



RESEARCH PAPER

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Effects of sluice gate on fisheries and crops production at Jugini CPP Area, Tangail, Bangladesh

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Key words: CPP, Louhajang river, sluice gate, fish and crop production.

<http://dx.doi.org/10.12692/ijb/4.8.8-13>

Article published on April 22, 2014

Abstract

The Compartmentalization Pilot Project (CPP), a water management project was introduced in 1989 which also called Flood Action plan (FAP-20) started in Tangail on 1991. The CPP project made a sluice gate on the Louhajang River at Jugini to protect the Tangail town from flood. There is a great impact of the sluice gate on the CPP area and also on agriculture and fisheries of the two parts of the sluice gate area. A study was conducted to assess the effects of sluice gate on fisheries and agricultural production both in upstream and downstream of the Jugini sluice gate in Tangail sadar during the period of July to December 2011. The study was performed mainly through survey methods with the assist of questionnaires and secondary information's. The results of the study showed that the agricultural production increased in the downstream where the fisheries production decreased gradually. The present data was also compared with the secondary data collected from CPP since its construction on Louhajong River at Jugini. In dry season, irrigation problems occurred due to unavailable source of water. To check the upstream problems, an embankment on the Louhajang River on the upstream part is necessary to build. The sluice gate was established aiming for controlling flood and benefits for downstream area people. Hence, there is no changed in upstream part, moreover upstream area is flooded every year and damage crops, decreases natural fish production. Therefore, it is necessary to practice alternative way for fish culturing with proper training where crop land fish cultivation might be an easy accessible method.

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Introduction

Bangladesh is situated in delta of large rivers and their tributaries, the Brahmaputra (Jamuna), the Ganges (Padma) and the Maghna, drains a huge catchment area outside the country as well as total surface of the country itself (142000 Km²). The watersheds of this three-river system cleave an average annual rainfall of 210140 and 400cm, respectively (Tsai and Ali, 1986). Immediately after the 1988 flood disaster, several studies were carried out by the Government of Bangladesh (GoB) and the international community to find a lasting solution for the flood problem. In June 1989, the World Bank agreed with the GoB to co-ordinate the various flood control and related initiatives from which the Flood Action Plan (FAP) emerged (FAP-20, 2000). The Compartmentalization Pilot Project (CPP) also called FAP-20 that started in 1991, is a water management project situated on the East bank of the Jamuna River with Tangail Town in its centre (Graaf, 2001).

Understanding the concept of compartmentalization is key to successful environmental assessment of the CPP, the concept were evolved in the Flood Action Plan to provide water management in protected areas and to contain the extent of flooding in case of an embankment breach. A compartment is an area in which effective water management, controlled flooding and controlled drainage is made possible through structural and institutional arrangements with intended benefits which will include flood control structures, increased crop production and crop diversification. The CPP is the first scheme for implementation and if proved effective, were adopted in FCD/I projects (FAP 20, 1992). The purpose of the pilot study was to design and develop the framework and survey instruments for a comprehensive study of the role of fish bio-diversity on human health and nutrition in rural areas of Bangladesh and the results showed that capture fisheries provided a very high percentage of the protein consumed by families studied (FAP-16, 1992). The agricultural monitoring system was designed to develop cropping and crop diversification programs in CPP area and land types, land use and cropping patterns were defined (CPP,

2000).

In Tangail, only normal floods are allowed to enter the floodplain where the high and dangerous flood levels are controlled. To minimize any possible negative effects of controlled flooding on fisheries, a maximum number of fishes should be allowed to enter the River Louhajang and its adjacent floodplains in the project area for their hatchings, nursing and feeding (FAP-20, 2000). In this regard, the research was conducted to implement the following objectives: i) to identify the effects of sluice gate (before and after construction) on crop and fish production at upstream and downstream region, ii) to identify the change of lifestyle of the local people due to sluice gate, and iii) to identify the possible ways for solving the existing problems in downstream and upstream of CPP area.

Materials and methods

Study Area

The study was conducted in two villages namely Kathua Jugini and Khurda Jugini of Baghil union, Tangail, Bangladesh. The total area of the project is approximately 13,000ha of which around 3300ha is floodplain (Banglapedia, 2008). The area of Kathu Jugini and Khurda Jugini are 217 and 349 acres, respectively. The households of Kathu Jugini and Khurda Jugini are 308 and 423, respectively, with population of 1377 and 1999, respectively (BBS, 2001).

