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Multilevel governance and fisheries commons: Investigating performance and local capacities in rural Bangladesh

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Abstract: This study presents a post-facto evaluation of the local capacity development processes used under co-management of fisheries and other resources of southern Bangladesh. It answers the question of how supportive were the capacity development tools used in implementing co-management. An 18 month study was conducted and six cases were investigated to understand the approaches to co-management programs used to develop local capacity. Founded in pragmatism and viewing co-management through a governance lens, a comparative case study method was used that combined both qualitative and quantitative research approaches for data collection and subsequent analysis. This study provides empirical evidence that co-management programs have applied a number of strategies (e.g. human resource and economic development) to enhance local capacities. However, these strategies have achieved mixed results with regard to developing governance that supports livelihoods. Training provided to develop human resources and economic capacity were not useful for fishers or had little lasting effects on fisheries development due to poor monitoring and a disconnection with the needs of local users. This study concludes that co-management can facilitate local capacity but in order to realize the full potential

of this approach we must address the issues of inappropriate technologies for training, the financial barriers to fishers with low cash income, and uneven power relationships among stakeholders, to create an enabling environment for effective modern governance of the fisheries commons. Our findings indicate a needs-based approach to capacity building is needed in order to support the livelihoods of local users through co-management.

Keywords: Capacity, co-management, community-based organizations, fisheries, incomes

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1. Introduction

This study includes a post-facto evaluation of capacity development strategies used for local institutions in a multilevel governance arrangement called “co-management” to support small-scale fisheries commons of six wetlands of Southern Bangladesh. Like many countries of the world, open water fisheries in Bangladesh have been experiencing resource degradation associated with overuse and a lack of effective management institutions (SEHD 2002; Thompson 2006). Impacts of the degradation of fisheries commons have been manifested through various forms of social-ecological disruptions. For example, the loss of important commercial species and reduced production from subsistence catch has led to a decrease in the livelihood incomes of fishers. Many of the concerns of small-scale fisheries are related to inappropriate institutional arrangements leading to

social marginalization and poverty (Nayak et al. 2014). Local small scale fishers are often unable to compete commercial vessels supported with technology, as the gear used by local fishers to harvest fish is much less efficient and results in lower overall catch. In such situations, state-based top-down management has not supported local livelihoods; revenue earnings for the commercial operations have been supported instead (Kurien 2004). In this case, the user rights of traditional fisheries have not been restored in inland and coastal fisheries (Chuenpagdee 2012). These concerns have been the source of dissatisfaction among fishers and users of other aquatic resources in wetland systems along with government departments but few achievements have been made through state-based management to address the challenges these open water fisheries face. However, an appropriate institutional structure to support overall governance can help ensure that these kinds of issues faced by small scale-fishing can be avoided (Pomeroy and Andrew 2011). To deal with challenges related to fisheries, recent management systems rely on a new institutional arrangement such as multi-level governance (Gruby and Basurto 2014). This approach combines users in shared resource governance (Bodin and Prell 2011) rather than the single state-based top-down management approach, which is often proposed based on economic gains from communal resources (Gordon 1954; Hardin 1968).

Co-management is one governance approach often implemented to address management challenges in fisheries systems, since other approaches such as state- or market-led management approaches have often failed to achieve social-ecological goals of resource governance (Pinkerton 1989; Yandle 2003; Imperial and Yandale 2005; Plummer et al. 2012). Co-management has been practiced across different resource systems such as fisheries, forestry, and water. Shared decision-making on the issues of resources (e.g. imposing bans during breeding season of fishes) has been a key theme in early co-management arrangements (Pinkerton 1989; Pomeroy and Berkes 1997). However, the overall scope of application of co-management in fisheries has been expanded over the last twenty years as it has been applied in many contexts including indigenous land rights and related management practices such as rural development (Béné et al. 2007; Borrini-Feyerabend et al. 2007; Capistrano 2010). Along with power-sharing, co-management systems are often seen as a means to poverty alleviation for resource poor communities where capacity building of local users through training that develop linkages among stakeholders across scales (from external to local levels) and allowing for the exercising of local rules applicable to resource management have been key considerations (ICLARM and NSC 1996; Wilson and Degnbol 2003; Tyler 2006; Berkes 2007; Marín et al., 2012; Hauzer et al. 2013; Mamun and Brook 2015). However, implementing capacity building strategies in productive ways remains a challenge within co-management regimes, challenges related to local corruption or poor funding arrangements remain (Uphoff 1992, 1993; Poitras et al. 2003; Westcott 2002; Barker 2005; Downsley 2008), and uneven power relationships among community groups and external actors exist (Ribot 2001). Moreover, the tools (financial and technical) used for enhancing capacity

building do not always meet the local needs of rural communities as they are outsourced with little relevance at local setting and this has been identified as a key obstacle by local communities toward the success of the co-management program.

The success of multi-level governance approaches can be assessed in connection with processes applied to build the local capacities to help fisher livelihoods and related wetland ecosystems through funding, technological and institutional supports available to local communities, and post project impacts of linkages in a co-managed fisheries. The purpose of this study was to examine how multi-level governance was supported by capacity building approaches applied in co-managed fisheries that include livelihood-focused training and economic tools such as micro-credits and grants at six open water systems in southern Bangladesh. More specifically it examined if capacity building strategies used under co-management supported the development of local users and improved the overall governance process of small-scale fisheries at the wetlands of southern Bangladesh covering floodplains, oxbow-lakes and rivers. One of our goals was also to develop an understanding of who benefitted the most and who lost the most from the co-management processes in rural societies in Bangladesh, where unequal power relationships have in the past led to marginalization of the poor and voiceless section of the community. Further, our study was aimed at helping to improve understanding of how capacity development processes that supported co-management of local forums (e.g. the CBOs) involved in open water fisheries systems of Bangladesh. We hoped that our study will provide important insights and direction to improving the sustainability of small-scale fisheries co-management within and beyond Bangladesh. The sections of the paper are as follows: Section 1.1 provides an overview of the capacity development under the rubric of rural development given co-management was also promoted to support local economy and access; Section 2 and 3 are about study area and methodological considerations respectively. Section 4 is about key findings while Section 5 is about revisiting the results and theoretical consideration of the findings where specific recommendations are also made for further research.

