

ISSN 0973-0915

# NORTH EASTERN GEOGRAPHER

VOL 35 No 1 & 2 2007-08



**North East India Geographical Society**

Department of Geography

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Guwahati - 781014

Assam [India]

## FARMING SYSTEMS IN CHAKMA VILLAGE, CHITTAGONG HILL TRACT, BANGLADESH : A CASE STUDY OF BAGHAICHHARI MUK VILLAGE

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**Abstract:** A field survey of farming systems was conducted in the ethnic-minority village of Baghaichhari Muk village in Dighinala Upazila, a part of the Khagrachari District in the Chittagong Hill Tracts (CHTs) of Bangladesh. The objective was to reveal the existing cropping systems and socio-economic conditions for developing farming systems in the village of CHTs. Three rice cropping systems were being carried out in the study village, namely, single, double, and triple cropping. Among them traditional single rice cropping under rain-fed condition was the most predominant. Water availability of the area was the primary factor in the selection of cropping systems by the farmers, as it resulted in differences in accessibility to irrigation water and soil fertility. Most households in the village owned small farms. Single rice cropping was more common among the small farmers. Some farmers of medium and small size farm households had introduced double or triple cropping. They manually lifted stream water with plastic or bamboo buckets for supplementary irrigation. Not only the plain land cultivation but also the Jhum (shifting) cultivation was there in the study village. Jhum was an important farming system for small and landless households in order to meet their own consumption at a subsistence level.

### Introduction

Bangladesh is one of the densely populated countries in the world. Its economy is mostly agrarian. Most of the country's landscape is flat and populated by Bengali-speaking people who are predominantly of the Islamic faith. In contrast, in the Chittagong Hill Tracts (CHTs), which is located in the southeastern part of Bangladesh, the vast majority of the ethnic groups profess Buddhism, followed by Hinduism, Christianity and Animism. The total area of CHTs is around

13,295 km<sup>2</sup> covering about 10% of the total area of Bangladesh and supports under one percent of the national population. Approximately 80% of the area is hilly to mountainous. The construction of Kaptai dam, completed in 1963s, has resulted in huge socio-economic damages in the CHTs. About 100,000 hill people were displaced from their homes and 54,000 acres (22,000 ha) of land, mostly farmlands, were inundated. Crop production is the main source of income and land is important property for the *Chakma*

villagers before and after the resettlement for the dam construction.

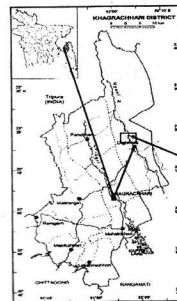
Roy and Munshi (2006) evaluated the overall performance of the hill agricultural systems with reference to the income and employment potentialities of the respondent households of the study area. Besides, the results of Uddin *et al.* (2000) revealed that the population of CHTs increased rapidly which created greater pressure on the land resources. *Jhumming* and traditional cultivation on steep slopes had set in motion a degradation process that would have serious consequences both for natural resources and for agriculture. They also noted that the technologies developed for mono-culture in the plain areas were inappropriate for the hill environment. Several studies on farming systems and rural development have already been carried out in the plain areas of Bangladesh. However, the farming system

studies in the remote areas of CHTs are still lacking. The holistic study of farming systems research is needed in order to provide basic information for research and extension works. The present study, therefore, was carried out to reveal the existing cropping systems and socio-economic conditions for developing farming systems in the village of CHTs. This study deals with characterizing the economy, farm size, land tenancy, soil, crop yields and use of inputs *etc.*

### Research site and methods

This study was conducted in Baghaichhari Muk village, 51 No Dighinala Union, of Dighinala Upazila in the CHTs region of Bangladesh, about 30 km from the Khagrachari District headquarters (Figure 1) for 3 years (2003-2005). Regular field surveys were done during the cropping seasons from 2003 to 2005.

