

**‘Who Benefits at What Cost’:
Farmers’ Experiences of Rice Cultivation in Bangladesh**

Case Story Collection on Rice Cultivation in Bangladesh



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Background of the Study

Bangladesh is the largest Delta in the world. Of the total of one million square km Bangladesh delta comprises of 60,000 sq. km (23,000 square miles). Historically, a strong peasant society and its culture have developed surrounding this delta. Due to the global influences and social mobility whole peasantry has been turning into farming culture. Including the floodplain, farmers at different agro ecological zones in Bangladesh have been undertaking diverse range of agricultural activities surrounding rice cultivation. In the past they use to rely on indigenous rice cultivar. However, after different development interventions Rice Farmers have been assigned to adapt exotic rice cultivar in different parts of the country. Intervention of different governmental and international organization brought in big changes in their agricultural practices and livelihood strategies. Moreover, the inputs in rice cultivation have been increasing alarmingly and the farmers have encountered huge constraints. A question arises whether these big changes have benefited the Bengali rice farmers at all or not. 'How did the rice farmers encounter the changing realities?'- is of the main interest of the project.

In these case studies it was intended to reveal how the rice farmers are fighting the realities in different agro-ecological zones reflecting on different constraints. They might have problem of sufficient land. Due to the dependency on exotic cultivars, farmers in different part of the country often encounter the problem of unavailability of seeds. In addition, there is a risk of not getting expected yields due to the lack of quality seeds. High price and unavailability of the fertilizer during the rice season are the other main constraints. Until now many conflicting situations have been emerging between farmers and fertilizer distributors surrounding this issue. The concerned government officials are also becoming part of these conflicts. Secondly, often the farmer pays high prices for the pesticides at the risk of being cheated by the businessmen as they are supplied mixed with fake products. To continue, farmers have specific difficulty with the regular failure of the electric supply which causes irrigation a problem. Rise in the fuel price and its unavailability during the pick season cause a huge trouble. Often the farmers have problem of accessing to the irrigation water. In some agro-ecological zones like Barintrack farmers fail to extract water as it goes down. Often the farmers encounter the problem of soil degradation which also disadvantaged them.

Bangladeshi rice farmers encounter diverse range of problems for so many years, and it is very important to us for many reasons that we address them. Farmers of different categories have distinctive nature of constraints when they carry out rice cultivation. Some case studies on the farmer representing different agro-ecological zones help have an understanding about the real situation of Bengali rice farmers.

Objective of the Study

The objective of the study was to conduct 30 case studies to document the local experience of the farmer regarding the changes occurred in rice cultivation in last 40 years. The study has identified farmers, who were eased or disadvantaged by different internal and external intervening forces, in 30 agro-ecological zones of the country. Moreover, the case study focuses on practices of indigenous and exotic rice cultivation to show their advantages and disadvantages. Issues related to decline in farming and its culture were revealed through these case studies. Furthermore, this study provides an understanding of whether the farmers have adequate policy supports in order to protect their rights which might have enabled them to overcome different constraints. Finally, in the case studies, documentation of the challenges encountered by the Bengali rice farmers and their responses to these particular problems were included.

Methodology

The study has employed an anthropological approach in order to conduct the cases. Firstly, the researcher studied newspapers and other source materials in order to have an idea about how farmers in different agro-ecological zones encountered complex situation in their life span. After that the research team arranged 30 focus group discussions in 30 agro-ecological zones. Key informants were identified during the sessions and they were interviewed individually. The FGD allowed gathering some generalized sort of information regarding rice farming and farmers.

Major Findings

The farmers of Bangladesh engaged in rice cultivation have been subsidizing the state in providing food. It has been revealed by the study in 30 Agroecological Zones in Bangladesh that farmers have been encountering multi-faceted problems in rice cultivation. Some of the constraints related to Agroecological factors have disadvantaged Bangladeshi farmers. Moreover, government policies do not significantly consider to provide the farmers with any support.. Following discussion focuses on the findings of the case studies in 30 Agroecological zones to contextualize the experiences of the rice farmers.

The major findings of the case studies suggest that rice farming is no more cost-effective to the farmers. They borrow money or sell assets to fight the rising cost of rice farming. After the harvest, the farmers do not get actual price of the product. They do not get back the investment. Their experiences suggest that though rice cultivation is not economically viable, they do it as it ensures them with food grain for family consumption. As rice is culturally their main food and their ancestors would cultivate rice, the farmers of Bangladesh respect this tradition and so, they grow rice. Another effect of unprofitable rice cultivation is that out of frustration many farmers commit suicide.

Usually the rich farmers have lesser hassles. But poor farmers and sharecroppers undergo severe pressure in order to manage the cost of rice farming.

The major reason why the cost of rice cultivation has increased is the shift from the local variety to HYV and Hybrid. The farmers used to depend on the local resources to cultivate local varieties. No fertilizer and pesticide were applied to the land except manure like cow dung. The farmers used to grow *Rabi* crops between two major rice seasons called *Aoush* and *Aman*. The total outcome from agriculture was profitable as the cost of production was relatively very low. But the introduction of the HYV and Hybrid rice varieties dramatically increased the cost of production as these varieties require a lot of fertilizer, pesticide and irrigation. So the farmers had to shift from locally available renewable natural resources to market dependent materials.

The most common problem which the farmers encounter is the unavailability of fertilizer. The study shows that farmers need to apply certain fertilizers as soon as they transplant the seedlings. Otherwise the seedlings get harmed. It makes them desperate to collect fertilizer even if the price is very high in the market. The price of fertilizer (specifically urea) has always been manipulated by dealers and other interest groups because of its high demand. This causes conflict between the farmers and businessmen in most of the parts of the Bangladesh. Many farmers died when they fought against different interest groups for fertilizer. Moreover, the new system which was introduced to make the fertilizer available to the real farmers rather than to the groups of vested interest has also created a new problem. The sharecroppers who have no land are discriminated in many parts of the country. The farmers have also lodged complaint against the procedure of urea distribution. According to the new system, farmers will collect a token from the Union Parishad (the lowest body of local government) and visit the officials at the Agriculture Office. This is quite a hassle for them. They queue up for hours in front of the UP chairman's and Agriculture Officer's place to collect the permission. They move from door to door to get the permission. Finally, they queue up at the retailers and wait for an unlimited time. After spending from two to four days when the farmer receives inadequate amount of fertilizer, the cost increases as they pay for conveyance to frequent the places for fertilizer. The delay to collect the fertilizer naturally delays its application to the land. It results into poor yield. It is also reported by the farmers that the price of the fertilizer is very high. They borrow money or sell house hold assets to meet up the high cost of fertilizer. They are also skeptical about the role of UP Chairman. The study reveals that many UP leaders have been favoring their relatives and allies in providing them with fertilizer. This scenario is common in all Agroecological zones in Bangladesh except a few places where the farmers still cultivate indigenous rice varieties as the demand of fertilizer is very low in those areas. Although other fertilizer is available in the market, the price has increased a lot. Many experienced farmers reported that during the introduction of HYV varieties they were given fertilizers and other services free of cost. When they

started depending on the new technology, gradually the price began to increase and now they completely depend on the market. Another problem of applying chemical fertilizer is the decline of soil fertility. The demand of fertilizer has been increasing in the land. The land which required 10-25 kg of fertilizer at the beginning now needs more than 40 kg. Farmers in most of the parts of the country are struggling to cope with this increased cost of fertilizer. Moreover, there are frequent conflicts between the farmers and local administration.

Another significant area of problem is seeds. Farmers used to preserve their own seeds at home when they cultivated local varieties. They also preserve the seed of HYV varieties. The down side of HYV seed preservation is that in two years time the yield starts to decline. There is no way to preserve the seeds of Hybrid rice. Farmers do not have the technology. Some farmers of different Agroecological Zones stated in their own language that those who introduced the new seeds took away the control of seed conservation from farmers. The farmers think that their own seeds were stolen or replaced by new varieties through a secretive process. The nature of seed crisis is varied throughout the country. The seeds of HYV rice were supplied from the agriculture office. In many areas farmers stated that seeds produced by the agriculture office have some quality. It produces more or less satisfactory yield. The major problem is that most of the offices are far away from the farming sites. On the other hand, the farmers do not get the seed on time even if they visit the office a number of times. The price of the seed also increases if they make few visits to the office. Earlier it cost them about Tk 10.00-12.00/kg, but now the price is Tk 30.00-35.00/kg. Another source of these seeds is neighboring farmers. If they buy it from the neighbors or relatives, it may give satisfactory yield. However, they encounter the same problem when the quality deteriorates in two years time. The farmers stated that the price of seeds available in the seed store is reasonable to certain extent. But the seed traders often mix low quality seeds in the packet. Farmers are being cheated in this way. The price of Hybrid seeds is very high. They are about Tk 40.00 per Kg. Farmers fully rely on the market as they do not have the technology to conserve this seed. The seed is available in the rural market, but most of the farmers are unable to purchase the expensive seeds. The downsides of the seeds are many. In many parts of the country some of the NGOs have forced the farmers to purchase these Hybrid seeds. Expenditure in Hybrid cultivation is much higher than the HYV varieties. Moreover, these rice varieties are too vulnerable. Many farmers in different parts of the country have experienced irreparable losses as the plants failed to produce rice grain. Although the yield is very high, risks of different kinds are involved to this rice cultivation. The sharecroppers or contracted farmers in many parts of the country are scared of cultivating Hybrid rice. Only those who have large land are able to take risks. But many of them jeopardize their lives in this way. Despite this, farmers in many parts of the country are still cultivating local varieties as they preserve their own seeds. They are far away from the problem of introduced technology in agriculture.

Another major problem encountered by farmers in different Agroecological zones is irrigation. In some Agroecological zones like 10, 22, 24, farmers cultivate local varieties and the paddy plants are rain fed. But all introduced varieties require large scale irrigation. Different irrigation methods and arrangements are used in different zones. In most of the places rich farmers can afford to have own shallow pump. They also rent the pump to small farmers and sharecroppers. Farmers also pay certain amount of money for the rent of pump and buy the fuel to run the machine. In some parts of the country, farmers leave 1/3 of the yield for the irrigation provider. Deep tube-wells with electric pump are also used in many parts of the country. All these methods are used by the farmers of different Agroecological zones and they have encountered problems of distinctive types. Those who rely on shallow pump suffer to cope with the increased fuel price. The small farmers and sharecroppers sell their household assets or borrow money from users and NGOs or sell a part of yield in advance. Often the fuel is unavailable even if they want to pay high. Conflict and collision with authority is quite common. Farmers miserably encounter crop loss and also struggle to cope with the rising trend of irrigation cost. Out of frustration, incidents like road block and attacks on the TNO offices occur in some sites. The farmers who depend on electric pumps for irrigation also suffer in many parts. Low voltage, voltage fluctuation and power failure for longer period are very common. Some of the irrigation projects run by the government also have problems as the decisions are manipulated by the managers. Despite this, a problem in some parts of Barind Tract is related to Agroecological factors. Although the project entitled Barendra Shech Prokolpo tried to provide irrigation facilities in many part of the zone, some areas are still beyond these facilities. In these areas large land owners store water in their ponds, and people carry water in clay pots to irrigate the land. Farmers bore the land to install shallow machine but fail to reach the water level. They dig about 20 ft and install the pump in it. It's risky to fetch water from the underground. Few people died in accidents when they tried to go down the pit.

Pesticides cause the other sector of difficulty for the farmers in all the zones. Most of the farmers are aware of the bad impacts of pesticides. But, they apply it to save the paddy quickly from the attack of pests. Farmers know that pesticides eliminate many of the useful insects along with the harmful ones. This has also devastated fish resources, water animals and birds. Bad impacts of pesticides in human body are also one of the main concerns of the farmers. Pesticides are available in the market and the price is not too high compared to the fertilizer and irrigation cost. The dealers or retailers prescribe the farmers which product should be applied to the field. Farmers rely on the knowledge and instruction of the traders without having any understanding of the appropriate application of pesticides. The advice is sometimes misleading. Often the farmers are cheated as they buy fake products from the traders. Their crops were damaged by pests as these fake pesticides did not work. Some farmers in Satkhira lodged complaint as they were treated this way. Their crops were damaged by pests due to the application of fake pesticides. When the pesticides are not available, some

farmers use ash or apply the juice of *neem* leaf. Many farmers informed that they are not in favor of pesticide use. It has destroyed the fish resources and other animals. One kind of earth worms which contribute to the soil fertility has become extinct because of pesticide application in the fields. Farmers also think many unknown diseases in human body are caused by this poisonous material.

Marketing and getting the real price of the product is one of the major constraints in rice farming. Farmers invest a large amount of money in rice season. In most of the cases it is evident that they become indebted and the situation worsens during the harvest period. Moreover, in many places they sell crops in advance from the fields to repay the loans. The market price is manipulated by the businessmen. They were reported to have syndicate in order to manipulate the price. Often the farmers do not have enough money after the harvest to pay the carrying cost. Advantages are taken by the middlemen. They buy it from farmers' house and pay less than the local market price. The advantage of the selling of paddy at home is that farmers can get the opportunity to measure the paddy properly. It was reported during the study that buyers in the market jointly manipulate the weight of paddy. All of them use fake standard and farmers lose from two to four kg of paddy per mound. It was evident that farmers are disadvantaged in different phases.

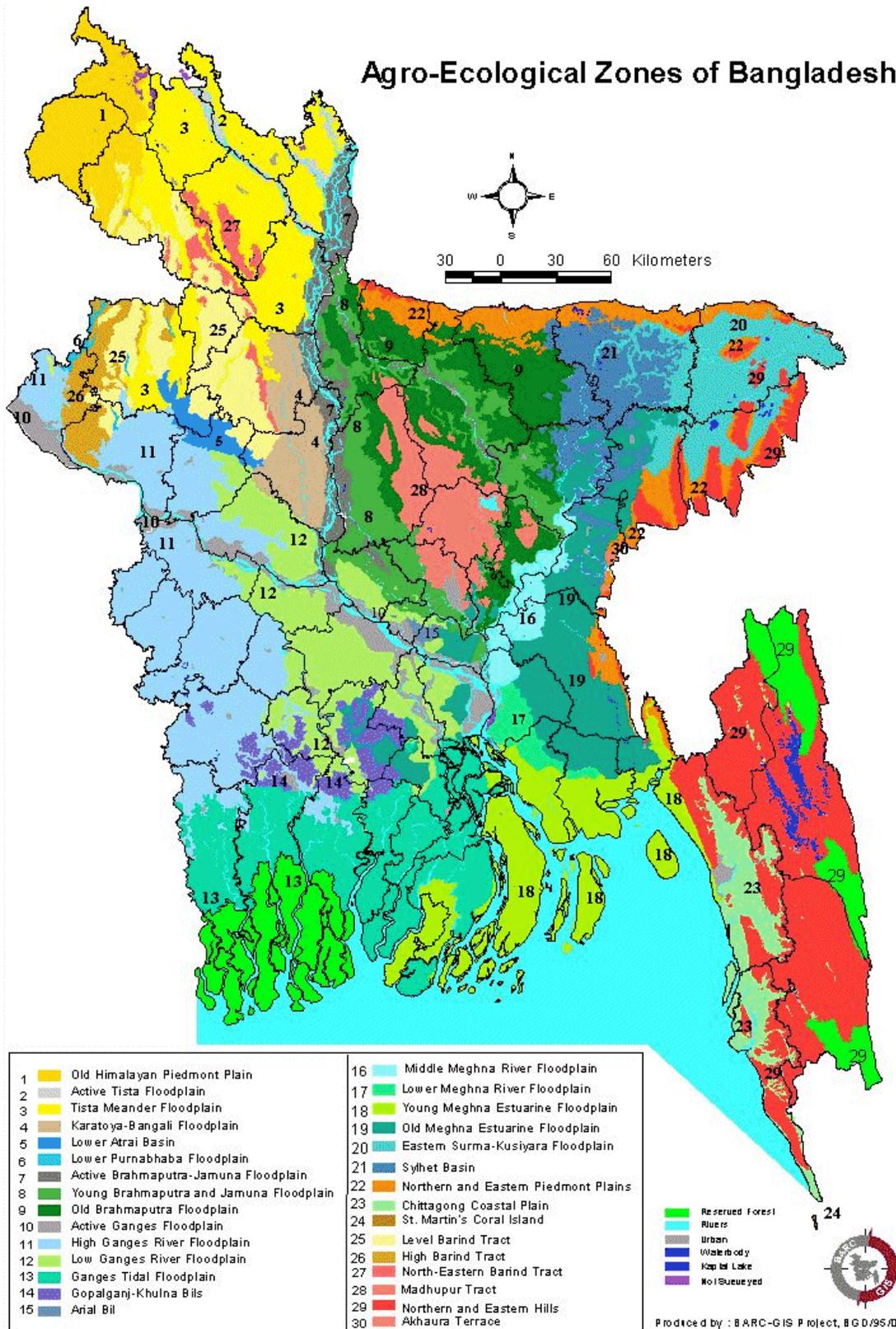
The farmers think that they have lower status in the society. No one wants to establish any relationship with a farmer's family. Societal attitudes towards farmers also hurt them. They encounter this problem when they visit the government officials. They are not treated very well. Often they are insulted by the people who hold the power position. At their early age farmers used to observe festivals after the harvest. This tradition has declined a lot.

However, the major findings of the study suggest some recommendations to the policy makers which may relieve the rice farmers a little from the ongoing struggle and they are mentioned below:

1. Farmers need a friendly environment, and a favorable attitude should be developed among the concerned officials/people so that they can lessen their elitist/positivist view.
2. The farmers think that the responsibility of distributing fertilizer should be given to someone who genuinely feels their pain. It should be managed by the farmer community rather than the UP leaders, traders, high officials or any interest groups. This may ensure them to get sufficient amount of fertilizer on time.
3. The government should control the fluctuating price of urea. The same measures should be taken to other fertilizers as problem also occurs in the distribution channels of those fertilizers.

4. The seed should be distributed through genuine sources that ensure their quality.
5. The price of seeds should be kept up to the ability of farmers and measures should be taken to control price manipulation.
6. Government should reexamine the quality and impacts of some of the Hybrid rice which created environmental hazard and disadvantaged the farmers.
7. Measures need to be taken against some NGOs that insist the farmers to purchase the Hybrid seed of particular brand.
8. A user friendly technology should be developed so that farmers can preserve their own seeds as they did earlier.
9. Technology should be developed to promote the cultivation of local rice varieties as still their potentials are evident in different parts of the country.
10. Government should have an effective policy to resolve the irrigation problem.
11. The fuel price should be subsidized for the farmers, and the distribution of fuel for irrigation should be maintained through a transparent channel so that farmers can have easy access to it. Constant power supply should be ensured which may reduce the irrigation cost.
12. The government should take measures so that the farmers can sell their harvest in real price. Interferences of other interest groups which disadvantage farmers should be stopped.
13. A country-wide information network should be established which may allow the rice farmers to have free access to information regarding rice farming.