1.1. Overview of capacity development process

Increased resource demands coupled with successive political and economic downturns have left many communities and governments in positions of management instability and incapable of effectively and equitably governing natural resources (Harkes and Novaczek 2002; Armitage et al. 2008, 2009; Roe et al. 2009; Gutiérrez et al. 2011). However, natural resources such as fish have been the last resort for many resource poor nations including Bangladesh where low incomes exist, but have little scope for earning except farming and fishing. Given a better managed open water fisheries has been a key developmental option to enhance local capacity especially for the fishers (Thompson 2006).

The concept of capacity development has been broad and applied both in developed and developing country contexts (Westcott 2002). However, it has

gained prominence in developing countries to support communities who have lower incomes and weaker institutional structures and who often cannot get engaged in ecosystem development and management of commons. In the case of rural development, capacity building can mean strengthening skills to overcome exclusion from developmental processes and improve livelihoods through income generation for impoverished local people (Uphoff 1993; Barker 2005; FAO 2013). In the case of public policy, capacity development has been used to strengthen the ability of an organization, community or individual to perform certain tasks (FAO 2006; Opere 2007). Ubels and others (2010) defined capacity as the ability of a community to enhance or renew, and sustain livelihood conditions.

The tools applied to enhance capacity vary across organizational and public domains (UNDP 1997; Opere 2007). For local development contexts, promotion of health care service, social awareness, and development of infrastructure have been attractive approaches to capacity development. Recent capacity development programs also focus on improving livelihoods through micro-financing, and empowering women through education (FAO 2002; Alpay 2010; UNESCO 2011). With respect to resource governance, multi-stakeholder approaches such as co-management are often proposed to overcome the financial instability of rural poor and institutional uncertainty towards managing fisheries (WorldFish 2007). It is especially true in the case of fisheries governance where fishers are typically cash poor and lack formal institutional structures (e.g. local cooperatives) needed to support fisheries systems (Jentoft 1989; Balint and Mashinya 2006; Roe et al. 2009). The co-management approach often includes training programs to enhance the capacity of the local communities, followed by some generating activities. For example, this may include programs that supported raising livestock or promoted community-based microcredits. This approach to capacity building has been especially helpful during a fish moratorium (banning of fishing for a certain time) that has been implemented for the breeding seasons in many inland fisheries to conserve fish stocks. During a moratorium, fishers have few opportunities to generate cash income from other sources (Thompson 2006). During this ban on fishing there has often been an increased rate of poaching by hungry fishers who will keep fishing in unsustainable ways, such as harvesting juveniles or parent stocks (Gezelius 2004). To avoid these unintended consequences of governance, a co-management approach supports boosting management systems through supports for local cooperatives to implement fish harvest rules or access limits. Fishers share management authority so that overall governance systems are improved for managing the commons and local livelihoods (Jentoft 1989; Pomeroy 1995; Wilson and Degnbol 2003; Béné et al. 2008; UKaid 2010). In Bangladesh donor funded co-management programs have been directed toward income generation by local communities and to build capacity and improve the livelihoods of fishers so that they are capable of supporting multi-level governance (WorldFish 2007) which has been a key area of investigation for this study.

2. Profile of the study area

This study was conducted in the greater Jessore District of Bangladesh (See Figure 1). It includes six water bodies from three categories of inland fisheries systems: floodplains (e.g. Isali and Goakhola), oxbow-lakes (e.g. Bukbhora and Porakhali), and rivers (e.g. Nabogonga and Fatki). The fisheries of the study sites vary in the ways that they are used. The rivers and floodplains are open water, while the oxbow-lakes are semi-closed hydrologically as they may connect with rivers at high flush floods in some years. For oxbow-lakes, fences are erected at the openings that connect rivers to protect the escape of stocked carp fish (local major carp including *rohu Labeo rohita* and *katla Catla catla* and Chinese carp including common carp and grass carp). This type of fencing was not applicable for the other study sites as they are open water where fencing is not feasible. Oxbow-lakes have been culture-based fisheries with some productions of indigenous fish (*tengra Mystus spp.*, *puti Puntius spp.* etc.) that can effectively co-exist with exotic carp species stocked to enhance fish production. For oxbow-lakes, annual stocking is required for the fisheries to thrive and maintain continuous production, while rivers and floodplains have capture fisheries and managing natural stocks is important for the development of the fisheries along with giving access to traditional fisheries at the fishing areas.

