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The Role of Social Capital and NGOs in Community Based Management of Open Water Inland Fisheries of Bangladesh

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Abstract

The aim of the paper is two-fold. It presents an integrated conceptual framework based on the literature on common-pool resource institutions, social capital and NGOs, and secondly, it applies the framework to the case of Bangladesh fisheries sector. Current theoretical and empirical research on common-pool resources arrive at two major conclusions: first, the tragedy of the commons is not an inevitable outcome, and secondly, sustainable management of CPRs depends not only on bio-physical characteristics and user characteristics but also on a broader institutional framework or social capital. Formal institutions and externally-supported NGOs can play an important role in this context. The experience of Bangladesh openwater inland fisheries confirms that private property rights attached to waterbodies largely solve the problem of appropriation externalities, but have failed to fulfill equity and long-term sustainability goals because of the elite capture of fishing rights. Community-based fisheries management supported by NGOs since the early 1990s has addressed these problems with some success. Two factors appear to determine their performance: the support of formal institutions (legal, administrative), and the project design based on active participation of members that presupposes some social capital.

JEL Classification: 013; Q22
Key words: Common-pool resources; NGOs; CBOs; and social capital.

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The importance of openwater inland fisheries in Bangladesh for the diet and health of the population, livelihood of poor people and potential resource for general economic development is immense. About 80 per cent of the rural households catch fish for consumption or sale, and fish constitutes 60 per cent of total protein consumption (BBS, 1997). The fishery sector if properly managed can provide resources for economic development. But the contribution of fisheries to economic growth and poverty reduction has remained limited due to several factors of which institutional problems are the main ones.[2] Current institutional framework has failed to fulfill the three criteria of sustainable development - efficiency, equity and protection of the resource base.

The objective of this paper is to analyse the institutional problems of openwater inland fisheries of Bangladesh in light of recent literature on common-pool resources, collective action and social capital. The main focus will be on the characteristics of the resource, the problem of protection of property rights, and the role of formal institutions and NGOs in promoting social capital and collection action. The paper is based on existing theoretical literature on CPRs and on existing empirical studies related to fisheries in Bangladesh. It is organized as follows:

1. Openwater fishery a common-pool resource
2. Prerequisites for sustainable management of CPRs - the role of local community
3. NGOs, social capital and community action
4. Characteristics of the openwater inland fisheries in Bangladesh
5. Existing institutions related to openwater fisheries in Bangladesh
6. Community-based fisheries management - NGOs, collective action and social capital
7. Summary and conclusions

1. Openwater fishery as common-pool resource

Public good characteristics of CPRs: There is an extensive literature on the institutional problems related to common-pool resources due to their public good characteristics. Common pool resources like fishing grounds, groundwater supplies, forests, pastures are neither public or private goods but share some attributes of both. Unlike pure public good,

common pool resources are rival. The rivalry is associated with the flow of resource unit (Ostrom, E. 1992). For example, fishes caught by one fisherman are not available to others. But similar to a public good, there is a jointness in the use of the resource system, i. e. fishing ground is used by many people. Rivalry or subtractability of the resource-unit (fish catch) implies the possibility of approaching the limit of the number of resource units produced by common pool resource system, i. e., fishing ground). Crossing the limit can lead to higher costs of extraction for everyone, or in worst cases, destroy the resource system (Ostrom, 1992).

Common pool resources share another characteristic of public good i. e., low excludability. Low or non-excludability implies that it is costly to exclude users from obtaining subtractable resource units (Musgrave, R. A. 1959). The cost of exclusion depends on the scale or boundaries/divisibility of the resource system, and technologies available for exclusion (Oakerson, 1992). Openwater inland fisheries often face problem of exclusion because of their vast scale and indivisibility. Two other characteristics of CPRs are important for the management point of view. They are mobility of the resource to be harvested and storage capacity (Schlager, Blomquist and Tang 1994). In the case of fisheries, fish is quite mobile and storage possibilities are to a large extent limited.

The above characteristics of the fisheries as CPR - partial rivalry/subtractability, low exclusion, mobility and lack of storage capacity pose management problems, and hence, institutional
arrangements play an overwhelmingly important role.

[2] Fishery resources have deteriorated due to the construction of roads, embankments, drainage, flood control, natural siltation and overfishing (Middendorp, et al. 1999).

2. Prerequisites for sustainable management of CPRs - the case of openwater fisheries

The role of the community

Successful management of CPRs like openwater fisheries should fulfill three criteria: efficiency, equity and sustainability. Ostrom, Garner and Walker (1994) identify two major problems faced by users of CPRs - the appropriation problems and provision problems. The former concerns the allocation of the yield of a resource in an efficient and equitable manner. Specific problems that may arise are appropriation externalities, technological externalities and assignment problems. The provision problems are mainly to do with sustainability issue, and they may arise due to development failures, maintenance failures and degradation problems.