Agro-Ecological Zones of Bangladesh



(Source: [http:// Gateway to Land and Water Information Bangladesh Map 2_3_1 Map of agro-ecological zones.htm](http://Gateway to Land and Water Information Bangladesh Map 2_3_1 Map of agro-ecological zones.htm))

AGRO-ECOLOGICAL ZONE 1

Old Himalayan Piedmoundt Plain

Old Himalayan Piedmoundt Plain (4,008 sq km) -this distinctive region- is developed in an old Tista alluvial fan extending from the foot of the HIMALAYAS. It has a complex relief pattern. Deep, rapidly permeable sandy loams and sandy clay loams are predominant in this region. They are strongly acidic in TOPSOIL and moderately acidic in SUBSOILS; low in weatherable K minerals. Seven general soil types exist in the region, of which non-calcareous brown floodplain soil, black terai soil, and non-calcareous dark grey floodplain soil predominate. Organic matter contents are generally higher than in most FLOODPLAIN soil of Bangladesh. The natural fertility of the soil is moderate but well sustained. Soil fertility problems include rapid leaching of N, K, S, Ca, Mg and B. Most of PANCHAGARH and THAKURGAON districts and the northwestern part of DINAJPUR district are included in this zone.

Sub Region: a) North-central; b) Northern; c) Southern (Bangla Pedia)

Name: Samir Uddin, Village: Sayedour, Up: Begunbari, Age: 70, Education: class VIII. Upazilla: Thakurgaon, District Thakurgaon



Samir Uddin is a marginal farmer. He has inherited 12 bighas of land from his father. He started cultivating paddy as an individual farmer about 45 years ago. At that period he used to cultivate local *Aman* varieties like *Kalam*, *Dhepa Kalam*, *Panati*, *Jhingashail*, *Anda* etc. He also cultivated *Aoush* varieties like *Katar*, *Tinchania*, *Badamphul*, *Akahmani* etc. This traditional cultivation has changed. Now he cultivates *Bharati Sharna*, *Shufala*, *Nepali Sharna*, *Pajam*, BR -41, 34, *Badshahbhog*. During the *Aoush* period he cultivates *Chaina*, *Mala*, *Chandina*, *Pari*, BR-29, *Shufala*, *Heera*, Hybrid etc. Excepting rice he cultivates maize, wheat, potato, onion, and other vegetables.

The situation is as such that no one now cultivates any local variety. It happens due to the unavailability of seeds and obviously the high productivity of exotic varieties. Secondly, it yields less compared to local varieties. In the early 60s Govt. officials encouraged and supported the farmers to cultivate exotic varieties.

Though at the beginning they were very reluctant, gradually they accepted the change and recently they have almost shifted to hybrid rice cultivation.

The changes in rice cultivation have increased their cost as it caused the change of input arrangement, and at the same time a lot of risk is involved in hybrid rice cultivation. Now they have additional burden of seeds, fertilizer, pesticide, excessive labor, irrigation etc. which they did not need when they cultivated local varieties.

Currently one of the major problems Samir Uddin encounters is related to irrigation. During the *Aman* period he irrigates his fields about five times and in the *Aoush* season about fourteen times. He gets water supply from the deep tube-well. Earlier he used to pay Tk. 1200 per acre to the water board for the irrigation. He had the option to pay for the irrigation after the harvest. Now a project provides him with the irrigation water. He pays on an hour basis and the charge is Tk 70. It troubles him and other poor farmers. He borrows money in high interest rate to pay the charge of irrigation and becomes indebted. Often he sells his paddy when it is in the field only to pay this debt.

Farmers preserve seeds in their house. Self conserved seeds produce good yields. However, these techniques of self-conservation can not be applied with the seeds of hybrid rice. The seeds of exotic varieties, if preserved in farmers' house, do not produce sufficient yields. So, they depend on the market. The shop keepers are always busy to maximize their profit. They increase the price of seeds in *Baishakh-Jaisthaya* or *Poush-Magh* when the demand is high. On the other hand, the seeds available in the market do not produce satisfactory yield. The business men do not bother about farmers' need. Only the affluent farmers can cultivate hybrid rice. Since the price of seeds is very high, the medium farmers can't cultivate these varieties. Instead they cultivate *paijam*, BR-48, 34 as they can preserve the seeds of these local varieties in their house. The problem of preserving seeds in the house is that they produce less yields. Like him many farmers were insisted to cultivate *shufala* and other hybrid rice varieties. NGOs are providing them seeds. Often they get seeds from the agriculture office.

Samir Uddin buys fertilizer from the local market. As he has no money, he borrows it from the money-lender in high interest rate. Presently the fertilizer has been channelled through the Deputy-Assistant Agriculture Officer, Dealer and the UP administration. This system has disadvantaged him because those who do not have updated papers of land ownership fail to obtain the required amount of fertilizer. Not only Samir but also other small farmers and sharecroppers have no access to this fertilizer distributed through the UP administration. On the other hand, fertilizer supplied by the Govt. does not fulfil the requirement. The government has fixed the price of urea at Tk. 300 per sack. In the black market this fertilizer is sold at Tk. 600-900 per sack. Some farmers like him adopted some alternative measurers as they were advised by the evil business men.

They put liquid pesticide instead of fertilizer in the fields. It affected drastically with decline in the yield.

Samir Uddin collects fuel for irrigation from the fuel-station in the town. He also collects it from the open market. Fuel crisis during the rice season has been a recurrent problem. Moreover, the price is exorbitantly high. He and other farmers have tokens given by the Government to collect fuel. But, on many occasions he and other farmers were physically assaulted by the police when they went to collect it..The power supply is more frustrating. Poor power supply and crisis of fuel has caused a serious problem of irrigation for him.

He uses pesticides such as *Furadin*, *Bashodin Sanfuran* and liquid pesticides like *Ripkod*, *Dimecron* etc. These are available in the market. Now-a-days they are unable to grow anything without pesticides. He uses them to eliminate pests even when he prepares the land for cultivation. According to him, this has created a new problem. All insects- both good and bad and even fishes are disappearing. Sometimes the family members commit suicide by drinking liquid pesticides and insecticides if any conflict arises in the family.

He has calculated the cost involved in hybrid rice cultivation in each bigha, and it is about Tk. 5396. Cost for fertilizer per bigha is Tk.2775. He pays Tk. 350 for pesticides. Total labor cost is about Tk. 2650. The price of seed is Tk. 320. On the other hand, the product of rice per bigha is about 22 mounds. During the harvest period the price of paddy goes down in the market. He does not have any other alternative place to sell the rice. He gets Tk. 440 for each mound of paddy. Total price of the harvested paddy is Tk. 8800 per bigha. His profit is Tk. 3204. If he measures his family members' (including his own) contribution to the field and at home in the post harvest period, this can not be considered as a profit. On top of it they also pay for the carrying charge. On the other hand, he keeps some of the paddy for the family consumption. According to him, there is no way to be benefited from this.

He thinks that current form of rice cultivation is completely market based. He has also stated that his involvement in the making of this poisonous food is related to greed of having high scale production. This circumstance has been created historically and was imposed on the farmers. He has nothing to do with this. He wants to be emancipated from this system.

AGRO-ECOLOGICAL ZONE 2

Active Tista Floodplain

Active Tista Floodplain (830 sq km) region includes the active floodplains of the TISTA, DHARLA and DUDHKUMAR rivers. It has complex patterns of low, generally smooth ridges, inter-ridge depressions, river channels and cut-off channels. The area has irregular patterns of grey stratified SANDS and SILTS. They are moderately acidic throughout and parent alluvium is medium in weatherable K minerals. Four general soil types occur in the region, and of them, non-calcareous alluvium predominates. Organic matter contents and SOIL FERTILITY level are low to medium.

Sub Region: Active Tista Floodplain (Bangla Pedia)

Name: Md. Liakat Ali, Father's name: Late Basir Uddin, Age: above 56, Village: No. lakhiyitari, UP: Mohipur, Upazzila: Gangachara, District: Rangpur, Education: SSC



He has been involved in agriculture for forty years. He has two boys and a daughter. He has got 50 *dun* (1 *dun* is equivalent to 30 dcml) of land. Now he has only 25 *dun* as rest of the land was eroded by the river Tista. He has inherited this occupation from his father. As he did not have the opportunity to get higher education, he involved himself in farming activities.



Seedling of local varieties

Before the independence of Bangladesh Liakat Ali used to cultivate *Aoush* paddy called *Gacharanga*, *Baiuyabhog*, *Chaitundunga*. He also cultivated *Aman* varieties called *Malsira*, *Sada Dhepa*, *Lal-dhepa*, *Kaladoma*, *Rasulvog*, *Fulpakri*, *Nayaraj*, *Jashuya* and *Nazirshail*. Now-a-days those local *Aoush* varieties have been replaced by BR-28, 29, 14, *Jagoran*, *Aloran*, *Sonarbangla* etc. On the other hand, local *Aman* varieties were replaced by BR-11, 39, 40, 32, *Moina*, *Sharna* etc.

Since this area is prone to flood, hybrid rice can not be cultivated here. As a result, Liakat Ali cultivates local varieties called *Laldhepa*, *Sadadhepa* and *Malsi*. He mentions that local varieties can be cultivated even after the flood in the month of *Bhadra*. Exotic varieties can not be cultivated at that time. Local varieties produce good yield, and usually less risk is involved in it.

Recent observation shows that the cultivation of local varieties of rice is declining because farmers are more interested in hybrid and exotic varieties of rice for their high yield. But, it has also created a problem for the farmers. Farmers have problem to get quality seeds. Although BADC and Government officials provided good seeds earlier, these have now been contaminated. These low quality seeds cause low production of crops for the farmers. Recently they had a confrontation with NGOs like BRAC and ASOD as they provided them with low quality seeds. In addition, seeds provided by the NGOs are expensive.

According to Liakat Ali, seeds of local varieties are very useful because there is no other alternative variety of rice to cultivate after the flood. Only the local varieties are suitable for late plantation. In their area, they need seeds two times a year. Firstly, they need this in the month of *Jaisthaya* during the *Aman* period, and secondly, in the month of *Agrahayan* during the *Aoush* period. Late plantation of *Aman* takes place in the months of *Ashar* and *Shravan*. He determines the quality of seeds according to the yield they produce. Quality seeds were found at BADC earlier. Seeds provided by BRAC and ASOD are very expensive. They also require more fertilizer.

About three years before the independence of Bangladesh, the Block Supervisor of Agriculture Extension Service introduced the seed of exotic variety. Farmers used to call it number five. After that they got the variety called 11. They require fertilizer and pesticide to cultivate this variety. It was the first time when they used chemical fertilizer whereas they used cow dung and other manure to cultivate local varieties. At the beginning they used to get fertilizer and pesticide free of cost, and the agriculture officers would teach them how to apply those new things in the fields.

In the past the expenditure in agriculture was very low as there was no application of fertilizer and pesticides. All the farmers required were cow dung, plough, seeds, cattle etc. which were available in their own house. Now they depend on others. They can not preserve the seeds of hybrid rice.

The fertilisers Liakat uses are urea, phosphate and patash. The most commonly used pesticides are basudin, furadan,. The shopkeepers advise him about how to apply pesticides in the land. In the past he used to apply 10 kg of *chalani* (it includes urea, phosphate, patash etc.) in each *dun* of land. Now it has increased to 45 kg. These fertilizers were available in the open market. Sometimes the price went much higher, but these were available in the market. Presently it is very difficult to get the fertilizer even with high price. Liakat goes to the Assistant Agriculture Officer, UP Member and Chairman to get a token. After a prolonged process and hassle he does not get the required amount of fertilizer from the dealer. Currently he spends from Tk. 1000 to Tk 1500 on buying fertilizer for each *dun* of land. The price of fertilizer has increased a lot and it is unbearable for him. It would have been worth getting urea in Tk 250 and phosphate in Tk 350 as they were getting these in 1995.

The large land owners sell the slot of irrigation to the smaller farmers. They need to provide irrigation 15-20 times in each *dun* of land. The irrigation cost is from Tk 1500 to Tk 2000 for this. In the *Aman* period if the drought occurs they need to irrigate 3-5 times in each *dun* of land. Liakat uses other people's pump machine to irrigate the land. It costs him about Tk. 70-80 per hour. If the price of fuel increases during the cultivation period, it creates a problem. He borrows money in high interest rate. Price of tilling also increases with the increase of fuel price as he depends on the power tiller. Farmers like him borrow money from local money lenders. They ask for high interest. If someone borrows Tk 1000, they give him Tk. 900 and keep Tk. 100 in advance as the deduction of interest. After that every month Tk. 100 is paid as interest for each thousand. Often he borrows money from NGOs. He sometimes sells domestic animals, trees and other household assets to repay the debt.

If pests attack the crops, it increases the cost. As he has been cultivating rice with an expectation to have high yield, Liakat becomes desperate to purchase pesticide to control the pest. Pesticides have some bad effects. They destroy the fish resources as well as the person who spreads it on the land often becomes silent victim of them. They also remain with rice grain. When people consume rice, they cause unknown diseases. Pesticides and insecticides are available in the market. Farmers keep some stocks in the house. This has created another problem in his area. Often the family members use pesticide to commit suicide if any dispute arises in the family in this *char* area. Particularly the young girls commit suicide due to the failure in love. They use pesticides and insecticides called basudin (grain and liquid), furadan, sumithion and melatheaon. Fake insecticides and pesticides are sold in the market. The application of these

“poisons” depends on the type of pests. It costs the farmers Tk. 300-Tk 600 in each *dun* of land.. A lot of conflicts arise with fertilizer. They have confrontation with UP Chairman and others.

Fertilizer is also considered by him as a kind of poison which damages human body. It degrades the soil fertility. Animals, birds, human beings even the environment are becoming victims of this. According to him every one is consuming poison.

The cost of rice cultivation in each *dun* is Tk. 5300. It includes the cost of fertilizer which is Tk.1200. The labor cost is Tk. 1600. Pesticide costs a farmer Tk. 400. For irrigation he spends Tk.1200. He buys seeds by Tk. 600. Moreover, he needs Tk. 600 for tilling. The production of rice in each *dun* is about 22 mounds. The price of rice is not more than Tk. 350 per mound. So, the total price of rice is about Tk. 7700 per *dun* of land. He thinks that farmers do not get proper price of the rice. The businessmen are benefited because they increase the stock. The farmers are unable to stock their own rice as they have the pressure to repay the debt . So they sell the rice as soon as they get the harvest. If they deduct the the cost of production, only about Tk. 2400 remains in hand. If his own labor and that of other members of the family is considered, there is no profit ,in fact, in rice cultivation. He retains 60 mounds of rice for his own consumption.

This area is affected by river erosion. Most of the wage laborers move to other parts of the country. It creates a labor crisis in the area. During the season the cost of wage laborer is Tk.100 including two meals a day. The female laborer gets half of the wage.

Liakat talked about the problem of tilling. There are some disadvantages with the application of power tiller. Using power tiller is expensive because of the high fuel cost. Power tiller owners quickly move from one plot to another. He thinks plough and cattle are far better than power tiller. They are not expensive. and farmers can plow their land when ever they want without relying on others.

As a farmer he encounters many social problems. No body wants to establish any social relationship with farmers. Most of the farmers have debt. They are losing all their properties in order to repay the loans. Often they are harassed by money lenders and NGOs. Liakat Ali thinks that nature is also against the farmers as they recurrently fight flood, drought and famine.

AGROECOLOGICAL ZONE 3

Tista Meander Floodplain

Tista Meander Floodplain (9,468 sq km) region occupies the major part of the Tista floodplain as well as the floodplain of Atrai, Little Jamuna, Karotua, Dharla and Dudhkumar rivers. Most of the areas have broad floodplain ridges and almost level basins. There is an overall pattern of olive brown, rapidly permeable, loamy soils on the floodplain ridges, and grey or dark grey, slowly permeable, heavy silt loam or silty clay loam soils on the lower land and Parent Materials medium in weatherable K minerals. Eight general soil types occur in the region, moderately acidic throughout, low in organic matter content on the higher land, but moderate in the lower parts. Fertility level is low to medium. Soils, in general, have good moisture holding capacity.

Sub Region: a) Central; b) Eastern; c) Lower Atrai Floodplain; d) Lower Little Jamuna Floodplain; e) North-eastern and Southern North-western; f) Upper Little Jamuna and Middle Atrai Floodplain (Banglapedia)

Name: Md. Azizar Rahman, Age: 52, Village: Shimulbari, UP: Shimulbari, Upazzila: Jaldhaka, District: Nilphamari



Farmers of the area used to cultivate local varieties called *Garia, Bhadai, Bogdola and Baribangla*. These were *Aoush* varieties. Local *Aman* varieties were *Agur, Panishail, Pankhiraj, Kartikshail, Beto, Ganzia and Koladoma*. These were cultivated 20 years back using cow-dung and ash. The cost of cultivation was very low. In early 70s exotic varieties like BR-11 and *Paijam* were introduced in the area. Block Supervisors of extension service requested the rich farmers in the area to cultivate the high yielding varieties. They also showed the farmers some demonstration plots. Farmers were given seeds, chemical fertilizer, pesticides, pump etc. to cultivate these varieties.

NGOs like BRAC and RDRS started providing seeds of hybrid rice. Most of the rich farmers cultivate hybrid rice because they can take risk. They cultivate HYV of rice called *Sharnabharati, Napali, Sharna Shonalika* etc. Most popular varieties of hybrid rice are *Jagoron, Sufala, Iratan, Hira, Atom, Alokghan*. Very few farmers still cultivate local varieties called *Ganjia and Badshahbhog*.

Azizur Rahman succeeded his father in agriculture. He learnt farming from his father. At his early age he used to cultivate local varieties called *Garia*, *Bagdola*, *Baribangla*, *Panishail*, *Joshua*, *Agur*, *Karticshail*, *Malshiara*, etc. Now-a-days he cultivates BR- 11,28, 29, 31, 32, *Aloran*, *Jagoran*, *Sonarbangla*, *Atom* etc. Despite rice cultivation he cultivates tobacco, potato, wheat, onion, garlic, chili etc. Now he sometimes cultivates local variety named *Badshahbhog*. He mostly cultivates exotic and hybrid varieties. The crisis of seeds has caused the local varieties difficult to cultivate, and they are also vulnerable to fertilizer. The seeds of local varieties are not available. Those who are introducing the hybrid varieties are making the the seeds of local varieties unavailable to people. The introduction of exotic varieties was delayed in this area due to the lack of irrigation facilities. After 90s farmers in the area started hybrid rice cultivation.

Farmers used to exchange their preserved seeds. Nowadays there is no way to preserve the seed at home. Seeds are available with the NGO and traders. Hybrid rice produces high yield, but they are delicate. If it is once attacked by virus or *chita*, it produces only 3 mounds of rice instead of 30 mounds. He takes risk whenever he cultivates hybrid paddy. He needs seeds in *Baishakh* during the *Aman* period and in *Kartrik* during the *Aoush* period. When he preserved his own seeds, he was able to maintain the quality. Now he buys seeds from different markets. Often he goes to the town. The seeds collected from outside home are not reliable. Farmers need seven kg of seed of HYV rice in each *bigha* (equivalent to 33 dcml) of land . The price is Tk 30 per kg. Requirement of hybrid seed in each *bigha* of land is 1-1.5 kg. The price of one kg of hybrid seed is Tk 200.

Most of the fertilizer is available in the market except urea. Azizur Rahman has to collect it through UP leader, agriculture officer and dealer. The process has become complicated. He has to apply for fertilizer for three times during the season. The requirement of fertilizer in each *bigha* during the *Aman* season is 45-50 kg whereas he needs 80-100 kg of fertizer during the *Boro* season. Urea is not as much available as they require. The total cost of fertilizer and pesticides per *bigha* is Tk 150.

