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Changes in Socio-economic and Environmental Situations in the Dalia Irrigation Project Area During 2000-2007: Policy Recommendations

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and
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ABSTRACT

This paper addresses the socio-economic conditions and problems faced by farmers in the Dalia Irrigation Project area in the districts of Nilphamari and Lalmonirhat. Although the purpose of this huge project was to use the Teesta River water for irrigation in this region, farmers are still deprived of irrigation water in the dry season as there is insufficient water in the Teesta at Dalia point owing to the withdrawal of water at upstream Gazoldoba, in India. Research has been conducted on the optimal use of Teesta water for the basin as a whole and several recommendations have been made. Nevertheless, due to indifference of the Bangladesh authority and lack of interest of their counterpart (India), the Joint River Commission (JRC) could not make any effective/concrete decision regarding use of the Teesta water. This paper reflects the findings of a sample survey carried out in the Dalia Irrigation Project area in 2000 and another follow-up survey in 2007 to show the changes in socio-economic and environmental situation. Moreover, recommendations made in earlier studies have been highlighted and reasons why these recommendations were not implemented have been pointed out.

Introduction

The multifaceted uses of water are well known. But just as its abundance and efficient management enhances quality of life, its scarcity and wasteful use brings misery to many. Scarcity of water has a negative impact on health, availability of food, and the people's lives. The poor are particularly vulnerable when water is of poor quality or in short supply. The Asia Pacific region is home to almost a billion of the world's poorest people; access to adequate and clean water is one of their principal concerns. For many, supply of irrigation water for their crops is a matter of life and death. In fact, difficulties of having access to water frequently determine the position of the poor on the poverty scale (ADB 2005). Water availability is a key ingredient of development and is influenced by a variety of factors. As a valuable natural resource, the issues connected with managing it are inherently diverse and complex. Policies for sustainable use of water need to be developed in consultation with all stakeholders. Especially, in using transboundary water or international rivers, the right of all riparian states should be considered carefully. In this regard, regional cooperation is one of the most basic factors affecting optimal use of international water bodies.

Bangladesh is surrounded by India on all sides. There are hundreds of rivers in the country, 54 of which have their origin in India (Islam & Higanon 2002). Naturally, being situated downstream,

Bangladesh is dependent on India for an equitable share of the international river-water supply.

Water problems in Bangladesh arise mainly during the dry season and the rainy season. Flash floods occur in summer and inundation occurs in the rainy season with sudden release of water at the upstream end or because of heavy downpour. Again, in the dry season, the small rivers dry up because of shortage of water in the big rivers due to upstream withdrawal of water through barrages built and operated by India.

As a result, various irrigation projects in Bangladesh have ceased to function, causing loss in crop production and increase in poverty. An example of the controversial use of common river water by India and Bangladesh is the Teesta River. The Teesta Barrage Irrigation Project was undertaken and partly implemented in Bangladesh while another barrage (Gazoldoba Barrage) was built 60 kilometers upstream on the same river by India. In this paper, changes in socio-economic and environmental situations in the Dalia irrigation project area during 2000-2007 have been highlighted. A socio-economic survey was carried out in 2000. In 2007, another follow-up survey was carried out in the same area using the same questionnaire. The findings of the surveys show both positive and negative changes. Recommendations made in earlier studies have been highlighted and reasons why they were not properly used to change the lives of the farmers in the study area have been discussed.

Two Mega Irrigation Projects on the Teesta: Dalia (Bangladesh) and Gazoldoba (India)

The Teesta Barrage (Dalia) is the largest irrigation project of Bangladesh. It stands across the Teesta River at Dalia-Doani point in Lalmonirhat district. The Barrage is located 16 km. downstream from the Bangladesh border at Dalia-Doani point, is 615m long and has 37 gates each 12 meters wide. The Teesta project covers seven districts of northern-Bangladesh. Although the project was initiated in 1960, its actual implementation began in 1979. Construction of the canal system started in 1984-85 (Teesta Barrage Project, BWDB 1993). The barrage was completed successfully in August 1990 and its operation commenced in 1993. The total cost of the whole project was US\$ 220 million (Teesta Barrage Project, BWDB 1993). There is a 4,500 km long network of canals for supplying irrigation water to the fields using a gravity irrigation method. Thus, no pumping cost is involved. In the first year of operation of the Dalia Barrage (1993), an area of about 65,000 bighas (16,000 acres) was brought under High Yielding Variety (HYV) paddy cultivation in the dry season. The project also had the aim of flood control and drainage for a target area of 750,000 hectares, of which 540,000 hectares were irrigable.

