

A CASE STUDY ON PARTICIPATORY MANAGEMENT OF FISHPASS IN BANGLADESH

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ABSTRACT

Sariakandi Fishpass is the largest Fishpass in Bangladesh connecting embanked Jamuna and Bangali Rivers to their floodplains. This structure initiates movement of adult fishes, juveniles, fingerlings, fish-eggs and other aquatics to floodplains at the beginning of monsoon. It has three-vents with sixteen-pools (4.2m×4.8m having 0.7m opening) in each vent. This paper evaluates impacts of the Fishpass on fish production, fish-diversity and socio-economic conditions of the region. A questionnaire survey has been conducted to collect information on local stakeholders. The survey output is used to develop a participatory management framework for operation and management of the Fishpass. In this framework, representation of local stakeholders has been gathered as Fisheries Management Group (FMG). An apex body called Fishpass Management Committee (FPMC) has been proposed comprising representatives from FMGs. There is also a Performance Monitoring and Technical Advisory Committee (PMTAC) of officials from different government agencies, local government institute (LGI), NGO and FPMC to coordinate technical assistance and interagency cooperation. Mutual accountability among these groups and committees has been ensured through defined rules and regulations. It is found that sedimentation immediately after monsoon cut-offs the flow through Fishpass. While impacts are found positive, it shows participatory management is crucial for maintaining the Fishpass and equitable distribution of benefits.

Key words: *Shanon Diversity Index, Local stakeholders, Participatory management, Mutual accountability, Fishpass.*

1. INTRODUCTION

Water resources development in Bangladesh has reached a stage where it has to advance progressively from single purpose scheme to more complex interrelated system by synchronizing agriculture, fishery, environment and others. Food chain and life cycle of natural fish and other aquatic species have become vulnerable due to interruption of the normal sequence of flooding in floodplains (NWMP 2001). Inundation of the floodplain provides the spawning ground, nursery area and major feeding opportunity for a wide range of fish species (Minkin 1989, Ali

1991). The impacts on natural fish migration, reproduction and ecological balance for flood control measures appeared as a major concern to the perpetual survival of floodplain fishes in many parts of Bangladesh (FAP-6 1994 and 1998; FAP-17 1994). The task of minimizing impacts on the natural fishes is very complex. It requires close cooperation of planners, biologists, engineers and stakeholders. In National Fisheries Policy (NFPO 1998) and National Environment Policy (NEPO 1992), emphasis has been given on the protection of fish diversity. It has also been stressed in National Water Policy (NWPO 1999) that measures should be taken to minimize the disruption to natural aquatic environment and water channels. The concept of fishpass and fish-friendly structure has been introduced in Bangladesh as a remedy to these overstretched problems. Until recently no organized attempt was made to improve fish habitat, or sound management involving affected communities (Rahman et al. 2002). In NWPO (1999) emphasis has been made to bring institutional changes that will help to decentralize the management of water resources projects and enhance the role of local people in efficient and socially acceptable manner so as to promote public and private responsibilities.

2. FISHPASS AREA

The Sariakandi Fishpass is the largest and most recent fishpass constructed and owned by Bangladesh Water Development Board (BWDB). This is a vertical slot type fishpass structure. It has three vents with 16 pools in each vent. It maintains connection between Jamuna (Brahmaputra) River and Bangali River. It is located at Debdanga of Kutubpur Union, Sariakandi Upazila, Bogra. The mighty Jamuna is on the east and the Bangali is on the west. The fishpass is situated between Sariakandi and Mathurapara Hard Points. There are 12 villages around the fishpass directly linked with its impact. The socio-economic condition of this area largely depends on the Jamuna and Bangali river system. The construction of Brahmaputra Right Embankment (BRE) in the late sixties has affected the flooding pattern and fish production in the Bangali River. An immediate impact on livelihood was evident. Subsequently this fishpass has come out as a blessing in the area. BWDB is now operating and managing the fishpass through a gate operator. Fourth Fisheries Project of Department of Fisheries (DoF) is now managing the fisheries of Bangali River by declaring few locations as sanctuaries using local people and a NGO called TMSS. However the local stakeholders are not consulted for the operation and managing of the fishpass.