He applies liquid pesticides on the crop two times. It costs him Tk. 160. Granaries are expensive. If the pesticides are not applied on time, virus attacks rice. It affects the yield.

Although he does not get the fertilizer on time, often it is found in the black market. The usual price of fertilizer is Tk. 300. However, the price goes up to Tk.600-800 in the black market. Very often with the UP leaders and agriculture officer fall out. The agriculture officer and UP chairman or members do not treat the farmer well. Azizur thinks fertilizer and pesticides are degrading the soils. Demand of fertilizer in the fields has been increasing. In contrast, gradually the

yield has been declining. It causes harm to human body. Fish species, aquatic animals and other useful insects are becoming extinct.

He irrigates each *bigha* of land 3-5 times during the *Aman* season and 15-20 times during *Aoush* period. The cost of irrigation per *bigha* during *Boro* season is Tk. 1000. He rents shallow pump from the owner. The price of fuel rises very high and at certain period it disappears from the fuel station. He and other farmers take on the traders. They fight each other. When the trader increases their stock, it creates an artificial crisis. They sell their household assets to fight the price hike.

The total cost of cultivation of *Aman* in each *bigha* is Tk 3520. The cost would increase in the *Boro* season. This amount covers the cost of fertilizer, seed, pesticide and irrigation. The harvest in each *bigha* is only 15 mounds. The price of each mound is not more than Tk 300 during this period. When he minuses the cost of cultivation, only Tk 980 remains in his hand. There is no benefit of rice cultivation for a farmer like him. He thinks it is completely a losing concern for him. Even he does not get any return of his own time and effort. He has stated that the farmer is thought to be the great mediator above all as it was described in the school text. This turns into a false statement. He is unable to change his occupation because he still loves his land.

AGROECOLOGICAL ZONE 4

Active Brahmaputra-Jamuna Floodplain

Active Brahmaputra-Jamuna Floodplain (3,190 sq km) region comprises the belt of unstable alluvial land along the Brahmaputra-Jamuna rivers where land is constantly being formed and eroded by shifting river channels. It has an irregular relief of broad and narrow ridges and depressions. The area is occupied by sandy and silty alluvium, rich in weatherable K minerals that are slightly alkaline in reaction. Six general soil types occupy the area. Organic matter status is low and fertility status is low to medium.

Sub Region: Active Brahmaputra-Jamuna Floodplain

Name: Md. Golam Hossain, Age: 35 yrs, Religion: Islam, Village: Vedipotol Pachanipara, Ward: 09, Union: Kazipur Sadar, Upazilla: Sirajganj Sadar. District: Sirajganj



Md. Golam Hossain has been in cultivation for 25 years. He has come into cultivation at a very young age. He has followed his father and uncle to take cultivation as his occupation. He has little education. He could not continue his education. He owns two bighas of land and has leased another one bigha. For leasing the land he pays 100.00 per decimal a year. In this regard he has paid 3000.00 for 30 decimals. But, due to flood the fields will remain uncultivated. In *Baishakh* he sowed *Gaincha* in his own land and in the leased land, but he could not harvest the crops. Destructive flood has swept away all crops. In *Aman mousoom* he tried again but the flood in its second spell destroyed all crops. He has no more seeds left. Dealers even have no seeds. In last *mousoom* he bought 10 kg of seeds by 500.00 but he is quite doubtful about how much he has to pay this year for seeds. There are many other farmers like Golam Hossain.

Golam Hossain says that in the past (20-25 years back) farmers of this area grew maize, potato, *dal*, mustard, linseed, sugarcane in dry season. In *IRRI mousoom* they grew BR 28, 29, *Jagoron*. But, flood visits the area every year. Most serious of them are the floods of 1988, 2005 and this year. This is causing cultivation in this area very difficult. In the past farmers grew *Mugidhan*, *Sholow*, *Khondori*. After the harvest of rice, they grew jute. The farmers would grow rice both in *Aman* and *Aoush mousoom*. They grow *Gaincha*, *Zotagaincha*, *Pajam* in *Aoush mousoom*. They also grow radish, eggplant, cauliflower, bean, potato, tomato,

dal, puishak, lalshak, spinach in Winter. During the rainy season they could cultivate only on the high land.

The change began when the farmers started growing the Chinese varieties of rice. Earlier they did not need any fertilizer except cow-dung. But, now they can't grow anything without fertilizer.

Now they grow *Gaincha, Zotagaincha and Kalozira* in *Aman mousoom* and in *IRRI mousoom* they grow BR 9, 11, 21, 29, *Hira, Zagoron*, BR 6, *Aloron*.

The soil type of this area does not allow the farmers to grow sugarcane.

Beside *IRRI*, the farmers of this area grow mustard and winter vegetables like radish, *lalshak, puishak*, cucumber, spinach, *datashak*, lady's finger, potato, wheat. The fields for crops are prepared in *Kartrik*.

Electricity is not a very serious problem in this area. They use deep tube-well and shallow tube-well to irrigate their land. Since the electricity supply is better, the farmers don't need much oil. They meet up their necessity from the retailers. They hire machine to irrigate their land.

Most of the farmers now use tractor to plow their land. Tractors can't till the land well. However, when the land is ploughed by cows, the top soil goes down and the soil beneath comes up. Tractors only make furrows.

Cost in one *bigha* of land:

1. Labor cost to prepare fields (4 x 75.00)	: 300.00
2. Labor cost to prepare seed-bed (4 x 75.00)	: 300.00
3. Weeding	: 200.00
4. TSP 40 kg	: 600.00
5. Urea 01 sack	: 600.00
6. Basodin/ Pesticide	: 200.00
7. Weeding again	: 150.00
8. To cut the crops	: 1400.00
9. Harvesting	: 250.00
10. Irrigation	: 1200.00

Total cost for rice cultivation in one *bigha* is Tk.5200. The harvest in one *bigha* of land is 25 mounds. The market price of one mound of wet rice is 350.00 whereas the dry rice is sold for 500.00. But the farmers are forced to sell their wet rice to pay the wage of the laborers.

The main reason why the farmers now can't grow local varieties is the changing environment. The water now remains stagnated because people have built dams in different places for fish cultivation,. Moreover, the seeds of local variety are not now available.

The change began during Muzibur Rahman's period. At that time agriculture officers came to the farmers and persuaded them to cultivate hybrid varieties. They would give them seeds in low price. At the beginning they needed only urea and the quantity was very little, so the farmers were very curious.

The farmers usually collect seeds from dealers. But, the dealers charge 50.00/60.00 more in each sack. Sometimes dealers refuse the farmers saying that they have no seeds and they favor their relatives. The seeds were available in the local bazaars specially in Shemanta bazaar or in Meghai bazaar. There was also Kazipur bazaar. Even the farmers collected seeds from Sherpur of Bogra. However, I collect seeds myself. In the past they themselves preserved their seeds in pitchers or in bottles. They first dried the seeds in the sun very well and then put them in pitcher or in bottle.

The farmers hardly required any fertilizer at that time neither did they require pesticide. The little fertilizer they needed was available. To grow rice farmers mainly need TSP and urea. They need 80 kg of fertilizer in each *bigha* of land. They usually need similar quantity of fertilizer for other crops. Now the farmers of this area have the main problem with fertilizer. Sometimes they do not get fertilizer when they need. So, their harvest goes down almost to the half. In cultivating high yielding variety the cost is high. It requires a lot of fertilizer, pesticide and irrigation. At the beginning farmers needed only 5 kg of fertilizer, But, now they need 80 kg of fertilizer in the same area of land.

The government should be more careful to distribute fertilizer. It can be distributed by the retailers. Government must consider the demand of the local farmers. The cost in irrigation is 1200.00 per *bigha*. The farmers know that pesticides harm the environment but they can't help.

Farmers take their crops to the local bazaar to sell. The middle class farmers sell their crops not once only; rather, they sell when they need. The wholesalers don't cause any problem. Usually there is no festival centering around rice harvest. People sometimes invite their relatives and dine together. However, there is no peace in people's mind. If they could afford, immediately they would switch to other occupations.

AGROECOLOGICAL ZONE 5

Lower Atrai Basin

Lower Atrai Basin (851 sq km) this region comprises the low lying area between the BARIND TRACT and the Ganges river floodplain. It includes the CHALAN BEEL area. Dark grey, heavy, acidic clays are predominate in this smooth low-lying basin land. Seven general soil types occur in the region. Organic matter, and status of other essential nutrients are medium, while level of available K (potassium) is high. Fertility status of soils is moderate.

Sub Region: Lower Atrai Basin (Bangla Pedia)

Name: Md Monsur Rahman, Age: 65, Village ; kazi Para, Up: Ahsangonj, Upojela: Atray, District : Noagaon.



He has four daughters and one boy. His father was a farmer and he inherited this occupation from his father. He has six bigha of land of his own. He cultivate s this land to maintain his family. He used to cultivate rice once a year during the past this were broadcast amound varities. The varities were namely, Matia Karal, Diga, Suli. This paddys were sown in yhe moundth of joisthow and were harvested in the moundth of Agrahayan after the introduction of IRRi varities this practices were seized. Now a days he cultivate once in a year. This are called IRRi Varities. IRRi Varities includes BR10 and 29 the highbride rice cultivates are namely, hira, sonarbangla, jagoron, aloron.

This paddys are introduced in the seed bed in the moundth of kartic. As soon as it produces seedlings, these are transplanted in the moundth of Agrahayan and Poush. He gets the Potato harvest in the moundth of Boishakh and Joistho other crops he cultivates are naely, Musterd , , Maize. The highbride rice had totally replaced the local varieties. Now a days it is possible for them cultivate broadcast Amound because of the waterlogging caused by the cross deem construction. During the period of Aiub Khan he and one of his fellow farmer collected the seed of IRRi Variety aid and had introduced it to their land they applied fertilizer called UREA phosphate, potash according the advice of agriculture officer. Five years ago he received seeds of high bride rice from BRAC office and other seed dealers. Name of these high bride varieties are hira, aloron,sufola, jagoron, sonarbangla etc. These varieties require huge amount of fertilizer irrigation pesticide laborer . These varieties requires huge amount of moundey and labor where is previously he only depended on the rain and no cost was involved in rice cultivation.

Fertilizer is a big constraint at the beginning he used to collect fertilizer from the agriculture office some the fertilizer were also available in the market. Price of one mound of UREA fertilizer was TK Ten only. Price of potash was 02/16 per Kg and price of TSP was TK 03/16 per KG. After that fertilizer was made available in the market. Now a days he has to go to the dealer, agriculture officer and UP members and Chairman to collect the fertilizer this is quite hassle for him often he need to go to the TNO to lodge complaint. It kills his time as he queuing for fertilizer for unlimited time. Govt service holder use abusive towards them . After such a long hassle he doesn't get the required amount of fertilizer in his land. Total cost of different fertilizer in per bigha land TK 1620. Now a days he gets a taken from the chairman which may allow him to get one sack of UREA fertilizer. It doesn't fulfill his requirement. Rest of the fertilizer he buy from the black market. The price is double and gradually this will raise more. On the other hand the amount of yield he gets this is because of the fertile silt available in the bill. The silt in the bill is more useful than the fertilizer. The silts are brought in the land with the moundsoon water. Only application of fertilizer may not enhance the rice cultivation. He thinks that crisis attached with the unavailability of URIRA fertilizer is caused by the agriculture officer and TNO as they are stilling or manipulating the distribution process

There are some other lacking the agriculture officer and other staffs usually hassle the farmer. They do not clarify the process to the farmer. Farmers are not given proper direction to collect the fertilizer. He spent ten to fifteen days to collect the fertilizer during this period the crops in the field are badly affected. The cost of fertilizer in per bigha land in TK 1500 to 1600 hundreds if he buys it from the black market needs to play double the price. Despite this small farmer are not given 10 to 15 Kg of fertilizer. The current system which required them to collect the signature from TNO CHAIRMAN and AGRICULTURE OFFICER is real system of hassling the farmer. He is desperate to speak out about his better experiences and least bothered about the consequences . He think they are not strong enough to fight the Govt. officials.

Irrigation is another problem for him. Each bigha of land required to be irrigated 25 to 30 times. They get irrigation water from the owner of small water pump and deep tube well who fetch underground water. Cost for irrigation with small pump per bigha is TK 1800 where is the charge of the deep tube well TK 1200 instead. This moundey needs to be paid in advance. The price of fuel raise high and electricity failure is commound phenomena. The crisis emerge in the water level goes down then they need to dig a pit and which is 10 to 15 feet deep inside the ground. Pump owners install their pumps at the bottom of the pit to fetch irrigation water this work is bit risky. The farmers like him sell out their house hold assets to pay for the increased irrigation charges if the fuel prices raises high.

Seed are not reserved in the house as he did it in the past. Even it was safe to preserve the seed of BR 8 and 29 in their houses. Now a days high bride varieties like JAGORON, ALORON, SONAR BANGLA, HIRA can not be

preserved in farmers house. He is forced to buy it. The seed available at BRAC and dealer shop is a bit risky to use. These are dieses prawn and requires huge pesticides . These are expensive. He has to move from door to door to get quality seeds. The agriculture officer always suggest to purchase hygh bride seed. The price of high bride seed per bigha Tk. 330. It is too expensive for them. It would have been worth if they were able to preserve the seed.

Mansur has stated that, he cultivates rice because he has own land. He works so hard to grow paddy but do not get the real price. The cost of rice cultivation is very high so he stars borrowing moundey at the beginning of the rice season. The pressure increased by the moundey lenders as soon the harvest period arrives. He sells out the harvest with low price to repay the debt. The rice traders make profit as they buy the paddy with low price and gets high price by selling out. He thinks he is cheated by the businessman. He works very hard in the field for seven moundths to grow the yield but have nothing in hand when he repays all debt. Often the rice traders buy paddy on credit. They pay the price slowly. This turns in to a loosing concern. His house hold paddy requirement is 72 mounds per year but he fails keep the amount because of the debt.

He uses pesticides for pest control in the land. These are available in the market. The sellers of pesticides advise them about the application methods of pesticides. He is not aware about the side effects, but these are effective against pest.

The demand of fertilizer has been increasing in the land. The stem of the paddy start rotting in a few days after harvest. He thinks their land is still fertile due to silting by the river, other wise it would have devastated by the fertilizer.

Total cost of fertilizer, pesticide, seed, irrigation, labor, tilling, harvest and carrying is Tk. 6230 per bigha. Yield of Hybrid rice in each bigha land Tk. 9500-10000. The profit is around Tk. 3000. If family members' and his involvement is considered then this can not be consider as profit. He invests his moundey and land as capital, but benefits go to other. There is no increase in his capital. On the other hand, this can not provide any food grantee to his family. Enormous amount of risk is involved in Hybrid rice cultivation. He often encounters the crop failures.

He thinks he will have sell out all land if the current situation continues. His debt has been gradually increasing.

AGROECOLOGICAL ZONE 6

Lower Punarbhaba Floodplain

Lower Punarbhaba Floodplain (129 sq km)- this small region- occupies basins and beels separated by low floodplain ridges. In this area, dark grey, mottled red, very strongly acid, heavy CLAYS occupy both ridge and basin sites. Organic matter status is medium to high. General fertility level is medium with high K-bearing minerals. The western part of NAOGAON and the northern part of NAWABGANJ districts are included in this AEZ.

Sub Region: Lower Punarbhaba Floodplain (Bangla Pedia)

Name : Hossain Ali, Age :50, Education :Class VIII, Vill :Mohadanga, Union :Chhaor, Upazilla :Porsha , Dist : Noagaon



About 90% of the people in this area are farmers. Hussain Ali has been involved in agriculture at his early age. He has five daughters and two sons. In the past people used to cultivate only one variety of rice, and it was *Aman* . They used to cultivate very little amount of *Aoush*. Popular varieties of *Aman* were *Shonashair* ,*Goja* , *Jhingashair* , *Malshora* , *Asshina* , *Harma* , *Dudhkolom* , *Baijhaki* etc . Now he cultivates rice according to three seasons: *Aman*, *Boro* and *Borshali*. In *Aman* season he cultivates varieties called *Shadashorna* ,*Lalshorna* ,*Ronjit* , *Atop* ,*BR 32* and *Tia* . In the *Boro* season he cultivates varieties like *Parija*, *BR 28* ,*29* . *Parija* , *Rupaliparija* and *CM* varieties are grown during *Borshali* season.

Now-a-days he only cultivates one local variety called *Atop* .Other local varieties are not cultivated due to low production. In addition, seeds of the local varieties have disappeared. The changes in agriculture began around seven years ago. He began with *Shorna*. Seeds were supplied by the agriculture office. He collected fertilizer from the dealer and cultivated the paddy according to the advice of the agriculture officer. At his early age he used to preserve seeds in his house. The seeds were first dried in the sun, and then they were put in a clay pot. The quality of seeds was very good . It produced seedlings very easily. At the beginning he didn't use any fertilizer to grow the local varieties. Later he used some fertilizer following the other farmers. The fertilizer is available in the open market. Only urea is unavailable. Now he has to collect it from the dealer with a

token provided by the UP. The demand of fertilizer in each *bigha* of land is 75 kg (urea 30 kg, TSP 15 kg, potash 10 mixed fertilizer 15 kg, gipsham 5 kg). It was very difficult to find urea. To collect the token from the UP leaders and agriculture officer is quite hazardous. The cost of fertilizer in each *bigha* is Tk 1025. Moreover, when they apply pesticide in the fields, the cost increases.

Irrigation is required for rice cultivation. He provides irrigation to the fields by the shallow pump. Often they collect water from the *beel* or dig the land to extract water. In the *Aman moushum* the land requires to be irrigated twice, seven times in *Boro* season and twice in *Borshali* season. He pays Tk 1800 to irrigate his one *bigha* of land. Power failure is a recurrent problem for irrigation. Renting shallow pump becomes expensive if the price of fuel rises. Moreover, the fuel is not available though they are ready to pay the higher price. It damages the crop. Often he borrows the additional money. He sells the rice in advance. In that case the business men pay Tk 300 for per moud of rice whereas the market price is above Tk 400. It really harms him.

Hussain Ali needs Tk 500 to buy pesticide for each *bigha* of land. Pesticides are available in the market. Though they control pests, pesticides are harmful for fish and animals. He also thinks that those who consume rice produced by using pesticide become passive victims of poison. The fertilizer has become a disputable item now-a-days. They have frequent conflict with the UP leaders and dealers regarding the distribution of fertilizer. He does not get required amount of fertilizer on time..Hussain Ali inherited 20 *bigha* of land from his parents. He didn't try any other job except agriculture. He requires five mounds of rice for his family consumption. He doesn't get the real price of his rice. When he goes to sell the rice, the price declines. The businessmen manipulate the selling channel by increasing the stock. Later he sells the rice to the Government with the real price. So all benefits go to the businessmen. Hussain Ali doesn't have any benefit.