**District:**  
Khagrachari  
**Sub-district:**  
Dighinala Upazila  
**Union:**  
51 No Dighinala  
**Study village:**  
Baghaichhari Muk village  
**The study area**



Source : [http://banglapedia.search.com.bd/HT/K\\_0147.HTM](http://banglapedia.search.com.bd/HT/K_0147.HTM)

Fig. 1 Khagrachari district and location of the study area

The study village stretches for 500 m from north to south and 3 km from east to west, and the Mayani River flows through its western part. A paved road and a reserve forest are located to the south and east of the village (Figure 2). All the 247 households in the study village were interviewed using questionnaire. In addition, interviews using a semi-structured questionnaire and field observations were also conducted.

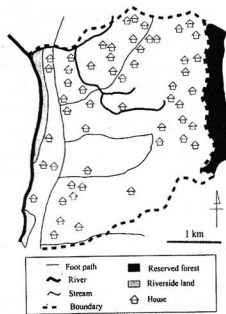


Fig. 2 : Map of Baghaichari Muk village

Three distinct cropping seasons exist in this area. The summer season in March and April is characterized by high temperature and humidity with occasional thunderstorms and cyclones. The rainy season starts in May and ends in October, while winter starts in November and ends in February (Soil Resource Development Institute 2002). According to long-term records (1961-1990) obtained from the

Rangamati Weather Station, rains begin in February, gradually increases until July, and then decreases (Figure 3). Ninety percent of the rainfall occurred during the rainy season from May to October. The highest (627 mm) and lowest (4 mm) amount of rainfall occurred in the months of July and January respectively. Maximum 33 °C and minimum 20°C temperatures were recorded in April and January.

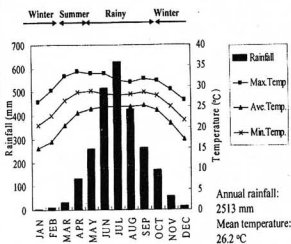


Fig. 3 : Annual rainfall and temperature of Rangamati

## Results and Discussion

### Toposequence of the study village

The Mayani River which border the western edge of the village flows from north to south. Some homesteads are scattered on the hill and some are concentrated on the plain area. The bank of the rivers is about 1-2m lower than the homestead areas, and the

rice fields are 3-4m lower than the homestead lands. A paved road from north to south passes through the western part of the village. In addition, a *kutchra* (unpaved) road passes through the village, and a small water reservoir is located in the midst of the fields. Registered hill lands and lands for shifting cultivation are situated on the eastern side of the village (Figure 4).

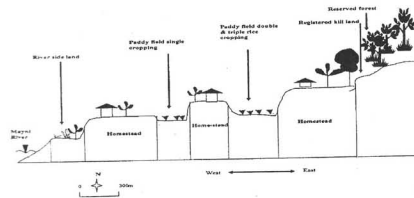


Fig. 4 :Toposequence of farm lands in the study village

### Farmland classification

According to the survey, villagers traditionally classified their lands by themselves into five categories: (1) homestead land (*ghor vide*), (2) paddy land (*ghan bhui*), (3) riverside land (*poundi bhui*), (4) registered hill land (*moire bondobosti*), and (5) land for shifting cultivation (*Jhum bhui*) (Figure 5).

### Homestead lands

These are residential area that varies in size from a fraction of an acre to one acre or more. Usually, these are surrounded by rice fields, and the villagers grow summer

vegetables, such as Indian spinach, snake gourd, lady's finger, bottle gourd, eggplant and so on. Fruit trees are also common in homestead areas, including coconut, jackfruit, guava, lemon, papaya, mango and so on. In addition, perennial woody trees such as teak, manila (*Gmelina arborea*), mahogany (*Swietenia mahogani*), and rain tree are commonly found.

### Paddy lands

Three rice cropping systems were observed in the paddy lands: single, double, and triple cropping systems. Single rice cropping under rain-fed conditions was the most prevailing system because irrigation facilities were very limited in this region. For the supplementary irrigation, villagers manually lifted stream water with plastic bucket or bamboo baskets. Double rice cropping was conducted in a few areas where rice fields were located near small streams. In some streams, water was available during the summer season to irrigate the rice fields. Farmers made small

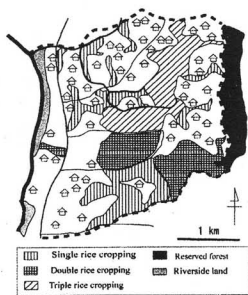


Fig.5 : Different farm lands and rice fields in the study area

irrigation channels to collect and divert water into their fields. Triple rice cropping was done only in low lands areas close to the foothills where water was available throughout the year. These areas were locally called *Null Paddy Bhui*.