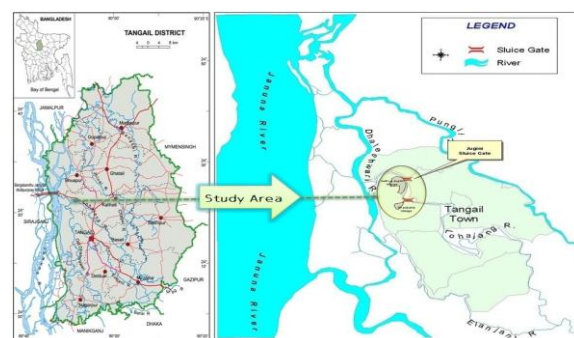


Fig. 1. Map showing the study area of Jugini sluice gate in Tangail sadar (Banglapedia, 2008; Halls, 2005).

Data Collection

The study was carried out through survey based

method. Data were collected from 120 randomly selected village people of different occupation levels like farmer, fisherman, businessman, service holder, and day labor of the whole CPP area using the participatory learning approach and methods adopted from CPP and WDB guidance sheet. The collected data was then compared with the CPP final report of both agriculture and fisheries which is the control variable that already exists. Secondary data was collected from Bangladesh Water Development Board (BWDB), Bangladesh Bureau of Statistics (BBS), Bangladesh Agricultural Development Corporation (BADC) and Water Resource and Planning Organization (WARPO).

Data processing and analysis

After data collection, compilation of necessary

information, tabulation, processing and presentation were done by using Statistical Package for Social Science (SPSS) and Microsoft office excel.

Results and discussions

Respondents profile

One hundred and twenty respondents were selected for completing the questionnaire survey. The highest number of the respondents were within the age group of 45-above. Majority of the respondents (63.33%) did not have any formal education and only 31% had completed primary education level (Table 1). The occupation of the respondents in the study area is shown in Fig. 2, where majority (60%) of the respondents depended on agricultural work and 38% on fishing.

Table 1. Profile of the respondents of study area (N=120).

Variable		Frequency	Percentage
Sex	Male	110	91.67
	Female	10	8.33
Age	16-25	20	16.67
	26-35	28	23.33
	36-45	32	26.86
	45-above	40	33.33
Educational Background	No Schooling	76	63.33
	Primary Level	31	25.83
	High School Level	7	5.83
	S.S.C	4	3.33
	H.S.C	2	1.67

Functioning of sluice gate of CPP

The outcome of the study showed that 63% (mainly the farmers) of the respondents confessed the beneficial effects, while 32 and 5% of the respondents observed harmful effects and no effects, respectively,

by CPP on their livelihood along with their occupation in the study area. Since the fishermen were vulnerable regarding the matter, many of them have changed their occupation.

Table 2. Average crop and fish production during 1994-99 and 2002-07 in the study area.

Year	Total Crop Production (ton)	Average Production (ton/ha)	Total Fish Production (ton)	Average Production (ton/ha)
1994-99	482380.0	80396.66	2476	412.67
2002-07	854401.8	142400.30	1376	229.33

Change of habitation after and before CPP

People of all classes (poor, middle class and rich) were affected by CPP more or less. Poor households (78% farmer and 28% fisherman) suffered from

severe difficulties in adjusting loss of income than the other economic classes of people. On the other hand, these households were less capable to take protective measures against hazards than the riches.

Impacts of CPP

After implementing CPP, the most significant trend in *Rabi* cropping had been increased instead of Mustard and *Boro* paddy. The yields of *Boro* rice had increased significantly from 1994 to 1999 in both compartment area and Tangail sadar upazila. Beside this, overall crop production was increased to 854401.8 ton from 482380 ton in between 1994-99 and 2002-07. The

study also showed that the crop production was increased after CPP implementation time to 2010. On the contrary, the fish production was decreased as the sluice gate was unfriendly for fish passing and the production was lowered by 1100 ton/ha (Table 2). Beside these, there were potentially negative impacts on soil fertility and water quality.

Table 3. The comparison of fish production during CPP and after CPP.