The cost of tilling the fields is getting higher. Previously Hussain Ali used to plough the fields by cattle. But, now he depends on power tiller. The cost of power tiller is very high. The total cost of cultivation in each *bigha* of land is about Tk 5650. On the other hand, rice production in each *bigha* of land is 16 mounds which are sold in Tk 6400 only. So he counts loss every year by producing rice. He thinks there is no value added to the paternal land. On the other hand, they have miserable labor crisis in the area. The price of labor is also very high. One male labor gets Tk 100 a day and a female labor gets Tk 70. However, to subsidise the agriculture practice he borrows a lot of money which creates quarrel in the family. As a farmer he thinks he doesn't have any status in the society. The rich people do not show any interest to establish any relation with farmers' family. He thinks if the current situation continues for a long time, he has to sell all his land to survive. Gradually he will be losing all his land, and it will benefit the rich.

AGROECOLOGICAL ZONE 7

Active Brahmaputra-Jamuna Floodplain

Active Brahmaputra-Jamuna Floodplain (3,190 sq km) region comprises the belt of unstable alluvial land along the Brahmaputra-Jamuna rivers where land is constantly being formed and eroded by shifting river channels. It has an irregular relief of broad and narrow ridges and depressions. The area is occupied by sandy and silty alluvium, rich in weatherable K minerals that are slightly alkaline in reaction. Six general soil types occupy the area. Organic matter status is low and fertility status is low to medium

SubRegion: Active Brahmaputra-Jamuna Floodplain (Bangla Pedia)

Name: Hyder Ali, Age: 50 yrs, Village: Nayaratangandhi, UP: No. 4 Ratangandhi Union, Upazila: Sirajganj, District: Sirajganj



Md. Hyder Ali has three daughters and two sons. He lives in Jamunachar for long 50 years. He has seen many ups and downs, but he has not gone anywhere leaving the fertile land of the char. I have talked to him about the cultivation of this area. He says that the soil here is very fertile. Though the soil is sandy, nuts, maize, linseed, pigeon-pea, gram, *kaun* etc grow well here. Of local varieties, *Aman*, *Chinigura* grow well. Farmers need not use any fertilizer because the soil is very fertile. Hyder Ali owns 1.5 *bigha* of land and he has leased another *bigha* of land. With these he somehow manages his family. The most common problem in this area is river-break. Rivers break in almost every rainy season. If the rainy season lasts for a short time, the inhabitants are very lucky. They grow from 18 to 20 mounds of rice in each *bigha*. They manage their food with the rice they grow.

About the crops of the past he says that farmers would grow rice, jute, garlic, onion, sugarcane, wheat, vegetables. During *Boro moushum Gaincha Aman*, *Kolombo*, Chinese etc would grow.

Now these crops do not grow here because the soil has deteriorated with sand. Sand now accumulates here for more than one feet. So, the soil sucks water. Farmers can't grow rice anymore. But, nuts and linseed grow.

Now farmers grow here *Gaizra Aman*. IRRI does not grow here because there is no water in the fields during IRRI *mousshum* since the soil is sandy. There is not much cost in cultivation except the labor cost. They pay Tk 150.00 to each laborer.

In *Kartrik* they grow lentil, nut, maize, mustard and in *Falgun* they harvest these crops. Then they sow Kaun. However, most of the time rain water drowns this rice. In *Asshin* they again grow *Gaizra* variety of rice and harvest in *Poush*. Moreover, in *Kartrik* they grow lentil in high land. During this season they do not irrigate their land since the land is moist. Rice grows 12-14 mounds in each *bigha*. In *Kartrik* maize grows well in the *Char*, but they do not have necessary seeds. By growing maize they can overcome their loss partly.

After 1980 people here would grow Chinese variety of rice. But, since the soil of this area is turning sandy day by day, farmers here can't grow Chinese variety, IRRI, BR-11, BR-28, BR-29.

They usually buy seeds from dealers at Ratankandi Hut. They buy seeds of vegetables, maize and mustard. They preserve the seeds of rice.

Usually they do not use fertilizer, but sometimes they use five kg of urea. They use little pesticide named Raison which costs them Tk 95.00. They buy fertilizer from local dealers. The dealers charge more. Sometimes they hide fertilizer and later sell in high price. One sack of fertilizer costs them from Tk 300.00 to Tk 350.00. In the open market this fertilizer is sold by Tk 500.00.

The following problems they face in cultivation:

- 1) No rice cultivation specially IRRI
- 2) Maize cultivation is possible but there is scarcity of seeds
- 3) Irrigation cost is more because of scarcity of oil
- 4) Scarcity of fertilizer

Cost in one bigha of land:

- 1) No cost in plowing the land
 - 2) Labor cost (10 laborers)= 1000.00
 - 3) Seeds 08 kg = 350.00
 - 4) Pesticide 2 bottles =180.00
 - 5) Fertilizer 5kg = 35.00
 - 6) To harvest rice (08 laborers) = 800.00
- Total = 2,365.00**

The production is 14 mounds and they sell the rice for Tk 5600.00. The rice they get is enough for them for eating. The hay and straw help them and they use them as cattle-food.

The members of the family help in cultivation, so the cost reduces. But, since they live on the river-bank, they are always scared.

According to Hyder Ali, the seeds of the past were better. Though the harvest is low, cost is also low. But, now the cultivation requires too much attention. They can't always remember all these rules. In the past, they would throw the seeds in the fields and the seedlings would sprout. They would later go to the field and cut the crops. But, now so many sufferings. Disgusting! Sometimes they feel to change their profession.

They mostly use their products for their own consumption. If any amount remains left after their use, they sell it in the local bazaar. If they call the wholesalers, they come home and buy their crops. In the past farmers arranged many kinds of festivals, but now they have no pleasure in their mind. So, there is no festival.

AGRO-ECOLOGICAL ZONE 8

Young Brahmaputra and Jamuna Floodplain

Young Brahmaputra and Jamuna Floodplain (5,924 sq km) region comprises the area of Brahmaputra sediments. It has a complex relief of broad and narrow ridges, inter-ridge depressions, partially in filled cut-off channels and basin. This area is occupied by permeable silt loam to silty clay loam soils on the ridges and impermeable clays in the basins, neutral to slightly acid in reaction. General soil types include predominantly grey floodplain soils. Organic matter content is low in ridges and moderate in basins. Soils are deficient in N, P, and S but the status of K and Zn are reasonable.

Sub Region: a) High Jamuna Floodplain; b) Upper Brahmaputra Floodplain; c) Upper Brahmaputra-Jamuna Floodplain

Name : MD. Fazlul Haque, Age : 65, Village: Agcharan, UP: Kokdohra, Upazila: Kalihati, District: Tangail



Fazlul Haque is a share-cropper. He has five children. He did not inherit a single piece of land from his parents. According to him there are two rice seasons in this area. One is called IRRI (*Boro*) and it begins in the month of *Magh*. The other season starts from *Shravan* and *Bhadro* and it is called *Aman*. These kinds of rice are transplanted and sown. He cultivates *IRRI* varieties in the month of *Poush* and *Magh*. During this season he cultivates the varieties called 29 , 14 , *Gazi* , BR 3 and Hybrid . All these are cultivated in *Boro* season. *Aman* varieties are *Parja* , *Kaika* , *Junukra* , *Chamara* . Only *chamara* has a few varieties . At his early age he used to cultivate *Chamara* and *Aoush* paddy. *Aoush* varieties were called *Haita* , *Ashakumra* , *Bhaturi* , *Chapila* etc . Now he and other farmers don't cultivate *Aoush* because they depend on IRRI varieties, and when the harvesting period arrives, the flood water enters the area. So there is no way to cultivate *Aoush* varieties. IRRI (all HYV varieties are considered by him as IRRI) varieties were introduced in this area in 1978. BADC provided some pump machine which they installed on the riverside. These IRRI varieties replaced the local varieties namely *Kaliboro* , *Kunailboro* etc. Seeds of the IRRI varieties were provided by the Government. Gradually farmers have started to cultivate this variety. It has increased the cost of rice cultivation. But the yield has increased dramatically.

He started farming on his own at his age of seventeen. He used to cultivate 12 *paki* (one *paki* is equivalent to 56 dcml of land) of land as a share-cropper. He didn't have any land of his own at that time. Now he owns 70 dcml of land.

When he started cultivating IRRI varieties, a small amount of seeds was provided by the government. Then he began to preserve seeds in his house. For the first time when he bought seeds, the price was Tk. 8.00 per kg. The seed of Hybrid paddy rice was collected from the NGOs last year. The price was very high. It cost him Tk. 40.00 per kg. He bought five kg of Hybrid seed. He tried to preserve the seeds of this rice but failed. It did not produce any seedling. Now the price of labor, fertilizer and tilling is rising so high that rice cultivation is no more profitable for him. The need for fertilizer in one acre is 7.5 mounds. He mixes three types of fertilizer- urea, TSP and potash. Often he applies more fertilizer like gypsum, phosphate etc.

The total cost of fertilizer is Tk 2700.00. Labor cost is Tk 1500.00. During the harvesting period the labor cost rises up to Tk 500.00, and there is scarcity of labor in the market. The cost of seed is about Tk 1000.00 for an acre. The price of irrigation for each dcml is Tk 40.00. Often the farmer leaves one-fourths of the crop for the irrigation provider. Total cost for irrigation in one acre of land is Tk 4000.00. Total cost of cultivation in one acre of land is Tk 10,000.00. They get 30 mounds of rice in one acre of land. Those who own the land get the whole amount of paddy. The share cropper gets only 15 mounds but he bears the whole expenditure. It means the share cropper does not get the benefit of rice cultivation. Those who cultivate their own land may have some profits because the land owner spends Tk 10,000.00 on 30 mounds of harvest while the sharecropper spends the same amount of mounded money only on 15 mounds. So he is not interested in sharecropping now. Now he is only interested about contract basis cultivation. It means that landowner will get certain amount of rice and as a leasee he will get the rest. The cost will be covered by him. For example, this year he cultivated *Chamara* variety, and there was a crop failure due to the early flood. According to the contract it was a total loss for him. So a farmer is a loser in all respects.

The government has announced that farmers will get fertilizer on time. This is a fake statement. He showed the fields and said that they need fertilizer as soon as the water of flood recedes. The real price of fertilizer is Tk. 750.00 but he won't get it even by Tk. 1000.00. There is no fertilizer in the market or anywhere. So the amount of fertilizer which is required in 20 days is applied 40 days later. It affects the yield. Half of the yield than what was expected goes down for the late application of fertilizer. This is a common occurrence. The fertilizer used to be available in the market earlier. Now they go to the dealers' shop and queue up

for three or four days but get little amount of fertilizer. This does not cover his need.

The seed is available in the market but often they do not get quality seed. Irrigation is a big constraint now-a-days. Those who use face insurmountable difficulty because of the price hike. Electricity failure is a regular experience. The price of pesticide is not very high. It costs only Tk 100.00 or Tk 150.00 per acre. Fertilizer and pesticide are degrading the quality of soil. The demand of fertilizer has been increasing alarmingly. Now there is no way to introduce manual plowing because farmers have no cattle in their house. At their early age they used to have 20 to 25 cattle in their house. These used to graze in the *Robi* crop fields and defecate there. So farmers did not apply cowdung separately. This year Fazlul Haque cultivated 150 dcml of land. He hardly could get his capital back. He cultivates rice because there are no other options. He uses a metaphor. He borrowed Tk. 20.00 from some one (as if he is leasing the land) and put his own labor on this . At the end of the day he is getting Tk. 15.00 in return. So total loss is Tk. 5.00. The Tk.15.00 that he is getting in return is just the conversion of his own work. He did not even have this amount in his hand. He was unable to spend anything at once. After the harvest he discovered that the whole business was a losing concern for him. On the other hand, he borrows money as a share cropper from different sources. At the end, however, after experiencing loss and pain he finds 20 mounds of rice available in his house.. So this is the benefit. If he was not trying for this, there would have been no grain in his house. He may recover from the losses by doing other work but he needs to manage some food grains for his family consumption. He is cultivating rice because of the need of stomach. He borrows money from different NGOs and often he fails to repay the money if there is a crop failure.

AGROECOLOGICALZONE 9

Old Brahmaputra Floodplain

Old Brahmaputra Floodplain (7,230 sq km) region occupies a large area of Brahmaputra sediments before the river shifted to its present JAMUNA channel about 200 years ago. The region has broad ridges and basins. Relief is irregular, especially near the old and present river channels. Soils of the area are predominantly silt loams to silty clay loams on the ridges and clay in the basins. Organic matter content is low on the ridges and moderate in the basins, topsoils moderately acidic but subsoils neutral in reaction. General fertility level is low.

Sub Region: a) Bansi Valley; b) High; c) Low; d) Medium High; e) Medium Low (Bangla Pedia)

Name: Md. Abdul Hye, Age: 36 yrs, Religion: Islam, Village: Chondikola, Ward# 04, Municipal Corporation: Eshhorgonj, District: Mymensingh Children: two daughters and one son



Abdul Hye has a needy family. He has succeeded his father and uncle in farming. He is not literate in terms of formal education. He is from a middle class family. He has inherited eight *katha* of land from his father. With this little amount of land he manages his family. He has seen the change in cultivation since 1980 when he was very young. But most drastic change occurred since 1997 with the introduction of IRRI. Now farmers do not grow jute since the fields remain moist.

About the crops cultivated earlier he says that people used to grow *Paijam*, *Aous-agali*, *Nema*, *Kotoktara*, *Kaisabinni*, *Boddizaman*, *Chaimusi*, *Keratch*. Moreover, they grew jute, wheat, chili, vegetables, potato. He recollects that farmers did not use fertilizer in the fields when he was a child. They would put hay and straw in the fields. They would sow jute in *Chaitra* and cut in *Shraban*. They would sow *Bawa* rice in *Shraban*. This would grow up as the water increased. Those happy days are now no more. After the advent of IRRI the days began to change.

Now Abdul Hye grows *Paijam*, *Gazi*, *Boroshail* and 29. He preserves the seeds of these rice. He first selects the best seeds, dries them in the sun well and then puts them in a pitcher. Now the farmers grow *Gazi*, BR-29, BR-35, *Paijam*, *Gulera* etc. BR-29 and BR-8 are grown more than other varieties. They grow *Gulera* very little. Now all farmers grow same kind of rice because the yield of BR rice is high. The seeds of this rice are available at Esshorgonj Bazar, but there is scarcity during *moushum*. Back in 1977, framers grew garlic, ginger, onion, lentil in *Magh- Falgun*. But, now they grow IRRI in those fields.

Cultivation round the year:

Baishakh- field is plowed

Jaistha- field is plowed

Ashar-

Shraban- Aman is sown

Agrahayan-rice is harvested

Magh, Falgun-Boro is sown

Baishakh, Jaistha- rice is harvested

The problem of fertilizer is quite acute. They irrigate their fields before they till them. Farmers do not get fertilizer when they need. After three or four days when they till the fields, they need fertilizer. At that time they find that fertilizer is not available. They queue up but the dealers say that there is no fertilizer. When they offer extra money, the dealers give them fertilizer. Three farmers sometimes share one sack. Meanwhile the irrigated water of the land dries up. Again, the farmers irrigate their fields and they put fertilizer in the field but that is not adequate. Again they rush for fertilizer. On the other hand, the seed-bed should be prepared because if you can't sow on time, you will lose good yield. After they collect fertilizer, they rush for fuel-oil for irrigation. After 21 days they again rush to the dealers for fertilizer. The scenario is no different. They queue up and collect fertilizer. When they queue up, it is common that quarrel and fight sometimes occur for breaking queue. For pesticides they face the similar kind of problems. Sometimes pests destroy their crops in the fields.

He mainly collects fertilizers from the dealers. But, according to him, the government should watch the dealers tightening the administration. If the administration pressurizes them, the dealers can't misappropriate the fertilizers.

Another problem is fishery. In Chondikola, there are 20-25 fisheries. They reserve water and cultivate fish. Therefore, there is water-stagnation problem in the area. Earlier the water of the marshes would fall into Kachamaitra marsh but now it has been turned into a fishery; so, the water of the marshes can't pass.

Farmers never depend on electricity because during *moushum* the disruption of electricity is quite frequent. The acutest problem is oil. *Boro* is sown, but there is no oil. The farmers go to pump, but there is no oil. Many farmers crowd in the pump, but maybe only 50 of them get oil. On the following day there is the similar kind of crowd and again maybe only 50 of them get oil. The same cycle continues. So, many farmers do not get the oil at all. Only those who are physically strong can manage to get oil. Sometimes the farmers pay Tk 1.00/ Tk 2.00 more for each litre. If the farmers can't irrigate on time, it harms the crops and the result is less yield. When the irrigation is done, there is crisis of fertilizer. Cultivating crops is nothing but sufferings. Because of the delay to collect fertilizer, the farmers again irrigate their fields and then put fertilizer. So, their expenditure doubles. The labor cost has increased from Tk 100.00 to Tk 150.00. The price of diesel has gone up from Tk 13.40 to Tk 42.30 per litre.

Irrigating the fields by electricity is very expensive. It happens quite often that the electricity has gone off when only the half of the field has been irrigated. The fields are irrigated on contract for Tk 250.00 per *katha*.

Though it takes much time, it is always better to plow by cows. Tractors can't till the land well. The weeds remain on the surface of the land. As a result, weeds grow abundantly. However, when the land is ploughed by cows, the top soil goes down and the soil beneath comes up. So, the weeds go beneath the soil, rot and become manure. As a result, 2/5 kg of urea suffices. But, now rice is grown using a lot of fertilizer. When the local variety is cultivated, they grow faster and so, they bend. As a result, the farmers can't grow local variety even if they wish. If you plow the field by cows which has already been cultivated by machine, you will get 05 mounds more rice. However, most of our farmers don't have their own cows. If the fields are plowed by rented cows, the expenditure goes up. So, the farmers are forced to use tractor.

Now the farmers use 10 kg of fertilizer in each *katha* whereas they used 02 kg earlier. Day by day the amount is increasing.

Pesticides are not available on time. *Furadin*, *Chanpuran* are mixed with fertilizer to put in the field. But, when the fertilizer is not available, farmers can't use the pesticides. At that time they use ash, margosa juice which work as pesticides. Pesticides do not benefit farmers. Rather, they harm in many ways. All pests and insects good or bad die of them. They mix with water in ponds and canals and kill fishes. Many fishes have disappeared from this area.

Calculation of IRRI cultivation in one *bigha*:

Oil (2 litre) : 82.00

Maitta manure (6 kg x 20)	: 120.00
1 st plow	: 150.00
Seeds	: 130.00
To sow seeds (02 laborers)	: 200.00
Lunch	: 40.00
To weed (02 laborers)	: 200.00
Lunch	: 60.00

Fertilizer:

1 st Phase	
Maitta manure (6 kg x 20.00)	: 120.00
Kala manure after 03 days	: 50.00
2 nd Phase	
Lal manure (6 kg x 20)	: 120.00
Urea (5 kg x 7)	: 35.00

After 15 days
Shada manure (10 kg x 7) : 70.00

Pesticides:

Basodin : 120.00

Irrigation:

Irrigation in every 3/4 days : 150.00
Oil price borne by farmer : 70.00

Again in every 7 days (total) : 1500.00 – 2000.00

Labor cost:

To sow : 150.00
To weed twice : 300.00
To cut the crops : 450.00

Production in each *katha* is from 1.5 – 2 mounds. The farmers themselves sell their crops in the bazaar. They get the real price. They separate the amount they need for their own use and they sell the rest at the bazaar.