The role of institutions is central to appropriation and provision problems. Institutions provide a set of rules for cooperation and competition, and thereby adjust conflicting claims of different members of community and of groups for scarce resources (Ostrom 1986, 2001), Bromley (1989), and North (North 1991). With respect to fisheries, the user community must be able to act collectively in devising rules for appropriation and provision. The crucial question is - what are the factors that work behind the community´s ability to devise rules?

Traditionally, common-pool resources are managed by users in a community according to local customs and rules. However, efficiency of common property institutions has been questioned. Earlier collective action literature (Hardin, 1968) postulated that resources jointly used by the community would tend to be misused because of the failure of collective action by the community. Implications are that for efficient management the resource in question should be privatized or state should control it. Subsequent literature on common-pool resources, however, suggests that the so-called tragedy of the commons may not occur. There are examples of successful management of CPRs/fisheries by the community (Berkes 2000; 1992). Also, recent theoretical and empirical literature suggests that private (individual) rights in natural resources do not necessarily lead to efficient management (Larson and Bromley 1990) unless backed by community institutions.

Still, the management of the commons by local community is not an universal phenomenon, and there exists diverse institutional arrangements especially with respect to fisheries. In a case study, three questions need to be addressed: 1. What type of local-level institutions exist

related to the use of the commons? 2. How successful are these institutions in meeting the goals? 3. What are the factors associated with the emergence and sustainability of the institutions?

Most of the common-pool literature concerns the factors behind the emergence of community action in the management of commons. A summary of the literature by Agarwal (2002) names three major works by Ostrom, Wade and Baland & Platteau, that are complemented with Agarwal´s own reflections. Three categories of factors are identified - resource characteristics, user characteristics and external factors that influence the emergence of local-level institutions. The importance attached to these factors by different authors differs a great deal. For example, Ostrom stresses community factors whereas Agarwal, Wade, Baland & Platteau and McCay consider broader socio-economic and political contexts. Still, the characteristics of the resources remain at the background and their importance have been stressed by several authors (See Schlager, Blomquist & Tang 1994; Ostrom, Gardner and Walker 1994). Agarwal stresses that it is not the list of factors but how the factors interact that should be focused in research.

