Chapter IV

Description of the Study Site

This chapter presents detail about the characteristics of the study area. At the beginning of this chapter, describe socio-economic information of Bangladesh. The end part of the chapter allocated to present specific socio-economic information on Gazipur district.

4.1 Description of Bangladesh Socio-economic Characteristics

4.1.1 Location and Topology

Bangladesh is a low lying country bordered to the west, north, and east by India and to the southeast by Myanmar. Bangladesh is a country crisscrossed by 230 rivers, with three large rivers - the Jamuna (Brahmaputra), Padma (Ganges), and Meghna- converging and opening into the Bay of Bengal. The Jamuna-Padma-Meghna river systems together drain two million square miles of land, 93% of which is outside the border of Bangladesh and out of Bangladesh's control. The topography of Bangladesh is roughly 80% flat land, 12% hilly areas, and 8% terrace land. The hilly areas are located in the south-eastern and north-eastern regions and the terrace land is located in the north-western and central regions of the country. Bangladesh's topography and geographic location make it prone to a wide array of natural disasters, including cyclones, floods, erosion, tornadoes, droughts, and earthquakes.

There are 30 Agro-ecological zones (AEZ) in Bangladesh. Emphasis is given to soil properties in relation to land use and agricultural development.

Criteria involve in AEZ are:

I.   Physiographic (land forms and soil parent materials)

II.   Depth and duration of seasonal flooding

III. Climate

Other factors of dividing AEZ are:

a)   Length of Rabi and Kharif season

b)   Rainfall duration

c)   Occurrence of temperature etc.

4.1.2 Climate of Bangladesh

Bangladesh has a tropical monsoon-type climate, with a hot and rainy summer and a dry winter. January is the coolest month with temperatures averaging near 26 ^{o}C (78 ^{o}F) and April the warmest with temperatures from 33 °C to 36 °C (91 ^{o}F to 96 ^{o}F). The climate is one of the wettest in the world. Most places receive more than 1,525 mm of rain a year, and areas near the hills receive 5,080 mm. Most rains occur during the monsoon (June-September) and little in winter (November-February). This hot and humid climate is very much suitable for rice pest resurgence and multiplication.

4.1.2.1 Rainfall

The average annual rainfall varies from a maximum of 5,690 mm in the northeast of the country to minimum of 1,110 mm in the west. The groundwater, however, provides adequate storage to compensate for annual variations in rainfall and stream flow. The average annual discharge from the three major rivers - a total of 35,000 cusec- is second only to the Amazon. They carry billions of tons of sediment load every year.

As it is situated in the tropic, the country is prone to cyclones associated with tidal surges, especially in the pre-monsoon and post-monsoon months. Because of high density of population in the flat deltaic coastal region, the loss of human lives in such cyclones has at time been very heavy.

4.1.2.2 Temperature

There is no great difference in temperature conditions around the year from one region to another. During the hot season, temperatures are a little higher inland (Dhaka - April - average maximum temperature 35°C / 95°F) than on the coast (Chittagong - April - average maximum temperature 32°C / 89°F). Owing to the greater cloudiness of the rainy season, average daily sunshine hours are least between June and September (about four hours per day), but six - eight hours per day for the rest of the year. From January to April maximum temp. Varies 9°C. And minimum varies 11°C. Day temperature ranges from 7 °C to 12 °C in the cool months and in the other months it varies between 23 °C to 30 °C (Table 4.1).

Table: 4.1 Average temparature and rainfall

Month / Temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.temp. (°C)	25.4	28.1	32.3	34.2	33.4	31.7	31.1	31.3	31.6	31.0	28.9	26.1
Min.temp. (°C)	12.3	14.0	19.0	23.1	24.5	25.5	25.7	25.8	25.5	23.5	18.5	13.7
Rainfall (mm)	07.0	19.8	40.7	110	257	460	517	432	290	184	35.0	09.4

4.1.3 Land Use Pattern in Bangladesh

Most of Bangladesh lies within the broad delta formed by the Ganges and Brahmaputra rivers and is exceedingly flat, low-lying, and subject to annual flooding. Much fertile, alluvial soil is deposited by the floodwaters. The only significant area of hilly terrain, constituting less than one-tenth of the nation's territory, is the Chittagong Hill tracts district in the narrow south eastern panhandle of the country. There, on the border with Myanmar, is Mowdok Mual (1,003 m/3,291 ft), the country's highest peak. Small, scattered hills lie along or near the eastern and northern borders with India. The eroded remnants of two old alluvial terraces-the Madhupur Tract, in the north central part of the country, and the Barind, straddling the north-western boundary with India-attain elevations of about 30 m (about 100 ft). The soil here is much less fertile than the annually replenished alluvium of the surrounding flood plain. From the land cover types and extent of Bangladesh we found agriculture poses 66.19% of total area among which only Boro rice covered 4.25% areas alone (Table 4.2).

Table 4.2 Land cover types and extent of Bangladesh 1992-1993.