Farmers grew both modern and local rice varieties in all the rice cropping systems. The popular modern rice varieties were BR22, BR11, BR3, China IRRI, Apon IRRI, Joy IRRI, Bayee IRRI, Biplob and the local varieties included Sonali Pajam, Gonda Pijam, Rangamoni, Nadengeporo, Dob shit dhan, Kaligira and Binni. According to the farmers, they obtained a new variety called Bayae-IRRI from BR11 two or three years ago. Now it has become very popular among the villagers due to its tall stature, good yield and taste. The local variety, Binni was sticky and generally used for various local rice cakes, while Kaligira had a pleasant taste and smell which gave a high price. Generally, farmers did not want to cultivate the local varieties because of low yields. For example, farmers obtained the yield of 20-35 *Ari* (200-350 kg) from 0.161 ha of land put to local varieties, whereas a modern variety grown in the same area yielded 60-80 *Ari* (600-800 kg).

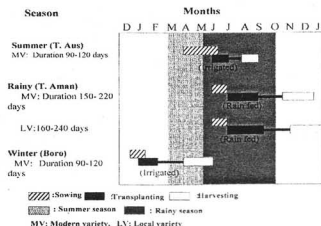


Fig. 6 : Cropping calendar of four rice cropping systems in the study village

### Riverside lands

Long ago riverside lands were used only for vegetables. The villagers did not cultivate these lands intensively. The fields were left fallow after harvest and used for cattle grazing. However, due to increased population, these lands were converted into rainfed rice about 15-17 years ago. The seeds were sown in July and harvested in September. As a double cropping, winter vegetables such as tomato, potato, brinjal and okra were grown after harvesting rice.

### Registered hill lands

These are situated in the hilly areas which were once government property (*khas* land) and different species of wild trees and bushes existed there. Farmers initially obtained the lands by petitioning the government for ownership. After getting the land registered, they began to plant various trees such as teak, bamboo, mango, jackfruit etc.

### Land for shifting cultivation

Shifting cultivation is a traditional farming system commonly found in the hilly areas of CHTs. The lands were situated in the reserve forest and usually far from the village. Landless and small landholders normally practiced shifting cultivation. They grew various crops such as upland rice, maize, sesamum, cotton, cucumber, sweet pumpkin, chilly, etc.

### Relationship between farm size categories and different farm lands

According to the Bangladesh Bureau of Statistics 2001, the farmers were classified into four categories based on their landholdings : (1) landless farmers (own no land), (2) small farmers (having an operated area of less than 1.01 ha), (3) medium farmers (having an operated area of 1.01-3.03 ha) and (4) large farmers (having an operated area of 3.03 ha and above). As shown in Table 1, 12 households (5% of the total households) in the study village were landless and most of them were daily laborers. Among the small size categories, 98% households have homestead lands of 26.08 ha, 44% households have a total paddy land of 25.08 ha, 6% have a total riverside land of 1.33 ha, 5% households have registered hill lands of 4.44 ha and 6% of households have a total *jhum* lands of 9 ha. Only 3 households have no homestead land. They moved from *Katorung chhara* village and they were residing in this village in relatives' land. They moved to this village for various reasons such as availability of work, good transportation and prospects for better income.

100% households of medium farm size categories have a total homestead land of 31.02 ha, 89% households have paddy land of 45 ha, 36% households have riverside land of 7.46 ha, 21% households have registered land of 18.29 ha and 2% of households have 1 ha of *jhum* lands. According to these figures the farmers possessed more rice land than either riverside land or registered land in all farm size categories.

It was also found that 72 households owned medium and large farm size which constituted 29% of the total households in the village. On the other hand, 163 households owned small farms of 59 ha in total which constituted 66% of the total households of

were far away from their residences (about 10-12 km).

