

The evolution of community-based floodplain aquaculture in Bangladesh

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1. Introduction

The spread of floodplain aquaculture (FPA¹) is one of the accompanying trends of countrywide expansion of aquaculture in Bangladesh. While the spread of general aquaculture has been observed since the country's independence in 1971, the trend of aquaculture in seasonal floodplain water-bodies is comparatively new. Although there were reports of stocking-based rise of harvested fish from floodplains since 1988-89 (Ahmed 1999; Islam 1999), numerous studies reported the recent mainstreaming of FPA phenomenon (Gregory et al. 2007; Toufique and Gregory 2008; Belton et al. 2011; Haque et al. 2011; Sultana 2012). Besides, the Department of Fisheries (DoF) started to publish FPA data in its annual Fisheries Resource Survey System report only from 2011 (FRSS 2011).

Not surprisingly, the spread of FPA has also witnessed development of several types of FPA management systems. Among them, one management system has been regularly featured in various studies—sometimes with sole focus, sometimes in comparison with other similar management systems (Gregory et al. 2007; Toufique and Gregory 2008; Mustafa and Brooks 2009; Sultana 2012; Khan 2015; Bayazid 2016). The development of this management system has been attributed to a non-governmental organization (NGO), called SHISUK², as its collaboration with a community of the Daudkandi subdistrict in the Comilla district to form an FPA was widely recognized as pioneering. This first NGO-collaborated FPA (NFPA), named Pankowri Fisheries Ltd (PANKOWRI), was formed in 1996. While the NGO promotes the management approach by entitling it the Community Enterprise model, it is popularly known as the Daudkandi model of FPA. The profitability of FPA enterprise, demonstrated by this NFPA, resulted in the proliferation of more than 50 FPAs in the neighbouring communities in a span of two decades. While the NGO promoted and partnered with only a few of these FPAs, others were independently formed by landowners of various floodplains. The NGO later expanded their FPA programme in other parts of the country.

However, how this FPA management system evolved over time—in the NFPAs and independently-formed FPAs (IFPAs)—is yet to be adequately explored. Khan (2015) pointed out some changes over the decades since its first application. Given the common-pool resource (CPR) nature of the floodplain water-bodies, modifications in management system are not unexpected as Ostrom (1990, p. 58) identified that “appropriators designed basic operational rules, created organizations to undertake the operational management of their CPRs, and modified their rules over time in light of experience according to their own collective-choice and constitutional-choice rules”. Identifying and studying such changes will shed lights on critical aspects of collective management of community resources, like, how users responded to the opportunities opened-up through improved use of the resources or solved management problems using their experiences over time, etc. (Agrawal 2001; Olsson et al 2004; Carlsson et al 2005; Ostrom 2007; Berkes 2009; Armitage et al 2009; McGinnis and Ostrom 2014). The purpose of this paper is to identify the extent and nature of the modifications—whether uniform or varied considering the numerous adoptions—made over last two decades. By studying organizational and management aspects of FPAs selected from five districts of Bangladesh, this paper tries to articulate the modifications implemented by participants. As this FPA management system was expanded through

¹ In this paper by 'FPA' we will mean, depending on the context, the floodplain aquaculture as a distinct type of aquacultural practice and also the collective management group formed by investors for practicing such aquaculture.

² *Shikhya, Shastha, Unnayan Karjakram* in Bengali, which can be translated into English as Education, Health and Development Programme

independent adoptions and NGO-led programmes, the study covers both types of FPAs with an emphasis on NFPAs.

The article is outlined as follows: section 2 reviews briefly the development of this management system, followed by a brief theoretical framing of collective FPAs in section 3. Methodology and data collection is presented in section 4. Collected data regarding the FPAs is offered in section 5. Discussions and concluding remarks are presented in section 6 and 7 respectively.

2. Proliferation of FPAs with the support of NGO promoted management approach

Bangladesh has 2.8 million ha floodplain water-body—largest among all inland open water-bodies (FRSS 2015). For a long time, these water-bodies had been only used as open access source for capture fishery during the monsoon. An FPA initiative seemed difficult or simply inconceivable to implement because of floodplain water-bodies' seasonal nature, involvement of considerable number of landowners and mixed property rights, among other reasons (Ahmed 1999; Islam 1999). Formation of an FPA would require supplementary investments in infrastructure because of water-body's seasonal nature, in addition to usual investment for fish farming. The lack of any collective initiative among landowners was due to the risks of ripping the benefits off by non-investors, failures to reach agreements about and conflicts over sharing costs and benefits, alternative seasonal uses of floodplain lands, etc. Moreover, there were issues of rule enforcement within the community. An adoptable model of collective and self-organized FPA management system has to demonstrate that such obstacles can be dealt with in addition to the prospects of rewarding returns. The Community Enterprise model initiated in the Daudkandi subdistrict in 1996 was reported to meet these criteria (Gregory et al. 2007; Toufique and Gregory 2008; Belton et al. 2011b; Khan 2015).

However, the SHISUK's collaborative attempt to establish an FPA was not the first of its kind in this community. A small group of landowners started an FPA named *Dhanuakhola Nagarpar Adarsha Motsha Chash Prokalpo* (DHANUAKHOLA) in their lands in 1984. Although this FPA is still operational, in the first few years its activity was irregular due to reasons mentioned earlier. Moreover, this FPA was formed in a small floodplain of 13.35 ha land and there had been no other successful FPA in the community until PANKOWRI was formed in 1996. However, the precedent of DHANUAKHOLA in the community proved significant as SHISUK had cited its profitability in motivating the neighboring landowners to form PANKOWRI. Through forming PANKOWRI in a larger floodplain, SHISUK modernized and improved upon previous practices, devised ways to solve past difficulties and expanded the scope of collective FPA enterprises.

Figure 1 shows the chronological spread of FPAs that flourished mainly in two ways. In one way, following the success of PANKOWRI, SHISUK formed more NFPAs in partnership with the community stakeholders in various parts of the Daudkandi region throughout 2000s. From early 2010s, the NGO gradually expanded its FPA programmes in other districts. On the other hand, landowners established IFPAs by playing leading roles without any NGO involvement. This type of FPAs, formed through flexible application of the NGO-promoted management approach, are very common in the neighbouring communities of the Daudkandi subdistrict. The proliferation of IFPAs showed that the development and management of FPAs can be achieved without the NGO initiative and involvement when community participants successfully engage themselves on their own.