Land cover category	Area (sq km)	%
Evergreen forest	4482.8	3.21
Degraded forest (shifting cultivated area)	8517.3	6.10
Mangrove forest	4513.1	3.23
Marshes	1124.4	0.81
Grass land	1706.4	1.22
Agriculture	98258	70.44
Barren land	14325.3	10.27
Water bodies	5673.9	4.07
No data available (cloud-covered)	894.1	0.64

4.1.4 Role of Agriculture in Bangladesh Economy

The economy of Bangladesh is primarily dependent on agriculture. About 84 percent of the total population live in rural areas and are directly or indirectly engaged in a wide range of agricultural activities. The agriculture sector plays a very important role in the economy of the country accounting for 31.6 percent of total GDP in 1997-98 at constant (1984-85) prices. The agriculture sector comprises crops, forests, fisheries and livestock. Of the agricultural GDP, the crop sub-sector contributes 71%, forest 10%, fisheries 10% and livestock 9%. The sector generates 63.2% percent of total national employment, of which crop sectors share is nearly 55 % (BBS, 2008). Agricultural exports of primary products constituted 10.4% of total exports of the

country in 1997-98. In the past decade, the agriculture sector contributed about three percent per annum to the annual economic growth rate.

The agriculture sector is the single largest contributor to income and employment generation and a vital element in the country's challenge to achieve self-sufficiency in food production reduce rural poverty and foster sustainable economic development. The government has therefore accorded highest priority to this sector to enable the country to meet these challenges and to make this sector commercially profitable.

4.1.5 Rice Farming in Bangladesh

Rotating cultivation of rice, wheat and other crops under bed-planting system can double the yield in the northern districts, particularly in the high and dry Barind belt. Optimistic results were found in the research on cropping pattern, conducted at different locations of the region over the last couple of years. Raised beds facilitate sowing without waste of time allowing crop growth to better match water availability.

Under the conventional system, the single largest constraint requires planting of wheat in the country late in winter, leading to a poor yield. Sowing bed could be a good alternative to the country's dominant wet culture. Bed planting improves water distribution and irrigation efficiency, gives better results in using fertilizers and pesticides and reduces weed infestation and crop lodging. It saves crops from disturbance from rats. The pattern helps farmers save 30 percent irrigation water and 30 to 40 percent of seeds and fertilizers.

To maintain sound soil health, it could be advisable to grow rice using a different system in order to improve compatibility between monsoon rice and upland

winter crops. This would also suit the shift in economic importance toward the winter crops over monsoon rice. By using the new pattern of crop rotation, the huge tracts of land that remain fallow in the Barind (northern Bangladesh specific land) after the harvest of transplanted Aman (local variety of rice) each year, could be used to grow wheat, followed by mung pulse, by providing small irrigation facilities.

Department of Agricultural Extension (DAE) can contribute the large-scale cultivation of short-duration crops like wheat and mung pulses could suit croping intensity and diversification with rice-based cropping pattern. Wheat and mung pulses seed varieties developed by BRRI and BARI were given to farmers through demonstration to popularise the cropping pattern.

4.1.6 Status of Rice Cultivation in Different Ecosystem

In Bangladesh the rice-growing environment has been classified into three major ecosystems based on physiography and land types. These ecosystems are a) irrigated, b) rainfed, and c) floating or deepwater. The rainfed ecosystem has been further classified as rainfed lowland and rainfed upland. Thus, all rice varieties cultivated in the country are grouped into five distinct ecotypes which are a) Boro, b) Transplanted Aus (T. Aus), c) Transplanted Aman (T. Aman), d) Upland Aus (direct-seeded Aus), and e) Deepwater rice (Floating rice). Boro rice is grown completely under the irrigated ecosystem during the dry period (November to July) while T. Aman (during July to December), T. Aus (during April to August) and Upland rice (during March to July) are grown under the rainfed ecosystem. Of the total 13.8 million ha of cultivable land in the country (UNDP/FAO, 1988), 10.27 million hectares (74.4 percent) are devoted to rice cultivation covering the above four

ecosystems (BBS, 2004, 2008). Besides these, special types of ecosystems like tidal wetland covering about 425 thousand hectares and about 3.05 million hectare of coastal saline soils are also included into the 10.27 million hectares of rice land.

4.2 Description of Gazipur District

The study area is located near the central part of Bangladesh. The area is intensively cultivated area. The name of the district is Gazipur and the sub-district named on Kaligonj. The land type of this locality is known as Madhupur tract which is classified as AEZ soil class 28 among 30 soil type AEZ classification. Normally land is fertile. The other crops besides rice are jute, sugarcane, various types of vegetables and sometimes pineapple and sugarcane occasionally. Cultivation of rice in here mainly by irrigation of underground water but during transplanted Aman season it has been done through rainfed condition.