Millat-e-Mustafa *et al.* (2002) studied the cultural and religious norms in *jhum* cultivation of CHTs. Many researchers have already studied the laws, customs and anagement

**Table 1 : Relationship between farm size categories and different farm lands in the study village**

| Farm size Categories (ha) | Total            | Houestead land |                 | Paddy land   |                 | Riverside land |                | Registered hill land |                | Jhum land    |               |              |
|---------------------------|------------------|----------------|-----------------|--------------|-----------------|----------------|----------------|----------------------|----------------|--------------|---------------|--------------|
|                           | HH               | Area (ha)      | HH              | Area (ha)/HH | HH              | Area (ha)/HH   | HH             | Area (ha)/HH         | HH             | Area (ha)/HH | HH            | Area (ha)/HH |
| Landless                  | 12 (5)           | 0              | 0               | 0            | 0               | 0              | 0              | 0                    | 0              | 0            | 2 (17)        | 2.02         |
| Small (<1.01)             | 163 (66)         | 59 (98)        | 160 (26.8)      | 71 (44)      | 25.08           | 9 (6)          | 1.33           | 8 (5)                | 4.44           | 9 (6)        | 9             |              |
| Medium (1.01-3.03)        | 61 (25)          | 102.02         | 61 (100)        | 31.02 (89)   | 54 (36)         | 45             | 22 (36)        | 7.46                 | 13 (21)        | 18.29        | 1 (2)         | 1            |
| Large (>3.03)             | 11 (4)           | 50             | 11 (100)        | 10.27        | 11 (100)        | 20.48          | 6 (55)         | 5                    | 7 (64)         | 17.4         | 0             | 0            |
| <b>Total</b>              | <b>247 (100)</b> | <b>211</b>     | <b>222 (90)</b> | <b>67.38</b> | <b>136 (55)</b> | <b>90.11</b>   | <b>37 (15)</b> | <b>14</b>            | <b>28 (11)</b> | <b>40.14</b> | <b>12 (5)</b> | <b>12</b>    |

Source : Household survey in 2004

Note : Figures in parentheses indicate percentages

the village. It was found that the number of households in medium and large farm size categories was smaller than those of small farm size category. Small and landless households attempted to overcome the land scarcity problem by involving themselves in *jhum* (shifting) cultivation, though *jhum* lands

practices of this farming system (Millat-e-Mustafa, *et al.*, 1998a, 1998b, 2001, Rahman, 1988, Khisa, 1982, Schendel *et al.*, 2000, Siddique, 1999, Tripua, 2000). Therefore, this study is limited only to the number of households of different farm size categories who were involved in *jhum* cultivation.

### Relationship between farm size categories and rice cropping pattern

Based on the survey of all households of the study village (247 households), four rice cropping patterns were observed in the crop seasons during 2002-2004 (Table 2). The crop calendar of these patterns is shown in Figure 5. It was found that more farmers of small and medium farm size categories did single rice cropping under rainfed

in Boro rice cropping which the farmers could not afford. More farmers of large farm size category followed T. Aus—T. Aman—Fallow system in 2004 than that in 2002 and 2003. Only a few farmers belonging to all farm size categories practiced triple rice cropping during the study period. Farmers believed that Boro rice growing was unreliable and they found buying fertilizers and irrigating fields a costly affair.