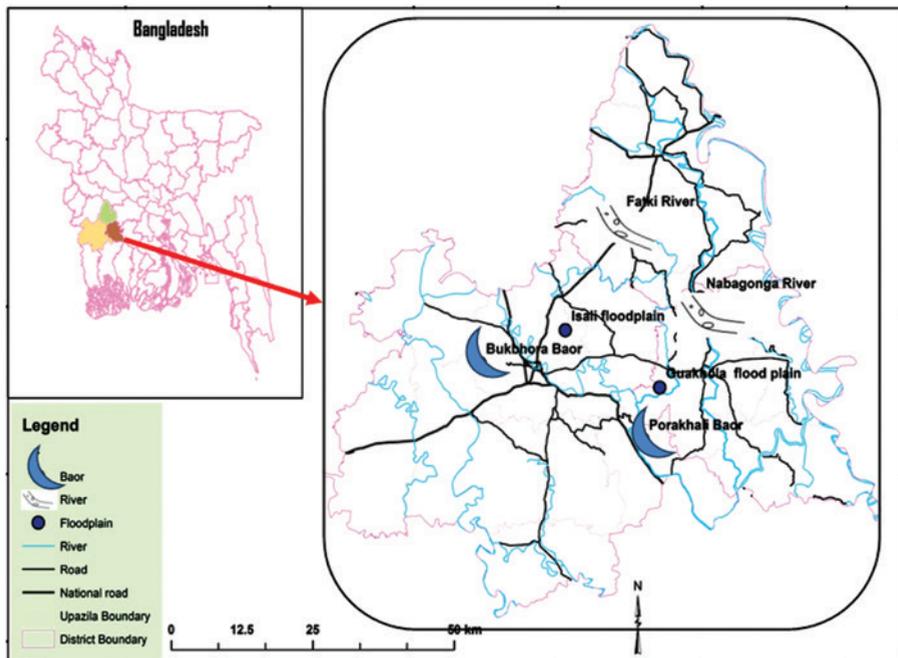


Figure 1: Map of Bangladesh showing location of study sites.

Fishers are the dominant resource users of the aquatic systems of the study sites, except in Isali. The Isali site is mainly a farming community (rice crops), except for a few fisheries activities at the adjacent canal called *Kamargoona khal*. The canal provides seasonal fish culture opportunity through stocking carp fingerlings. The climate is arid in the summer in most years. At that time of the year, many open waterbodies are used for irrigating crops. For the rivers and oxbow lakes, users include part-time and full-time fishers from traditional fishing groups locally called *Jele*. For these study sites, fishers also include landless individuals from both Muslim and Hindu communities who are the residents of the wetland study areas. As per conditions set by donor with the concurrence of Department of Fisheries, the landless farmers and traditional fishers (who are not supposed to adopt professions other than fishing for cultural reasons) were the first on the priority list for co-management programs for rivers and oxbow lakes, including the Goakhola site (WorldFish 2001). They were chosen to be included for the co-management programs for economic development and also to give them access rights to fishing grounds that were otherwise used by outsiders either for fishing or for other uses such as agriculture. For all sites, residents (fishers and farmers) from local villages participated in community-based organizations (CBOs) formed under fisheries and water management programs, except river sites. For Fatki River, out of the three villages that cover the designated stretch for co-management, one village did not agree to support co-management, while for the Nabogonga site, out of the seven villages that cover the area designated for co-management, there were mixed responses as many of the villagers did not participate in co-management as they have no trust in co-management (Pers. Com. with CBO Leaders of both sites, 2012).

The fisheries of all the study areas were degraded due to overharvest and siltation of the water and flood control embankments that impede natural stocks and conservation of fisheries has been commended in national fisheries policy (Toufique 1994; MoFL 1998; SEHD 2002). Local users and professional fishers have been suffering from the loss of their income and a lack of fish for household uses. Development and conservation of fisheries was a priority area for the government after agricultural focused development was initiated in the 1970s. As Bangladesh has had a relatively low capacity to promote rural development, including fisheries, donor supports were sought to promote co-management involving rural economic development through conserving fish stocks and also by supporting local users through training and small infusion funds. To operate co-management programs a number of national and international agencies and NGOs were involved (See Table 1 for more detail about types of organizations involved in fisheries and other projects.). International agencies like UKaid provided funding to the implementing agency (NGOs) through technical agency like WorldFish Center to support co-management programs. The technical agency (e.g. WorldFish Center) and government agency (e.g. DoF) were responsible for supervising the co-management program while, the implementing agencies (NGOs) organized community members and helped form CBOs and provided

Table 1: Distribution of organizations involved in funding and technical supports of CBOs.

CBO	Funding agency	Technical/Government agency	Implementing agency (NGO)
Fatki/ Nabogonga/ Goakhola	UKaid	– WorldFish	– Baste Shekha
Isali	ADB (Asian Development Bank)	– Local Government Engineering Department Bangladesh – Government of Netherlands	– Baste Shekha
Bukbhora/ Porakhali	Danish International Development Agency (Danida)	– International Fund for Agricultural Development (IFAD) – WorldFish*	– Baste Shekha – Bangladesh Rural Advancement Committee (BRAC)

*WorldFish was not directly involved in implementing co-management, however, they provided some funding for research to compare WorldFish sites with non-WorldFish sites.

training. In the co-management programs examined, approaches implemented to build financial capacity included grants and community micro-financing (WorldFish 2007). Funding for grants in the form of revolving funds (funds to be used to meet the temporary needs but to be reimbursed after as a core fund belongs to CBO for future uses) and microcredit loans were generated through either the involved NGOs, or through monthly savings raised by each CBO. In many instances co-management programs have been successful during the term of the project, but failed immediately after the project was completed. Examples of these include offering training for income generation, and helping community access fishing areas. Other areas covered in co-management include focusing on the participation of women and the poor, who are often underrepresented in development programs. We found that women fishers were rarely involved in fishing at our study sites and they are mostly underrepresented in co-management especially in old comanagement programs (e.g. oxbow-lakes). Overall, capacity development processes used in co-management could not achieve expected full potential as fishers could not use the lessons learned during training afterwards that are discussed in the paper.