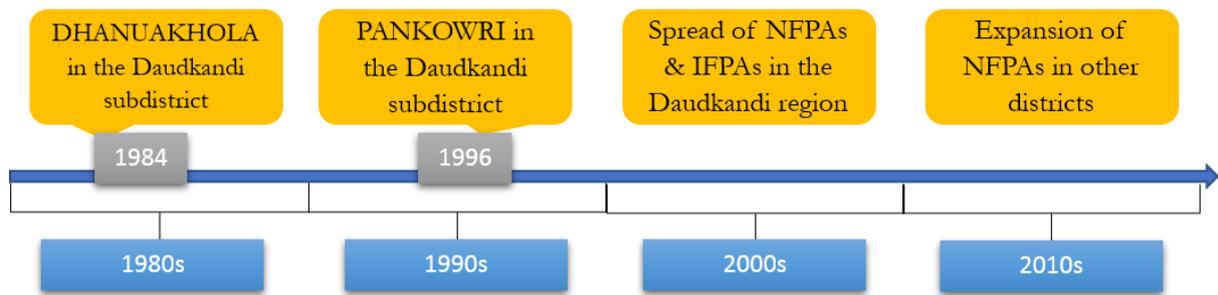


Figure 1: Chronological spread of FPAs based on the studied management system

The formation steps and management cycle now generally followed in these FPAs are shown in Figure 2. The green boxes depict the seasonal cycle of aquaculture (e.g., stocking, nurturing, harvesting, etc.) operations in a floodplain water-body, once an FPA has been formed. The yellow boxes show the preliminary formation stages of mobilization, reaching agreement, obtaining capital, setting physical boundary and forming management committee. However, in absence of successful demonstration until SHISUK’s intervention, these preliminary stages were perceived to be more difficult as proved by lack of collectively managed FPAs.

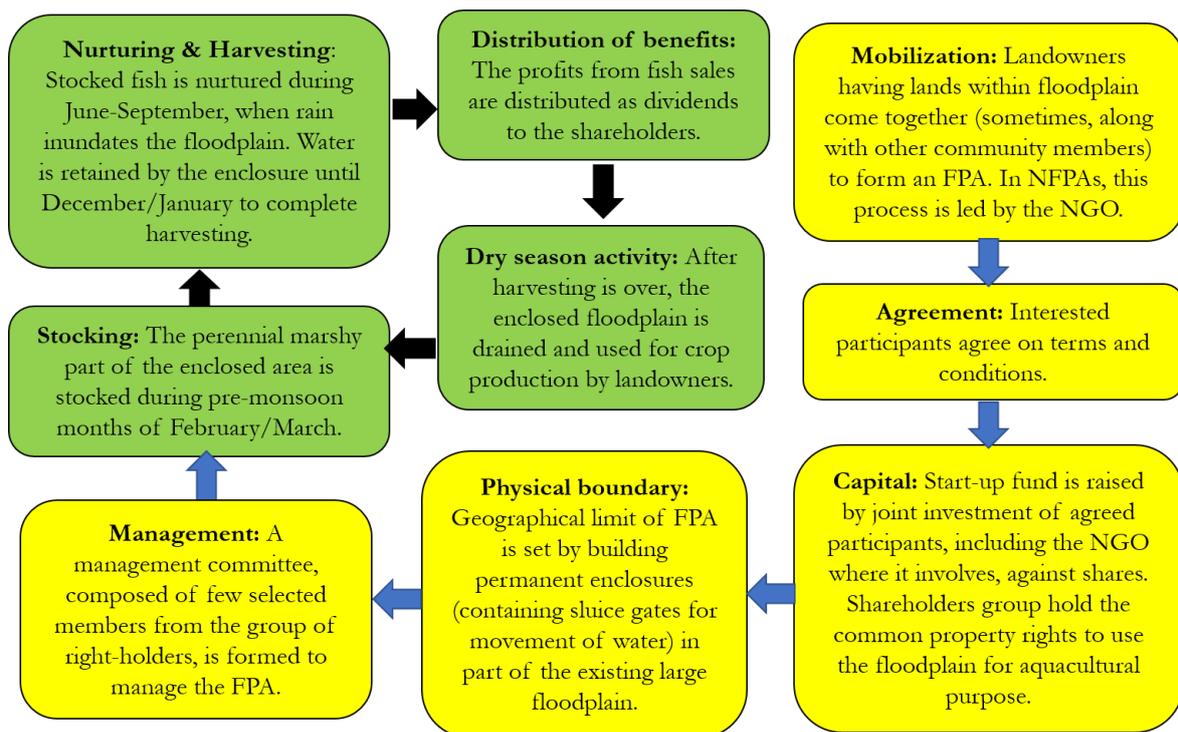


Figure 2: FPA formation and management cycle (Yellow boxes indicate the formation stages and green boxes the annual operations)

Source: Adapted and modified from Bayazid (2016)

3. Theoretical framing of NGO intervention and collective management of FPAs

SHISUK’s intervention to promote FPA in various parts of the country can be regarded as an extension of conventional co-management practices. In its classic conception, co-management was understood as sharing responsibilities and authority, primarily, between centralized government agencies and local users in management of a resource (Jentoft 1989; Berkes et al 1991; Pomeroy et

al 1997; Carlsson et al 2005; Beem 2007). However, through a meta-analysis of co-management interventions in developing countries, Evans et al (2011) showed that many “co-management projects involve support by independent organizations or non-governmental organizations, in place of the state”. This was precisely the role of SHISUK in developing FPAs. The NGO, SHISUK, collaborated with community in promoting aquacultural practice without any government initiative framework for and involvement in managing FPA enterprises. The involvement of government agencies in similar FPAs occurred only after the trend became popular among landowners. Besides, the NGO not only made investment but also participated in management and day-to-day operations of the FPAs. So, responsibilities and authority was also shared to some extent by community stakeholders (landowners and other shareholders) and the NGO. By contrast, the participation of government agencies was limited to providing financial and technical supports and research collaboration during the project periods.

In the realm of property rights, there are two aspects regarding the collective management of floodplains for the aquacultural operation. One set of property rights determines exclusivity of the owner to benefits and costs accrued by owning and using the resource along with transferability of these rights through voluntary exchange (Tietenberg and Lewis 2009). Sometimes these rights also authorize the kind of use for specific user or user-group. This type of authorization is more relevant for running FPA operation in floodplains because the same floodplains are used for agricultural production in the dry season. In the collective management of FPA, a group of right-holders is formed from the members of the community. This group has the sole right to use the specified floodplain for aquacultural operation. However, the lands within the floodplain are private properties of numerous landowners. Therefore, the collective rights of the group to use the lands for their purpose is obtained by the simple mechanism of rent. Through rent each individual landowner transfer their private property rights in exchange of rent fee to the group for a specified period around the monsoon. In the dry season, the landowners practice their private property rights by engaging in agricultural activities, mostly rice cultivation.