3. DATA COLLECTION

Two categories of data like stakeholders' perception to fisheries management and fish catches in the area have been collected for this study. Stakeholders' perception data were collected through field visit and questionnaire survey. Questionnaire survey was conducted among the N=42 households of the study area. To substantiate questionnaire findings, three focus group discussions (FGDs) were

carried out at three key locations of the study area. Interviews were held for Department of Fisheries (DoF), Department of Agricultural Extension (DAE), Department of Cooperatives (DoC), TMSS and BWDB local officials. The fish catch data were collected from TMSS office (partner NGO of Fourth Fisheries Project of DoF). Fish catch data includes information like number of fisherman, types of gears, fish catches, etc.

A fishing unit is defined by a fisher (or group of fishers in the case of gears such as the commercial seine nets) with a given type of gear and eventually the fishing craft used. One unit effort is defined by the fact that a given fishing unit has fished during the past 24 hours. The estimated total effort for each group of fishing unit is as follows:

$$\text{Total effort} = (N \text{ fishing units}) \times (\text{days in the month}) \times C_A$$

where, C_A is the Activity Coefficient to define the proportion of fishing units that are expected to fish during the given days. The total number of fishing units (N) is known from regular standardized counting of the number of fishermen and the number of gears used at different sanctuaries. The relationship, which is used to estimate the total catch, is therefore:

$$\text{Total catch} = (\text{fish catch per unit effort}) \times (\text{total effort}).$$

4. RESULTS AND DISCUSSION

Fishpass and Impact

Fish production: There was decline of fish production in Bangali River immediately after the construction of Brahmaputra Right Embankment (BRE) Project. The fishpass starts operation in April 2001. Afterward, a significant positive impact on fish production has been observed in the Bangali River. According to TMSS data the total catch has increased about six times compared to the pre-fishpass period. Many rare species were back in the area after construction of the fishpass.

The Shannon index (H') is used as a measure of fish diversity. The formula for this index is:

$$H' = -\sum_{i=1}^N p_i \ln(p_i)$$

where, $p_i = \frac{n_i}{N}$ is the proportional abundance of the i th fish species, n_i is the number of i th fish species, N is the sample size of the total catch.

Table 1 shows the diversity index is increasing each year between 2001 and 2004. This indicates the proportionality of abundance of fishes. Number of fish

species has also increased in the Bangali River. During focus group discussion and questionnaire survey it has been expressed by the locals that the production of threatened fish species has increased and the rare fish species is found more frequently in the Bangali River.

Table 1: Fish species and diversity indices of the Bangali River

	2001	2002	2003	2004
Number of species	37	41	45	56
H'	1.51	2.15	2.5	2.9

Socio-economic: One of the objectives of construction of Sariakandi Fishpass is to improve the livelihood of local fishermen. It has been observed from questionnaire survey that the fish business and subsequently family income and fish consumption have increased.

Problems Related to Existing Management Practice

Lack of co-ordination: The present O&M procedure is not demand driven. Local beneficiaries have no control on the fishpass. There is hardly any participation of other pertinent agencies like DoF and DAE. Table 2 shows that 90% (N=38) of the total respondents are aware that BWDB is responsible for the management of the structure. However a big part of them (N=32) are not satisfied with the existing management system. They cited various problems like improper operation of gate, inadequate enforcement of laws related to catch juveniles during migration season, non-participation of local beneficiaries, etc are the major limitations for proper management of the fishpass in the area.

Inadequate law enforcement: Implementation of rules and regulations to restrict activities damaging fish migration is essential for fruitful outcome. Seventy four percent (N=31) respondents believe that enforcement of law is inadequate. As such effective enforcement of law could improve the scenario is mentioned by 70% of the total respondents. Unfortunately, such activities are absent at the fishpass site and as a consequence it has become a fish-trap.