There is hardly any festival during harvesting season. But, if the harvest is good, the farmers arrange *Milad Mahfil* and distribute courtesy sweets. Their only pleasure is when they eat *pilau* and chicken together. However, they hardly get the opportunity. They desperately try to pay back their debt.

AGROECOLOGICAL ZONE 10

Active Ganges Floodplain

Active Ganges Floodplain (3,334 sq km) region occupies unstable alluvial land within and adjoining GANGES river. It has irregular relief of broad and narrow ridges and depressions interrupted by cut-off channels and active channels. The area has complex mixtures of calcareous sandy, silty and clayey alluvium. The general soil types, predominantly include, calcareous, alluvium and calcareous brown floodplain soils. Soils are low in organic matter and mildly alkaline in reaction. General fertility level is medium but deficient in N.

Sub Region: Active Ganges Floodplain (Bangla Pedia)

Name: Sheikh Mainuddin, Age : 55 , Vill : Khalpardangi , Union : Chor Hajigonj, Upazila : Chor Bhodrashon, Dist : Faridpur



Main crop in this *chor* on the river Padma is rice. There are two crop seasons in this area- *Aoush-aman* and *IRRI-boro* season. Farmers cultivate local varieties - *Porangi* , *Manikmoundol* , *Kedarnat* , *Dudhshai* , *Modhushai* , *Shonadigha*, etc . In the *IRRI-boro* season they cultivate BR 8, 11 ,29 etc. Now-a-days most of the farmers of this area cultivate HYV rice. Soil in this area is sandy. So most of the farmers cultivate *Aoush* variety. The seed of *IRRI* variety is collected from local agriculture office. This is a very remote area and the communication is not very convenient. So farmers try to preserve their own seed. Sheikh Mainuddin collects fertilizer from the dealers at the Hajigonj bazaar. Fuel is also available there. Often they go to upazila shador. There is no electricity in this area, so farmers use shallow pump to irrigate the fields. Farmers use power tiller to cultivate their land. They sometimes plow the land manually.

The laborers come from different areas. They charge Tk 120.00 a day. The local varieties cannot fulfill the demand of people at the moment. So, they are cultivating exotic varieties. Farmers in this area have less access to fertilizer and fuel. They have to pay a lot to obtain these materials.. Mainuddin has followed his father to take agriculture as his profession. He cultivated *Aoush*, *Aman*, onion and garlic. Every year the *Aoush* is destroyed by flood water. So he

survives on the IRRI varieties. He depends on nature in order to cultivate both *Aoush and Aman*. But nature is not very friendly to them and this is why farmers like him prefer to cultivate IRRI-*boro* although this includes some extra expenditure. He has started rice cultivation in the IRRI season since 2006. The seed has been collected from the agriculture office and local dealers in the market.

There was no need for fertilizer in the land when they only cultivated local varieties. Now it is quite difficult to cultivate crops without fertilizer. He collects fertilizer from local market. but it is not available on time. The price of fertilizer is manipulated by the traders in the market. They ask for high price. It creates conflict between trader and farmer. The cost of fertilizer in each *bigha* is Tk 2000.00 .

Mainuddin spends Tk 1000.00 for irrigating one *bigha* of land. He has got seven *bigha* of land from his father of which five *bigha* of land is situated in the *chor* and another two *bigha* is in the high land. River erosion is a common phenomenon in this area. The river erodes the land every year. This is one of the major constraints. The seed is required in the month of Kartrik. The demand of fertilizer is 15 kg in each *bigha*. Two months later he needs 20 kg more. This year he got urea through the token provided by the UP chairman, member and the agriculture officer. Government shouldn't distribute the fertilizer through the dealers. They always try to cheat the farmers by increasing the price of fertilizer. They create artificial crisis which does not allow the farmers to get the fertilizer on time. The pesticide is available in the market. There are different brands. He gets advice from the shop-keeper regarding the application of pesticide in the land. The block supervisor is of help for him to certain extent. The labor cost in land is Tk 150.00 per day. He requires 20 laborers and pays them Tk 3000.00 for different works transplantation and harvest. Each *bigha* of land produces 35 mounds of rice. The price of one mound rice is around Tk 600.00. There is no way to sell this rice in the market. Most of the rice he produces is used for his own family consumption. If the production goes down, he borrows money from different sources like money lender, NGOs etc.

The rice cultivation mainly depends on nature. Flood is a common phenomenon. They fight flood almost every year. It interrupts the rice farming in the area.

AGROECOLOGICAL ZONE 11

High Ganges River Floodplain

High Ganges River Floodplain (13,205 sq km) region includes the western part of the Ganges river floodplain which is predominantly highland and medium highland. Most areas have a complex relief of broad and narrow ridges and inter-ridge depressions. The upper parts of high ridges stand above normal flood level. Lower parts of ridges and basin margins are seasonally shallowly flooded. General soil types predominantly include calcareous dark grey floodplain soils and calcareous brown floodplain soils. Organic matter content in the brown ridge soils is low but higher in the dark grey soils. Soils are slightly alkaline in reaction. General fertility level is low.

Sub Region: a) Central and Southern; b) Ganges-Mahananda Floodplain; c) Northern (Bangla Pedia)

Name: Nazir Hossain Biswas, Age: 55 yrs, Religion: Islam, Para: Collegepara, Village: Altapaul, UP: Altapaul, Upazila : Keshobpur District: Jessore



Nazir Hossain has succeeded his forefathers in cultivation. His grandfather and father all used to cultivate. He would go to the fields and saw how his father worked. Once he went to the field with his father. He put a bundle of seedlings in Nazir's hand and told him to plant them in row and he did that. He learned cultivation by seeing. None has forced him to come into cultivation. He has taken cultivation as his occupation by his own interest. But he does not like his children to come into cultivation. He likes to see them in other professions. After his death none will carry out cultivation in his family. Growing crops is a very difficult job. However, when the crop ripens, the joy of the farmers knows no bound.

Nazir Hossain Biswas owns two *bigha* of land. He has borrowed another two *bigha*. His homestead is in one *bigha* of land. However, he grows vegetables for domestic use in 10 *katha* of his homestead. If any little amount remains left, he sells that in the market.

Keshobpur area is lower than other parts of the district. For two to three months of the year this area remains under water. During that time there is no cultivation in those drowned fields. The cultivable land of this area has been divided into

Poush, Vadoore and IRRI. In *Poush* the rice is sown in *Bhadro* and cut in *Poush*. In *Vadoore* the rice is sown in *Baishakh* and cut in *Shraban*. IRRI is sown at the end of *Poush* and cut in *Chaitra-Baishakh*. But, for the last four or five years other places than Keshobpur also go under water. So, farmers can't cultivate their land for five to six months. Except rice, farmers of this area used to grow lentil abundantly 25 years ago. But, now they hardly cultivate lentil. Now they grow jute, sesame, linseed, sugarcane and a little amount of wheat. The cultivation of high-yielding variety of rice began in this area in 60s.

The farmers of this area grow almost same kind of rice. Five or six years back they used to cultivate some local varieties; however, for last four or five years they are not cultivating the local varieties. The cultivation of local variety does not suffice them because the yield is low. But, the hybrid variety yields good harvest. So, all are interested to grow this variety. Of its many varieties, the farmers mostly grow BR-21, BR-28, BR-29. They prefer to eat fine rice; so, they mostly produce fine rice like BR-28. In the past they grew *Surma and Pajjam*. But, since *Surma and Pajjam* are not fine, they now don't grow them. Around five years back all used to grow these rice. People in this area produce rice, jute, sesame, linseed, lentil, sugarcane, wheat etc. In the homestead they grow vegetables, green chili, potato, onion for domestic use. What the farmers grow in different months are given below:

1. *Baishakh* : rice, vegetables
2. *Jaistha* : rice. Jute
3. *Ashar* : harvest of rice
4. *Shraban* : sowing rice
5. *Bhadra* : harvest of jute
6. *Asshin* : rice
7. *Kartrik* : sowing dal
8. *Agrahayan* : sesame, linseed
9. *Poush* : sowing of rice
10. *Magh* : sowing of rice
11. *Falgun* : sugarcane, dal, potato
12. *Chaitra* : sugarcane, dal, potato

Earlier the farmers used to collect the seeds from others in exchange. They used to dry the seeds in the sun four or five times to preserve them. They selected the best crops for seeds. However, the farmers usually collect seeds from local seed-shop which is popular as seed office among the farmers and it has a branch at Keshobpur Bazar. They collect seeds from Khulna or Jessore if it is not available at the seed office though it hardly happens. They contact with the seed office before the season begins. After struggling really hard to get the seeds, they are sometimes upset because of the poor quality of seeds and being quite unsure about the authenticity of the seeds.

They prefer to collect seeds from dealers. But the price of the seeds should be fixed following proper rules and any artificial crisis cannot be created. The dealers must ensure that the seeds are not contaminated and the farmers are not cheated buying contaminated seeds. If any farmer is cheated buying contaminated seeds, he should be compensated.

They collect fertilizer from the local dealers. During the season, dealers charge more, but the farmers need fertilizer; so, they desperately try to get it by applying all techniques and tricks. Now the dealers have introduced tickets for getting fertilizer. It has eased the farmers. One sack of urea costs them from Tk 300.00 to Tk 350.00 and for phosphate they pay from Tk 400.00 to Tk 450.00. Since it is farmers who feel genuinely other farmers, it is better that the fertilizer are distributed by farmers. During season the crisis of fertilizers is very acute. The farmers need fertilizers at any cost. Sometimes two farmers share one sack. Sometimes they go to Jessore or Khulna if the fertilizer is not available at Keshobpur

Earlier we put only three kg of urea in each *bigha*. Later, we began to put phosphate which was followed by zipsum and dosta. Now we need 40 kg of urea and 40 kg of phosphate in each *bigha*. This quantity may increase next year and the end is unknown. Again, without fertilizers the plants become reddish and droop. If we put fertilizers, the plants become green and they grow up. Actually the land has lost its fertility.

They buy fuel-oil in retail from the local petrol pump. As the oil price is very high now, they try to use electricity. They use oil when there is no other alternative. However, a year back they did not have any difficulty getting oil. But now since it is very difficult to get oil, they are very calculative about using it.

Nazir Hossain has a power-tiller but he has no machine for harvesting rice. Now since the machine is available on rent, he does not need to buy it. The preserving cost of them is very high. If they are not oiled properly, they rust. The farmers don't know the know-how to take care of them. Nazir has his own tilling tools to plow his land and pipes and machine to irrigate.

Earlier there was no expenditure except labor cost in rice cultivation. They did not use any fertilizer except 2/3 kg of urea. There was no attack of pests. They used margosa leaves, mulberry leaves, kerosene if any pest had attacked rice. But, the high yielding variety is very susceptible to pests and they need a lot fertilizer.

During the rainy season the farmers don't require any irrigation. But during the second block ,i.e., at the end of *Baishakh* they require a little irrigation. The irrigation costs them Tk 60.00 an hour. They irrigate one *bigha* of land three times of three hours each.

Last year the jewelry of Nazir Hussain's wife was pledged to buy seeds. Later, it was released by selling milk. Again, buying seeds is not the only expenditure. Moreover, he is at a loss buying pesticides and fertilizers. After all these if the crops get damaged, they have no alternative than death. They then borrow money in high rate of interest from usurers. To repair this damage they need three or four years.

The cost of fertilizer in one *bigha* of land: (two phases)

1st Phase

08 kg of potash = 120.00
20 kg of phosphate = 240.00
20 kg of urea = 140.00

2nd Phase

04 kg of potash = 60.00
10 kg of phosphate = 120.00
10 kg of urea = 70.00

The following fertilizers are used if the land becomes less fertile:

10 kg of zipsum = 500.00
02 kg of dosta = 200.00

For poison = 100.00
For pesticides = 100.00

Labor cost in one bigha of land:
To prepare land: 350.00 (03 laborers)
To sow seedlings: 350.00 (03 laborers)
To take care of the crops: 300.00
To cut the crops: 300.00
To harvest the crops: 300.00

Irrigation cost: 500.00

However, to cultivate local variety they needed only two laborers which would cost them only Tk 120.00 and a little fertilizer which would cost only Tk 50.00-Tk 60.00. The crops would grow very easily and they would pass their time merrily.

They usually cultivate in the Rainy season. So, they don't require irrigation. But if it rains a lot, it causes problem for them. Many fields go under water. However, he has no problem because most of his fields are high.

On the other hand, in *Falgun-Chaitra* they grow vegetables and they irrigate their fields for few days. At that time they rent power tiller which is run by oil. If the price of oil increases, the farmers save money from their budget of daily expenditure and buy oil.

Using pesticides does not benefit farmers. Rather, it harms in many ways. All pests and insects -good or bad- die of them. All vegetables get intoxicated. Pesticides pollute environment. They mix with water in ponds and canals and kill fishes. Many fishes have disappeared from this area. Kopat, ripkot, thydin, eldrin are some commonly used pesticides. The pesticides cost the farmers Tk 1000.00 in each *bigha*. Sometimes they are cheated by buying contaminated pesticides. According to his own statement:

“BR-28 has been planted in my field and one month has passed by. It seemed there would be good harvest seeing the plants. Suddenly green pests attacked the entire field. At first I tried to prevent them by my own hand. But it was difficult to prevent the pests alone. So I sought for advice from the pesticide dealer. The dealer gave me two bottles of pesticide and told me to spray them mixing with water. Two days after I sprayed the pesticides, the rice of my field turned yellow. I immediately informed the local agriculture office, TNO and the pesticide dealer. All rushed to the field and saw what I told them. I spent Tk 25,000.00 in the field which I collected selling my wife's jewelry and a cow. Now I have to borrow money from usurers to pass my days.”

If he does not get the pesticides on time, he sprays kerosene, margosa leaves, mulberry leaves. It benefits a little. Sometimes he fell out with local dealers for contaminated pesticides but he never fought because they are his local relatives.

Fertilizers and pesticides harm the soil of their fields. For example, every year the amount of fertilizer is increasing. Without fertilizer, the crops droop and with it they become healthy. During Ershad's rule, they used three kg of urea in each *bigha* whereas they now need 40 kg of urea in the same area of land.

Total labor cost in per *bigha* land is Tk 2050.00.

Break down of labor cost in one *bigha* :

1st plow : 350.00 +150.00 (for lunch)
For sowing: 350.00 +150.00 (for lunch)
For care: 300.00 +150.00 (for lunch)
For cutting: 300.00
For harvest: 300.00

Total cost of fertilizer in each *bigha* of land is Tk 1550.00.

Break down of fertilizer cost is given bellow.

1st phase:

8 kg of potash: 120.00
20 kg of phosphate: 240.00
20 kg of urea : 140.00

2nd phase:

4 kg of potash: 60.00
10 kg of phosphate: 120.00
10 kg of urea : 70.00

For less fertile fields-
10 kg of zipsum : 500.00
2 kg of dosta : 200.00

Total cost of pesticides in each *bigha* land is Tk 200.00.

Break down of pesticide cost is given bellow:

Granular beat: 100.00
Others : 100.00

The cost is variable. However, the cost of local variety is low.

The cost of labor in each *bigha* is mentioned below:

Plow : 350.00 +150.00 (for lunch)
For sowing: 350.00 +150.00 (for lunch)
For care: 300.00 +150.00 (for lunch)
For cutting: 300.00 +150.00 (for lunch)
For harvest: 300.00

There is a little expenditure for fertilizer and sometimes there is none.

On an average farmers put five kg of urea which costs them only Tk 50.00. This variety does not need any pesticide. The harvest in each *bigha* is eight mounds.

On one calculation it is seen that the harvest of hybrid variety in each *bigha* is 25 mounds and the expenditure is Tk 4,000.00. So, the farmers can save around eight mounds. This is not a big deal for him.

The farmers need people all the year round. The members of the family help. During the sowing of the seedlings the farmers need laborers. The women of the family also help. It is very difficult to get laborers during harvesting season. You have to book laborers paying them in advance. During harvesting season you have to pay Tk 120.00- Tk 150.00 each laborer whereas at other time you can pay him Tk 100.00. The women help thresh and dry the crops. The men of the family help bring the crops at home.

Most of the farmers now use power tiller to plow their land. Power tiller can't till the land well. The weeds remain on the surface of the land. As a result, weeds grow abundantly. However, when the land is ploughed by cows, the top soil goes down and the soil beneath comes up. So, the weeds go beneath the soil, rot and become manure. As a result, we plow the land twice by cows and thrice by power-tiller.

To market the products of the farmers is a big problem. When the farmers take their crops to the bazaar, the wholesalers cheat them in price and weight. They also trick not to buy the crops. So, Nazir Hossain Biswas sells his rice, dal and other crops to his brother-in-law (wife's sister's husband). As a result, he is not cheated. But for other farmers the wholesalers come to the farmers' home and buy their crops. Farmers never get the justified price of rice.

At the middle part of this area stagnation of water is a big problem. During the main cultivation time of the year, the land remains under water. Again, in *Chaitra* during IRRI cultivation there is acute problem of water. Only those farmers who can afford irrigation can cultivate their land.

Those farmers who have a large area of land earn more social prestige than those who have less land. Again, if they lose the amount of land by selling, they begin to be less respected.

There are no festivals as there were earlier. Earlier people would cut their rice once a year, so they would get time and they would harvest their crops with festivals. But, now the farmers have no pleasure in their mind since they borrow money when they cultivate. So, after harvest they pay their debt. The hybrid variety of rice has snatched pleasure from her mind. Moreover, people are so busy now that they have no time.

AGROECOLOGICAL ZONE 12

Lower Ganges River Floodplain

Lower Ganges River Floodplain (7,968 sq km) the region comprises the eastern half of the Ganges river floodplain which is low-lying. The area has a typical meander floodplain landscape of broad ridges and basins. Soils of this region are silt loams and silty clay loams on the ridges and silty clay loam to heavy clays on lower sites. General soil types predominantly include calcareous dark grey and calcareous brown floodplain soils. Organic matter content is low in ridges and moderate in the basins. General fertility level is medium.

Sub Region: a) Central; b) Eastern

**Name of the Farmer: Md. Akhter Hossain, Age: 50, Village: Ajolpotti
UP: Majhardia, Upzila: Nagar kanda, District: Faridpur**



This area is just in the middle of Faridpur District. It stands on the Bank of the river Kumar. The river use to produce huge amount water in the past which made the land fertile. The farmer use to cultivate different local paddy varieties and other cash crop like onion, lentil, garlic etc. In the late 80s the water flow of the river was control by constructing a dam. It has changes the scenario of the agricultural practices. Nowadays IRRI boro paddy and onion is the main crop in the area. The farmer use to cultivate local varieties and these were namely, digha, manik digha, hijal digha, dhana digha etc. Those varieties were cultivated in the seasons of aman and aus. Nowadays some farmers still cultivate a local variety called chita aman but the production is very low.

Akhtr Hossain has been involved in cultivation since his childhood from family. He could not study because of want. His father was a farmer. He helped his father in cultivation and this is how he was oriented with cultivation. Around 20 years back he grew *Sita-aman* and onion. He grew Lakshmi-digha, Manik-digha, Hizol-digha, Dhola-digha varieties.

Now he grows IRRI-29 and onion. He grows IRRI because of its high production and profitability. He collects the seeds of exotic varieties from local bazaar and Upazilla Agriculture Office. There was water in this area in the past which helped the cultivation of local variety of rice. But, there is no water in the area. So, the farmers have no alternative except hybrid variety.