Another aspect of property rights—along the conceptualization of Schlager and Ostrom (1992)—is related to the bundle of rights, responsibilities and limitations of the members of a collective group which hold rights to use the floodplain for aquacultural operation. The rights to the benefits of aquacultural operation are the basic rights of a member of such a group. These rights are based on the personal investment they made, especially, at the beginning of FPA formation. However, the real management and operation of such an FPA is run by a committee composed of few selected members from the group of right-holders. This type of management committee (MC) holds the rights to all sorts of collective-choice actions (making operational decisions and rules) and operational activities including harvesting. The rights of ordinary members of the group are limited to benefits according to their investments and, sometimes, include rights to participate in electing members of the management committee. Constitutional-choice actions occurred during the formation of FPAs, and participation in such activities defined by community members’ stakeholding, power relationship and pattern of communal decision making process.

Thus, in collective management of FPA, common property rights are created for a group of property users, so that they can collectively manage aquacultural operation in floodplain water-body. Through the formation of such a group having common property rights, the erstwhile seasonal open access floodplain water-body has been brought under common property regime. In NFPAs, the NGO is also a common property right holder on the basis of its investment, and shares management responsibility and benefits along with other shareholders. In all FPAs,

irrespective of their formation pattern, the investor right-holders are now known as shareholders and those who are selected for managing the FPA affairs as directors. Such a management committee is called board of directors (BoD) or executive committee (EC). These terminologies will be used in this paper for simplicity.

4. Study sites and Methods

Study sites: The study was conducted on fifteen FPAs, including both IFPAs (five) and NFPAs (ten), so that changes in their organizational and management aspects could be studied side by side. At the time of the study, NFPAs were found in seven districts of Bangladesh. From them, five districts were selected where at least one fully operational FPA was found which had records of continuous FPA operations. The selected sites are pointed in Figure 3. They are the Comilla (sub-district Daudkandi), Manikganj (sub-district Harirampur), Natore (sub-district Shingra), Jhalokati (sub-district Rajapur) and Pirojpur (sub-district Nazirpur) districts. Outside the Daudkandi region, in other four sites, the FPA trend is relatively new. These sites were selected to find whether there was any difference between the older and newer FPAs in terms of organizational and management practice. It was attempted to select both NFPAs and IFPAs from all sites. However, while more than 50 FPAs—numerous IFPAs along six NFPAs—have been found operational in and around the Daudkandi subdistrict, only NFPAs are found to perform continuously through a well-organized institutional scheme in other four sites. As such, eleven—six NFPAs and five IFPAs—FPAs were selected from the Daudkandi region. From each of the rest of four districts, one NFPA was selected.

Data collection: The main method for data collection was interviews based on structured questionnaire, supplemented by non-structured questions asked as the situation required during the field visits. Two general field visits were conducted. The first visit (April – May of 2016) was conducted when the FPA staff were preparing the floodplain for the approaching monsoon by stoking part of the floodplain with young fish and/or nurturing them. During this visit data was collected from 12 FPAs from the Daudkandi, Harirampur and Shingra sub-districts. The second field visit (October–November 2016) was made during the harvesting season. In this visit interviews were conducted at three new FPAs from the Rajapur, Nazirpur and Daudkandi subdistricts in addition to the 12 FPAs of first visit. All the FPAs were visited several times.

Principal interviewees included FPA staff, directors, lease holders and some ordinary shareholders. Collected data were checked against official documents wherever it was possible. Besides interviews, some participant observations were also made by attending at the FPA meetings, harvesting sessions and other official activities (e.g. election of members of BoD). In addition to FPA staffs, NGO staffs were also interviewed. The interviewees included NGO staffs of each regional office, FPA programme coordinator and executive director. Mainly, three types of data were collected. One type of data focused on formation and development of the FPAs. It included information regarding the mobilization of landowners and other community people, infrastructure, initial investment, landowners and shareholders, among others. Data regarding management included information about aquacultural operations, decision-making process and administration rules and practices. Third category of data focused on the changes of the management practices over the years.