**Table 2 : Relationship between farm size categories and rice cropping in Baghaichari Muk village**

| Patterns Names                      | 2002          |               |              | 2003          |               |              | 2004          |               |              |
|-------------------------------------|---------------|---------------|--------------|---------------|---------------|--------------|---------------|---------------|--------------|
|                                     | Small (163HH) | Medium (61HH) | Large (11HH) | Small (163HH) | Medium (61HH) | Large (11HH) | Small (163HH) | Medium (61HH) | Large (11HH) |
| Fallow-T Aman-Fallow<br>Single rice | 19 (12)       | 25 (41)       | 0            | 27 (17)       | 18 (30)       | 0            | 34 (21)       | 25 (41)       | 1 (9.09)     |
| T Aus-T Aman-Fallow<br>Double rice  | 15 (9.2)      | 14 (23)       | 2 (18.18)    | 18 (11.04)    | 4 (7)         | 2 (18.18)    | 26 (16)       | 14 (23)       | 4 (37)       |
| Fallow-T Aman-Boro<br>Double rice   | 3 (2)         | 2 (3.27)      | 2 (2.45)     | 4 (2)         | 1 (3.06)      | 0 (3.27)     | 5             | 2             | 0            |
| T Aus-T Aman-Boro<br>Triple rice    | 1 (1)         | 1 (2)         | 0 (3.06)     | 5             | 0             | 0 (2)        | 3 (2)         | 1             | 0            |

Source: Household survey in 2005

Note : Figures in parentheses indicate percentages

condition in 2004 than that of 2002 and 2003. In double rice cropping pattern, farmers followed more the pattern of T. Aus—T. Aman—Fallow than Fallow—T. Aus—Boro. The reason might be that irrigation was needed

### Occupational structure of the household heads

The household heads were classified into two categories in terms of their occupations: (1) those who practiced farming and (2) those

who are engaged in non-farming sector as their primary occupation. Both were sub-divided into two groups depending upon whether they had extra or secondary jobs: (1) household heads having only primary job and (2) those having both primary and secondary jobs.

As shown in Table 3, it was observed that in the landless group only 4 household heads worked as daily laborer in farming and 8 household heads did non-farming works as their primary occupation. It was clearly seen in all farm categories, except the landless group, that most household heads were engaged in farming. Only a small proportion was involved in non-farm occupations as their primary or secondary jobs. These data clearly showed that farming played an important role

in the livelihood of the people in the study area. Household heads whose primary occupation was farming were found to be in greater number than those with non-farming occupation in all farm size categories, except the landless category. Secondary jobs were mostly related to the non-farm employment which were part time or temporary or permanent. Some villagers had to do secondary as they could not earn their living with primary jobs alone. These jobs included daily laborers, rickshaw pullers, taxi drivers, petty business, carpentry, small business and, etc. Unlike the plain regions, the villagers rarely go to the neighboring towns in search of the job opportunities because of uneasy transportation and socio-cultural barriers.

Table 3 : Occupational structure of the household heads in the study village

| Occupation of household heads |                        |              |                    |              |                    |
|-------------------------------|------------------------|--------------|--------------------|--------------|--------------------|
| Farm size categories (ha)     | Total household number | Farming      |                    | Non-Farming  |                    |
|                               |                        | Only primary | With secondary job | Only primary | With secondary job |
|                               |                        |              |                    |              |                    |
| Small                         | 163<br>(66)            | 71<br>(44)   | 48<br>(29)         | 32<br>(20)   | 12<br>(7)          |
| Medium                        | 61<br>(25)             | 43<br>(70)   | 15<br>(25)         | 3<br>(5)     | 0                  |
| Large                         | 1.1<br>(4)             | 5<br>(46)    | 2<br>(18)          | 4<br>(36)    | 0                  |
| Total                         | 247<br>(100)           | 123<br>(50)  | 65<br>(26)         | 46<br>(19)   | 13<br>(5)          |

Source: Household survey in 2004

Note: Figures in parentheses indicate percentages

In all the farm size categories, a considerable number of households had secondary jobs in order to get a supplementary income. It was also found that the landless households performed non-farming works more than farming as their primary occupation. 66 % of the landless households were engaged in non-farming activities, while the rest 34% were engaged in farming. However, some landless households depended on farming as a primary activity by leasing in land from others.