While Bangladesh's Teesta Barrage Project was designed to utilize the water within this river basin, India's "Tista Multipurpose Project" aimed at transferring water from the Teesta to the Mahananda river, which forms part of a different basin, i.e., the Ganges basin (Abbas 1984). This action was deemed likely to have adverse effects. At the initial stage of implementation of India's project, the barrage was built at Gazoldoba in Jalpaiguri district, situated about 66 km. upstream of the Dalia Barrage site.

The total target area under the Gazoldoba barrage is 228,000 acres. This barrage started to withdraw water excessively in the dry season in 1996, when the Dalia Barrage (Bangladesh) was in operation. According to the Bangladesh Water Development Board (Teesta Barrage Project, BWDB 1993), due to operation of the Gazoldoba barrage, water flow of the Teesta River decreased significantly, threatening the water-availability situation in Bangladesh. Exclusive control of Teesta's waters in the dry season at Gazoldoba makes the Dalia Barrage useless; furthermore, the sudden release of excessive water through the Gazoldoba Barrage during the rainy season causes floods and bank

erosion, and causes serious suffering of the people in the Bangladesh area of the basin.

The water level at Dalia point in different years is shown in Figure 1. The minimum flow at this point in the dry season has drastically decreased since Gazoldoba barrage began its operation, while the maximum flow has been maintained in the rainy season. According to the figure, we note that the present situation of the flow of water at Dalia point is very severe and the barrage is useless with the Teesta River remaining dry. This crisis in Bangladesh is causing environmental problems and hurting the economic conditions in the area.

The Objectives of the Surveys

The surveys conducted in 2000 and 2007 had the following objectives:

- To understand the socio-economic situation prevailing in the study area.
- To identify the socio-environmental problems and to study the changes in these problems between 2000 and 2007.
- To focus on the causes of the changes that have occurred.

Methodology

To learn about the socio-economic conditions, to identify the socio-environmental problems, and to determine the changes during the period 2000-2007, the results of a socio-economic survey that had been conducted in the target area in December 2000 were compared to those found in the survey carried out in February 2007. The same questionnaire was used for both surveys. The target population of the study were households with at least .27 acres (1Bigha) of cultivable land. Heads of such households were randomly selected from the total target population of around 7,500 households in 2000 and 8,250 in 2007. Ten percent of the population (760 households in 2000 and 825 in 2007) was included in the sample.

In 2000 and 2007, surveys were conducted in 19 villages of 4 unions of 2 thanas (police station) on the bank of the Teesta River of Nilphamari district in Bangladesh. The average age of the respondents was 45 in 2000. Among the respondents 95% (n=720) were male and 5% (n=40) were female. In 2007, the survey was conducted in the same target area. The average

age of the respondents was 43. Among them 90% (n= 137) were male and 5% (n=10) were female.

Data Source and Techniques of Data Collection

Data sources were both primary and secondary. Primary data were collected through face-to-face interviews, while the secondary data were collected from various agencies, e.g., Water and Sewerage Authority, Bangladesh (WASA); Bangladesh Water Development Board (BWDB); Teesta Barrage Monitoring Office, Dalia, Lalmonirhat, Bangladesh; Ministry of Agriculture Bangladesh; Indian Journal of Meterological Geophysics; Indo-Bangladesh Joint River Commission (JRC) records, Daily discharge and water-level Data supplied by the Dalia and Kawnia water monitoring point authorities; Asian Development Bank (ADB), Bangladesh Bureau of Statistics (BBS) and online resources.