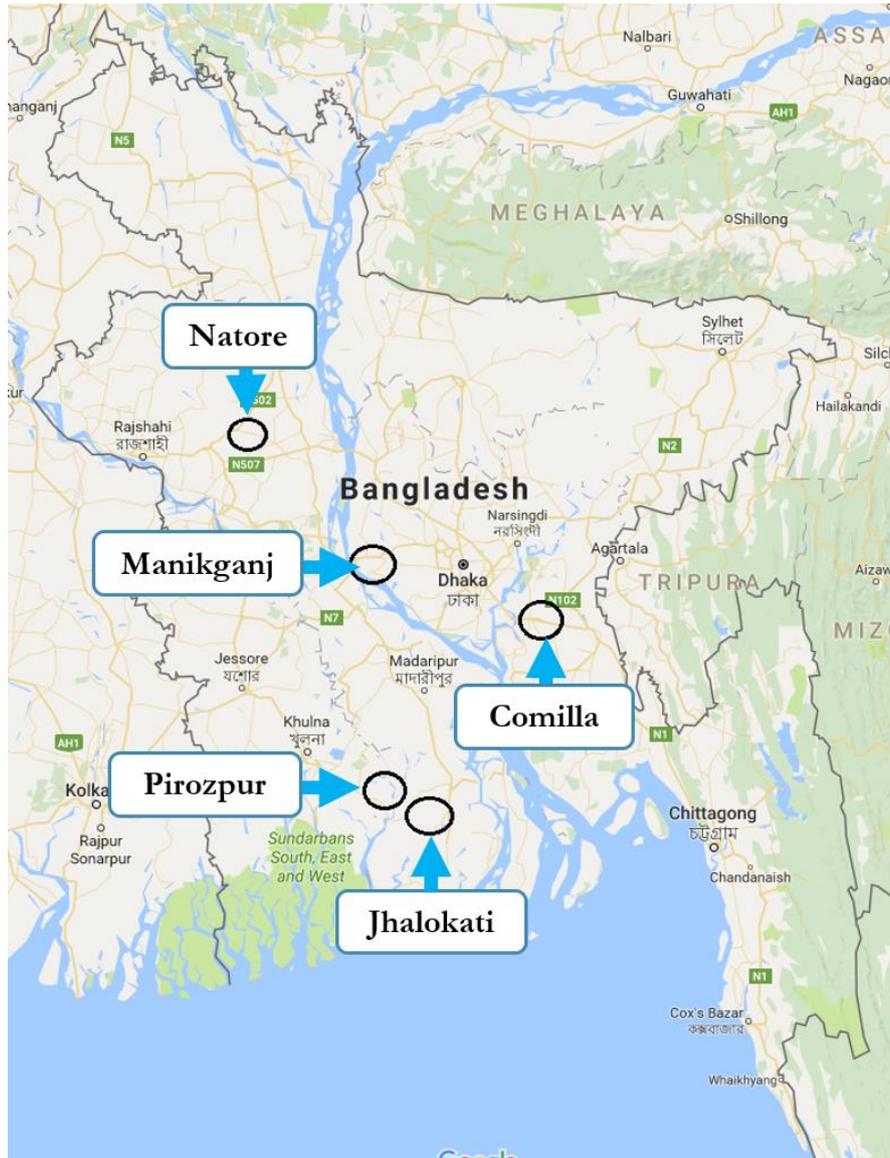


Figure 3: Location of studied FPs

5. Modifications in organizational and management aspects of FPs

The studied fifteen FPs are chronologically put in Table 1 and in the parentheses beside their names were included the names by which they were locally known. In the Daudkandi region, since PANKOWRI, SHISUK collaborated with the community in forming KHIRAI, LKS, CHAARGRAM, SHANTO and PROSHANTO, while landowners established IFPAs, like, CHARIPARA, KUSHIARA, ASIA and SHISHIR. DKK, RANINAGAR, UB and JHONJHONIA, which were first NFPAs in their respective communities, were result of SHISUK's collaborative attempts outside the Daudkandi region. These four FPs were originally formed through various projects where different government development agencies participated as facilitating partners. These agencies provided a portion of the infrastructure cost during the formation of these FPs. However, their involvement was confined to projects durations and after that the FPs were supposed to function as other NFPAs.

5.1 Shareholder composition and its changes in the FPs over the years

In all FPAs, the investments were made against issued shares, following the practice introduced by SHISUK in 1996, except for the DHANUAKHOLA which was formed in 1984. Although, in the DHANUAKHOLA, the participant landowners made individual investments like all other FPAs and divided profits accordingly, its organizational formality had not been sophisticated enough at that time to treat these investments against any issued shares. The general practice followed for share investment was that a landowner would make investment in proportion to his landholding amount. Thus, the landowner who had more lands was entitled to have more shares. However, in SHISHIR all landowners made equal investment. In NFPAs, there was an additional guideline limiting the individual shareholding to 20 shares, even if the landholding amount permitted more. However, in newer NFPAs (RANINAGAR, DKK, UB and JHONJHONIA) shares were issued not in proportion to landholding amount, rather anyone (i.e., landowner and non-landowner) from the community was allowed to buy shares to the limit of 20. Understandably, such practices were not applicable to the NGO as it was an extra-community investor. Its share investment was determined through negotiating with the community partners, however, there was a common practice that the NGO would not invest more than 30% of total share investment.

Shareholders' composition was significantly different between NFPAs and IFPAs (see Table 1). In the NFPAs, the NGO was the largest single shareholder holding 6.62% (PANKOWRI) to 30% (JHONJHONIA) of shares. Collectively, landowners were the largest shareholder group holding 92.68% (PANKOWRI) to JHONJHONIA (35.22%) of shares. Among local non-landowner shareholders, two categories were observed. One category was the local landless people who didn't possess any lands. While in the older NFPAs (PANKOWRI, KHIRAI, LKS, CHARGRAM and SHANTO) a specific quota of shares was maintained for this category, among latter NFPAs (DKK, RANINAGAR, UB) only in JHONJHONIA was such quota found (see Table 1). In this type of quota, one share was endowed to one landless person or household. Although SHISUK paid for such shares when it invested for its own shares, they were distributed after the NGO had earned back its invested money from dividend against these shares. Other category of non-landowners included local well-off people who didn't have any land in the floodplain which was under FPA's operation but possessed lands in other parts of the community. They included traders and merchants, locally and nationally important members of political parties, elected representatives to local government bodies, among others. This kind of non-landowner shareholders were known as VIP shareholders.

In the IFPAs, landowners were the major shareholders (Table 1). In most of IFPAs the non-landowners were not allowed from the very beginning. Only handful of local non-landowners were found in these FPAs: in CHARIPARA two shares were given to the neighbouring households; in KUSHIARA three shares were endowed to local religious institutions and in SHISHIR three non-landowner became shareholders by investing equally as other shareholders.

FPAs were run by MCs composed of members selected from shareholders. Given the landowners overwhelming proportion, only landowner shareholders were permitted to be directors in IFPAs. However, in ASIA three non-landowner directors were found in exception of this general observation. In IFPAs, MCs were formed through a process of deliberation and negotiation among incumbent and aspirant MC members and, sometimes, community leaders, though change of MCs were irregular and rare, if any. By contrast, in the NFPAs of the Daudkandi region, the general practice was to form MC for two years by holding election among shareholders. This practice was regularly followed in all NFPAs, except for PANKOWRI where election was not regular. The basic requirement for both directors and voters was to be landowners and shareholders at the same time, though exception was found, once again, in PANKOWRI which

had one non-landowner director. However, differences were found in directors' requirements and mode of forming MCs in latter NFPAs (RANINAGAR, DKK and JHONJHONIA) where non-landowners were found in MCs. Additionally, in these NFPAs, deliberation and negotiation was preferred to election in forming MCs on the grounds that election sometimes caused division and hostility among shareholders. However, the option of election was still available given that the deliberation would fail or general shareholders prefer elections. It should be noted that, the NGO didn't have direct voting right in selecting members of management committees, though it held the position of chairman of MCs in all NFPAs, except PANKOWRI.