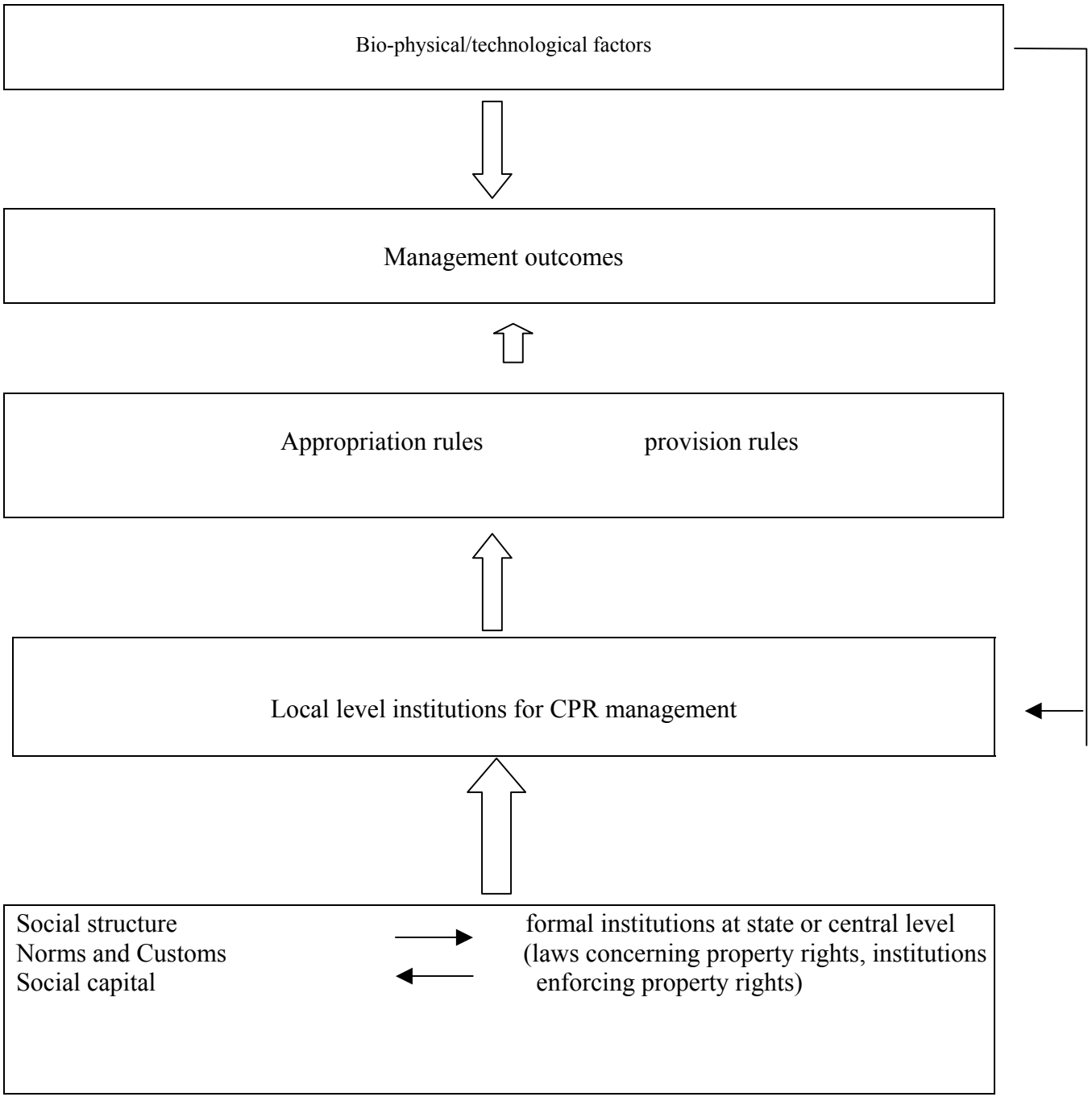
CPR researchers now a days argue that given the bio-physical nature of CPRs no single type of institutional arrangement can lead to sustainable management, instead a polycentric/nested approach is needed (Ostrom 2000, Folke 2002). Different types of institutional solutions - private property rights, state regulations and community enforcement mechanisms are also part of a polycentric approach. Also, the new institutional economics views the role of community institutions differently. Community institutions are not substitutes for market institutions and/or government regulations but they complement these institutions by providing the basis for their proper functioning (Aoki 2002). The burgeoning social capital literature further enriches CPR research by adding another dimension as described below.

Social capital and community action

Ostrom and Ahn´s recent work (2001) suggests that the ability of the community to arrive at collective action to deal with resource allocation problem depends on the level of social capital. Social capital is a broad concept as it encompasses both tangible characteristics like formal rules/procedures/networks, and intangible ones like trust, norms of reciprocity (Groottaert 2001, Krishna and Uphoff 1999, Coleman, 1999). It is not difficult to imagine that low level of trust among community members, and between civil society on the one hand and formal executive/legistative and judicial bodies on the other, would hamper sustainable management of CPRs. Social capital is crucial for any type of institutional solutions such as private property rights, state control or community control/management.

Social capital like institutions can play at different levels both vertically and horizontally. Horizontally it can influence collective action through trust and norms of reciprocity among community members. On the other hand, community action can be successful only if it is backed by formal rules, and people have respect and trust in public officials. The role of social capital in the emergence of local-level common-pool resource institutions is also implicit in McCay´s conceptual work of "embedded rational choice" where political ecology plays an important role in shaping individual rational response (McCay 2002). The discussion above is summarized in the following framework.

4. Framework for the proposed study



Summing-up: Openwater inland fishery has CPR characteristics - partial rivalry, jointness in use of resource system, non-exclusion, mobility of the flow of resource and low capacity for storage. Successful management of CPRs by the community towards economic efficiency, social equity and environmental sustainability faces appropriation/technological externalities, assignment and provision problems. It is affected by bio-physical-technological conditions as well as user characteristics and broader institutional set-up. The community's ability to devise rules for sharing, monitoring and conservation is affected by different factors such as the property rights regime, heterogeneity among community members, economic condition of the community, educational background, alternative sources of income. Social capital in the form of networks, norms, customs and formal rules play an over-arching role.
The main question raised in this paper is, what role external forces can play in promoting collective action among the fishing community given the resource and user characteristics?