Results and Discussion

Changes in Scio-economic and Environmental Situations During 2000-2007

In 2000, all the respondents were fully or partially dependent on agriculture, with most (63%) being involved in agriculture only. The landless day laborers worked in the agricultural fields of the landholders. Only 17% of respondents had a business. The average yearly income of the respondents in 2000 was US\$ 794 (1US\$ = Tk 56) and in 2007 it increased to US\$ 1,202 (1US\$ = Tk 68). However, in 2007, the proportion of those depending solely on agriculture decreased by 10% (53.02% depended solely on agriculture). Thus the increase of average income includes contributions of sources other than agriculture.

A comparative distribution of land ownership in 2000 and in 2007 within the Dalia irrigation area shows that in 2000, 73% respondents held .5-5 acres of land, 14% held 5-10 acres and only 5% held 10-15 acres. In 2007, 78% of the respondents held .5-5 acres of cultivable land, 16% held 5-10 acres and only 6% held 10-15 acres. None held land up to 15 acres or above in the target area.

On literacy, in the year 2000, 40% of the respondents had completed primary school, 29% were illiterate, 23% went to secondary school and only 8% went to college for higher education. In 2007 only 3% of the respondents were illiterate,

65% completed primary school, 30% went to secondary school and only 2% went to college for higher education. It shows that the number of illiterate people has decreased in the target area and the proportion that had completed primary and secondary education increased significantly. However, the number of those who sought college education decreased noticeably.

Figure 2 shows amounts of different types of land owned (in hectares) in 2000 and 2007 within the Dalia region. We see that little has changed regarding the proportion of different types of land in 2007. The proportion of Doas (very fertile) was the largest. There was very little sandy or unfertile land under the surveyed area. In fact, most of the land was Doas (very fertile) in the Dalia barrage targeted area.

In 2000, 76% of the farmers were using urea and TSP in their land for cultivation. Fifty percent were using cow dung and 34% were using compost. The Agricultural department of the Bangladesh government and various NGOs educated them about the benefits of using compost and cow dung for high yielding and sustainable agricultural production. In 2007, 75% of the respondents used Urea, while 62% used TSP. However, among these respondents use of cow dung (12%) and compost (10%) was very low. The reason for this could be that use of animal power for cultivation decreased in the area. It was more costly to plough the land using oxen than using power tiller. Therefore the production of cow dung had decreased, and hence its use as fertilizer also decreased.

In the Dalia target area 67% land was cultivated three times, 28% land was cultivated twice, and 5% was cultivated only once. There was no difference regarding cropping intensity in the years 2000 and 2007.

On housing conditions between 2000 and 2007, 69% of the houses in 2000 were katcha (made by bamboo, straw and stalk etc.), 30% were made of corrugated iron sheets (roof only), wood and bamboo, and only 1% houses were pucca (concrete building). In 2007, 18.42% houses were katcha, 71.05% were made of corrugated iron sheets (roof only), wood and bamboo, and 10.52% were pucca (concrete buildings).

In 2000, 43% of the respondents in the Dalia area were in ill health, 43% were in a tolerable condition and only 14% respondents were in good

health. On the other hand, in 2007, 14.06% were in ill health, 25.81% were in a tolerable situation and 60.12% in good health condition. The situation has improved significantly for which the credit mainly goes to the activities of the NGOs (e.g., Grameen Bank, BRAC, ASA etc.) working in the study area.

Most (78%) of the respondents were drinking tube-well water in 2000, 17% were drinking dug-well water and 5% drank from rivers and ponds. In 2007, 82.24% of the respondents were drinking water from tube-wells, 17% used dug-wells water and 0.48% drank from river and ponds. The tube-wells in the target area were not contaminated by arsenic poisoning.

In 2000, 74.47% of the respondents had no latrine: They used bushes, bamboo gardens and open public spaces. But in 2007, the percentage dropped dramatically to 18.54%, mainly due to the health awareness programs undertaken by several NGOs (e.g., Grameen Bank, BRAC, ASA etc.). The sanitation situation has also improved significantly in 2007 as compared to 2000.

