People’s Perceptions about the Socio-Economic and Environmental Impact of Coastal Green Belt in Bangladesh

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ABSTRACT

Keywords: Afforestation; Coastal Area; Green Belt; Plantation.

Understanding the perceptions and attitudes of local people towards afforestation is crucial for successful afforestation. To better understand the people's perceptions about the coastal green belt, we surveyed the Satkhira and Bhola districts during January 2021. A questionnaire survey of 200 respondents was conducted by a purposive and random sampling technique to obtain quantitative data. On the other hand, two Focus Group Discussions (FGDs) were performed to obtain qualitative data based on the diversity of age, sex, education, and occupation variables. We used to evaluate the respondent’s perceptions about the coastal green belt by 5-point Likert scale data. The majority portion of the people in our study area was poor and their profession was fisherman and housewife among males and women respectively. The majority of them agreed that the green belt helped them in numerous ways, to rear their cattle and built a house near the green belt, by promoting the growth of crops, and further protect them from different natural calamities by reducing wind velocity. Shelterbelts greatly enhance tourism in that area, improved communication facilities, and increase their socio-economic condition and values. Shelterbelt has long-term benefits, peoples have positive attitudes towards shelterbelt and they seek training to maintain this shelterbelt smoothly. Respondents wanted fruit tree species as shelterbelt species near the embankment. This information can be used for policy formulation in terms of successful plantation by considering people’s attitudes, which may work in both mitigation and adaptation of climate change in the coastal remote areas of Bangladesh.

INTRODUCTION

Bangladesh's coastal zone stretches along the Bay of Bengal, covering 47,201 Km² (32 percent of the country, including 19 districts) and lies between 21°-23° North latitude and 89°-93° East longitude (Islam, 2004; Ahmed, 2019). Bangladesh's coastal zone is divided into three sections based on geographic features: the eastern zone, the central zone, and the western zone. The semi-active delta is crisscrossed by several channels and creeks in the western section. The most dynamic and continuous processes of accretion and erosion occur in the middle region, whereas the eastern section is covered by a mountainous terrain that is more stable (Thomas, 1992). This region has a population of 36.8 million people, with more than half of them (52%) living in poverty (based on living standard) (Islam, 2008).

In coastal areas, road infrastructure, power, housing, transportation, sanitation, and coastal protection are all lacking. Woodcraft, artesian employing wood, bamboo, CI sheet (tin), and other locally accessible materials are used by the local coastal people to construct their homes. The poorest populations in the coastal areas are the most exposed to and victims of climate change’s negative effects (Islam & Rahman, 2015). A green belt is an area set aside for open space, usually in the vicinity of larger cities (Ramesh, 2014). The “green belt” as a concept is an important part of sustainable
development in the twenty-first century (McMichael AJ, 2000). A greenbelt is needed for protecting the embankment from tidal surges through plantings on its outer slope, and for protecting life and property in the region by embankment plantings (Ramesh, 2014).

Climate change which is a result of global warming is an extremely crucial issue in Bangladesh that severely affecting the natural environment (Hossain et al., 2010). Bangladesh is one of the most vulnerable countries in the world to the early effects of climate change because it is a low-lying country (MoEF, 2008). Climate change is responsible for the property of Bangladesh’s people, particularly those living along the coast and on the char islands (Islam & Rahman, 2015). As a result, this enormous coastal area requires management, coastal ecosystem protection, and coastal community safety (Ahmed, 2019).

Forests that act as sinks can significantly reduce greenhouse gas concentrations in the atmosphere, helping to mitigate climate change (IPCC, 2007). Shelterbelts generated by trees along the world's coasts are widely acknowledged for minimizing the negative effects of climate change (Latief & Hadi, 2007; Tanaka et al., 2007), desertification management (Mohammed et al., 1996), stabilize soil to reduce sand shifting (Mohammed et al., 1996; Bai, 2010), lowering wind speeds and minimizing tsunami damage (Torrey, 1976; De Zoysa, 2008), protecting cyclones and typhoons (Bai, 2010) and others. Bangladesh's coastal management and development programs began in the early 1960s with the construction of coastal embankments, the creation of coastal greenbelts, community-based management, and delta development (Iftekhar, 2006).