However, the number and composition of shareholders were not static and this kind of change had corresponding impact on formation of MCs. Composition of shareholders changed in two ways. In one way, share composition changed when shareholders traded shares among themselves and with non-shareholders. However, the trading of shares was guided by FPA-specific rules, e.g. which determine whether a non-landowner can buy shares or not. In none of the IFPAs, no new non-landowners could purchase shares, however, the current non-landowner shareholders (e.g. in CHARIPARA and SHISHIR) could sell their shares to other landowners. By contrast, the non-landowners could purchase shares of NFPAs, except PANKOWRI. Shareholders composition also changed when FPA management changed shareholding rules or dissolved shares, as was found to happen over the years in the following FPAs:

PANKOWRI: In the NFPAs, use of the landowners' lands, participation of SHISUK and investments were based on a contract with a validity period of five to ten years. After expiration of such contract, the landowners might renew the collaboration reconsidering its terms and conditions, which include nature and extent of involvement of all interested parties. In PANKOWRI, according to such contract at its inception in 1996, shares were issued to any interested member of community (i.e., landowners and non-landowners). Moreover, non-landowners had not only bought shares but also had been allowed to be members of MCs (like RANINAGAR, JHONJHONIA or DKK). However, in 2008, after expiration of first contract period, the landowners decided to renew their collaboration with the NGO but not with non-landowners. Thus, the non-landowners had to sell their shares, and, at the same time, shares were redistributed according to landholding amounts and the landowners who hadn't bought shares at the inception were allowed to buy shares. Moreover, landholding was added as a requirement for directors. Consequently, PANKOWRI now had only three non-landowner shareholders, including SHISUK. Even some of SHISUK's shares were bought back and dissolved by BoD. This kind of reduction of SHISUK shares wasn't found in any other NFPAs.

KUSHIARA: Like PANKOWRI, in KUSHIARA's early years of its operation when not all landowners had invested in shares, there had been provision for non-landowners to have shares. However, over subsequent years such shares were bought back by making change in its rules, and the landowners who had not previously bought shares were offered shares. Moreover, previously 5% shares had been maintained for local landless people, however, later this provision was revoked.

PROSHANTO: Two hundred shares, that had been originally planned for landless people and bought by SHISUK on their behalf, were dissolved when they were to be distributed on the grounds of non-existence of such landless people in the community.

ASIA: The landless shares (186) were bought back and dissolved.

Table 1: Studied FPAs

	FPA Name	Year of formation	Locality	Size (ha) of the floodplain	No. of landowners	No. of Shareholders	Non-landowner shareholders
1.	<i>Dhanua Khola Nagarpar Adarsha Motsba Chash Prokalpo (DHANUAKHOLA)</i>	1984	Daudkandi, Comilla	13.23	68	68	0
2.	<i>Pankowri Fisheries Ltd. (PANKOWRI)^N</i>	1996	Daudkandi, Comilla	85	420	423	3 (1 ^S +2 ^{LN})
3.	<i>Charipara Rupali Agro Fisheries (CHARIPARA)</i>	1999	Daudkandi, Comilla	26.71	158	160	2 ^{LL}
4.	<i>Kushbara Fisheries (KUSHLARA)</i>	2000	Daudkandi, Comilla	13.35	65	68	3 ^{LL}
5.	<i>Asia Fisheries (ASLA)</i>	2001	Daudkandi, Comilla	170	575	575	0
6.	<i>Khirai Fisheries Ltd. (KHIRAI)^N</i>	2003	Daudkandi, Comilla	61	305	557	120 (1 ^S +19 ^{LN} +100 ^{LL})
7.	<i>LKS Fisheries Ltd. (LKS)^N</i>	2003	Daudkandi, Comilla	46.94	213	495	136 (1 ^S +35 ^{LN} +100 ^{LL})
8.	<i>Chargram Fisheries Ltd. (CHARGRAM)^N</i>	2004	Daudkandi, Comilla	140	519	713	140 (1 ^S +39 ^{LN} +100 ^{LL})
9.	<i>Shishir Motsba Chash Prokalpo (SHISHIR)</i>	2004	Daudkandi, Comilla	13.35	34	31	3 ^{LN}
10.	<i>Proshanto Motsbo Prokalpo (PROSHANTO)^N</i>	2007	Daudkandi, Comilla	147	828	806	0
11.	<i>Shanto Motsbo Prokalpo (SHANTO)^N</i>	2007	Daudkandi, Comilla	80.13	474	850	101 (1 ^S +100 ^{LL})
12.	<i>DKK Bio-Village O Samajik Motsbo Prokalpo (DKK)^N</i>	2012	Harirampur, Manikganj	54.54	195	497	55 (1 ^S +6+48 ^{LN})
13.	<i>Raninagar Chalan Beel Motsbo Community Enterprise (RANINAGAR)^N</i>	2013	Singra, Natore	25	86	262	97 (1 ^S +96 ^{LN})
14.	<i>Uttampur Badurtola Motsbo Chash Community Enterprise (UB)^N</i>	2015	Rajapur, Jhalokati	28.04	117	164	47 (1 ^S +46 ^{LN})
15.	<i>Jhonjbonia SHISUK Community Enterprise (JHONJHONLA)^N</i>	2015	Nazirpur, Pirozpur	37.39	92	242	177 (1 ^S +126 ^{LN} +50 ^{LL})

(Source: Authors' Survey)

N= NFPAs, S= SHISUK, LN= local non-landowner who bought shares, LL= landless shareholders who were endowed shares

5.2 Emergence of lease-based management of aquacultural operation

In early 2010s, a practice of leasing emerged in the Daudkandi region for managing the FPAs main activity, i.e., aquacultural operation. By using the leasing mechanism, the shareholders of the FPAs transfer their rights to run aquacultural operation—instead of being managed by the shareholders’ representative MC—to lessee in exchange of an earning. Table 2 shows how the rights and responsibilities were shared between MC of an FPA and lessee of aquaculture operation. Through lease mechanism, a MC’s rights to operational activities and related collective-choice actions regarding aquaculture was transferred to a group of lessees. All other rights and responsibilities regarding FPA management remained in the hands of shareholders and their representative MCs.

Table 2: Shared rights and responsibilities in FPAs with leased aquacultural operation

Major activities regarding management and operation of FPAs	Responsible group	
	Shareholders’ appointed MC	Lessee group
Aquacultural operation: stocking, nurturing and harvesting		✓
Collective-choice action regarding aquacultural operation		✓
Dividend distribution to shareholders	✓	
Land rent distribution to individual landowners	✓	
Build/monitor/maintain necessary infrastructure and resource conditions	✓	
Paying compensation for the damage of land and other property of individual landowners/surrounding households	✓	
Decision about leasing	✓	

(Source: Authors’ Survey)

Eight of eleven studied FPAs of the Daudkandi region were now managing their aquacultural operation by leasing mechanism. Table 3 contains lease related information (e.g., inception year of lease-based management, tenure of lease contract, numbers of members of lessee group, etc.) of these FPAs. Although SHISHIR was found to be the first FPA to implement leasing mechanism in 2007, its application was more formal and organized in the NFPAs, as would be clear from the following paragraphs. The aquacultural operation of CHARIPARA, KUSHIARA and ASIA, and NFPAs of other four districts still managed by shareholders nominated MCs.