Regarding natural disasters, all respondents selected more than one answer about the types of natural disasters they experienced during the last 5 years. In 2000, 96% mentioned flood, 70% mentioned river erosion, 39% cyclone and 26% faced drought and dust. In 2007, 17% mentioned river erosion, 79% mentioned floods as the most significant disasters in the area. Clearly, in 2007, people faced much less natural disaster than in 2000.

In 2000, among 760 respondents, 532 (70.37%) replied that the barrage had not created new jobs. In 2007, 658 (85.58%) respondents replied that the barrage has not created new jobs. Thus we find that according to the respondents, utility of the Dalia barrage project as a means of creating new jobs decreased in 2007 as compared to the year 2000.

Respondents also indicated the types of benefits they had enjoyed since the operation of the barrage in 2000 (see Table 1). In the Dalia area, the production of rice had increased tremendously. The transportation system had improved and bridges and culverts were built and electricity was introduced. The working spirit was elevated, employment in agricultural labour sector increased and rural poverty started to decrease. Unjust distribution of products in sharecropping

had decreased and the wages of agricultural labour increased. However, the highly positive observations and expectations that were expressed in 2000 were attenuated in 2007.

Policy Recommendations

Research has been carried out on the sharing of the Teesta waters and various policy recommendations have been offered. For example, in Islam & Higano (2002) the policy recommendations were:

Establishing a Special Economic Block

Both countries can take initiatives for (i) preservation of monsoon-season water, (ii) integrated control of flood water and (iii) bilateral trade and business.

Planning and policymaking emphasis must be placed on optimal and amicable water sharing based on a suitable trade model.

Bangladesh should also make certain arrangements so that Indians, using the Teesta River water (at Dalia or northern districts), can avail opportunities for business and trade in Bangladesh.

Joint ventures (co-project or bilateral agricultural projects) should be encouraged to establish mills and factories (e.g. rice mills, tobacco husking mills, paper mills, food processing mills) dependent on crops produced in the Teesta region.

Reducing Bilateral Conflicts and Ensuring Justice

Both Bangladesh and India are recognized as third world countries. Both countries should try to cooperate mutually for socio-economic development, rather than engaging in conflict and wasting time and resources (Islam & Higano 2002).

Extensive cooperation is required in developing infrastructural connectivity and facilitating transit of goods within the region.

However, it must be remembered that “mutual confidence and cooperation” (Schachter 1977) between the leaders of India and Bangladesh is necessary for an economic policy to be implemented properly. Leaders of both sides have to be sincere in their efforts. They must also have

an open mind and be ready to accept rational and reasonable suggestions offered by their counterparts (Islam & Higano 2002).

Realities

Though the present political situation of Bangladesh is quite different from what was observed in the last two decades (1987-2007), the following issues still need to be addressed

- Every year when the dry season arrives, news of new record-low water levels at the Teesta Barrage site is reported. Bilateral meetings did not lead to any permanent solution because there was no bilateral agenda to ensure bilateral economic benefits.
- Policy planners of the government usually do not seek opinions of researchers before policy planning. In the developed world, policy planners have direct relationship with relevant experts who guide them in policy planning. For example in Japan, when posting a traffic signal, cost-benefit studies are carried out before a decision is made. But this is not so in Bangladesh; rather the policies are imposed by the planners themselves. The results derived from research projects usually do not reach the table of the policy planners.
- Political bargaining gets priorities over economic necessities. Bilateral treaties and policies that are only politically induced cannot bring about socio-economic welfare of a region.

Conclusion

Based on a social survey, an overview of the socio-economic and environmental situation existing in the Teesta Barrage target area has been presented in this paper. A comparative picture of the target area of 2000 and 2007 has been highlighted. It was found that some improvements have occurred among the inhabitants regarding income, education, housing, health and sanitation. However, this has occurred through NGO interventions and by using underground water for irrigation. Deep and shallow tube wells are mostly run by diesel (Islam and Akmam 2007). However, both the use of fossil fuels and the extraction of underground water are detrimental to the environment. Instead, using Teesta water for irrigation would be much more cost-effective and environment-friendly.