3. NGOs, social capital and collective action

Non-governmental organizations (NGOs) are usually initiated by external agents in contrast to community-based organisations (CBOs) that are purely indigenous. NGO activities may be facilitated by already existing CBOs. In the last three decades, NGOs have been considered to be an important vehicle of economic development and poverty alleviation in poor countries. NGOs are non-traditional institutions that compete/complement market and state hierarchies, and are mainly involved in microcredit, informal education, healthcare and the management of local common pool resources and in the democratisation process. NGOs may differ in terms of their scale, purpose and scope of operation, structure (hierarchical or horizontal), and genesis (see Holmén and Jirström 1996 for a literature survey). The focus of our study is the local NGOs that are supported by external agents but interact with local-level informal groups. They generate/build on different forms of social capital such as trust, norms of reciprocity, informal institutions and networks that fall under two broad categories - cognitive/relational and structural/institutional, to promote collective action. According to Uphoff (1999), to achieve collective action social organizations such as NGOs are confronted with four functions: decision-making, resource allocation/management, communication and conflict resolution These tasks are performed with the help of existing social capital and/or creating new ones.

Trust, according to Ostrom and Ahn (2001, p.18) is the most encompassing factor in collective action as it facilitates voluntary cooperation. Collective action problem arises in the first-generation collective-action theories due to the lack of trust and information in a Prisoner´s Dilemma game. The second-generation collective-action theories are based on repetitive interaction and building of trust with the result that individuals still behave selfishly but gain from trusting each other, and hence voluntarily cooperate. Uphoff argues that individuals are guided by not only self-interest but also altruism.

NGOs role: Trust may be created through the establishment of formal rules and procedures that enable repetitive interactions. Rules that are stable provide incentives for the parties of transactions to behave trustworthily (Ostrom and Ahn, 2001 p. 20). Establishing long-term relationships can be harnessed to deal with different kinds of resource allocation problem. In this way social interactions can be persistent and acquires the status of capital (Collier, op. cit.) Trust can be an important component of this process. Group formation may be adopted as a tool of resource distribution to ensure security through group pressure. It often works better than a purely market-oriented capitalist or feudal system which distance the poor population from formal institutions. (See Chattopadhay and Dufflo, 2001 for the recent experience of women´s political influence and resource distribution in West Bengal India).

Norms of reciprocity are informal institutions and another form of social capital that can be influenced by NGOs. For example, people learn to respect rules and interact with each other within the framework set up by the NGOs.

Networks can be classified into two categories: horizontal/vertical and dense/weak. Dense horizontal networks may efficiently transmit information across the network members. It can also create incentives to behave in a trustworthy manner for those who have selfish motivations. However, density is not always a virtue. Extending the network beyond the family, kinship and close community is considered important for sustaining social stability and collective action (Granovetter, 1973). NGOs contribute by extending the network horizontally by increasing its inclusiveness.

Networks can be vertical as well (Collier, 1998) and NGOs may function as intermediaries between the civil society and the hierarchy and/or the market. They enable civic organizations

to monitor the performance of other market or state institutions providing different services-health centers, schools, infrastructures, legal and judicial matters.

In Ostrom´s model different forms of social capital - trust, norms of reciprocity, network and institutions interact with each other and facilitate collective action. However, Ostrom and Ahn (2001, p. 21) argues that contextual factors may include the aspects of trust that cannot be reduced to one or other form of social capital. Trustworthiness of a population may depend on history and culture.

In short, NGOs can play an important catalytic role between the local community and formal institutions imposed on the community by external forces. Recent empirical studies have shown that even if the level of social capital is low in a community because of heterogeneity, NGOs through collective action can create social capital that enhances the sustainability of a given project (Khawaja 2000). The ability of NGOs to deal with management problem depends on the design of the project as has been confirmed in Khwaja´s study on Pakistan. One the other hand, it can create conflict in a community where people are accustomed to traditional institutions characterised by inequalities.

The case of Bangladesh openwater fisheries is examined below in terms of the framework presented above. The remaining part of the paper is devoted to an analysis of the institutional arrangements, their effects on efficiency, equity and resource sustainability, and the response of the broader community (government, donors, NGOs and CBOs) to solve problems related to inland openwater fisheries in Bangladesh.

4. Characteristics of the openwater inland fisheries in Bangladesh

Bangladesh has four million hectares of openwater with one of world´s richest and complex fisheries. The rivers, lakes and large deeply flooded depressions and floodplains support around 260 fish species (Rahman 1989 cited in Sultana and Thompson 2000). There are three broad types of fisheries in Bangladesh - openwater inland fishery or capture fishery, culture fishery in ponds or enclosed water bodies and marine fisheries. Of these three, openwater inland fisheries is by far the most important for employment, diet, and source of government revenue. The bio-physical characteristics of openwater inland fishery exhibit the typical problems of CPRs i. e. Partial rivalry/subtractability, low degree of exclusion depending on the technological possibilities, jointness in the use of the resource system, mobility of resource units and storage problem. Within openwater inland fishery, there are different types of waterbodies posing a wide variety of institutional problems. There closed or semi-closed waterbodies, open beels (depressed areas forming lakes especially in the wet season), and flowing rivers.