Non-participatory decision making: There is no participation of beneficiaries in decision-making. Decision making is overwhelmingly done by implementing agency (BWDB). There is also no grass-root level organization to oversee the interest of the poor traditional fishermen. Table 2 illustrates that 90% (N=38) of the total respondents want to take part in the management process for better operation of gate and enhance fish production in general. However, a lack of initiative on the part of local beneficiaries to be involved in the mainstream management of the structure is being observed.

Table 2: Questionnaire survey (N=42) on existing management and improvement requirement

Beneficiaries awareness about ownership of the structure & management responsibility		
BWDB	38	90%
No idea	4	10%
Satisfaction level on existing management by BWDB		
Satisfied	10	24%
Dissatisfied	32	76%
Gates not properly operated during breeding season	31	74%
Non involvement of beneficiaries	21	50%
Inadequate enforcement of laws	31	74%
Difficulties in fish and fish fry passes	4	10%
Improvement of present management		
Involvement of beneficiary in gate operation	35	83%
Operation of gate in proper time	32	76%
Enforcement of rules & regulation to stop illegal juvenile catch	29	70%
Involvement of other related departments	20	48%
Involvement of representative from elite people	3	7%
No/no idea	5	12%
Willingness to participate in fishpass management committee		
Pessimistic	4	10%
Optimistic	38	90%
Gate operation in proper time	29	76%
Enhancement of fish production in the Bangali River	12	32%
Better management	8	21%

Stakeholders Perception Regarding Management Organization

Management organization: All the respondents who are aware of the BWDB management responsibilities (N=38) as shown in Table 3, suggest that there should be Fisheries Management Group (FMG) at each villages as a lowest level management organization. Representatives from each of the FMGs will form one Fishpass Management Committee (FPMC) to coordinate and decide the local requirements. This will be the apex body of the local representatives for proper management of the fishpass structure in the whole system. For monitoring, technical and other assistances there should be a Performance Monitoring and Technical Advisory Committee (PMTAC), consisting of BWDB, DoF, DAE, DoC, Local Government Institution (LGI), along with selective representatives from FPMC of the local beneficiaries. Gate operation will be decided by FPMC through their nominated Gate Operator on requirement basis.

Membership of FMG and FPMC: Representation of all stakeholders is the key factor for better management. Fishermen are the prime beneficiaries of the fishpass. All the respondents (N=38) who are aware of the BWDB responsibilities favored fisherman for maximum membership in the FMG. A large number of respondents opined that members and chairman of LGI should also be in the FMG. Membership of other professionals is also suggested as shown in Table 3. This will give the local people a united decisive voice in the management process. The local beneficiaries will feel that they are the owner of the structure and the system.

Participation of organizations in PMTAC: Fishpass O&M and management will require close cooperation of BWDB, DoF, DoC, DAE, LGI, NGO and FPMC. Involvement of BWDB and other relevant agencies is indispensable for better management of the structure and capacity building of the local stakeholders. This idea has been reflected in the opinion of the local beneficiaries (Table 3). According to the view of the local beneficiaries 90% (N=38) believe that DoF and LGI should be the members of the PMTAC along with BWDB. DoF should be responsive for the technical know-how of the fisheries. LGI should help implementing rules and regulations against illegal fish catching. Implementing agency BWDB should be responsible for technical assistance and major O&M work. FPMC members should be included in PMTAC for transfer of information related to problems and subsequently technical knowledge to the local communities.

Table 3: Perception of local stakeholders on fishpass management structure

Management structure	Frequenc y	Percentag e
Tier of fishpass management		
FMG at the bottom level	38	90%
FPMC at the apex level	38	90%
PMTAC for consultation and interagency coordination	36	86%
Eligibility of membership for FMG and FPMC		
Fisherman	38	90%
Union Parishad chairman	31	74%
Union Parishad member	29	69%
Woman	27	66%
Farmer	23	57%
Teacher	17	40%
Elites	6	16%
Businessman	6	16%
Landless	3	7%
Member organizations for PMTAC formation		
BWDB	38	90%
LGI	38	90%

DoF	38	90%
DoC	30	71%
DAE	17	40%
FPMC	12	29%
NGO	8	19%
Process of selecting members in FMG and FPMC		
Selection by focal group discussion (FGD)	33	79%
Election	1	2%

Selection of members: It is crucial to find out the process of selecting members for any management group. Existence of democratic atmosphere is the key factor for the success of any water resources project. As such local stakeholders perceived (N=33, Table 3) that focal group discussion (FGD) should be the method used for selecting members in the FMGs and FPMC. They viewed election (secret ballot) should not be used at this preliminary stage.