3. Methodological considerations

This research is based on the social science and participatory resource governance literature and theory. For understanding the impacts of capacity development processes among study sites, we used a comparative case study approach, as designed by Yin 2002. We also used existing theories such as pragmatic dualism (mixed methods), which has supported analysis and interpretations made in this study. Both qualitative and quantitative approaches were used (Creswell 2009) for data collection and analysis. Data sources included both primary and secondary materials. Primary data was collected between 2011 and 2012 utilizing

three Participatory Rural Appraisals (PRAs) using semi-structured interviews, focus groups, and participatory observation. This combined approach helped reduce data gaps and capitalized on the benefits of each technique (Townsend 1996). Semi-structured interviews were key instruments used for primary data collection. Oral or written consent was obtained from interviewees. Interviewees (111 individuals) made up key informants from DOF (Department of Fisheries), NGOs and other related groups. District officials that provide services to land management along with local fishers and community members who participated in co-management programs. Specifically, informants included 78 CBO members (fishers/farmers/fish traders), 18 CBO leaders, and 15 officials (10 from NGOs and five from state offices). Interview questions were asked related to the types of training provided under co-management, which individuals received the training, how the members were selected, how useful the training was perceived to be in shaping fisheries governance and managing livelihood incomes, and who lost and who gained from training offered. Interviews were primarily conducted following one-on-one interviews, but some follow-up telephone interviews were done because not all participants were available during the time of field investigations. Interviews were recorded, transcribed and translated to English from Bengali. Seven focus groups were conducted (one in each site, with the exception of Goakhola which had an extra focus group for women participants).

In addition to the PRA based approaches, secondary data were also utilized to characterize effectiveness of the training offered and livelihood implications of such training for the CBOs within the case areas. Secondary data was primarily collected from published and unpublished sources (e.g. inception reports, project memorandum and exit plans) available from the WorldFish Center, Dhaka, the local agent of UKaid (Formerly Department for International Development, UK) and community sources such as record books, brochures, and posters.

4. Results

This section indicates how the inappropriate technologies, the types and number of technologies and lack of congruencies among technologies have impacted co-management outcomes. It was found that, trainers were outsourced by NGOs (Such as from DoF), due to lacking in house resources to deliver programs. Table 2 indicates that training involved multiple techniques to achieve human resource development goals (i.e., generate alternative incomes, create gender awareness, and build skills at microcredit and office management). Prominent techniques for generating alternative incomes were taught primarily by NGOs and included fish cultivation, poultry and duck rearing and integrated farming. Not all CBOs offered the same alternative income generating training (IGAs), for example, Goakhola was offered training for land management (integrated farming) such as rice-fish culture (where rice are combined and fisheries together creating ecological sanctuaries within the floodplain system).

Table 2: Types of training offered in study sites ("X" denotes training was available).

Types of training	Goals	Isali	Goakhola	Bukbhora	Porakhali	Nabogonga	Fatki
Gender awareness	Awareness	X					X
Social awareness (Project implementation)	Awareness	X					
Conservation reserves	Fish protection	X	X		X	X	X
Microcredit (Group savings)	Financial capacity		X		X	X	X
Bookkeeping and accounting (Daily account management)	Build skills and office management	X	X		X	X	X
Poultry and livestock rearing	Generate alternative income		X				X
Fish culture	Generate alternative income		X		X		X
Mushroom cultivation	Generate alternative income		X				
Integrated farming	Generate alternative income	X	X				
Low water crops	Generate alternative income		X				X
Fishery law awareness raising training	Awareness/conservation		X			X	X
Pesticide uses and organic farming	Skills	X					X
Composting of manure	Skills/livelihoods						X
Ribbon rating of jute	Skills Technology transfers		X				X
Total training received		4	12	6	4	5	12

(Source: Progress Report, WFC 2003, 2007).

4.1. Human resource development through training

This section indicates how the inappropriate technologies, the types and number of technologies and lack of congruencies among technologies have impacted co-management outcomes. It was found that, trainers were outsourced by NGOs (Such as from DoF) and the DoF due to lacking in house resources to deliver programs. Table 2 indicates that training involved multiple techniques to achieve human resource development goals (i.e. generate alternative incomes, create gender awareness, and build skills at microcredit and office management). Prominent techniques for generating alternative incomes were taught primarily by NGOs and included fish cultivation, poultry and duck rearing and integrated farming. Not all CBOs offered the same alternative income generating training (IGAs), for example, Goakhola was offered training for landscape management (integrated farming) such as rice-fish culture (where rice are combined and fisheries together creating ecological sanctuaries within the floodplain system).

All five CBOs except the Nabogonga, increased financial means through micro-credit or small grants payable from project funds. Funds available to communities from donors have been used to established community centers, maintain operational costs of CBOs and also to promote microcredits at community level. Although financial support in the form of loans and revolving funds were available, they were inadequate to implement and apply the lessons learned through technological training designed to help local fishers and other stakeholders.

For example, operation of home-based poultry production was not possible in many cases as fishers failed to gain any returns from such operations and often ended up losing their original investment. Knowledge of fishers about poultry production was generally low and production was greatly reduced due to an overall lack of understanding of how to raise poultry. In most cases, outside supports for the rearing of juvenile poultry or avoiding bird flu ended when those projects were discontinued and consequently fishers could not continue such technologically-intensive programs as poultry firms. To some extent CBOs generated their own funds from membership fees to promote IGAs. To achieve the gender goal of co-management NGOs (Baste Shekha and Centre for Natural Resources Studies, Dhaka) offered training programs (e.g. Gender awareness training) to address social equity, and community empowerment in work places. With respect to gender awareness, some level of success was achieved as few women could participate on the co-management committees in new programs (Goakhola, Fatki and Isali), though not in old programs such as Porakhali and Bukbhora sites. To achieve the financial goal of helping communities to operate micro-credit and handling task of office management, programs included in the training packages looked attractive and were the preferred approaches by fishers. Also many of providers of training have their in house facilities to offer (See Table 2). NGOs provided training to both males and females, however, males often got priority because trainers claimed that men were much more involved in fishing than women were and would benefit more from the training as they all lived as joint families. As a

result, local power played a significant role in determining who would be included in the training programs.