Coastal embankments were erected along the coastal region from 1960 to 1980 to conserve agricultural lands and increase rice output. Against nature's will, a total of 5017 km of embankments were built throughout the coastline region (Rahman & Rahman, 2015). Because local people are the primary stakeholders in the Coastal Green Belt (CGB), it's crucial to understand their perspectives on the CGB in Bangladesh's coastal region. The purpose of this study is to find out the perceptions of local peoples towards the Coastal Green Belt and to know the way through which people get benefit from the coastal green belt. This understanding of people's perceptions is critical for the authority to make better administrative decisions for the long-term growth of CGB in Bangladesh's coastal region.

**MATERIALS AND METHODS**

**Study area**

This research was conducted in the coastal districts of Satkhira and Bholo. Munshiganj union in Satkhira District's Shyamnagar Upazila and Char Kukri-Mukri union in Bholo District's Charfashion Upazila were chosen for research. Because of the presence of a green belt near the riverfront on the embankment, these two unions were chosen. Shyamnagar Upazila is located between 21°36' to 22°54’ North Latitude and 88°54’ to 89°20’ East Longitudes under Satkhira district (BBS, 2011) while Charfashion Upazila is located between 21°54’ to 22°52’ North Latitude and 90°34’ to 91°01’ East Longitudes under Bholo district (BBS, 2011).

**Sampling method**

Before collecting data, we did a reconnaissance survey in the research area to acquire a sense of the area. We addressed the study objectives with local residents during the survey, which helped to understand the current state of the study area. To achieve the study's goals, we created a questionnaire for the chosen community. We utilized a 5-point rating Likert scale for the questionnaire since Likert scales are popular in survey research because they make it easy to operationalize personality traits or judgments. Miah et al. (2013) used Likert scale values in their survey for finding the impact of casuarina shelterbelt in the Chittagong coast of Bangladesh.

For analysis, we used the following scale: strongly agree = 5 points, agree = 4 points, neutral = 3 points, disagree = 2 points, and strongly disagree = 1 point. In this study, four villages (i.e., Munshiganj, Harinar, Parshokhali, Chunkuri) of Shyamnagar Upazila under Satkhira district and four villages (i.e., Babuganj, Rasulpur, Hajipur, Nabinagar) of Charfashion Upazila under Bholo district were selected objectively. A total of 200 respondents (i.e., 100 in Munshiganj union and 100 in Char Kukri-Mukri union) were selected by a purposive and random sampling technique based on objectives for conducting the interview and to ensure a representative proportion of different professions, shelterbelt beneficiaries, and local
stakeholders. Therefore, a total of 200 populations constituted the sample of the study. Two Focus group discussions were conducted to assess the overall impact of the shelterbelt and to determine if any significant changes in the perceptions between the individual households and the focus group.

**Data collection and Analysis**

We used two types of methodologies to achieve the study's goals: qualitative or descriptive analysis and quantitative analysis. In January of 2021, a questionnaire survey of 200 respondents and two Focus Group Discussions (FGDs) were performed to obtain quantitative and qualitative data, respectively. A five-point questionnaire interview with a single person in the quantitative and a focus group discussion (FGD) with 10-15 individuals (mostly from the area around the embankment plantation) in qualitative parts, were used. Secondary data was gathered from a variety of journals, publications, research papers, websites, and other official and non-government documents, both published and unpublished. After completing the data collection from personal interviews, we transferred schedules to a master sheet for facilitating tabulation. The report of the study is written and analysis is done systematically by using a computer program of MS word, Microsoft Excel, and SPSS of version 20.

**RESULTS AND DISCUSSION**

The demographic profile of the respondents surveyed in the study area is shown in Table 01. Young and very young persons dominated the research area's respondents, with an average education level of class six and a monthly income of 9785.00 BDT, respectively. Education, an important socio-economic element and a key to individual and communal empowerment, make a farmer more accessible to extension organizations for advice and more capable of dealing with technical recommendations that demand a certain degree of literacy (Tripp, 1993). In both research areas, women's participation in household income was very low. Nurunnahar et al. (2020) also found in Satkhira District's Shyamnagar Upazilla, women's participation in household incomes was very low. Discrete gender discrepancy is found in a contribution where different earning activities are higher at the local level (Angelsen et al., 2011).