Activities to be Performed

Activities of FMG and FPMC: Activities of FMGs and FPMC are shown in Table 4. Timely gate operation and stopping illegal fishing are the foremost duties of these organizations (N=38). According to the perception of 90% respondents, income generation should be another major activity (86%) to develop them as a self-sustained organization. Other tasks include minor O&M work (86%), maintain liaison (50%) with the PMTAC in order to overcome any technical problems, capacity building, etc. They must have regular meetings to discuss problems among themselves.

Services from PMTAC: The expected services from PMTAC according to the perception of the local beneficiaries are shown in Table 4. PMTAC will assist the local stakeholders by providing technical support and support to implement rules and regulations. They must give them training to build up their capacity and better understanding of management process. It will help the root level organization FMG to involve actively in the management process. The local beneficiaries also expect financial support from the PMTAC (N=37).

Table 4 Delineation of committee activities

Activities	Frequency	Percentage
Activities of the FMG and FPMC		
Gate operation	38	90%
Income generating activity	36	86%
Liaison with the PMTAC	21	50%
Meeting	29	69%
Prevent illegal fishing	38	90%
Minor O&M activity	36	86%

Raising fund for minor O&M	12	29%
Services of the PMTAC		
Technical support	38	90%
Implementing rules & regulations	38	90%
Training	36	86%
Financial support	37	88%

5. PROPOSED PARTICIPATORY MANAGEMENT MODEL

The tier and composition of local beneficiaries' representation in the management model are shown in Figure 1. The bottom level is termed as FMG and the apex level is termed as FPMC. There will be 12 FMGs at 12 villages around the fish pass where the fishpass has direct impact. All the inhabitants of these villages will be the general member of respective FMG. The executive committee (EC) should be consisted of 12 members from among the general members of the particular FMG. EC must have at least 3 members from women, 1 member from vulnerable social group, and 1 member from farmer community. The remaining 7 members are from fishers. President and General Secretary must be from fisher community through selection/election by a majority vote of the members of the FMG. Treasurer should be open to all social groups. All the executive members of the FMG will be the general members of the FPMC. The EC of FPMC should also be consisted of 12 members with President and General Secretary from fishers' community through selection/election by the general members of the FPMC. There is no position for Treasurer in FPMC. FPMC is solely responsible for coordination of plan and decisions of the individual FMGs with PMTAC. Representatives of BWDB, DoF, DoC, DAE, LGI, NGO and FPMC in the PMTAC will monitor the activities of FMGs and FMPC and will provide technical assistance to the general members and the community as a whole.

The organizational linkages in which the local stakeholders will participate for fishpass management are shown in Figure 2. It shows the mutual linkages of FMG and FPMC with others. The FMG/FPMC representing local stakeholders will be the driving force of the management process. The implementing agency along with other agencies in the PMTAC will undertake necessary steps for the formation of local stakeholder groups (FMGs and FMPC) with the assistance of other community organizations (like NGOs) and provide training and other technical assistances to the FMG for their involvement in the management. The PMTAC will also take initiative to ensure necessary coordination and cooperation between FMGs and FPMC.