With respect to training, communities raised several concerns related to how training was implemented that included issues associated with the type, effectiveness, location of training venues, appropriate use of technologies and congruency across programs. The types of training offered were mostly problematic because they often did not reflect the needs of the fishers which co-management programs aimed to support. For example, training was offered for fish farming in locations where river fishing was dominant (e.g., Fatki and Nabogonga Rivers). In these cases, most traditional fishers were never engaged in stock-based fisheries (e.g., fish aquaculture farms) but rather engaged in subsistence or fulltime fishing. Being subsistence users, they hardly knew and were rarely interested in business oriented fisheries such as aquaculture. In many other instances, participants identified that training did not support their livelihoods. For example, the CBO leaders of Fatki River indicated that training, which focused on building skills related to pond preparation (cleaning and fertilizing) and fish stocking/cultivation (Focus group discussion, February 2011), only benefited fishers that owned ponds and did not benefit the more common landless or traditional fishers. Although some training benefited some members (e.g., microcredits), many members were excluded from receiving benefits. However, communities including Goakhola and Fatki have learned to operate their own microcredit programs that may be the most successful outcome of the comanagement initiatives.

A further investigation for the usefulness of technology driven training to fishers provided some contentious information. DoF and NGO partners expressed that training was offered according to in-house facilities and human resources (that were readymade and easy to offer) rather than according to the needs of the community. When asked about training utility to support fisher livelihoods, CBO members and leaders expressed more mixed than straight forward in answering and they did not say the training really worked for them. Moreover, there were issues related to the types of training offered and the intensity at which CBOs received training as they were not equally distributed across study sites. The amount of training sessions available for CBO members varied greatly among the project sites (ranging from between four to twelve sessions) (See Table 2). The highest amount of training was provided at WorldFish supervised co-management sites (Goakhola and Fatki), where CBOs received 12 training sessions each. For agricultural and fisheries development, the Isali project which was managed by the Government of Netherlands and administered by the Asian Development Bank (ADB 2007) received only 4 to 5 training sessions (See Table 2). In the Isali case site, the project management planned 14 training sessions for CBOs for 2007, but not all training was provided after (CBO Leaders, Isali, 2011) due to a lack of capacity of NGO involved. Therefore, training planned and training implemented was not equivalent that what community members claimed.

The location of training venues was also problematic because they restricted some potential participants from attending training sessions. Fisher leaders from

Fatki River identified that the training sessions were often held inconveniently within the district towns. To attend these sessions, support for travel was not balanced across potential participants. Funding for travel was rarely provided to general CBO members (often poor fishers) but travel funds were often provided to the leaders (CBO members, Fatki River). The general members indicated that this was justified such that the leaders would share what they learned with the general members, but this was rarely the case. CBO leaders of Fatki River and Goakhola Floodplain proposed many times to the training providers that a better approach to include more participants in training programs would be to offer training locally within each community, but this was rarely arranged.

The appropriateness of technologies introduced through training was also a key issue related to training effectiveness. Throughout training sessions there were instances where technology was introduced without attention to its usefulness for farmers and fisher groups. For example, trainers in Fatki attempted to discourage fishers/farmers from using open waters for jute retting (jute fibre fermentation technique), a process that is blamed for killing fish in open water, they instead use tanks/mini ponds/pools (Banik et al. 2003). It is an attractive practice from an environmental view point, however; this technology was not appropriate for CBO members because of the (relatively) high capitalization costs required for purchasing the related materials (polythene sheets to make tanks). Similarly, other technologies such as cage aquaculture and biogas transferred through training sessions were not appropriate for Fatki site. The president of Fatki River, who for the first time started cage aquaculture in 2003, discontinued it in 2004. After investing in nets and other supplies, he was unable to return a minimum profit and therefore, was unable to get a return on his investment. The president expressed his dissatisfaction with the promotion of unproven technologies paid for with borrowed money (CBO members borrow money from local NGOs to implement new technologies). He explained that NGOs have a conflict of interest given their own investment in staff training in cage aquaculture technology, and their continuing income stream from the donors advocating for the use of particular technologies. About a question related to how the case aquaculture worked, he clearly mentioned... it would be better if they (NGO) properly tested the technology (case aquaculture) before they introduce it at community level (CBO Leader, Fatki River, 2012). Case aquaculture was found nowhere to be proven very profitable in Bangladesh at time of the implementation at CBO level (2001–2006), even in locations where the technology was extensively adopted such as in Kaptai Lake, compared to conventional pond aquaculture (personal experience of the main author as an aquaculture officer with BFDC). For similar reasons, programs such as biogas and mushroom culture were not useful for adequate funding and opportunity for marketing of produces.

Lack of congruency across the training programs also has produced contradiction and confusion for participants creating counterproductive results from capacity building strategies. For example, a school teacher from Isali expressed his concerns about pest control training which can be read as follows...