Recent development indicates that the importance of capture inland fisheries is decreasing with a corresponding increase in culture fisheries partly due to government policies. The reason behind government promotion of culture fisheries is that, culture fisheries are less subject to problems of exclusion and mobility than capture fisheries, and private ownership can be an optimal solution. However, this has undesirable implications for the distribution of benefits, poverty alleviation and nutritional status of poor people. While the development of culture fisheries is important for the economy, it does not mean that capture fisheries have to be neglected. Bangladesh has vast potential for openwater fisheries, and given proper institutional, technical and financial support it can contribute to the fulfillment of multiple development goals.

5. Existing institutions related to openwater fisheries in Bangladesh

The fisheries of Bangladesh became state property under the jurisdiction of the Ministry of Land (MOL) after the abolition of Zamindari system through the East Bengal State Acquisition and Tenancy Act in 1950. A significant part of the inland fisheries is now divided into 13,003 bodies called jalkars or jalmahals. The MOL continued with the colonial policy of leasing out fishing rights in waterbodies to the highest bidder (for 1-3 years) with a

view to raise revenue. Most fisheries have been leased to the highest bidder preferably to cooperatives. However, in the process of competition, control became concentrated to a handful of rich/influential persons. The lease-holders usually sub-lease to as many fishers as are willing to pay user fees set to ensure a profit (Naqi 1989, McGregor 1995 cited in Sultana and Thompson 2000). However, under this leasing system the genuine fishers have not gained fishing rights due to their lack of power to enforce property rights. Fishing rights are held by influential middlemen who can prevent unauthorized fishing either by threat or social pressure (Toufique 1997).

A New Fisheries Management Policy (NFPM) was introduced in 1986 to address the problems pointed out mainly by the National Fishers´ Association. As a result, the responsibility for nearly 300 waterbodies was transferred by MOL to DOF (the Department of Fisheries) having the right to issue licence to genuine fishers.

In practice, however, the influence of middlemen continued because DOF found it easier to collect revenue from a few leasees, and the poor fishermen being unable pay licence fee had to depend on the middlemen. The administration of the fishery sector has become more complex since 1995. The government ended revenue collection from flowing rivers in order to reduce tax burden on the fishers. This turned the rivers into open access resource with the associated problem of overexploitation. Ultimately, NFMP was ended by MOL, and the administration of closed waterbodies of upto 8 hectares was handed to the Local Government Division in 1996 and then transferred to the Ministry of Youth and Sports in 1997.

The description of the institutional arrangements with respect to inland fisheries suggest that except rivers private property rights are common. It would be interesting to find out how far private property rights have been able to deal with appropriation and provision problem. Toufique´s six-month-long field-level investigation in the district of Sirajganj (Toufique, 1998; 1997) focuses on these issues. Toufique analyzes the existing institutional arrangements in terms of physical characteristics - scale, mobility of fish flow - and technological conditions related to fishing techniques in Bangladesh. The quotation below presents his findings:

"…the appropriators have been successful in internalizing appropriation externalities such as rent dissipation, assignment problems and technological externalities *(conflicts among fishers*

over fishing area depending on the type of fishing gears used). There exists a significant amount of rent and there is no conclusive evidence on biological overfishing in the inland fisheries of Bangladesh. However, the agents have failed to internalize provision problems due more to the flow nature of the resource system than to any collective action failures. We have also observed that the relationship between the lessees - the holders of property rights over the water bodies - and the fishers is not anonymous. It is rather of patron-client type. In the inland fisheries of Bangladesh private property rights have nested in and maintained by many rules historically developed by the fishers." (Toufique 1998, p. 419).

The points stressed in the study are that

- the local community has been able to deal with allocation and exclusion problem through strict enforcement, and the assignment problem i. e. conflicts over fishing area;
- the institution of private property rights is maintained through traditional rules;
- patron-client relationships exist;
- the ability of the community to arrive at collective action is not questioned, it is the physical characteristics of the resource system that is behind provision or sustainability problem.

Toufique does not consider explicitly (in this paper) the problems with the current system especially the community failures. In spite of efficiency in allocation, enforcement and assignment of fishing rights in the current system, there are problems of equity and sustainability. Patron-client relationships may be stable arrangements but are not necessarily equitable Toufique´s 1997 paper gives a vivid description of how the poor pay disproportionately higher transaction costs in acquiring fishing rights as well as higher enforcement costs in preserving the rights. Moreover, the open access problem in rivers arises not only due to their physical characteristics but also the institutional vacuum created by the government.

