve the quality of the habitat.
20. A thorough baseline survey should be conducted covering the entire wetland management unit including linked floodplains, and not just the *jalmohal*, which has been leased, and all the relevant institutions and stakeholders must be identified.

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