“I received two types of training for pest management in farming from two different agencies: one relating to more efficient and intensive usage of chemical pesticides; and the other on how to largely avoid pesticides through use of integrated pest management techniques. In the latter training, I learned that not all insects are harmful and that certain insects are desirable and can be cultivated to predate upon other unwanted insects. This is contradictory with pest management training that promotes the intensive use of chemical pesticides to control pests”. Further compounding confusion, many members felt that training about integrated pest management was inadequate to make choices based on the trade-offs between the two types of training. Accordingly, such training has not proven particularly useful. In his opinion, while both objectives may be valid, farmers may respond best to training that does not confuse them with such divergent approaches to the problem.

4.2. Financial capacity building process

Two types of main financial capacity building strategies were included in co-management to support financial abilities of CBOs and their related members. These strategies include revolving funds as grants and microcredits, however most communities received few other grants, such as start-up funds. Start-up funds were of low value and when available were used to support the temporary needs of CBOs such as construction of community centers or to pay for meeting expenses. These funds helped communities to invest in capital intensive projects such as dredging of degraded canals in Goakhola. In such cases, some apparent misuse of grants by CBO leaders did occur, such as Goakhola site (personal communication with previous WorldFish Personnel). However, the two main financial strategies applied for capacity development (revolving funds as grants and microcredits) had notable impacts on local capacity development processes.

4.2.1. Grants as revolving funds

Sourced from the United Kingdom government, the revolving funds were provided to WorldFish to be distributed to respective communities (e.g., Nabogonga, Fatki and Goakhola) through NGOs. Revolving funds allow fishers to take out loans for items that they may not otherwise be able to afford instantly (e.g., nets or boats, often at the beginning of the season) and repay the amount owing at the end of fishing season. As per conditions set for the utilizations of the funds, the grants offered to CBOs to be recycled throughout subsequent years. The revolving funds was offered as core funding for local fishers to avoid high interest loans that they would otherwise incur and was used primarily for operating the CBOs (i.e., paying lease fees to secure waterbody access or ponds rentals to establish fish sanctuaries). These larger revolving funds also help poor fishers avoid taking out traditional loans from Mohajons (The traditional local money lenders) with higher interest rates (sometimes three times more than bank or NGO loans). As Rahman, Assistant Director, (Center for Natural Resources

Studies), Dhaka (Pers. Com. 2011) explains, poor rural fisher communities can avoid falling into a loan trap within traditional credit lenders (Mohajons) where high interest rates prevent fishers from repaying their loan. The revolving funds, therefore, might have a greater impacts on fishers to save them from high interest's loans and avoiding the loan traps. While this has been the case for Fatki and Gokhola, not all communities had access to low interest rate revolving funds. Co-management projects at Oxbow lakes and Isali had no access to revolving funds and had to rely on the external fund sources (e.g., bank loans) with comparatively higher interest rates.

The management of revolving funds (with the exception of start-up funds) was typically not very effective due to a lack of accountability and transparency pertaining to how funds were handled. WorldFish, DoF, and NGOs signed an agreement to distribute the full loan amount to the CBOs if adequate development in institutional capacity to administer funds was exhibited. According to the CBO leaders at Goakhola, the agreement meant that the full loan amount (about \$12,000) from the assigned NGO Baste Shekha (BS) was to be delivered after the year 2016 if they met the requirements as a successful CBO (e.g. Continued CBO activities such as group meetings, controlled access, financial capacity development such as microcredit operations). The CBO leader of Goakhola site expressed very strongly that there was no accountability for NGOs such as Baste Shekha (BS) should they violate their own contract with the CBO, nor is it clear what recourse might be available and how well the existing resolution process would work (OPR-4 2005) should the NGOs violate the agreement. He said BS, as the partner NGO, has received the money on behalf of the community and "we do not know about the standards for measuring the capability of the Goakhola CBO as we are not part of the funding yet." He mentioned further that, "after the initial project term was over in 2006, we have been running our program almost without help of outside agencies for years now, so we are demonstrably capable CBO. We only know that we have been allocated, the money, but we don't know when and if we will receive it from the NGOs." He also questioned that if the money is nominally provided to the "community", then why has no share been received by them during the past eight years while the NGO are using the funds freely? In his words, NGO is acting like "A fence eating the fruits of the garden". These statements exemplify the concerns of CBO leaders over whether the NGO will really hand over the money to them and that the basis for such suspicions revolves around a lack of accountability and transparency which diverges from common perception that NGOs improve empowerment of the poor as is stated by Uphoff (1993). Although community expect a revenue sharing mechanism between BS and Goakhola given the grants were delivered in the name of the respective CBOs, there was no such arrangement available during the study period.

Contrary to what has been expressed by Goakhola CBO, BS portrayed a different perspective. One BS field officer, on condition of anonymity, identified that there may be certain "grey areas" in how NGOs use these funds. He also

blamed the community over questionable uses of other small funds previously provided to them (expenses related to meetings) and used this to justify the NGOs continued reluctance to turn over the greater part of revolving funds to the CBO of Goakhola. As per the view of a former WorldFish Personnel, there was no agreement signed between the respective NGO and the Goakhola CBO about fund transferring and the CBO has failed to secure any benefits from the fund held by the NGO. NGOs appear to benefit from these arrangements by holding revolving funds before giving it to CBO; however, they are likely to face challenges in the future to operate microcredit programs in CBO areas, due to the resulting conflicts between the CBO and NGO (CBO leaders Goakhola). CBO leaders explained that a petition was already sent to UKaid, the main funder of fisheries co-management programs (through the British High Commission in Dhaka) and copies of the documents were also duly forwarded to the concerned NGO; to WorldFish; and to the DoF in protest. As of this writing, no conclusion is in sight. The litigation is still ongoing on who will own the revolving funds (as per information from a former WorldFish Employee, 2016). This experience has shown that issues relating to revolving funds which would greater positive impacts on CBOs (avoiding loan traps) which have created a notably unhealthy relationship between the NGOs and the Goakhola CBO.