The institutional problems in the openwater fisheries sector in Bangladesh are rooted in low level of social capital. Specifically, they are reflected in: the lack of formal rules (in the case of rivers) and weak enforcement of rules; elite capture of rents; stable patron-client relationships that prevent collective action among the poor; *exclusive* nature of grouping among the powerful members, etc. Moreover, the inability to deal with conservation problems

may be due to community-related factors including the design/quality of development projects that are indicators of structural social capital. The role of NGOs in solving the problems is reviewed below through an account of the community-based fisheries management (CBFM) initiated in mid-1990s in Bangladesh.

6. Community-based fisheries management - NGOs, collective action and social capital

CBFM project funded by the Ford Foundation was based on a partnership of the government (DOF), five NGOs - BRAC, Banchte Sheka, Caritas, CRED and Proshika and ICLARM. The project has been contemplated in the true spirit of polycentric approach. DOF was to provide formal rules and sanctions, NGOs would help build institutions promoting collective action, the community and local bodies would see to the enforcement aspect. The project first developed an institutional arrangement for devolving responsibilities for managing fisheries to the user communities and tested in 19 wetlands and waterbodies - ten rivers, three seasonal wetlands ("open beels") and six permanent lakes ("closed beels" for example oxbow lakes). The aim of the project was to test and assess alternative local fishery management arrangements in order to achieve greater efficiency, equity and sustainability.

Several studies (Thompson et al. 2000; Sultana and Thompson 2000) have evaluated the performance of CBFM in different locations. The three types of resource system - closed beel, open beel and river- that differ in terms of physical characteristics and institutional arrangements are considered. Thompson and Sultana´s study generally corroborate Toufique´s findings mentioned above. Open access problem is more common in rivers than in other waterbodies where allocation rules may be easily applied and enforced. However, open access problem in rivers is the outcome of the institutional vacuum created by the government on removal of the revenue collection from the fishers in 1995, and it is not necessarily due to the physical characteristics of rivers. Institutional arrangements in floodlands change according to seasonal variations in the level of flood, with dry season characterised by private property rights and rainy season by common property. Now the crucial question is: does exclusive fishing right to the community organization affect the performance of CBFM in terms of efficiency, equity and sustainability?

Information provided by the surveys indicates that the fulfillment of efficiency goal is good in open beels, is not so good in closed beels and is rather bad in rivers. Similar results are also observed in case of sustainability. Equity goals are met in closed and open beels while rivers

show less satisfactory results. Empowerment goals are measured through two indicators - representation and attendance in meetings. Here, open beels exhibit better performance than closed beels and rivers. In general, clearly-defined exclusive property right seems to be necessary for successful management but it is not a sufficient condition for successful management. The missing factor appears to be the broader institutional framework in which different agents - NGOs, local government, community-based organizations, and individual fishermen, interact with each other.

The role of different factors in CBFM´s performance - general observations

Boundaries, scale and type of fishery have played a minor role contrary to the expectation derived from the literature on CPRs (Pomeroy and Williams 1994; Thompson et al, 2001). Well-defined bounded fisheries with low mobility of fish flow, and bounded user community are not associated with successful management. Among the closed beels CBFM was unsuccessful in two, on the other hand, two out of three open and unbounded beels were successfully managed by a heterogenous user community.

Already existing formal rules/property rights conferred by the government and traditional rules in Bangladesh tend to ensure the success of CBFM. The open access problem in rivers which were declared as open access by the government confirms the importance of clear-cut rules defining property rights in a conflicting situation with the traditional rights held by people. However, there is an exception - the open floodplain beel of Goakhola-Hatiara where no jalmahal existed. The community in this area has been able to agree on and comply with conservation measures (dry season fish sanctuaries and a closed season) that have helped to protect fish and improve returns from fishing.

Homogeneity of community members is expected to generate more collective action because of high level of trust and norms of reciprocity (social capital). However, the findings of CBFM do not support this hypothesis. Sometimes a completely homogenous community has failed to unite, and a heterogeous user group is able to work together for common goals of sustainable fishery. In the surveys of CBFM, homogeneity has been narrowly defined in terms of religion and sex. If instead social status is used as a criterion, then a different picture emerges. The NGOs have targeted the poorest members of the fishing community, and promoted their interest by reducing the involvement of middlemen and the rich fishing licence holders. The willingness among the poor members to invest in fish stocks and conservation

measures seems to have increased with ability of NGOs to prevent elite capture of benefits.