### Conclusion

Generally, the farmers in the study village practice traditional farming systems. Most households in the village owned small size of farmland. Farmers grew modern rice varieties as well as local varieties. Hybrid rice varieties were introduced few years ago in the plain areas of Bangladesh; however, the study village was so remote that only occasionally modern varieties were grown. *Jhum* cultivation was carried out by the small and landless farmers. Three rice cropping systems, namely mono, double and triple cropping were prevailing in the study village. The traditional rain-fed rice was most popular. The selection of cropping pattern by the farmers was closely related to their farm size and the water availability in the paddy fields. According to the survey, water availability was found to be the most crucial factor determining the cropping pattern. It was also associated with soil fertility and accessibility to water for irrigation. Single rice cropping under rain-fed

conditions was the most prevalent system due to the limited irrigation facilities. Double and triple rice cropping were practiced only by some farmers of medium and small farm size categories, who could afford irrigation. Some potentially better options such as rivers like the *Mayani* and small streams (*Baghaichari*) remained unexploited in the study area. The occupational structure of the households in the study village indicated that farming was their main occupation although some were engaged in non-farming activities. Some households had secondary occupations to derive more earning. The study village, Baghaichari Muk, is a traditional type of village where agriculture and the rural life as well is not yet developed. However, the survey clearly showed that there were still possibilities for further development. Based on their existing socio-economic and agricultural structures, villagers were eager to adopt modern agricultural technologies such as high yielding varieties, shallow tube well, deep tube well and fertilizers. Therefore providing such agricultural access to the farmers by the government and/or NGOs should be included the conceptual framework for formulating strategies for the development of the rural communities in these areas of CHTs.

### References

- Ando, K. and Rashid, A. (1990) : 'Cropping Patterns and their Evolution, in Kaida, Y. ed., *Agricultural and Rural Development in Bangladesh: Tetulia Village*, in Bogra, Japan International Cooperation Agency, Dhaka.

- Bangladesh Bureau of Statistics (BBS) (2001) : *Statistical Pocket Book Bangladesh 2000*, Dhaka.
- Chakma, S. S., (2004) : Study on Farming Systems of *Chakma* Village in Chittagong Hill Tracts, Bangladesh, unpublished Masters thesis submitted to the Graduate School of Asian and African Area Studies, Kyoto University.
- Chakma, S. S and Ando, K (2005) : Preliminary Study of Farming Systems in *Baghaichhari Muk* Village, Chittagong Hill Tracts, Bangladesh, *Japanese Journal of Tropical Agriculture*, Vol. 49 (Extra Issue 2) : 25-26.
- Chakma, S. S. (2006) : Local Land Use Technologies: Adaptive Strategies for Rice-Based Cropping Patterns in Chakma Village, Chittagong Hill Tracts, Bangladesh, in Maruyama, J; Wang, L; Fujikura, T and Ito, M (eds), *Crossing Disciplinary Boundaries and Re-visioning Area Studies*, Proceedings of Kyoto symposium, November 9-13, Kyoto University Clock Tower Centennial Hall, pp. 183-194.
- Uddin, M. S, Kamal, M. S. and Mollah, M. H. (2000) : Hill Farming System and Resource Utilization in the Chittagong Hill Tracts. A Baseline Survey, Hill Agricultural Research Station, Khagrachari, Bangladesh Agricultural Research Institute.
- Millat-e-Mustafa, M., Siddique, M. A., Khan, N. A. and Newaz, M. S. (2002) : An Empirical Study on the Jhum Farming System in the CHT, in Khan, N. A., Alam, K., and Khisa. S. K., eds., *Farming Practices and Sustainable Development in the Chittagong Hill Tracts*, Chittagong Hill Tracts Development Board (CHTDB), Chittagong land Swiss Agency for Development and Co.,operation.
- Roy, M. K. and Munshi, S. K. (2006) : Hill Agriculture : A Socio-Economic Analysis, Bangladesh Academy for Rural Development, Kotabari, Comilla.
- Salim, M., Ando, K., Uchida, H. and Tanaka, K. (1990) : Village-Level Studies on Rice-Based Cropping Systems in Low-Lying Areas of Bangladesh, *Japanese Journal of Crop Science*, 59 (3): 518-527.
- Soil Resource Development Institute (2002) : *Guide Book of Land and Soil Resource Utilization of Dighinala Upazila of Khagrachari Hill District*, Ministry of Agriculture, Dhaka.
- Thana Cereal Technology Transfer and Identification Project (GOB/UNDP/FAO-Project: BGD/89/04)(1998) : Technical Progress Report, Dhaka, p. 44.