In the past they would collect the seeds themselves. They learned from their forefathers how to preserve seeds. They did not irrigate their fields. They also did not use fertilizer in the fields. There was enough natural manure in the fields. Now it is impossible to cultivate without fertilizer. The farmers collect fertilizer from the local dealers. Most of the time, they don't get fertilizer on time. The price of fertilizer is increasing day by day which enhances the cost of production. Finding no other alternative the farmers are growing hybrid varieties.

Earlier the farmers did not use pesticides. Now pests destroy crops if no pesticide is sprayed. Now nazra, sana and other pests attack crops. But, there was no existence of these pests in the past. Akhter Hossain has inherited 2.5 bigha of land. He runs a family of eight members with the income earned from this land. In the past they did not have problem with seeds. But, now the problem of seeds, fertilizer and oil is getting acuter and acuter. Sometimes he borrows mounded from others to buy them. So, his condition is deteriorating every year. The quality of seeds of Agriculture Department is good. Some companies are also providing the farmers with quality seeds. They need seeds in Falgun-Chaitra.

When the farmers began to grow exotic variety, they needed only 20 kg of fertilizer in each bigha; however, they now need 40 kg. The more the days are passing, the more they are requiring the fertilizer. And, it is happening because the quality of soil is deteriorating.

Fertilizer has been distributed this year with the help of army. So, there was no problem. But, last year people lamented for fertilizer. Dealers arbitrarily distributed fertilizer and increased its price. According to Akhter Hossain, fertilizer should be distributed by army every year. He usually uses urea, TSP and MP as fertilizers.

He spends 1000.00 on fertilizer in each bigha of land. He hires others' shallow machine to irrigate his fields since he does not own any and spends 1200.00.

He spends 600.00 on tractor/power-tiller. He needs 10/12 laborers in his cultivation. In addition, the members of the family help him. On an average, he gets 50 mounds of rice in each bigha. In the local bazaar he sells each mound for 600.00. He uses almost all his rice for his own consumption. So, he borrows mounded for other expenses.

He thinks though fertilizer and pesticide increase the production of crops, they cause different diseases in human body and they also harm fishes. Flood is a natural calamity in this area. People of this area build high platform to save them from flood water. They also take shelter in boat or in high places.

Hailstorm is another disaster of this area and people don't know any device to protect them from it.

AGROECOLOGICAL ZONE 13

Ganges Tidal Floodplain

Ganges Tidal Floodplain (17,066 sq km) region occupies an extensive area of tidal floodplain land in the southwest of the country. The greater part of this region has smooth relief having large areas of salinity. Riverbanks generally stand about a metre or less above the level of adjoining basins. Non-calcareous grey floodplain soil is the major component of general soil types. ACID SULPHATE SOIL also occupies a significant part of the area, where it is extremely acidic during the dry season. Most of the topsoils are acidic and subsoils are neutral to mildly alkaline. Soils of the SUNDARBANS area are alkaline. General fertility level is high, with medium to high organic matter content.

Sub Regions: a) Khulna Sundarbans; b) Nonsaline, calcareous; c) Nonsaline, calcareous and non-calcareous; d) Nonsaline, noncalcareous e) Saline, Acid Sulphate Soils; f) Saline, calcareous and noncalcareous; g) Saline, noncalcareous (Bangla Pedia)

Name: Shudhanshu Ghosh, Age: 65, Village: Chandipur, Thana: Shayamnagar, District: Shatkhira



Shudhanshu Ghosh has two boys and two girls. He cultivates 24 *bigha* of land. Of them he got 4 *bigha* of land through sharecropping. Although he is better off, something frustrates him a lot. He remembers the days when he had started cultivating his land independently. At that period farming was a pleasure for him like other farmers. The rotten grass in the *beel* used to produce manure. He used to plough the land only once a year and covered the land with rotten grass. Three or four days later that turned into manure. Then he cultivated paddy. One month later he used to visit the land to watch the situation and to clean weeds from the land. There might be attack of pests in the field during this period. If it would really happen, he would control them by putting *kerosene* and sap of *neem* and *tut* leaf. Various kinds of fish were available in the rice fields. These fishes were tasty.

The yield per *bigha* was eight mounds. It could cover his requirement. The new varieties of paddy arrived during the Pakistani Era. His father and uncles had shown no interest to introduce those varieties in their land. But the agriculture office used to provide them with free seeds, fertilizer and pesticide. Gradually a

few farmers at the neighborhood had started cultivating these varieties to get more yields. Then others had started following them. After the independence he also followed this trend. As far as he can remember, the price of seed and fertilizer was very low at that period. Each sack of fertilizer cost him about Tk 30.00. The requirement of fertilizer was very low; he put only three kg of urea in each *bigha* of land. During the period of Ershad, pesticide was being sprayed on the land from airplanes. It controlled the pests. They used to get pesticides free of cost from the agriculture office. Pesticide at that period cost about Tk 30.00 – Tk 40.00. Now-a-days they are scared and rush into the land to see if the paddy has been attacked by pests. For example, he transplanted paddy in his land yesterday. His son reported to him that pests attacked on them. They were rushing to the shop to buy insecticides; otherwise, the seedlings would not survive.

Currently they grow BR -21, 22, 23, 10, 11, 30, and 41. The names of the cultivars are *Paijam*, *Chinekani*, *Haridhan* etc. He cultivates indigenous variety in a small piece of land. In rest of the plots he cultivates exotic varieties. It produces better yield and people spend money gradually to cover the cost. So people like him and others cultivate them by borrowing money. Currently he cultivates a few local varieties of paddy - *Paijam* and *Chinkani*. A new variety called *Haridhan* has been cultivated in four *bigha* on experimental basis. The shape of the grain is fat and stem is much stronger. He is expecting a satisfactory yield.

In the past the farmers used to exchange seeds among them as they preserved them in their own house. Currently there is no choice except buying them from the seed store in the market. He depends on the seeds available in the market. The seeds of BR 10, 11, 30, 23, 22, 41 are available with the dealers. Often he is cheated if he buys seeds from the dealers. Dealers sometimes sell seeds with the date expired or they mixed some old seeds with new ones and put them in the packet. These seeds do not produce any seedling. Farmers are being cheated and disadvantaged in this way. Often the seed dealers create an artificial crisis of seeds in the market. The price of the seeds at that period is supposed to be Tk 250.00, but they demand Tk 300.00-Tk 350.00. It creates a crisis for him. There are no other ways to get seeds. Then he often sells his household things or curtail his budget allocated for other necessities for family to buy the seeds. During this time they collect food from the jungle. Last year, this deteriorated the law and order at Shayamnagar Bazar. The dealers suddenly increased the price of the seeds without any reason. Then he and other farmers protested against this illegal high price fixing. He along with other farmers went to the TNO and lodged a written complaint. As all farmers collectively protested against this bad act, the price went down to the original price.

Shudhangshu thinks if the seeds would have been distributed through a genuine farmer, there was a chance for all farmers to get it at the right time. There would have been no scope for any one to manipulate this. He prefers farmers to be the

distributors because only a farmer can feel the pain of others' The dealers only know how to make his trade and how to make more profit.

Increased use of fertilizer is a big problem for him. He used to cultivate the land with wooden plough in the past. It allowed him to send the surface soil to the deeper layer along with rotten leaves of plants. But as soon as power tiller was introduced, this practice changed. Power tiller only makes furrows in the surface soil and does not bring the deeper soil up. It has increased the demand of fertilizer in the land. Now he needs 40 kg of urea (excluding other fertilizer) in each *bigha* of land, but at the beginning when he started cultivating HYV varieties, he used to put only three kg of urea.

Water logging is one of the major constraints. The canal connected with Chandipur beel has been filled up. It is impossible to carry water through the agricultural land. The land in the area is cultivated once a year. Paddy remains in the land from *Ashar* to *Agrhayan*. During the rest of the year, he is unable to cultivate in his land due to the lack of irrigation facility. There is no water in the rivers and canals. On the other hand, salinity in the fields increases from *Poush* to *Chaitra*, so the land remains uncultivated.

In the current season he has cultivated *Haridhan*. The low land is good for local varieties while the high land is suitable for HYV varieties. He went to Dhaka to attend a program where he got the seed of *Haridhan* from a farmer. He has been cultivating this variety for last three years. In the current year he has transplanted *Haridhan* in four *bigha* of land. He prefers to cultivate exotic paddy because it produces high yield compared to local varieties. The exotic varieties are yielding 22-25 mounds per *bigha* while local variety yields only eight mounds. But the cost of production of exotic varieties is high and if the cost is deducted, it stands on the price of 8 mounds. He spends the money at different spells so he can't take down the exact record of his expenditure. Most of the farmers like him fail to assess the total cost.

At the beginning farmers in the area were given free seeds and fertilizer. As soon as the farmers started cultivating the hybrid varieties, the price of seeds began to increase every year. Now they cost him about Tk 4000.00 to cultivate one *bigha* of land. When ever he recalls, it makes him mad. Fertilizer cost is Tk 750; total labor cost is about Tk 2050; rest of the money is spent on seedling, tilling etc. Now he cultivates a couple of varieties of hybrid rice.

A major problem he encounters is related to increasing demand of fertilizer in the land. In 1981 when first the fertilizer was introduced, he applied only three kg and gradually it has increased up to 40-60 kg. Now it is impossible to grow anything in the land without applying fertilizer. The paddy plants fall on the ground and become yellow if fertilizer is not applied on time. It is really difficult to get the fertilizer on time. It becomes problematic to collect fertilizer during the crop season. Its price rises higher and often it is not available even if they are ready to

pay high price. The retailers often sell fake products to the farmers. Often the paddy dies in the land as they are cheated by the retailers with fake products. They are scared of both high price of fertilizer and fake products supplied by the retailers. When they fail to buy fertilizer in the local market,, they go to Moutala and Kaliganj. It troubles him a lot to collect extra money for fertilizer. Often he survives on wild vegetables to overcome this monetary crisis.

Another problem he encounters has been associated with pesticide and insecticides use. It kills all insects even which are crop friendly. After the use of pesticide the attack of pests goes down to minimum level for first few days. But five or six days later the attack of pests increases tremendously. It happens because pests from the neighboring plots come to this land, and they grow rapidly in number. In that case he applies more pesticide. The pesticides he uses are *Kapat, Ripact, Thidin, Furadin, Cup, Dyzin* etc. Most of the pesticides available in the local market are produced by Indian companies and these are illegally getting in through the border. The price of pesticide is currently very high. It is about Tk 500.00 per liter. The cost of pesticide per bigha is Tk 200.00 and often it rises up to Tk 500.00. This creates a great problem for him.

Marketing is a big constraint for him. If he takes his paddy on his own to the market, there is a chance to be cheated. The buyers jointly fix the low price and also manipulate the weight. So Shudhangshu like many other farmers sells his harvest to the wholesalers rather than to the stokers in the market. The *Arot dar* 'stoker' in the market pays Tk 480.00 for per mound paddy, when the *paikar* 'wholesalers' pay Tk 460 for the same amount of paddy. Once he went to the market and fixed the price of paddy with the stoker at Tk 480.00 per mound. He measured his harvest at home and the total weight was 30 mounds, but when it was taken in the market, the shop-keepers measured it as 29.50 mounds. They went to neighboring shop and the measuring equipment showed the same weight. The fact is that the stockers in the market have formed a pact and they jointly manipulated their measuring equipment. As soon as got back home he sold the paddy to the wholesalers at Tk 460.00 per mound. This type of problem he encounters every season.

Environmental constraint is also noticeable as it is described by him as a constraint in rice farming. On the one hand, water logging causes huge trouble because lands are inundated by excessive water. It is difficult to transplant anything in the low land. On the other hand, from the month of *Agrahayan* to *Chaitra* a large area remains fallow because of drought.

Farmers used to have different rice cakes during different festivals. They arranged this just after the harvest. Now no festival is observed in farmers' house. Like others Shudhangshu is frustrated and scared of the uncertain future as a rice farmer.

AGROECOLOGICAL ZONE 14

Gopalganj-Khulna Beels

Gopalganj-Khulna Beels (2,247 sq km) the region occupies extensive low-lying areas between the Ganges river floodplain and the Ganges tidal floodplain. Soils of the area are grey, and dark grey, acidic, heavy clays overlay PEAT or muck at 25-100 cm. General soil types include mainly peat and non-calcareous dark grey floodplain soils. Organic matter content is medium to high. Fertility level is medium.

Sub Region: Beel Centres

Name of the farmer: Bijoy Krishna Gain, Age: 55, Religion : Traditional Hindu Village: Shanpukuria, Up: Satpar, Upozila: Moksudpur, District: Gopalganj



The village is situated around the Chanda *beel*. Chanda beel is part of modhumoti floodplain. Most of the land in the area is part of Chanda beel. These lands produce only one crop a year. Nowadays farmer cultivate some exotic varieties during the IRRI boro season. These are namely, Br-29, 28, 26, 14 etc. They also cultivate Hybrid varieties and these are Hira, Jagoron and aloron. About 20 years back farmers in Chanda beel area used to produce local varieties of asush aman paddy. The aus varieties were namely, lakhmilata, bailam, choudha mugur, kochamurui etc. Aman varieties were called netpasha, kachkalam, gourakajol, bandarjata and khaiya matar. The main reasons why farmers ceased the cultivation of local varieties were related to increase in the salinity in the area about 20-25 years back. Secondly, flood and water logging has become a compound phenomenon. Lastly, high yield of exotic varieties attracted most of the farmer so they have grown with an interest those varieties.

Bijoy has been involved in cultivation by inheritance. When he was 7/8, his father died. He helped his brother in cultivation. When he was 25/26, he became a complete farmer. He grew Aush/Aman at the beginning. At that time he grew *Lampilata, Bailum, Chaiddamugur, Koccamuri* varieties of Aush and *Letpasha, Katchkolom, Gaurakajal, Bandardata, Khaiyamotor* varieties of Aman.

Now he grows hybrid varieties called *Hira*. He grows rice once a year because crops don't grow here more than once a year. He sowed *Khaiyamoto* variety of *Aman* this year but they have drowned in flood water. Because of the low production, the farmers of this area don't grow any local variety of rice. Farmers can't grow the local variety of rice because in the Chandabill area, the quantity of saline water is increasing. They are growing hybrid variety of rice for the last 20 years.

Bijoy collects the seeds of Ufshi variety from BADC, local dealers and different companies. He needs adequate irrigation, fertilizer and pesticide to grow Ufshi. Now he collects fertilizer from local dealers of Shatparbazaar. Every sack of fertilizer costs him 320.00/330.00. He spends around 1600.00 for irrigation in each bigha. He irrigates three times a week. He needs about 20 kg of Ufshi seeds for each bigha.

In the past they collected seeds themselves. They selected the best crops, dried them in the sun thrice or four times and preserved them in the sack as seeds. At that time there was no lack of natural manure because they burnt the hay and that would turn into manure. Bijoy has inherited 2.5 bighas of land and he has leased another two bighas. Beside cultivation, he runs a business of buying and selling rice. He tried to preserve the seeds of Ufshi but the harvest was low. So, he left the attempt. The quality of Ufshi seeds collected from different companies has deteriorated. He needs seeds in Kartrik every year.

According to Bijoy, Government should initiate research to invent quality seeds which can ensure high harvest.

At the beginning when he grew exotic, he needed less fertilizer and pesticide. But, as days are passing, the quantity of these is increasing. The reason, he thinks, is the over use fertilizer and pesticide. Again, there is less rain in the fields. Moreover, they face problem to get fertilizer. Sometimes they overpay for fertilizer. Bijoy thinks allowing only few is causing problem of selling fertilizer. He thinks if Government arranges open-market to sell fertilizer, it will reduce the problem.

There is no electricity supply in this area. So oil is indispensable. But, price-hike and scarcity cause problem in the area. So, he thinks government should take initiatives.

There is not much problem with pesticides because some companies supply them. Mazra and Parulia attack in this area. So, farmers use theovit, veratia, sumitheon and other kinds of pesticides. Bijoy thinks people suffer from various diseases and fishes are dying in this area because of fertilizer and pesticide.

On an average, farmers need 10/15 laborers and each laborer charges from 120.00 to 150.00. The cost of cultivation in one bigha land (equivalent to 52

dcml) is around Tk. 9000. It includes the cost of tilling, irrigation fertilizerfuel and labor. The yield produced around 35 mounds in per bigha of land. The price of paddy rises up to Tk.550 per mound. The value of paddy he grows in one bigha is (550x25) Tk.13750. On an average, the production of rice in this area is 25/35 mounds per bigha (depends on the varities). Bijoy sells around 70/75 mounds of rice and bears the expenditure of his children's education and family.

He has no social problem in the area. There is disagreement in the family for any food crisis but there is suicidal problem in his lineage.

During IRRI and Boro mousum there is draught sometimes but Bijoy irrigates his fields properly. He knows no strategy to fight over-rain.

Basically, he grows rice to meet up his demand of food and to manage other expenditure.

AGROECOLOGICALZONE 15

Arial Beel

Arial Beel (144 km) this region occupies a low-lying basin between the Ganges and DHALESHWARI rivers in the south of the former greater DHAKA district. It has much in commound with the lower Atrai Basin and the Gopalganj-Khulna Beels. The soils of this area are dark grey, acidic heavy clays. Non-calcareous dark grey floodplain soil is the chief general soil type. Organic matter content generally exceeds two percent in the top subsoil. Available moisture holding capacity is inherently low. General fertility level is medium to high.

Sub Region: Arial Beel(Bangla Pedia)

**Name : Nikhil Chandra Baidya, Age:40, Religion:Hindu, Vill:Ganeshrampur
UP: Shekharnagar, Upazila: Sirajdikhan, District: Munshiganj**



Nikhil Chandra Baidya has been living in this region for last 30 years. The *beel* is about half km away from his house. It remains under water more than seven months a year. So there is no cultivation during this period. They are able to cultivate in the *beel* from the month of *Agrahayan* to *Boishakh* and *Jaishthya* . After the month of *Jaishthya* *beel* goes under water. According to him agriculture has become very expensive. His father and grandfather used to cultivate rice with joy, but he undertakes agriculture because there is no other option. They used to cultivate a lot of *Robicrops* about 30 years ago. They are called *Chaitalyfoshol*. After the introduction of IRRI varieties many traditional practices have been obsolete. At the edge of the *beel* people used to cultivate *Chaitalyfoshol*, and paddy used to be cultivated in the low land areas. *Aman* varieties which were cultivated during this period are called *Vauna*, *Khointor*, *Shonadia* etc. These varieties were sown in the month of *Boishakh* and were harvested in the month of *Asshin* and *Kartik*. The flood water has increased compared to the past. On the other hand, due to the construction of embankment this water cannot recede quickly. So the water logging remains as a problem for longer period and it creates a problem for rice cultivation.

About 20 years ago a change occurred in agriculture in this area. The HYV varieties were brought in this area in 1986 and 1987. He cultivated BR 8 during this period. Now they cultivate BR 29, 28, 14, *Biplob* and a local variety

Bagunbichi. *Bagunbichi* is an aromatic rice but yield is low. The seed bed is prepared in *Kartrik* for this variety and cultivated in the month of *Agrahayan*. Harvest period is *Boishakh*. Most of the farmers like him in this area cultivate the same varieties of rice. They are cultivating HYV because of high yield. Nowadays the variety called *Biplob* is becoming popular.