Recent research indicates that heterogeneity of wealth and social status may not pose a threat to collective action with a positive gain for all participants that the impact heterogeneity/homogeneity differs according to its specific nature (in terms of wealth, social status) and the type of the resource and specific institution in question. For example, inequality in wealth may have positive effects on the functioning of an irrigation system if a few wealthy farmers have sufficient stake in the resource system (Bardhan and Dayton-Johnson, 2002) to be willing to share the benefits with less wealthy farmers. In this connection, the role of NGOs in conflict resolution is important.

The experience of CBFM confirms that some conflicts between the newly created fisher cooperatives and other groups who traditionally have held power and influence over fishery resources are quite common but the NGOs could resolve these conflicts ultimately (Sultana and Thompson, 2000, See Table 1. below). Conflicting situtations are more likely in the case of large and complex river system where many stakeholders are involved and exclusive fishing rights to poor fishing community is not feasible. The problems in river management has been exacerbated by the government´s inability to provide clear-cut rules (Thompson and Sultana, 1999).

The role of CBOs, NGOs and other external agents, and the design of the project are considered important for sustainable development. In probing into the questions - "Is building on existing institutions necessary or does collective action promoted by NGOs need existing stock of social capital", it has been found that previous CBOs help NGO´s effort to organize. However, the evaluation study of CBFM indicates that initial existence of certain social capital is not essential. New institutions can be created by external agents. In terms of design, it is observed that skilled NGO staff dedicated to helping communities to organize, and who have as their main target building the capacity of local management committees for resource management, are vital, rather than occasional organisers or an emphasis on micro credit. It should be noted that there has also been an indirect effect of NGOs on the formation of new community-based organizations independent of external support (Thompson and Sultana 1999).

In short, the first-round evaluation studies largely confirms the positive role played by the

NGOs in promoting and harnessing social capital that has led to community action in the inland fisheries sector. The NGOs with the legal and administrative support from the government could organize poor members of the fishing community, build trust among them, set up rules and procedures for allocation, use and preservation of resources, and also resolve eventual conflicts among different stakeholders. Summary statistics on the outcome indicators in Table 1 more than 50% of the cases have acheived high to medium success with respect to social goals such as participation, equity, rule compliance, legitimacy. Success in attaining the goals with respect to conservation of fishery resource and sustainability of the institutions has been more modest.

Several factors appear to affect the performance of CBFM and these are

- the presence of CBOs
- enclosure and exclusive fishing rights enforced by users
- formal recognition of community rights
- ability of NGOs to identify and target groups with some common interest
- benefits from collective action visible to the members
- management committees consist of NGO members and their active participation with financial responsibility

Regression analysis:

Based on the information available in the papers, we ran two regressions to find out the factors that determine the overall performance of CBFM projects and their conservation efforts in 19 locations.

Regression 1. Explaining the performance of CBFM projects

Dependent variable: Outcome indicator (OVERALL) - a composite variable based on the evaluators´ assessment of CBFM project (Thompson, et al . 2001, pp. 8-9). The factors considered by the authors in evaluation are: the rate of participation, equity, legitimacy, rule compliance, retention of rights, income and catch total and catch per unit of effort performance (Summary statistics on the outcome indicators is presented in Table 1 below).

Table 1: Outcome Indicators (per cent of cases)

	High	Medium	Low	None
Conflict	36.8	31.6	21.1	10.5
Participation	26.3	21.1	36.8	15.8
Equity	42.1	21.1	36.8	
Rule compliance	53.3	13.3	33.3	
Legitimacy	21.1	31.6	5.3	42.1
Retention of right	47.4 (yes)	-	-	52.6

	Increase	Decrease	No Trend
Catch (totalproduction)	56.3	12.5	25
CPUE (per unit effort)	15.8	10.2	31.6
Missing data (42.1%)			

	Very Good	Good	Tolerable	Bad
Fishery	25.3	10.5	5.3	57.9

	Good	Average	Poor	Failed
Management actions				
Overall performance[a]	31.6	21.3	26.3	42.1
Institutional sustainability				
Prospects[b]	31.6	15.8	31.6	21.1

Notes: a. The evaluators have rated overall performance on the basis of the criteria listed above in the table.
b. According to the evaluators, ”failed” includes cases that have been abandomed or never started, and poor includes ”sites that will be included in a second phase of CBFM and where it is hoped to establish sustainable institutions” (Thompson et al, p. 9).