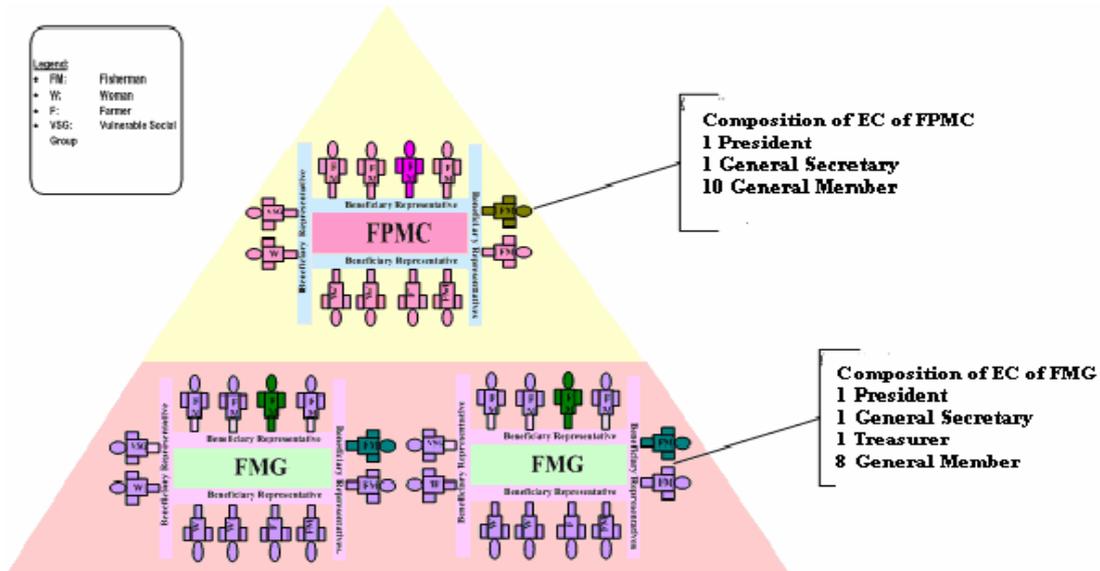


Figure 1 Management model and its composition

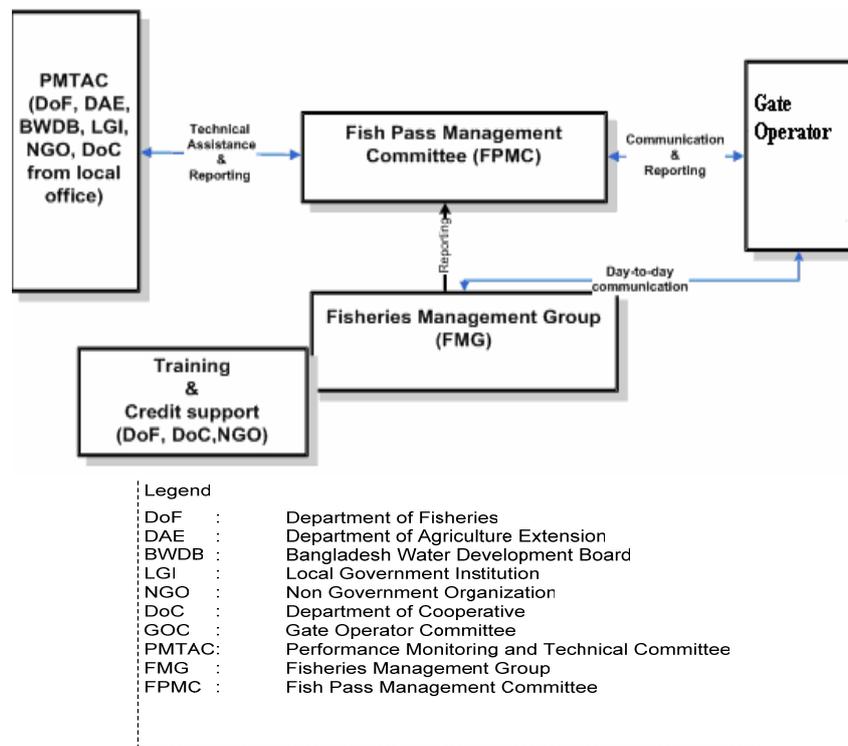


Figure 2 Organizational linkages for the fishpass management model

Rules and Regulations for Fisheries Management Group (FMG), Fishpass Management Committee (FPMC) and Performance Monitoring and Technical Advisory Committee (PMTAC)