4.2.2. Microfinancing

The second prominent approach to building financial capacity in the CBOs examined was through community-based microcredit loans. Microcredit loans provide low interest rates and better accessibility of funding and are well-known for developing local capacity, income generation and poverty alleviation in the developing world. Within all case sites examined, microcredit programs were initiated, but only two cases found them helpful, namely, Fatki and Goakhola site (Table 3).

In these two communities there was a need for low interest rate loans to buy gear (i.e. for water craft, poultry, fertilizers, bulls, or for funding special occasions such as marriages or festivals), and to pay for operational and living costs during the off season when income was low. As per a former WorldFish Personal, Goakhola especially was supported by low interest loans (5%) offered by BS

Table 3: Microcredit operations by two CBOs during 2009–2010.

Name of projects	Goakhola floodplain	Fatki river
Total loan disbursed	67,900	98,100
Total recovery	57,124	87,253
Number of loan recipients	16	23
Rate of recovery (%)	84%	89%
Interest rates (%)	8%	12%
	TK 70=1 Can \$ as per 2011 conversation rate	

(Source: Phone interviews, Cashiers, Goakhola and Fatki, 2012).

which was persuaded by WorldFish (Personal communication, a former employee of WorldFish, 2016). Funding used by these two communities for developing microcredit loans was also generated through user fees (e.g., memberships or selling the fish from harvest reserves at Goakhola). Community-based microcredit loans have advantages over regular loans from the banks or local NGOs; because they have lower interest rates resulting in better recovery rates and contributes to the empowerment of women. For smoother operation, better legitimacy and fairness, communities opened bank accounts under three signatory leaders. It was decided by the community through consensus that interest rates would be established based on the feasibility (e.g, members' ability of paying back of loans) of the average community member. Typically, under community-driven microcredit communities this resulted in annual interest rates between 8-12%, which is much lower than 20-30% interests rates from local NGOs or 50-60% lower than from local Mohajons. In addition to higher interest rates, NGOs, Banks, and the Mohajons also accrued cyclic interest (i.e., interest on interest) charges which are usually absent from community driven microcredit program. Within the two pioneer CBOs for promoting community-based loans (Fatki River and Goakhola) recovery rates were notably higher (>80%) than other CBOs. For details on loans dispersion and recovery rates see Table 3.

In addition to lower interest rates various reports such as the Gender Study by WorldFish has identified that microcredit also empowers women through loans for raising poultry (See WFC 2005). Women normally get involved in small entrepreneurship such as poultry raising and therefore, are empowered by earning for their family, a situation that upholds their prestige in families and society levels. Based on this information it is assumable promotion of microcredits have been an effective strategies than any other approaches utilised for capacity development (Community driven, lower interests etc.).

Goakhola and Fatki case sites demonstrate the opportunity for microcredit loans to be helpful for increasing financial capacity, but more can be done to improve their access. Even though the amount of microcredit loans has increased substantially, for example, loan transactions have increased 500% in Fatki and 667% in Goakhola since 2005 (CBO Records, 2011) the amount of loans fall short to be able to meet demand. This is reflected in the low number of loan recipients in Goakhola and Fatki (see Table 3), where only 16 of 52 and 23 of 28 members received support respectively. Although microcredit loans are helpful for some members, present support is not enough to meet the needs of much of the community. For CBOs like Baors who depend heavily on funds for stocking fingerlings (juvenile fishes) and unlike Goakhola and Fatki microcredit loans from NGOs were nearly useless. In general, NGOs provide small loans (under Tk. 30,000/year) that are ten times insufficient for fishers' needs in Baor CBOs for stocking of fingerlings and repay the interest incurred from outstanding loans they have. Baor co-management projects were generally uninterested in taking loans from NGOs since the smaller loans were often insufficient even to reimburse the cost of buying fingerlings from private producers.

In instances that microcredit loans were sufficient for fishers' needs, interests rates become a challenge. For example, Porakhali Baor fishers receive sufficient microcredit loan support from NGO, Podokkhep amounting to Tk. 1,400,000 (\$17,000) in high interest loans. According to Rafiqul Islam, these loans have created a substantial burden on local fishers because previous leaders did not recognize the importance of incremental repayment and now find the loans increasingly unmanageable.

Corruption also played a role in the effectiveness of microcredit loans to build financial capacity of CBOs and caused the discontinuation of co-management programs altogether. Although mechanisms were taken to reduce corruption (joint signatory, disclosing yearly transactions in general meetings every years) prior to loan agreements, respondents from Bukbhora and Islali identified the illegal use of funds by CBO leaders. Little progress has been made on recovering the money unlawfully used by CBO leaders, because those involved (past leaders) are in community positions of power and are backed by often corrupt political systems (Amundsen 1997; Pirnini 2011). Uncertainty in the uses and recovery of community funds has made general members disinterested in paying monthly membership fees and uninterested in participating in CBO activities such as attending community meetings where, in some cases such as in Isali, distrust towards other CBO members was found to be strong. Similarly, examples were also identified in oxbow-lakes sites such as Bukbhora and Isali sites where past leaders breached the trust of general members by abusing s community funds.