How the leasing system works: The aquacultural operation was leased at the beginning of each monsoon before stocking of the floodplain started. The preferred method of leasing was decided upon by directors of the FPA on behalf of the shareholders. Two methods were common among the FPAs. In one method, which was followed by all NFPAs, a lease circular was proclaimed in the community. Following the announcement, interested groups of lessees submitted their proposal to the MCs. From them, through a process of open bidding in the presence of directors, shareholders and NGO staff, the highest bidder was selected. Sometimes, this selection was done in a sealed-bid manner. After the selection, a contract was signed with the selected lessee group. This contract stated the tenure of the lease, mode of lease payment, geographical limit of the aquacultural operation and rights and responsibilities of the parties, among others. Another

method of leasing involved non-public and more informal search for a suitable lessee through personal communications of the directors of the FPA. After the leasing trends became popular, many lessees emerged in the Daudkandi region who engaged in this type of leasing enterprises. The directors sometimes communicated with familiar lessees of their communities and reached an agreement through less formal process. This type of practice was found in DHANUAKHOLA. A variation of non-public leasing involved internal selection from interested directors of the FPA itself. Subsequently one or more directors leased the aquacultural operation from the MC. In SHISHIR, one interested director leased the aquacultural operation and then managed it with the help of external lessees of his choice.

Incomes for FPA: The main purpose of an FPA was to generate income by running aquacultural operation in the floodplain. As the FPA was not going to engage in this operation after transferring its rights to the lessee group, the money it earns against this transfer from lessees became its sole income. This lease income was distributed as rent to the landowners, as dividend to the shareholders, as salaries to directors and other regular and irregular staff, and used for repair and maintenance of the floodplain and infrastructures and paying compensation for any damage the aquacultural operation caused, etc. The lease payment was usually paid to the FPA in equal installments at the beginning of each aquacultural seasons if the aquacultural operation was leased for more than one season.

The lessee group: Every lessee group had a leader with whom the lease contract was formally made. Not only the main function of a lessee group was the same as an FPA (i.e., managing aquacultural operation), but also was the manner of its formation. Its participants invested differently and shared return accordingly, like the shareholders of the FPAs. However, lessee group contained far fewer investors than an FPA (see Table 3), and participation was informal, flexible and, usually, limited to lease period. An FPA had no significant prerequisite regarding manner of formation or number of members of lessee group.

However, many lessees were found to have more direct stakeholding (e.g., as shareholder) in the FPAs in addition to as lessees. The nature of this direct stakeholding is shown in Table 3. Based on such stakeholding, the lessees can be broadly put into two categories:

- a) One type of lessees were the shareholders or directors or landowners of the FPA from which the lessee group leased the aquacultural operation. This category could be called insiders.
- b) Another category included those who had no stakes in the FPA as landowners, shareholders or directors. However, many of these lessees were directors or shareholders of other neighbouring FPAs. This group can be called outsiders.

Few lessees were also locally prominent traders of aquacultural input, e.g., fish feed or fertilizer or fingerling.

Table 3: FPAs with leased aquacultural operation and the status of lessees in terms their stakes in the FPAs*

FPAs	SHISHIR	SHANTO	PROSHANTO	LKS	CHARGRAM	KHIRAI	PANKOWRI	DHANUAKHOLA
Lease period (year)	3	2	2	2	2	2	1	2
Lease started in	2007	2011-12	2011-12	2012-13	2012-13	2013-14	2015-16	2015-16
Members of Lessee Group	4	18	19	9	22	18	19	10
Lessees' relations with FPAs	LI (D ^{PO})	D	S (D ^O)	D ^P (S ^O , LM)	S [NL], T (D ^O , LM)	S	S, T	D
	LI	LI, T (D ^O , LM)	D ^P	D ^P	LI, T (D ^O , LM)	S	LI, T	LI (LM)
	D, T	LI, T (D ^O , LM)	S	S	D, T	S	S, T	D (D ^O , LM)
	LI (S ^O)	D	S	LI	LI	LI (S ^O , D ^O)	LI	D
		LI (D ^O)	LI	LI (D ^O)	LI (D ^O)	S (LM)	D (LM)	LI
		S (D ^O)	LI	LI (D ^O)	D	LI (LM)	S	LI (S ^O)
		LI (D ^O)	LI	S	D	LI (D ^O)	LI	LI
		LI (D ^{PO})	LI	S	LI (D ^O)	LI	S (LM)	D
		S (D ^O)	LI	S (D ^{PO})	LI (D ^{PO})	S	S	LI, T
		S	LI		LI (D ^O)	S	D (LM)	D
		LI (D ^O)	LI		S	S	LI (LM)	
		D ^P	LI		LI	LI	S (LM)	
		LI	D ^P		LI (D ^O , LM)	D	S (LM)	
		LI (D ^O)	D ^P		LI, T	S	D (LM)	
		LI	D ^P		LI	LI	LI (LM)	
		LI (D ^O)	S		S (D ^P , LM)	D	S	
		LI	S		S, D ^P	S, T	S (LM)	
		LI	D		LI	S	LI (LM)	
			S		S (LM)		LI (LM)	
					S			
				LI				
				LI				

(Source: Authors' Survey)

*Most of shareholders and directors were also landowners, so only those who are non-landowners (NL) are indicated. Lessee's relation with other FPA is given in parentheses.

D= incumbent director, S=shareholder, LI= lessee other than director or shareholder of the FPA whose lease they hold, T= aquaculture related trader, LM=lessee of another FPA, D^O= incumbent director of another FPA, D^P= past director, D^{PO}= past director of another FPA, S^O= shareholder of another FPA

6. Discussion

Table 4 presents a classification scheme based on the finding of previous section. Besides the categories of NFPAs and IFPAs, the studied FPAs now can be differentiated in relation to the group managing the aquacultural operation, as shown column wise in Table-4.