In fact, we note that while positive changes have occurred in the Teesta Barrage area despite the influence of the Gazoldoba Barrage, things could have been much better on the Bangladesh side had the Teesta waters been available as envisaged by planners. For example, food production is always a crying need, and to produce more food deep tube wells (DTW) are currently being used, given the shortage of surface water. DTW is expensive on the one hand and detrimental for the environment on the other. Also, through over extraction of underground water, the water table is going down, making the area vulnerable to earthquakes. The option of having surface water (Teesta Barrage water) is the best option, which would enable the farmers to use cheaper irrigation water that would also be environment-friendly. Moreover, it is likely to create better job opportunities, leading to economic emancipation of the poverty stricken people.

Important policy recommendations have been proposed in this paper on the basis of past studies. The realities regarding implementation of such policy proposal are very complex and time consuming since there are regional and international links to the problems of this area. To avert a crisis, regional cooperation and working together to solve the problems are imperative, considering the holistic goals of providing greater benefit of humanity. The states comprising the Teesta Basin area, today, must work together and extend their hands of cooperation to each other to achieve an amicable solution to the Teesta Basin problems of water sharing.

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APPENDICES

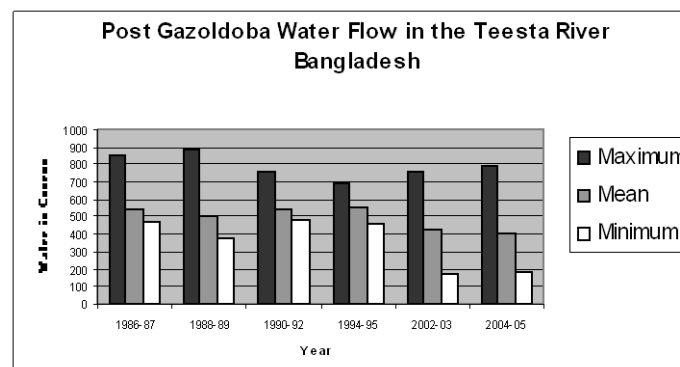


Figure 1. Post Gazoldoba Water Flow in the Teesta River, Bangladesh

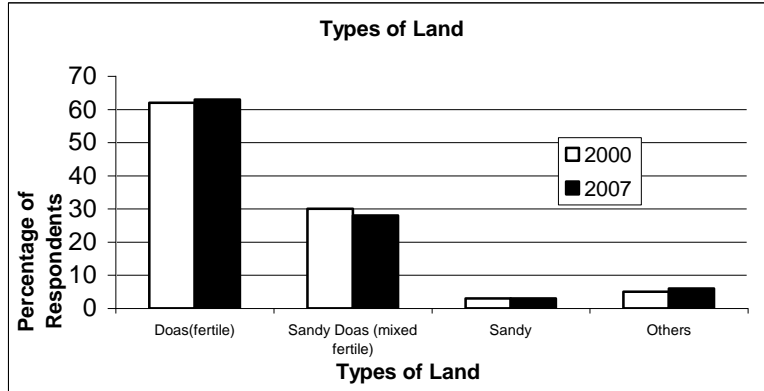


Figure 2. Distribution of Types of Land in the Target Area

Table 1. Types of Benefits (Provided by the Barrage) Enjoyed by the Respondents

| Target Area | Types of Benefits | 2000 | 2007 |
|-------------|--|-------------------------------|-------------------------------|
| | | Percentage of the respondents | Percentage of the respondents |
| Dalia | Production of crops increased | 100% | 100% |
| | Transportation system improved, bridge, culvert, electricity have been introduced | 100% | 75% |
| | Working spirit aroused, employment in agricultural labour sector increased and rural poverty started to decrease | 100% | 55% |
| | Mal-distribution of product in share cropping has been decreased, wage of agricultural labour increased | 65% | 45% |

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