Table 1. The demographic profile of the respondents in the study area

| Selected characteristics of the respondents | Categories         | Number and percentage (%) of the respondents |
|---------------------------------------------|--------------------|-----------------------------------------------|
| Gender                                      | Male               | 140 (70%)                                     |
|                                             | Female             | 60 (30%)                                      |
|                                             | Total              | 200                                            |
| Age (years)                                 | Very young (18-25) | 52 (26%)                                      |
|                                             | Young (26-35)      | 72 (36%)                                      |
|                                             | Middle aged (36-45)| 44 (22%)                                      |
|                                             | Old (above 45)     | 32 (16%)                                      |
|                                             | Total (Mean = 31)  | 200                                            |
| Level of education                          | Illiterate         | 35 (17.5%)                                    |
|                                             | Class I-V          | 89 (44%)                                      |
|                                             | Class VI-X(SSC)    | 54 (27%)                                      |
|                                             | Above SSC          | 22 (11%)                                      |
|                                             | Total (Mean = class VI) | 200                                        |
| Monthly income in BDT                       | < Tk.3000          | 47 (23.5%)                                    |
|                                             | Tk. 3000- Tk.5000  | 13 (6.5%)                                     |
|                                             | Tk.5001-Tk.10000   | 33 (16.5%)                                    |
|                                             | Tk. 10001-Tk.15000 | 79 (39.5%)                                    |
|                                             | Above Tk.15000     | 28 (14%)                                      |
|                                             | Total (Mean =9785) | 200                                            |
|                                             | Fisherman          | 76 (38%)                                      |
Furthermore, the most common occupations in the research area were fishermen for men and housewives for women. Dey et al. (2020 a) also found a maximum number of respondent’s professions were fisherman and housewife among male and female respectively in the Munshiganj union under Shymnagar Upazila of Satkhira district. Islam et al. (2020) found middle-aged dominated respondents and most of their Education was up to the primary level in the different unions of Dacope Upazila under Khulna district. Islam et al. (2011) observed at East Dhangmari in Dacope Upazila of Khulna district, the average literacy rate was class five, and the income of the respondents was 4620 BDT. Saha et al. (2015) found in the same study area, the average yearly income for a boatman and an eco-tour guide was Tk. 8495 and Tk. 4433, respectively. Dey et al. (2020 b) observed respondents’ mean monthly income was 6775 BDT. and mean education level was class six in the Dacope and ShymnagarUpazila under Khulna and Satkhira district respectively.

Table 2. Descriptive statistics of variables

| List of variables (used Likert scale data) | Munsiganj Union (Satkhira) | Char Kukri-Mukri union (Bhola) |
|-------------------------------------------|-----------------------------|---------------------------------|
|                                           | Mean | Standard Deviation | CV(%) | Mean | Standard Deviation | CV (%) |
| Is there present any active shelterbelt in this area? | 3.714 | 0.912 | 24.577 | 3.979 | 0.432 | 10.868 |
| Is this shelterbelt helps to build the house near the shelterbelt? | 4.204 | 0.539 | 12.827 | 4.081 | 0.533 | 13.076 |
| Is this shelterbelt helps rare cattle near the shelterbelt? | 4.142 | 1.080 | 26.071 | 4.040 | 0.911 | 22.568 |
| Is this shelterbelt promotes the growth of crops? | 4.020 | 1.108 | 27.571 | 4.081 | 0.885 | 21.705 |
| Is there reduce wind velocity from previous for this shelterbelt? | 4.428 | 0.841 | 19.004 | 4.510 | 0.581 | 12.898 |
| Is this shelterbelt protecting people from storms? | 4.857 | 0.353 | 7.279 | 4.918 | 0.276 | 5.624 |
| Is this shelterbelt protecting people from flood and tidal surges? | 4.918 | 0.276 | 5.624 | 4.959 | 0.199 | 4.031 |
| Is this shelterbelt protecting your village? | 4.877 | 0.331 | 6.790 | 4.918 | 0.276 | 5.624 |
| Is this shelterbelt having aesthetic value? | 3.836 | 0.986 | 25.706 | 4.040 | 0.762 | 18.873 |
| Is this shelterbelt promoting tourism in this area? | 4.122 | 0.807 | 25.210 | 3.755 | 0.778 | 20.721 |
The majority of respondents in both research regions (Char Kukri-Mukri and Munshiganj) believed that shelterbelts aid in the construction of houses near shelterbelts, help to rear cattle and the promotion of agricultural crop growth (Table 2). They also agreed that the shelterbelt reduces wind velocity, which protects people from natural disasters such as storms, floods, and tidal surges by shielding their community. Furthermore, they agreed that the shelterbelt offers aesthetic values, such as assisting in the development of tourism and communication facilities. Furthermore, they stated that they had favorable opinions toward shelterbelts and believe these shelterbelts improve their socioeconomic status. Many people disagree that people are aware of the need to protect the shelterbelt and that people want a more stable shelterbelt than the one now in place (Table 2).