Table 4: Classification of sample FPAs

	Shareholders' representative MCs	Lessee group
IFPAs	ASIA CHARIPARA KUSHIARA	DHANUA-KHOLA SHISHIR
NFPAs	DKK JHONJHONIA RANINAGER UB	CHARGRAM KHIRAI LKS PANKOWRI PROSHANTO SHANTO

In all types of FPAs the landowners are the principal and common stakeholders. This is usual, given that they privately owned the lands within which the FPA operation was conducted. However, non-landowners were also present in both types of FPAs in different proportion with important differences in rationale and methods of their inclusion. The principle reasons for including non-landowners were as follows:

1. **Obtaining the necessary capital:** This was mainly observed in the NFPAs as the NGO reported that it always wanted to make the FPA initiatives as inclusive as possible. It was repeatedly reported by the interviewees that in many FPAs—especially in the early ones—many landowners had not initially been convinced about the profitability of the FPAs to make investment and had been adequately happy with the rent earnings against FPAs' use of their lands. At that time, affluent non-landowner who were ready to take the risk and make investment had been offered shares freely.
2. **Securing support, rule enforcement and leadership:** The affluent non-landowner shareholders sometimes included community leaders (e.g., members of political parties) and other crucial members (e.g., non-landowner living in contiguous lands of a floodplain). On the one hand, the participation of the community leaders ensured their approval and support of the FPA initiatives. Their involvement would facilitate compliance of rules by participants (shareholders, directors and landowners) and non-participant members of community (e.g., by not poaching) along with quick, effective and lasting resolution of any conflict. On the other hand, this type of inclusion confirmed these key non-landowners' commitment to comply with rules of FPA as its participants and beneficiaries. Although this kind of involvement was more relevant to the NFPAs (as the NGO itself was an extra-community entity), it was also found in IFPAs. However, rule enforcement within community was not the only reason behind the inclusion of these non-landowners. There were issues of leadership within community (e.g., Olsson et al 2007; Gutiérrez et al 2011; Stöhr et al 2014), and in many NFPAs, it was reported that early critical leadership roles had been played by non-landowners.
3. **Poverty alleviation:** Landless community people were included to make FPA initiative socially more beneficial. While no IFPAs was found to include the landless in any meaningful proportion, in NFPAs their inclusion depended on their presence in the

community. In NFPA's where there was no landless share quota, and in PROSHANTO where such shares had been dissolved, directors reported that in their community there were no ultra-poor landless people who couldn't afford buying shares.

The first two points explained why shares were issued not in proportion to landholding amounts and why non-landowners were found in MCs of RANINAGER, JHONJHONIA and DKK or even in PANKOWRI in its early years. Interestingly, while the non-landowners of affluent and community leader category earned their position in MCs through their roles in FPAs, the landless shareholders failed to do so even when they were present in considerable number (e.g. in IFPAs). This might be because their participation was based on endowment rather than on active engagement. However, arrangements for non-landowners' participation were not permanent, as we have seen in PANKOWRI or KUSHIARA, where non-landowners had been eventually excluded.

The reason for such change could be found in the growing realization of the profitability of FPA enterprises among landowners. Because of this enhanced realization, on the one hand, only the prospect of lucrative return motivated the landowners to collectively start aquaculture in their lands, and on the other hand, many landowners who had not bought shares before became eager to be part of the rising profits. While in the IFPAs, the landowners as major organizers were not generally eager to include non-landowners unless this inclusion helped the functioning of FPA management (as mentioned above), in some FPAs where non-landowners were involved they were asked to leave. In PANKOWRI and KUSHIARA this resulted in inclusion of erstwhile non-shareholder landowners and exclusion of non-landowner shareholders. Such heightened realization also resulted in dissolution of shares that had been endowed to the landless. However, in KHIRAI, LKS, CHARGRAM or SHANTO, the inclusion of non-shareholder landowners was slow and gradual and didn't exclude any non-landowner shareholders.

So, it seems that there was a gradual rise of landowners' proportion in shareholders' group in the studied FPAs of the Daudkandi region. The involvement of non-landowners, especially the affluent ones, was now generally perceived by landowners as meddling or to have negative impact on the FPA performance and on their property. Even for the NGO, the priority in the Daudkandi region was to keep the landless, and it was successful in doing so, except for PANKOWRI and PROSHANTO. However, it seems that because of the presence of the NGO, the majority of NFPA's of the Daudkandi region still kept landless shares. The only IFPA (ASIA) which had issued considerable landless shares subsequently dissolved those shares. In this regard, few FPA staffs informed that some landless shareholders had sold their shares in times of crisis. While, in this connection, the efficacy of earnings from only one share in poverty alleviation of a landless poor household may be questioned, it may be mentioned that many landless shareholders kept their shares. However, in the context of a general reluctance to include non-landowners, the possibility that non-landowners might get involved in the FPAs by purchasing shares from landless shareholders perhaps led some FPA managements to buy back and dissolve the landless shares.

Thus, with the gradual realization of profitability by most landowners, the support of non-landowners became redundant and their sharing of benefit perceived as unwelcome extraction of benefits by outsiders at the expense of landowners' legitimate claims. Interestingly, this attitude was also extended to the NGO, whose involvement was viewed in the same way by few landowners. The result of SHISUK's share reduction and removal from MCs' chairmanship in PANKOWRI were the result of few landowners' opposition to its presence in the FPA.

However, important exceptions were found in landowners' general attitude towards non-landowners. In ASIA and PANKOWRI, exceptions were made in general rules to include non-landowner directors in MCs. When we compare the case of PANKOWRI against other NFPA, where aspirant non-landowners were found to buy or obtain lands through inheritance to fulfill the landholding requirement of a director, we learned that this exemption, made for *one* non-landowner, was ascribable to his power relations within community. This type of exceptions indicates that community's internal dynamics of power relationships determines, to some extent, the inclusion or exclusion of non-landowners—along its continuity and non-landowners' type—which translates into facilitation or contestation of the enforceability of the rules and functioning of the FPAs in the community. For NFPA, this signifies that SHISUK's role in maintaining NFPA's organizational integrity is also shaped by such internal dynamics of power relationships.

The innovation of lease management and rise of professional aquacultural managers

During last two decades in the Daudkandi subdistrict the shareholders and directors of the FPAs experienced many difficulties. Topping the list was making unsatisfactory profits or outright loss which led to no or lower than expected dividends or land rents. Relevantly, there were frequent mentions of various issues surrounding the management committees' handling of FPA affairs. These included complaints about lack of cooperation and mistrust among the directors, inefficient management of aquacultural operations along with typical allegations of financial embezzlements, among others. The transfer of the FPA's income generated function, aquacultural operation, through lease mechanism to lessees seemed to be innovated as a solution to these problems.