The seed of the HYV varieties is collected from Sirajdikhan bazaar. Often farmers go to Nimtola bazaar or they collect seeds from Dhaka, Gazipur, Shekhnogor, Alapur etc. In that case the cost of seeds increases a lot. If he is not able to get the seed on time, this delays the paddy cultivation. The unavailability of seed affects the whole process of cultivation. Often they spend double the price for everything. If the price of rice increases in the market, this also affects the price of seed. During the cultivation period a sack of seed is Tk 350.00 to Tk 360.00 (each sack contains 10 kg of seeds).

Nikhil Chanra Baidya has been share cropping 10 *paki* of land. Half of the crops produced by share cropping is left with the land owner. But often the land owner shares half of the irrigation expenses. He has one *paki* of land of his own where he only grows *Chaitalyfoshol*. A problem occurred about three years ago. When he collected a sack of seed of BR 29 from Nimtola market, the retailer assured him about the quality of the seed. He spent three days and after many hassles he managed to get the seed. But the disaster was that about two-thirds of the seeds were unable to produce any seedling. The dealer was quickly informed about the matter. The dealer didn't listen to him and declined to compensate anything. He spent more than Tk 5500.00. The dealer told him that he collected a big amount of seed. So, some of the seeds may not be up to the quality; he experienced this consequence. This is only one dimension of the problem. Often the farmer encounters different other problems, for example, failing to get the fertilizer or providing irrigation on time.

He told about the problem related to unavailability of fertilizer. Now-a-days farmers completely depend on their fate about getting fertilizer. They take money in their grip and visit the shop of the retailer but no result. They frequently communicate with the dealers and stand on the long queue to obtain fertilizer. After three or four days they get fertilizer. But, the amount is not sufficient. He requires one mound of fertilizer, but the supply is only 20 kg. So they use less

amount of fertilizer which does not cover the need of the land. This results in low yield. Currently the paddy he cultivates needs a good amount of fertilizer. But the local varieties did not require fertilizer. Nowadays *Aman* paddy requires less amount of fertilizer. About two years ago they used to apply 10 kg of fertilizer in one *paki* of land. And now the demand has increased up to 15 kg. In high land they provide irrigation with shallow machine and it costs them Tk 100.00 per hour. The cost of irrigation in one *paki* of land is Tk 900.00. In low land areas there no need of irrigation. The rice depends on the rain water.

Now he uses tractor to cultivate the land. People do not use cattle and plough in rice cultivation. He doesn't preserve any seed in his house because the process is very complicated. So he collects it from the market. They used to preserve seeds in their house and exchanged it among the neighboring farmers. He uses pesticide called *Basudin*, *Andring* etc. The demand of pesticide is not very high. It costs him about Tk 100.00/ Tk 150.00. The seed is required in the months of *Boishakh* and *Agrahayan*. The problem of packet seed is that the farmers don't know whether the seed is good or bad. They have a fear about this. Often the whole investment turned into a loss. At that time they encounter tough time. Then they borrow money from money-lenders or NGOs in high interest rate. Now-a-days Nikhil Chandra spends Tk 1000.00 on fertilizer for each *paki* of land. The main problem related to fertilizer is unavailability. Often they need small amount of fertilizer. The dealers are not willing to sell such a small amount of fertilizer. On the other hand, the retailer asks for high price which increases the price a lot. Application of fertilizer in the land gradually decreases the fertility. If once fertilizer is applied to the land, there is no way to grow anything without it.

The problem related to irrigation is unavailability of shallow machine during the season. Often the price increases from Tk 100.00 to Tk 150.00. If the fuel is unavailable, the machine doesn't work. So the problem is like that when the fertilizer is available, at that time there is no irrigation. If the irrigation is available, then the fertilizer is unavailable. Often many people fight to get irrigation water from the same machine.

The pesticide degrades the environment but often it fails to eliminate the insects and pests. These are also causing problems in our stomach. If the pesticide is unavailable, then he uses kerosene or ashes. These have lesser impact on pest control. He sells paddy from Tk 450.00 to Tk 480.00 per mound. He directly goes to the market.

The total cost involved in paddy cultivation in each *paki* is Tk 5420.00. On the other hand, often they sell the unprocessed wet paddy when they fail to cover the processing cost. So the price of unprocessed paddy is Tk 2500.00 to Tk 3000.00. And the price of processed paddy is Tk 400.00 to Tk 480.00 per mound. Now-a-days they do not observe any festival during the harvesting period. Often the Hindus and Muslims arrange some meditation or perform rituals. But if they have crop loss due to the low yield, it makes them very sad. Recent agricultural practices have hijacked their peace and happiness

AGROECOLOGICAL ZONE 16

Middle Meghna River Floodplain

Middle Meghna River Floodplain (1,555 sq km) this region occupies an abandoned channel of the Brahmaputra river on the border between the greater Dhaka and COMILLA districts. The region includes areas of old Brahmaputra chars within the MEGHNA river as well as adjoining parts of the mainland. Soils of the area are grey loam on the ridges and grey to dark grey clays in the basins. The dominant general soil type is non-calcareous grey floodplain soil. Topsoils are strongly acidic and subsoils slightly acidic to slightly alkaline. General fertility level is medium with low N and organic matter.

Sub Region: Middle Meghna River Floodplain (bangle Pedia)

Name: Dhanu Mian, Age: 50, Religion: Islam, Village: Homna, Thana: Homna, District: Comilla



Dhanu Mian came in cultivation with father and uncles. He used to go to the fields with them. Since he did not go to school, he took farming as his profession. Now he enjoys this profession. But he does not want his children to come into this profession because he anticipates that the coming days may be more difficult for the farmers.

He used to grow *Bawa, Pajam, Shahi-balam*. Moreover, in *Galgun-Chaitra* he used to grow chilli, potato, onion, tobacco, jute and winter vegetables. But now he grows BR-28, BR-29, *Aftab, Biplob*, BR-8. Right now he is growing only *Shahi-balam* (sweet scented rice). To him the major reason why he does not grow local variety is its low production. The maximum harvest in each *kare* is 4/5 mounds. Pests don't attack. However, since mostly IRRI is cultivated in these land with more chemical fertilizers, eg, 30 kg per *kare* on an average, the local variety grows here very fast and bends down on the ground. As a result, it rots being wet in water and the farmers are losing their interest to grow this variety.

Dhanu Mian is a middle-aged experienced farmer. He is well aware of the distinctive changes in cultivation. The difference between the earlier and the present form of cultivation is quite wide. Though the production has increased, it is very difficult for the farmers to bear the expenditure. The change in rice cultivation began in Ayub's period and it speeded up in Ziaur Rahman's period. Dhanu Mian began to cultivate IRRI during 1980-81. At that time there was a

scarcity of seedlings. All were scared of these seedlings anticipating loss. He could collect seedlings from the local agriculture office.

He owns seven *kani* of land. Lending or borrowing land is not popular in this area because of the unavailability of land. So, all farmers cultivate their own land. Usually the day labourers work in the field for wage. To talk about the cultivation of past time Dhanu Mian says that during Falgun-Chaitra moundths they cultivated sesame, nailla jute, chilli, potato, onion, lentil, tobacco as *Rabicrop*. Moreover, they cultivated vegetables, cauliflower, cabbage, tomato, pumpkin, bean, radish, carrot, eggplant during winter. However, after they started cultivating IRRI, the cultivation of these crops has stopped since they have no more land left. They cultivate twice a year- during Ashar-Shravan and during Falgun-Chaitra. During the rest of the year they can cultivate crops specially vegetables only in the high land. The change in cultivation began during Ayub Khan's rule. The change accelerated during Mujib's period. During Ayub Khan's period the agriculture officers would go to the houses of the farmers and explain how they can cultivate rice in which land. The change in cultivation at that time came with the introduction of IRRI.

Now almost all farmers grow same kind of rice. However, few farmers grow *Shahi-balam*(fine and scented) and *Paizam* in *Aman* season. In fact, this rice is grown out of liking. On occasion or for guests this rice is cooked. At present BR-28, BR-29 and BR-08 are very widely cultivated. Moreover, *Biplob* and *Aftab* of hybrid kind are cultivated. The harvest of these kinds is good. Twenty mounds is grown in one *kani*; moreover, with proper care and adequate fertilizers it is possible to grow 22-24 mounds in one *kani*.

Now two kinds of crops are cultivated in the area: *Bawa* rice in small area of land in *Baishakh-Jaishtha* and *Aman*, *Paijam*, *Shahi-Balam* (sweet scented) in *Ashar-Shravan*. In addition, BR-29 and BR-28 are also cultivated. *Agrahayan* is the harvesting moundth of these rice.

In Magh, BR-28, BR-11 and BR-08 as well as *Biplob* and *Aftab* of hybrid kind are planted. In Falgun-Chaitra, earlier *Rabicrop* was cultivated whereas now IRRI and BR are cultivated. But, chilli, pulse, winter vegetables, potato are grown in high land where water does not stand.

He himself preserves the seeds of those rice that can be preserved and usually they can be preserved for two years. After two years he preserves the seeds from the agriculture office and dealers. However, if any rice grows well for two years, he separates the best seed from them and preserve and cultivate for two years. To get the seed on time you have to queue up at the seed-shop. It's better you collect seeds 15-20 days earlier than you require.

He collects fertilizers from local dealers. Dealers charge 15.00 -20.00 more in each sack with the excuse of increased transport fare. And, sometimes he

does not get fertilizers even spending more money when he requires. At that time three of us share one sack of fertilizers. It does not fulfill my requirement. So, the purpose of using fertilizers remains unsuccessful.

Because of the frequent disruption of electricity, he depends on fuel-oil for irrigation. Since the demand is more, there is also an oil crisis. The price of oil goes up 2.00/3.00 per litre. The oil is not available even at the oil station. Sometimes there is a long queue. To prepare land specially during IRRI/*Boro* season it is necessary to irrigate it properly. But for the scarcity of electricity and oil, it usually delays to prepare the land and consequently we are late to cultivate our crops. And the result is ending up with low harvest.

They have now become very machine dependent to mean agricultural tools. Most of the farmers now use tractors to till their land. Very few farmers having little land plough their land by the cows. Tractors can't till the land well. The weeds remain on the surface of the land. As a result, weeds grow abundantly. However, when the land is ploughed, the top soil goes down and the soil beneath comes up. So, the weeds grow less. But the tractor serves none of them. Only it hastens the tilling.

Now-a-days farmers use urea, potash, gypsum, black fertilizers, cow-dung, *dosta*, red fertilizers and mixed fertilizers. People did not use all these fertilizers earlier. They used only cow-dung. The harvest was less but they did not spend much to cultivate rice. The leaves and straw would turn into manure.

During Aman season the land does not require irrigation because of the rain water. To cultivate *Rabicrop* the land required irrigation at the past time and the farmers used to irrigate their land from the nearby ponds and canals. Now they irrigate their land by shallow tube-well or deep tube-well because most of the tanks, canals and even ponds have been filled up. So, the farmers' expenditure has gone up for cultivation since they now spend money on fuel-oil for irrigating their land.

Earlier the farmers would preserve the seeds. They would also borrow from neighbors or relatives. But now the seeds are available in packets. The seeds of pumpkin, papaw, bean, pea, radish, potato, cabbage, *lalshakh*, *puishakh* etc are available in packets. The land was fertile earlier; so, no fertilizer was required. Only the natural manure was put in the land. However, now it is possible to cultivate without chemical fertilizers. So, the soil has deteriorated.

Now, as soon as you sow, the pests attack the plants because they are easily susceptible to pests. Another danger is: for example, one farmer has used pesticides, then the pests attack the neighboring fields. Therefore, there is always the attack of pests. Again killing the pests by pesticides is quite

temporary. The attack of pests is so severe that sometimes it leads the farmers to the end of patience.

Dhanu Mian owns seven *kani* of land. To best of his knowledge, leasing of land is not very popular in this area because people of this area prefer to cultivate their land either by themselves or by day laborers. Cultivation is their forefathers' occupation. Now it has been a very difficult profession as the expenditure has gone up. Still they engage them in cultivation because of their attachment with this for a long time.

Mainly the women preserve the seeds. The plate where the seeds are put to dry is first dried well in the sun. Then the dried seeds are preserved in a clay pitcher ensuring it air-tight. Again after two or two and a half month later the seeds are dried in the sun. The farmers need the seeds in Ashar and Chaitra. They think the seeds were better earlier because they produced plants with strong stems. At that time they did not look after the plants so much. But, now they have to be very watchful because the plants may need pesticides or water any time. They find it very difficult to follow the growth of the plants. They always don't understand everything.

They want good seeds that give them good harvest but require less fertilizers and pesticides. They used to put five kg fertilizers 15/20 years earlier; however, they now put 25/30 kg fertilizers in the same amount of land and they are anticipating to put more in the days to come. Without fertilizers the crops turn white. In fact, the soil has lost all fertility. Unavailability of fertilizers in need harms the harvest. The fertilizers don't help the crops if they are not put on time. In the union level the fertilizers may be distributed by the farmers and the government should subsidize for fertilizers. Since they damage the environment, it is better not to use pesticides. But, there is no other alternative.

Expenditure of cultivation in one kani is given below under different heads:

To prepare the land and plough (three times with tractor) : 450.00

Seeds (ten kg) : 240.00

To prepare seed bed (he himself does it): Zero taka

Labor cost to uproot seedlings : 240.00

Labor cost to plant seedlings (4 laborers x75): 300.00

Weeding Cost:

First Phase:

After 20/21 days (4 laborers x 100): 400.00

2nd Phase:

After two monthths (4 laborers x 75): 300.00

Fertilizers:

First Phase:

Black fertilizers : 10 kg x 10 = 100.00

Red fertilizers : 10 kg x 10 = 100.00

Urea : 5 kg x 7 = 35.00

2nd Phase:

Urea : 10 kg x 7 = 70.00

Pesticides after one or one and a half mounds:

Basodine , Endrin : 120.00

Irrigation :

After one week 11 times in three mounds (on contract) : 1600.00

Irrigation is also made from deep tube-well in case of land being at a distant place for 2500.00. Contract is effective despite of rain. Since he does not cut the rice himself, Dhanu Mian employs laborers who usually come from Mymoundsingh or the North Bengal. It takes him around 1500.00. The harvest is around 20 mounds in one *kani*. They sell each mound for 450.00- 480.00. This is not cost-effective. The hay is used as shade of house or cattle-food.

There is no wholesale merchant in this area. So, the farmers themselves sell the rice at Homna Bazar. After consumption there is very little , let's say, 30/40 kg left to sell. It does not satisfy the wholesalers. The farmers sell their rice after a tight bargaining. If the selling price is not what they expect, they bring the rice back home.

The cultivation of vegetables has declined because of IRRI cultivation. They grow little vegetables like bean, gourd, pumpkin, papaw, cucumber in the kitchen garden for domestic use. Sometimes they sell the residue and earn around 1500.00-2000.00 a year. The biggest problem of this area is flood. Since there are no canals, the water stagnates. So, during Aman season there is no harvest in this area. At that time people live on credit.

People usually don't arrange any crop-based festival. They don't find cultivating crops quite pleasing. So, they think it is not possible for people to arrange any festival if they are not happy in mind.

AGROECOLOGICAL ZONE 17

Lower Meghna River Floodplain

Lower Meghna River Floodplain (909 sq km) this area occupies the transitional area between the middle Meghna river floodplain and the young Meghna estuarine floodplain. Soils of this area are relatively uniform, silt loams occupy relatively higher areas and silty clay loams occupy the depressions. Non-calcareous dark grey floodplain and calcareous grey floodplain soils are major components of general soil types. Topsoils are moderately acidic and subsoils neutral in reaction. General fertility level is medium to high with low to medium organic matter status and K-bearing minerals.

Sub Region: a) Calcareous, flood protected; b) Calcareous, unembanked; c) Noncalcareous, flood protected; d) Noncalcareous, unembanked

Name : Md. Shahjahan Mian, Age: 40 yrs, Religion : Islam, Village: Baroipara, P.S. : Chatkhil, District: Noakhali



Md. Shahjahan Mian is involved with cultivation since his childhood. He has succeeded his father in farming. He has a small family with three daughters and one son. He is carrying out a moderate life with his wife and relatives. But, he is not without problems. He told those problems of cultivation.

He owns 10 gonda of land and has leased another 08 gonda. With the earning from cultivation he is somehow managing his family.

* 05 gonda = 01 bigha

To talk about cultivation of the past he says that there were few people in this area. There were only 70/80 families and all were Hindu families. Their main crop was betel. This is how the nomenclature goes. Now there are 2/3 betel gardens. The history goes back to 40/50 years. At that time there was a little rice cultivation. Farmers at that time would grow *Kalozira, Shakkarghora, Ghigz, Nazirshail, Murabazal, Gochi, Sonalu, Pajjam, Duthzor, Hirmaima* varieties of rice. These were *Aman*. These would grow in rain water. They did not need any fertilizer or pesticide. In *Boro mousoom* the farmers irrigated their fields using *Don* from the canal named Mahendra. It was not expensive. The farmers needed only the laborers. In Winter they grew eggplant, potato, parble, dal, vegetables.

However, after independence the hybrid variety began to be cultivated in this area. My grandfather and father did not like it. But, when they saw that they yielded high production, they got interested about them.

Now almost all farmers grow BR11, BR39, Mukta, Mala, IRRI38, Hira2. These varieties are grown in the rainy season. In the dry season- from Poush to Baishakh they grow Hira Zagaron, Aftab.

Now there are three crops in the area. The inhabitants have divided them as follows: Rainy season--Ashar- Kartrik, Dry season-- Agrahayan- Chaitra, Winter-- Magh- Baishakh. Aman is usually grown in Rainy Season. The varieties that are grown- BR 11, BR 39, IRRI 38, Hira-2. In the past (35 yrs back) they grew *Shakkarghora, Ghigz, Hirmiacca, Murabazal, Nazirshail, Pajam, Duthzor, Kalozira*. In the dry season they grow *Hira, Jagoron, Aftab*, BR 16, 20, 28, 29 varieties of IRRI. They also grow hybrid varieties. In Winter they grow cauliflower, pumpkin, bean, jute, potato, *dal*, lady's finger, spinach, *lalshak*, tomato, cabbage, radish, *puishak*.

Farmers themselves used to collect the seeds of rice and vegetables. Moreover, they used to sell good local seeds in the bazaar. They would also exchange seeds. These all would happen 35 years back. Now all kinds of seeds- good or bad- in packets are available in the bazaar. Sometimes rules are written on the packet which they don't understand. So they can't yield good harvest from these seeds.

In the past all farmers reared cattle so they could use the cow-dung as natural manure. They buy chemical fertilizer from local Chatkhil or Sonaimuri bazaar. They buy oil from the local pump or from the retailers. Electricity runs in very low voltage so most of the machines have been out of order. Though plowing by cows is good in all respects, it is now-a-days is very expensive. So, all farmers use power-tiller to plow their fields. They think they would get 5 mounds more rice if they could cultivate their land by cows.

The price of fuel-oil is increasing everyday. Now the price of diesel, kerosene and mobil is 46.00, 46.00 and 120.00 respectively. Sometimes the pump owners increase the price suddenly. The farmers sometimes even starve to tackle the situation. They can't take medicine if anybody gets sick.