Miah et al. (2013) found that a shelterbelt built of *Casuarina equisetifolia* reduces wind speed greatly and promotes native species growth at the Parki beach area on Bangladesh's Chittagong coast. A shelterbelt, according to the Food and Agriculture Organization (FAO, 1989), can lower wind speed to a minimum from its highest level. Fritz and Blount (2007) confirmed that wind speed and storm waves can be reduced by coastal vegetation including mangroves. Brandle et al. (2000) stated that coastal vegetation's effective windbreak capabilities are determined by height, density, direction, length, width, continuity or uniformity, and cross-sectional shape. Hipsey et al. (2004) stated that shelterbelts along agricultural land can protect agricultural land from sea-salt spray and enhance crop output. Hossain et al. (2008) found that the coastal green belt project changes occupational attributes, assets, occupation, sources of drinking water, and environmental parameter positively at three Upazila of Noakhali district.

Miah et al. (2013) also found shelterbelt made with *Casuarina equisetifolia* increase growth of crops, facilitates tourism and protecting cyclonic storms at the Parki beach area on the Chittagong coast of Bangladesh. Moreover, Hossain et al. (2008) found that the coastal green belt project changes occupational attributes, assets, occupation, sources of drinking water, and environmental parameter positively at three Upazila of Noakhali district.
Table 3. Species choice by local people for embankment plantation

| Common Name | Scientific Name          | Percentage (%) |
|-------------|--------------------------|----------------|
| Narikel     | Cocos nucifera           | 26             |
| Aam         | Mangifera indica         | 11             |
| Kanthal     | Artocarpus heterophyllus | 3              |
| Tal         | Borassus flabellifer      | 8              |
| Amra        | Mangifera indica         | 11             |
| Kalojam     | Syzygium cumini          | 8              |
| Tal         | Syzygium cumini          | 8              |
| Amra        | Spondias pinnata         | 7              |
| Letchu      | Litchi chinesis          | 5              |
| Peyara      | Psidium guajava          | 2              |
| Akasmoni    | Acacia auriculiformis    | 9              |
| Rain tree   | Albizia saman            | 10             |
| Mahogony    | Swietenia macrophylla    | 6              |
| Others      |                          | 2              |

Most of the respondents in both study area wants fruits trees as shelterbelt species as fruit trees have immediate feedback after planting (Table 3). But, several respondents want woody species as their timber will be valuable after some time. Wolanski (2007) mentioned that when developing a shelterbelt plantation, the aesthetic values of the vegetation should be examined and prioritized. Miah et al. (2013) stated that throughout the establishment of the shelterbelt, social involvement and participatory planning should be followed to gain appropriate protection from the shelterbelt vegetation.

Table 4. Trusted organization by local people for embankment plantation

| Organization/Department name | Percentage (%) at Char Kukri-Mukri (Bhola) | Percentage (%) at Munshiganj (Satkhira) |
|------------------------------|-------------------------------------------|----------------------------------------|
| Forest Department (FD)       | 96                                        | 36                                     |
| Water Development Board (WDB)| 1                                         | 2                                      |
| Non-Government Organization (NGO) | 2       | 61                                   |
| Others                       | 1                                         | 1                                      |

Most of the respondents want Forest Department for planting trees as shelterbelts in Char kukri-Mukri area but most of the respondents want NGOs for the same work in the Munshiganj area (Table 4).

**CONCLUSION**

The respondents in the study area had a generally good and favorable opinion toward shelterbelts. The respondents' rate community involvement in the coastal greenbelt project as very positive. The shelterbelt provides immediate and indirect benefits to the residents of the study region. Shelterbelt helps their socio-economic situation by increasing their income. Shelterbelt protects people from various natural disasters and has a good impact on environmental aspects. Shelterbelts encourage the growth of crops and make tourism more accessible in the area. People might be motivated to participate in the development program and manage the plantation themselves through training and awareness campaigns. People in both communities are eager to participate in embankment plantations as beneficiaries.

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