Year	Land types	Fish production during CPP (kg/km/yr)	Year	Land types	Fish production after CPP (kg/km/yr)
1992	F ₁ +F ₂ +F ₃ +River+Khals	181	2002	F ₁ +F ₂ +F ₃ +River+Khals	273
1993	F ₁ +F ₂ +F ₃ +River+Khals	724	2003	F ₁ +F ₂ +F ₃ +River+Khals	300
1994	F ₁ +F ₂ +F ₃ +River+Khals	197	2004	F ₁ +F ₂ +F ₃ +River+Khals	250
1995	F ₁ +F ₂ +F ₃ +River+Khals	171	2005	F ₁ +F ₂ +F ₃ +River+Khals	225
1996	F ₁ +F ₂ +F ₃ +River+Khals	474	2006	F ₁ +F ₂ +F ₃ +River+Khals	181
1997	F ₁ +F ₂ +F ₃ +River+Khals	426	2007	F ₁ +F ₂ +F ₃ +River+Khals	200
1998	F ₁ +F ₂ +F ₃ +River+Khals	1101	2007	F ₁ +F ₂ +F ₃ +River+Khals	350
1999	F ₁ +F ₂ +F ₃ +River+Khals	107	2009	F ₁ +F ₂ +F ₃ +River+Khals	270
Total	F ₁ +F ₂ +F ₃ +River+Khals	3381	Total	F ₁ +F ₂ +F ₃ +River+Khals	1949
Average production		422.625	Average production		243.625

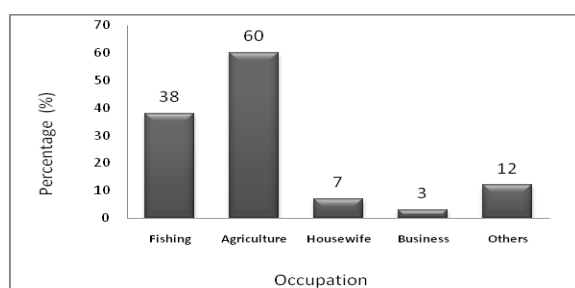


Fig. 2. Occupation of the respondents in the study area.

For describing agricultural sector, F₀, F₁, F₂ and F₃ were represented as high land or *Tan Jomi*, medium high land or *Pachot Jomi*, low land or *Dopa jomi* and *beel*, respectively, and for describing fisheries sector, F₀, F₁, F₂ and F₃ were represented as dry, floodplain, seasonal *beel* and perennial *beel*, respectively.

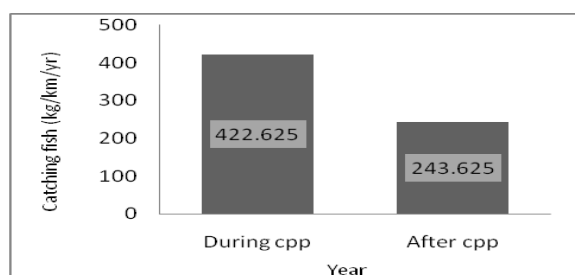


Fig. 3. Comparison of fish production between during and after CPP implementation.

Change of fish production

The study also revealed that after CPP the amount of fish catching was decreased because of the compartment was not “fish friendly” which was viewed from 64% respondents. The larva of fish could not pass easily from upstream to downstream that caused the decrease of fish production; therefore, fishes were not available in rivers, *khals* and *beels*. For this reason, anglers changed their profession for their livelihood. In a year during July to October, fishes were more available in F₁, F₂, F₃, river and *khal*. The annual yield per ha was calculated with the total area of the different habitats in CPP. In F₃ land about 165kg of fish per ha was caught, the yields for F₂, *khals* and the Louhajang River were 83, 10, 102 and 157 kg/km/yr, respectively (Table 3).

The amount of fish production was 3381 kg/km/yr during 1992-1999, where the average production was 422.625 kg/km/yr, and the amount of fish production was 1949 kg/km/yr during 2002-2009 with an average value of 243.625 kg/km/yr (Fig. 4).

Conclusion

The CPP had been built aiming for increasing agricultural output, controlling flood, expansion of aquaculture yield and avoiding flood damage of infrastructures and buildings. Therefore, the CPP has both positive and negative impacts in different cases, where upstream is flooded every year and crops are damaged, while the *Rabi* cropping was significantly increased than Mustard and *Boro* paddy. However, there was a noticeable impact on fish production in the study area, resulting in fishermen changed their livelihood patterns. Indeed the sound ecological balance is threatened in this area. Thus, careful eyes is essential to improve the present conditions of the CPP and alternative way for fish culturing with proper training is necessary where crop land fish cultivation might be an effective approach.

Acknowledgements

The authors are grateful to N. T. Meghla and T. R. Tusher, Lecturer of the Department of Environmental Science and Resource Management for their kind assistance to review the manuscript critically to improve its quality for publication.

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