Regression 2. Explaining the performance of protection/conservation efforts

Dependent variable: ACTIONS - A composite variable based on different types of protection/conservation activities - closed seas, stocking, sanctuary, gear restriction, guard rotation, rotaional fish. The data show ”yes” or ”no” for each action (Thompson et. at. op cit.). On the basis of this we have assigned values to the variable according to the number of actions taken by CBFM in each locations.

The selection of explanatory variables is based on the literature discussed in the theoretical section above - resource characteristics, user characteristics, institutional characteristics, external support and project design. Given the limitation of the data as raw data are not available to us, we have constructed the following variables:

Resource Characteristics - SIZE (small=1, medium = 2 and large = 3) defined as maximum-monsoon season-area: with small = up to 50 hectares, medium= 50 - 200 hectares and large = 200+ hectares.

CHARACTER indicating physical boundary (open =0 and Closed = 1)

User characteristics - HOMOGENEITY – (90% Muslim = 1, mixed = 0)

PROPAR (% of households participating)

FISHERHA - land owned (hectare) by participant households

CONFLICT over fisheries management measured as high, medium and low

Institutional characteristics – ACCESSRI (the right of access through lease, licence and private ownership and open acess)

External factors - GOVTRECO (government recognition of fishers´rights)

INSSUPPO (institutional support measured in scale with high number indicating many institutions involved simultaneously)

Project design TRAINNH - number of household receiving training by NGOs

CREDITTH (Taka received by households as NGO members)

MEETINGS (meetings held regularly = 1, irregularly = 0)

FINANSRE (financial responsibility borne by members yes = 1, no = 0))

EQUITY achieved – measured as high, medium and low

Results, regression 1: Our effort to include most of the first four categories of variables in a linear regression model gave poor results. Simple correlations between the dependent variable and explanatory variables indicate that neither resource characteristics nor user characteristics are strongly associated with the overall performance. This has also been pointed out in the evaluation studies discussed above. On other hand, institutional factors and project design have strong correlation with overall performance. The variables representing institutional aspects - ACCESSRI, GOVTRECO, INSSUPPO – appear to be highly corrrelated. Finally, we selected INSSUPPO capturing the institutional aspect and MEETINGS reflecting the project design. These two variables explain 69% of the variations in the overall performance. Having regular meetings (a discrete variable) have significant positive effect on the dependent variable. The effect of an increase in the number of institutions involved on the overall performance is large and significant.

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,083	,324		3,343	,004
	MEETINGS	,837	,268	,534	3,127	,007
	INSSUPPO	,330	,137	,413	2,417	,029

a Dependent Variable: OVERALL

R Square 0.72; Adjusted R Square 0.69; no. of observations 17 and F-statistics 19.857, sig. 0.000

Results - Regression 2: Explanatory variables that are expected to affect conservation efforts are various aspects of project design such as training of the members, credit received by members, financial responsibility conferred to the members, the principle of equity followed in fisheries management, conflicts over fisheries management and institutional support. Two variables EQUITY and FINANSRE (discrete variable) explain 79% of the variations in the number of different actions taken for conservation of fisheries. FINANSRE has positive effect on conservation and is highly significant. EQUITY is measured in terms of a value scale. It has large impact on the dependent variable and is also highly significant.

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,355	,491		-,724	,480
	FINANSRE	1,776	,493	,480	3,601	,002
	EQUITY	1,028	,258	,531	3,978	,001

a Dependent Variable: ACTIONS

R Square 0.81; Adjusted R Square 0.79; no of observations 18 and F-statistics 35.740, sig. 0.000

Our regression exercises indicate that institutional environment reflecting the interaction of formal and informal rules is more important in determining the overall performance than user characteristics or physical characteristics of the resource per se. On the other hand, while NGO involvement has generally positive effect in conservation effort, the design of the project matters. Active participation of members and equity are more important than credit or training received by the members. These results have to be interpreted with caution because of the quality of the data. There are too few observations as well as information on the some variables especially the user characteristics is of poor quality. In spite of this, results are interesting from research and policy point of view.

7. Summary and conclusions

In Bangladesh inland fisheries have been subjected to exclusive property rights conferred either to individuals or community. In recent years open access problem has arisen due to government policies. This has created confusion and conflict. It impairs the ability of CBOs and NGOs to arrive at collective action. The effects of NGOs in promoting sustainable management is generally good although the effects on poverty and income of the poor remain insignificant mainly because of the short period of time it had been operation and weak government support.

It shows that NGOs can create new social capital through induced collective action. But their effort may be facilitated by already existing social capital in the form of CBOs. The experience CBFM also lends support to the importance of social capital in the form of formal rules and vertical relationships between government organizations and local-level institutions. The design of the project matters a great deal. This means that "community failure" may not be an *absolute* stumbling block.

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