Bangladesh consists of 64 districts. Among that 30 AEZ had been designed so far. Gazipur district is under Madhupur tract zone, which consists moderate to high iron riches soil. The soil and cropping pattern is tremendously diversified by the last 15 years. Rice is the main crop of this district. Much more vegetables also enriched this district's cropping pattern. Total cultivable land of Gazipur district is 1, 25,287.53 hectares of which the rice cultivation covered 87,873 hectares (BBS, 2004).
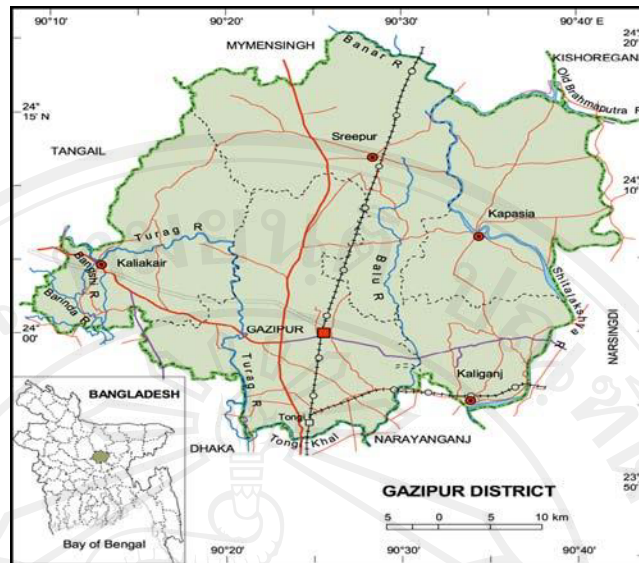
Figure 4.1 Map showing location of Gazipur district

4.2.1 Socio-economic Condition of Gazipur District

Gazipur district was established in 1984. It consists of 5 upazilas, 46 union parishads, 710 mouzas, 2 municipalities and 1,163 villages. The upazilas are Gazipur Sadar, Kaliakair, Kaligonj, Kapasia and Sreepur. Some archaeological heritages are Dholsamundra (the capital of the local Pala kings) at Boali, Toke Badshahi Mosque; *Dighi* and *mazar* at Chaura; old bridge (built by Meer Jumla) at Tangi, Bhawal Rajbari and the *maths* at Joydebpur. Mass killing site and mass grave is the *Marks of the War of Liberation* situated eastern side of the Joydebpur Rajbari, Sathkamair, and Tongi Shaheed Smriti School compound at Gachha. There is a Memorial monument: 'Jagrata Chaurangi' at Joydebpur Chowrasta which is the highest war monument of the country.

Population at present 2,02,62,44 among them male 51.77%, female 48.23%; Muslim 91.9%, Hindu 7.5%, Christian 0.4%, others 0.2%. There are some ethnic

nationals; they are Rajbangshi (Koch), Garo, Mandi, etc. Average literacy rate 36.25% among them male 43.2% and female 29.3%. Main occupations Agriculture 45.73%, agricultural labourer 11.73%, wage labourer 2.65%, commerce 10.85%, transport 2.79%, construction 1.1%, service 14.41%, others 10.74%. In land use, total land under cultivation 1, 25,287.53 hectares, fallow land 16,935.35 hectares. The land use pattern single crop 34.84%, double crop 50.76%, triple crop 14.40%. Land under irrigation 41.18%. Under land control landless 11.60%, marginal 38.80%, intermediate 30.40%, and 19.20% rich. The market value of land of first grade is BDT. 12,500 to 25,000 per 0.01 hectare (182 US$ to 363 US$). Main exports products and commodities are vegetables, fruits, medicine, cosmetics, cigarettes, aluminium products, readymade garments, mosquito coil, beverage (soft drinks), etc (BBS, 2008).

4.2.2 Problems of Rice Cultivation in Gazipur District

As rice is the main crop in Gazipur district, farmers pay much more attention on it. But due to lack of knowledge and sometimes scarcity of inputs and materials they face lots of production constraints for better yield return. Irrigated rice is grown after the harvest of T. Aman rice or after harvesting a non-rice crop like potato, mustard or quick growing vegetables. Low temperature during the early vegetative stage of the crop prolongs growth duration and thus most of the existing modern varieties mature within 165 to 180 days. This requires use of a high level of inputs like irrigation, fertilizer and plant protection measures. For plant protection measures appropriate surveillance and monitoring is the first need. But farmers have lack of

knowledge and experience for effective monitoring in their crop field. That's why often they faces pest infestation problem in rice cultivation.

4.2.3 Pest Infestation in Gazipur District

Gazipur is very near to capital city Dhaka. As mentioned in earlier section the other causes for pest infestation in Gazipur district is urbanization. This urbanization is much higher than all other districts of Bangladesh. The trend to increase pest population in here since farmers started to grow high yielding varieties in their field. The only way to reduce pest attack they use pesticides from the beginning. This excessive use of pesticides increases the resurgence of new pest strain in many cases. Earlier rice crop so far is lower infested than the vegetable crops. From the last ten years Gazipur district reported as one of the major infested districts for rice pest. The average yield loss of rice due to insect pest in Gazipur district in three cropping seasons is about 23% of the total expected yield. (MOA, 2008). Using surveillance method with the help of IPM technology farmers can achieve better performance, yet many things still hindered to disseminate of this technology.