The FMG, FPMC and PMTAC should follow the guidelines as outlined below:

1. All the men and women of a village near the Fishpass will be the general members of the FMG. All the executive members (ECs) of FMG will be the general members of the FPMC. Selection of these EC members could be through broad consensus among the general members. In situations with a lack of consensus, the EC members should be elected through a ballot system.
2. It is stated that there are 7 members would be from fishers' community. Fishers are anyone fishing regularly on a subsistence or professional basis. Membership of a traditional fisher group does not automatically qualify someone as a fisher.
3. Members of the EC should be changed in every 2 years. If any EC member involves in any unlawful activities will be eliminated from the EC. New member will be selected/elected in the same way for the rest of the period of the EC.
4. Members of FPMC and FMGs should meet every month on a particular date decided by them. Minutes of the meeting should be recorded properly. FMG must submit the minutes to PMTAC and FPMC. FPMC must submit their minutes to PMTAC. FPMC will hold an annual general meeting to inform the FMGs about the overall plan and activities for fund generation and minor O&M requirements. Each decision in FPMC and PMTAC must be properly transmitted to each FMGs.
5. FMG will submit their monthly fish catch record to FPMC and PMTAC for record keeping.
6. The FMG will be responsible for preventing illegal catch of fish-egg and fingerlings inside the structure, u/s and d/s and adjacent to the floodplain of fishpass and their respective area during breeding season. FMG should take initial initiative to assess their need. The PMTAC must provide them necessary supports on priority basis in this regard as and when required. If it is established that any member is involved in illegal fishing should be fined. The amount should be decided by the EC of the FMG. He cannot be member of EC of any level and will lose his membership forever.
7. Each FMG will collect contribution on a regular-basis (yearly) from individual households. The contribution amount will be decided on the number of members in each subsistence or professional fishing unit.
8. FMG will be responsible to utilize the minor O&M fund. Gradually they will take responsibility of medium-scale O&M work. Fund that is generated by contribution will be utilized to help the fishing community for development as well. They will work together to help the NGO to identify the community whom credit support is required. They must help individual fishing unit for income generation.

9. FMG will be responsible for channel maintenance, such as, removal of deposited silt in the u/s and d/s of the fishpass, sanctuary management, etc.
10. FPMC will be responsible to appoint gate operator. They must give necessary direction and decision regarding timely gate operation. PMTAC must help the FPMC to prepare a schedule for gate operation. Before operate the gate they must consult FMGs to avoid any conflict. FMGs will be responsible to pay the gate operator.
11. FMGs should get training through PMTAC for utilization of fund and locally available resources. PMTAC should also provide necessary training on management of fishpass, O&M work, breeding season of fishes, existing rules and regulations regarding size and season of fishing, etc.
12. FPMC will work as internal monitoring organization. They will look into the affairs of the FMGs and activities of physical, financial, environmental impact of the project, etc. They should give their feed back to the PMTAC. PMTAC and DoC will also monitor the works of FMGs and FPMC. They will work as external monitoring organization. A well-defined reporting chain of system should be established so that any malfunctioning may be sorted for correction in time.
13. FPMC will elaborate a Fisheries Management Plan for the entire area. This plan should be executed by individual FMGs. The Plan must enhance the access of all the members impartially.
14. FMG must be registered according to the rules and regulations of the DoC. Each FMG will open a joint bank account operated by President and Treasurer. Funds raised by the FMGs should be deposited in the bank. Bookkeeping system should be transparent and the account book should be open for inspection by the PMTAC, FPMC and DoC.

6. CONCLUSIONS

The proposed management model will provide detailed operational framework for stakeholders' participation and capacity building in fishpass management. It will give the local stakeholders a significant voice at all stages of management system. Mutual accountability has been anticipated among each organization. The model will help to develop capacity of the local stakeholders in participatory management. It will also gradually establish ownership of the local stakeholders and will help to achieve the objectives of the integrated water resources management (IWRM).

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