5. Discussion and Conclusion

This study indicates that for all six cases of small-scale fisheries operated through co-management adopted several tools to effectively support capacity development of local users. Many of them are used traditionally in other development programs such as poultry and cattle productions supported by microcredits (Gana 2013) what comanagement programs also have tried to adapt. It is understandable that the approaches utilised for co-management may have contributed towards greater social security and better access mixed economy for the rural poor (fishers also subsist from harvest such as use fishes for their protein needs and farmers fish to for par time incomes) to through fisheries development. It also could benefit users through sharing of resource to support local institutions (The CBOs) and their members such as farmers and fishers to enhance their financial and technical abilities. Some of them such as donor funds that have really benefited local communities as funds have utilised for the establishment of community centers. Revolving funds and community generated microcredits have created a venue for fishers to avoid high rate loans originated from banks or Mojajons. Communities achieved good learning to get involved in operating self-microcredits programs for their members. Therefore, the microcredits especially have lasting impacts in supporting rural poor. This outcomes demonstrate a learning achievements of CBOs through the interactions with NGOs (Community gained ability to operate

microcredit with the help of NGOs). For example, it was not supportive for many of the local groups who suffered from the loss of fisheries productions for whom the fisheries co-management was designed (e.g. traditional fishers the *jele* are not supported by aquaculture as they are unaware of the technology and no ponds are available to them. They are landless). The local empowerment processes through training under co-management of Bangladesh echoes the same trends of failures highlighted in previous research focusing local engagement. These include: local corruption, elite capture, and uneven power distributions as contended by developmental scholars such as Platteau and Gaspart (2003), Uphoff (1993) and further reported by FAO to highlight challenges related to developmental programs (2003). As a result, the approaches used for capacity development have resulted in little direct impact on overall governance of small-scale fisheries. In this regard, Barker (2005); Blockland et al. (2009) and Frey and Berkes (2014) contend that the success of co-management arrangements and the governance of natural resources depend largely on the processes of implementation of capacity building strategies.

Issues related to capacity approaches applied for rural development and their relevance towards multiple governance of natural resources including fisheries also have been discussed in recent studies related to commons (Béné et al. 2008; World Bank 2011) which is further identified in this research. In this regard, Frey and Berkes (2014) have discussed how local users are empowered in public speaking or have learned to assess ecological health in Indonesian coastal fisheries and avoided uses of cyanide. Emerging from the capacity building strategies examined are three prominent themes: knowledge (what users learned from co-management operation); power (how the local elites and government agencies have responded to governance process); and scale (different levels of successes across CBOs) relevant for understanding the role capacity building strategies had in supporting the governance of fisheries in Bangladesh. Capacity building strategies had considerable implications on knowledge transfer between NGOs and CBOs, particularly through training for operating microcredit programs.

The most striking feature with regard to knowledge transfer in connection with microcredit management, is that CBOs have shaped the microcredit system in ways that suit their local economy, such as, enabling loans with lower interest rates suitable for CBO members. Goakhola, a key promoter of community microcredit loans, acknowledged that knowledge from NGOs was critical for learning how to manage microcredit, demonstrating the importance of knowledge transfer linkages (NGO-community) in the co-management arrangement. However, in some cases the knowledge transfer and leaning process through microcredit programs did not support fisheries development (e.g. oxbow-lakes) and nor encouraged community initiatives (e.g. held up of revolving funds with NGOs). Observing that in some cases impacts of learning and knowledge transfer vary and their value across fisheries depends on the resource systems and actors where it is applied.

The second dimension of capacity building approaches to be discussed in connection with power relationships is how strategies utilized had implications on the distribution of power. CBO capacity development has failed in part due to including traditional fishers and women in profitable ventures such as fish cultivation. This type of exclusion has left many fishers out of reach of benefits that advantaged sections of the society (e.g. educated people and stakeholders such as rich farmers) receive (e.g. fish culture training benefited farmers that owned lands, while fishers who do not own lands to dig ponds did not benefit). It's a norm in many societies (including Bangladesh) that women and the poor have yet to take a significant role in rural development. Donor funded programs including co-management arrangements in Bangladesh offer opportunities to break current power relationships empowering women and the poor by engaging them in developmental process. However, rigid social structures that support the participation of men are difficult to change. The co-management arrangements examined here failed to break the social norms that disempower women and poor fishers.

Issues of power can be discussed further with regards to scale mismatch between decision makers and for whom the decisions are made. Often decisions were made by DoF and NGOs (the higher scales) that did not reflect the needs at lower scales such as with communities and the expected goals of rural developments are hardly achieved through capacity tools used (World Bank 2011; Bene et al. 2008). In the case of small-scale fisheries introduction of cage aquaculture with traditional fishers is a good example of such mismatch as fishers had no previous knowledge to operate such technology. Therefore, introduction of this technology has been ineffective indicating the gaps between scales. It also implies that communities had less negotiation power to deal with state officials or NGOs on choosing right technologies to improve their livelihoods or fisheries systems. They had to engage with any technologies offered through projects.

Based on our analysis of co-management arrangements with regard to the capacity building strategies applied across the six study sites, the strategies adapted through co-management could have brought much support for CBO capacity building processes to establish multilevel governance of small-scale fisheries. These did not occur in all cases, however, due to substantial limitations regarding inappropriate training packages and incongruence in training (was not relevant to local needs), lower financial supports, uneven power relationships among stakeholders, and local corruptions. However, comanagement driven capacity analysis through this research left many learning including types of strategies used, their effectiveness, the roles of communities and NGOs in supporting or limiting the approaches and uses of the funds. These findings can help to verify the capacity development measures applicable through comanagement of fisheries, forests and waters across the globe. Further research is needed on locally adaptable and needs-based training, appropriate technological packages, funding arrangements, issues of local corruption, and unbalanced power relationships can enhance our understanding for a more efficient small-scale fisheries in a co-managed setting.

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