As was shown in Table 3 and discussed above, many of lessees were in one way or another related to the FPAs. Many interviewers reported that the primary reason for transferring the management risk and responsibility to this type of directors through lease management was to solve two major problems the FPAs were facing. On one hand, through this mechanism the FPA secured a source of income which has no risk of loss as the FPA don't have to make any investment in usual aquacultural operations. By the same token, the challenge of making profit was transferred to the shoulders of lessees. This would solve the problem of hurting the income of FPA resulting from any mismanagement of aquacultural operation by the managing group, whether they were directors in the new role of lessees or any other outsider lessees. The underlying rationale was that in lease management the lessees could hardly afford mismanagement of aquacultural operations. This was because in the lease management of aquacultural operation the stakes of few members of lessee group were personal and high. They were running the aquacultural operation by making considerable personal investments rather than using investments made by others, i.e., of shareholders of FPA.

Lessees were also found motivated to take risks of their own affairs rather than running others' affairs. This may be because when the lessees were managing the aquacultural operation as directors of the FPA, the loss the FPA made were carried by all shareholders and portion of their personal loss was not high. Moreover, despite losses the directors had earned some remunerations against their services. There were also mentions of additional incomes in the form of commissions resulted from large scale and/or continuous purchase of aquacultural inputs from suppliers. While directors were still earning remunerations for their services, those who were involved in lease reported that they made higher incomes against higher investments.

The lessees were found to be a new type of fishermen whose involvement in aquaculture was of entrepreneurial nature. They didn't involve in catching fish by employing manual labour but involved in aquacultural activities mainly through investing in lease mechanisms. They were

responsible for making decision about stocking, harvesting and other operational aspects of leased aquacultural operations, though some were found to participate in harvesting and other fish culture activities as a part of direct monitoring. As we have shown in Table 3, many lessees were either insiders or stakeholders of other FPAs. Many had had years of experience of managing the FPA as directors. Moreover, through interviewing such lessees, we found that some of them were leaseholders in several FPAs in the communities. It was also found that one lessee group were managing several FPAs in the neighbouring communities. Thus, it seems that there has been an emergence of professional lessees who are occupationally involved in managing aquacultural operations, and rise of these professional lessees and lease-based management of FPAs' aquacultural operations have been two mutually reinforcing developments. However, growth of aquaculture related professions was not limited to lessees as the spread of FPAs was accompanied by rise of various input suppliers and output forwarders in the Daudkandi subdistrict (as indicated in Gregory et al. 2007; Toufique and Gregory 2008). In other four sites, the FPA trend seemed too new to result in growth of such professions.

When the staff, shareholders of CHARIPARA, ASIA and KUSHIARA were asked why they didn't follow lease-based management of aquacultural operation, they responded that they were continuously making profit and shareholders, i.e. landowners were happy with their management. While we didn't collect any time series information on revenues of these FPAs, a glance at the FPA profits from year 2015, we found that these three were among the eight FPAs which made profit in the last season.

7. Concluding remarks

The present study corroborated SHISUK's contribution in FPA development in the Daudkandi region and showed its recent attempts to spread the trend in other parts of Bangladesh. However, since SHISUK's intervention in the Daudkandi region, the expansion of FPAs was boosted by a trend of bottom-up adoption where landowners formed FPAs to collectively manage aquaculture in their lands. Although the NGO remained as a non-landowner institutional partner in the NFPAs, it was the landowners—either as partners or sole organizers—who played major role in subsequent evolution of FPAs' management and organizational practice. Landowners' primacy was underpinned by their ownership of lands within the floodplains and can be seen in the fact that even when they are not managing an FPA's aquacultural operation as director they are doing so as lessees.

Over the years, the participants changed FPAs' organizational composition and management practices in the light of what they learned through experiments and experiences. In this process of experiential and experimental learning-by-doing, the NGO has also been a partner. These two—adaptive management and the linkage characteristics of co-management—are the basic components of adaptive co-management (ACM) (Plummer et al 2012). However, whether the modifications that were implemented in the FPAs can be called ACM depends on if they would comply with the core components, feature and necessary conditions for ACM (e.g., Plummer et al 2013) or how they would be compared against ACM-based assessment of natural resource management (e.g., Stöhr et al 2014). Such evaluations can be made in ACM based future studies. Meanwhile, as illustrated in this article, many changes regarding FPAs were responses—like, proliferation of FPAs in the Daudkandi region, landowners' attempts to become rights-holders or concentrate among themselves the increasing flow of benefits—resulted from modified incentives brought about by community's integration with the market (cf. Pender and Scherr 1999; Agrawal 2001; Gebremedhin et al 2004; Tucker et al 2007; Cinner et al 2012). In the case of present study,

community's integration with markets through development of FPAs occurred with the help of the NGO. Although its involvement was not limited to that role as it has also shaped the management and governance of the FPAs, its capacity in these roles was somehow determined by dynamics of community's internal power relationships. However, lease-based management has been an adaptive mechanism innovated by shareholders to solve the problems in financial performance. Thus, to some degree, the FPAs evolved through participants' capacity to respond adaptively in face of challenges they experienced. Although the question whether lease mechanism led to effective and efficient management of aquacultural operation requires further inquiry in financial and managerial aspects, during our study we found most interviewed shareholders were happy with this lease-based management.

In any case, the introduction of aquacultural operation in seasonal floodplain water-bodies is an altered way of using the existing resources. This altered way entails not only new management practices underpinned by newly defined property rights-holders but also new level of involvement from the right-holders. Enhanced use of floodplain to obtain higher yield requires higher degree of involvement from the authorized and contributing users. In the context of heightened awareness of profitability of FPA enterprises, the twofold challenge for future will be, first, how the local poor or marginal community member can claim or maintain endowed claims over time on benefits for which they didn't make any contribution, and second, how the benefits from FPAs can be made more wide-ranging through continued inclusion of non-landowners.

Finally, in the other four sites, we didn't find the developments similar to those of Daudkandi region. All these developments—rise of landowners self-organized FPAs, changes in shareholder composition, lease-based management of aquacultural operation and rise of professional aquacultural managers—occurred over two decades of FPA expansion. Although the interviewees from these sites mentioned of few FPA initiatives in their areas, the level of intensity has yet to reach that of the Daudkandi region. Through a quick glance at the revenues earned from fish sales we found that the FPAs from other four districts are yet to reach the level of revenue that we observed in the Daudkandi region. The direction of the FPA evolutions in these regions should be carefully examined in the particular context of expanding FPA trends and the overall context of community-based CPR management.

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