The sharecroppers are in great trouble because they can't apply for bank-loan since they don't have any original paper. The owners of land don't cooperate them. Then they are forced to take loan from NGOs. Also the usurers of the area lend them mounded in high interest rate.

The electricity crisis is acute. Farmers don't expect to irrigate their fields by electricity because of frequent disruption. Plowing by tractors costs the farmers

200.00 per *gonda* (three times), 2000.00 per *kani* (three times), 500.00 per *bigha* (three times).

When the land is ploughed by cows, the top soil goes down and the soil beneath comes up. So, the weeds go beneath the soil, rot and become manure. So, we get 05 mounds more rice per bigha. Plowing land by cows charges the farmers 500.00 (three times).

Cost for rice cultivation in one bigha of land:

Buying seeds (1 kg)Tk. 320,
Cost for labor Tk. 2550
Cost for fertilizer Tk. 1040.
Cost for Irrigation Tk.600
Cost for pesticides Tk. 100

The total cost for rice cultivation in one bigha land is around Tk. 4610. The production of rice in one bigha land is 20 mounds. The farmers sell each mound for 420.00. The wholesalers sell it for up to Tk. 550 and we buy it later. Total price of 0 mounds paddy is not more than Tk.8400. After paying for the debts farmer do not have enough moundey in hand.

Sometimes if the heat is extreme, farmers fetch water from distant sources which doubles their expenditure. The cost for labor partly reduces because the members of the family share the work. They buy pesticides like Basodin, Dimekron, Carbicron which cost them 100.00, 80.00 and 100.00 respectively. They do not know the exact price of the pesticides but they overpay.

Shahjahan Mian grows radish, spinach, pumpkin, celery, bean, puishak in his homestead in Winter. He earns moundey by growing vegetable invest this moundey in rice cultivation.

The farmers do not get good price if they take their products straight to the bazaar. The wholesalers have created such a system that farmers can't sell their products to any other person except the wholesalers. Though they get a little low price, the farmers prefer to sell their products from their home because they can avoid some extra hassles. For example, rice this year sells in 420.00 a mound. But, the wholesalers are selling 560.00 a mound because they reserve the rice for some time. The farmers can't store their crops for some time because they have to pay back their loan and the wholesalers utilize this opportunity. After they sell the portion of rice they can afford, they maintain their family with the rest until the next season comes. This is how the farmers calculate their loss or profit: if they can maintain their family with the rice left, they think they have made profit and if the opposite happens, they think it's a loss. Again, if there is flood, they take lone from others. The biggest threat to the environment in this area is the

stagnation of water. However, they don't face it every year. When there is heavy rain fall, that year farmers miss Aman crop. There are two panels name Mahendra and Debendra. Water falls into the river from these canals. But, these canals have been leased. People cultivate fish in these canals building dams. These dams cause the stagnation of water.

The farmers of this area have severe social problem. Most of the farmers are sharecroppers and their social prestige is low. Social prestige depends on once amount of land. The sharecroppers sit on the benches outside the tea-stall and bow down when they see the landlords. Family-wise they don't have any problem but they suffer from inferiority complex. Poverty sticks to us as our dress stick to our body. Now cultivation doesn't benefit us; we are in this occupation just to survive. In the past farmers invited many people on different occasions but now they give second thought on how they can make the list smaller.

AGROECOLOGICAL ZONE 18

Young Meghna Estuarine Floodplain

Young Meghna Estuarine Floodplain (9,269 sq km) region occupies young alluvial land in and adjoining the Meghna estuary. The major soils are grey to olive, deep calcareous silt loam and silty clay loams, and are stratified either throughout or at shallow depth. Calcareous alluvium and non-calcareous grey floodplain soils are the dominant general soil types. Topsoils and subsoils of the area are mildly alkaline. General fertility is medium but low in N and organic matter.

Sub Region: a) Nonsaline: Central Bhola; b) Nonsaline: Meghna Estuary Charland; c) Nonsaline: North Bhola; d) Saline: Central Bhola; e) Saline: Noakhali, Hatiya and Meghna Estuary; f) Saline: Sandwip and South Bhola

Name : Shamsul Haque , Age : 67 , Vill: Ajbalia , Union : Ajbalia , Upazila : Noakhali shodor .



This area is part of flood plain and slide saline zone. Most of the population in the area is involved in farming. Rice and vegetables are the main crops in the area. The land remains under water for six months during the rainy season. Farmers are not able to cultivate adequately due to the prolonged water logging. Flood and water logging often damage the crops in the fields. Due to the excessive water in the land some farmers keep their land fallow for a season. Most of the farmers only grow one rice crop in a season.

In some highland areas some farmers cultivate cucumber, radish, *soyabeen*, chili, *lentel*, potato etc. The local *Aman* varieties are *Kajolail*, *Modhumaloti*. The rice season starts in the month of *Ashar* and finishes in the month of *Poush*. Others crops are cultivated in the months of *Chaitra* to *Bhadro*. Shamsul Haque is a marginal farmer. He has no land of his own. He got involved in agriculture at his age of 13. He has succeeded his father in farming. Shamsul Haque share-crops in one *kani* of land (1 *kani* = 120 dcml). His father left only the homestead. He cultivates a few local varieties called *Chikonchaplaiish* and *Kajolhaild* in the rainy season. He doesn't cultivate any exotic varieties of rice. It is also difficult for

farmers to cultivate any paddy during the *Boro* period because of the increased salinity.

He stated that the seeds are preserved in his house. He selects them from the harvest. These are dried under the sun for eight to 10 days. He doesn't collect the seeds from others. Often if his seeds fail to produce the plants, he borrows some seeds from the neighboring farmers.

The demand of fertilizer for the fields has been increasing gradually. Ten years back he applied 26 kg of fertilizer and now the field requires 40kg. The demand of fertilizer has increased due to the decline in soil fertility. The price of fertilizer has also increased in an alarming pace. Two years back the price of one kg of urea was Tk 6.00. Now it has increased up to Tk 9.00. The price of TSP was Tk 11.00 per kg whereas it costs about Tk 28.00. He collects fertilizer from the traders in Sonapur market.

He is not aware of the distribution procedure of fertilizer by the government. He heard that there is a system to provide fertilizer by the Union Parishad but he didn't find anything over there. Whenever he goes there, he gets the same reply "it is finished" which saddens him. He has no intention to fight with them. Shamsul Haque stated that earlier fertilizer was available in the market. He used to buy them from the Kholifar hat. Now they are not available there. When fertilizer was available close to his house, it was convenient for him to get them on credit. Even he was able to get small amount of fertilizer. Now-a-days he doesn't have access to fertilizer. He has to go here and there in search of fertilizer. He pays Tk 100.00 or Tk 150.00 for the carrying charge which increases the cost. But the problem is that fertilizer is not available when needed.

He gave an example from his experience. Two months back he heard that fertilizer is available in the Shaheber hat which is three miles away from his village. Then someone told him that this is available in Kalitola. When he arrived there, he found all fertilizer sold. He spends Tk 240.00 for traveling and carrying cost for two sacks of fertilizer. This is not the end; it may take 20 days to get the fertilizer. This delay to get the fertilizer application affects the growth of paddy plants. He is worried about it.

The laborers are mostly his family members. He and his four sons work in the land all the year round. So he doesn't need to pay for the labor cost. It would have cost him quite a lot of money if he hired the laborers from outside. The approximate cost of labor is Tk 5700.00. He manages to save the cost and this is the main reason of his survival. Otherwise this rice cultivation would stop.

Farming by plough and cattle is good for yield. The spear of plough reaches the deeper part of the soil. It removes the roots of the weeds. It makes the soil soft and requires less laborers to remove the weeds. But he has to depend on the

power tiller as no one has plough and cattle in the area. Farmers are unable to rear the cattle as the price is very high. On the other hand, lack of fodders is also a constraint in this regard.

He has obtained 100 mounds of paddy from three *kani* (one *kani* is equivalent to 120 dcml) of land. He left half of the harvest with the land owner. He has 50 mounds of rice at home, but his yearly requirement for domestic consumption is 60- 65 mounds. He needs to buy the rest of the paddy. He has been depending on the paddy produced last year. He may need to buy again in the next month.

The total cost of rice cultivation in each *kani* of land is Tk 8115.00. So he spends Tk 24345.00 to cultivate three *kani* of land. The cost includes labor cost, cost of seedling, fertilizer (urea, TSP etc), pesticides etc. The value of the rice that he gets from share cropping is (50x Tk 500.00) Tk 25000.00. If the cost is deducted, only Tk 655.00 remains as his profit. The total labor in the land is provided by him and his sons.

He thinks that rice farming does not benefit the farmers. He prefers to have the home made rice and this is why he undertakes farming activity. There is no other way to do during this period. It keeps them busy in the field.

He stated that vegetables cultivation allowed him to survive. For example, last year he cultivated chili in one *kani* of land and spent Tk 8225.00. The return was Tk 16000.00. He also stated that he runs the family cultivating other crops.

He thinks his status as a sharecropper is low. The land owner always pressurizes him in different ways. He does not consider Shamsul Hoq as a good farmer as he asks for more yield. On the other hand, some people conspire against the share-cropper. It creates problem. Ten years back he share-cropped a land. One of the fellow sharecroppers influenced the landowner and managed to take the control of land from his hand. This has created a problem for him. Then he went to his cousin and managed to make him realize his condition. He allowed Samsul Hoque to cultivate three *kani* of land.

Flood and water logging are the major constraints in rice farming in the area. The canals are filled up and they do not allow water to recede from the land. If the water logging delays, there will be no farming. This is a common problem in the area.

AGROECOLOGICALZONE 19

Old Meghna Estuarine Floodplain

Old Meghna Estuarine Floodplain (7,740 sq km) region occupies a large area, mainly low-lying land between the south of the Surma-Kushiyara floodplain and the northern edge of the young Meghna estuarine floodplain. Silt loam soils predominate on highlands and silty clay to clay on lowlands. Organic matter content of the soils are moderate. Topsoils are moderately acidic, but subsoils neutral in reaction. General fertility level is medium.

Sub Region: a) Dhaka-Narayanganj-Demra Project Area; b) High: Old Meghna Estuarine Floodplain; c) Low: Daudkandi-Habiganj; d) Low: Dhaka-Shariatpur-Barisal; e) Low: Eastern Kishoreganj; f) Low: Gopalganj Beels margins g) Low: Habiganj-North Brahmanbaria; h) Low: Titas Floodplain; i) Medium Low; j) Very poorly drained: Laksham-Begumganj (Bangla Pedia)

Name : Khokon Miah Khandaker (48) Father: Abdul Molla Khandaker
Village : Suhilpur Para : Hindupara, Location: Kalon Miar Bari, Thana and
District: Brahman Baria



He has five brothers and one sister. He got himself involved in farming at the age of twelve. His father had three *kani* (each *kani* is of 30 dcml land) of land. This land was sold at his early age. Since then he has been share-cropping on other people's land. He crops bearing all expenses by himself except the irrigation charge; however, as a share cropper he receives half of the yield. He did not have enough land from the beginning of his career. At certain period he used to cultivate 20 *kani* of land as the share cropper, and now it has reduced to five *kani*. Few days ago he also got involved in seed business. Often he used to buy seeds from fellow farmers and would sell them during the season. He often bought seedlings and sold them to the farmers and used to earn around Tk. 10,000.00-12,000.00 a year. He also used to buy seeds from the Agriculture Office. Earlier it cost him about Tk10.00-12.00/kg, but nowadays he spends Tk.30.00-35.00 /kg. Moreover, seed is not available in the office most of the time. The price used to be fixed by the government. He buys fertilizer from the allotted

retailer in the market. It is difficult for him to get required amount of fertilizer during the rice season. The price also goes up at that period. He often cultivates 29 (the farmers are confused if it is IRRI or BR; they perceive the number and name of HYV variety as IRRI). The cost of fertilizer in each *kani* of land is about Tk.1200.00; seedling costs about Tk 300.00. The labor cost and the irrigation cost are Tk 600.00 and Tk 400.00 respectively. For pesticide and insecticide he spends Tk 110.00. He also spends Tk 1000.00 to harvest his crops. Altogether he spends Tk 4200.00 when he cultivates 29 rice. It yields from 16 to 18 mounds in each *kani*. When he leaves half of the paddy with the land owner, he has only nine mounds of rice in his possession. Unfortunately, during that time the market price goes down because of the availability of rice. The price usually ranges between Tk 300.00 and Tk 400.00 per mound. If he can preserve it in his house for few months, then he gets reasonable price. But no choice is left with him. He sells his harvest in cheap price. From each *kani* he sells three mounds of paddy. In this way he finds it very difficult to be benefited from share cropping. So he declines to cultivate 12 *kani* of land and instead, nowadays he handles only five *kani* of land. Rice cultivation is a losing concern for him. He started seedling business after the flood of 1974. It helped him to transplant that seedling in his sharecropping land; on the other hand, fellow farmers were benefited by this. He used to collect seedling from greater high areas of Sylhet Division. Irrigation is one of the major constraints in rice farming. Since power failure is a regular phenomenon, during the rice season electric supply is available for only eight hours a day. Often the farmers get angry with the Project Manager, but he has nothing to do. Power failure is not caused by him. Due to insufficient irrigation water in the land dries up. The yield is also declining due to this. We get eight mounds of rice instead of 18 mounds in this particular rice season. It happens very often. In two or three years time he often encounters this huge power failure problem. This problem is gradually increasing day by day.

Govt. used to provide seed to the registered farmer in the early era. He also traditionally used seed of local variety which he preserved in his own house. Nowadays like other farmers he follows the same process to preserve the *bidesi* 'exotic' variety. The preservation procedure is that after the harvest he dries some paddy under the sunshine. It needs to be dried in every month if some one wants to get quality seed. Often the seed becomes redundant. Without proper care seeds get destroyed. If it rains too much, then the quality of seeds deteriorates. Then it becomes comparatively more vulnerable to pest attack if insecticides or pesticides are not properly spread in the field at that period. Most of the time seeds preserved by the farmer become faulty. Most of the time the seed supplied by the agriculture office is less faulty, but the supply is irregular. People at the office always inform about the unavailability of seeds. Last time he collected seeds from the govt. office about three years ago. The variety was BR 20 and it cost him Tk 40.00/kg which was very expensive. If he gets seed supplied by govt. and required amount of fertilizer, it is possible to yield 20 mounds of rice from each *kani* of land. Self preserved seeds by the farmer yield 15- 18 mounds in each *kani*.

Fertilizer supply during the rice season is a big constraint for him. He may need two mounds of fertilizer but he gets only 35 kg as supply. There is a huge shortage of fertilizer. Previously price was high but fertilizer was available in the market. Nowadays he needs to submit paper to certain person to obtain the fertilizer. On the other hand, he can not collect fertilizer from another UP. It is completely restricted nowadays. About 15 years ago one of the retailers tried to hide the fertilizer and created an artificial crisis in the market. People got agitated against him. As he did not get required amount of fertilizer, he got $\frac{1}{4}$ less yield from the field during the last harvest period. In contrast, he used to get good yields earlier even if he introduced less amount of fertilizer in the land. He is unable to put cow dung in his fields nowadays as he has no cattle in his possession. The price of fodder has been increasing, so people are becoming less interested to rare cows. On the other hand, quality of soil has been deteriorating due to the over use of fertilizer.

Insecticide is available in the market. He gets advice from the shop keeper if any problem arises and buys the pesticide and insecticide according to his advice. Only disadvantage of pesticide use is that it destroys all fish resources in the paddy field. Nowadays he does not find any fish in the field. Moreover, nowadays these new varieties of rice do not have taste. The culture of rice cake (pitha) has been declining. As a result, as a rice farmer he is not very optimistic. Rice farming is a losing concern according to his experience. So he has been trying to find other alternatives.

AGROECOLOGICAL ZONE 20

Eastern Surma-Kushiyara Floodplain

Eastern Surma-Kushiyara Floodplain (4,622 sq km) region occupies the relatively higher parts of the Surma-Kushiyara floodplain formed on SEDIMENTS of the rivers draining into the Meghna catchment area from the hills. This area is occupied by grey, heavy silty clay loams on the ridges and clays in the basins. Organic matter content of the soil is moderate. Soil reaction ranges from strongly acidic to neutral.

Sub Regions: Eastern Surma-Kushiyara Floodplain

Name : Abdul Kadir , Age : 35 , Vill : Bisshonathergoan , UP : Rampasha , Upazila : Bisshonath , Dist: Sylhet .



Abdul Kadir is a young farmer, but he is very much involved in rice cultivation. It is quite difficult to survive on rice cultivation. He has six *keyr* of land. He does not share crop. The soil of this area is very fertile. So the land owners employ laborers to run the farming activities. So it is difficult to get land for share cropping. Earlier this area was very low and it suffered from water logging. It produced only one crop a year. The owners of the highland areas were able to cultivate two crops. All varieties of vegetables were cultivated in this highland areas. Rice was cultivated in the month of *Boishakh* and was harvested in the month of *Bhadro*. This situation has changed in last 25 years. It happened due to the increase of population. People are constructing houses, roads which have increased the water logging. During last 15 years people were able to cultivate two crops and these are namely *IRRI* and *Boro*. Now most of the farmers follow the same farming pattern. They cultivate *BR 28, 29, Muktadhan, Aftab, Biplobdhan* etc. A few farmers are cultivating *Jagoroni*. This is a hybrid variety and the productivity is high. The cost in rice cultivation is bearable because it is spent gradually.

He collects seeds from the dealers' shop at Bisshonath bazaar or local BADC office. Seeds are not available on time. They have to inquire frequently when it would be available. Unavailability of fertilizer is one of the major constraints in rice cultivation. Now he has to go to the chairman. The dealers don't disburse the

fertilizer without written permission of the chairman. He pays Tk 10.00 as rickshaw fare to go to the chairman office and wait for the whole day to collect signature on the application. After this long waiting when he receives the fertilizer, the amount is not enough to fulfil the the requirement. He thinks this distribution system is complicated.

The rice he cultivates in the month of *Agrahayan* does not require any irrigation. It feeds on the rain water. But irrigation is required in the *Boro* or IRRI season. The charge of irrigation is Tk 100.00 an hour. He irrigates his fields for three to four hours a day. This continues for seven days. The fuel price for irrigation is also a problem. The fuel price increases a lot. In addition, he cannot rely on power supply. Low voltage of electricity is a major constraint. Often the pump machine becomes out of order. The expenditure relating to electric supply for irrigation is also high because installation charge is expensive.

Most of the farmers in the area depend on tractor. It saves the time. Now it is quite expensive to keep the plough and cow for tilling. The charge of tractor in per *kyer* land is Tk 250.00 including fuel cost. On the other hand, tilling by plough would cost Tk 500.00. He thinks that tilling by plough is good for the land as it increases the soil fertility because the power tiller does not reach the deep soil. This is why weeds remain in the land.

Abdul Kadir has succeeded his father in agriculture. At his early age farmers cultivated local varieties called *Chengi*, *Murali* , *Baukati* etc. No fertilizer or pesticide were applied in the land. One *kyer* land used to produce six mounds of rice. Its market price was Tk 1800.00. As no cost was attached to this local variety, cultivation was considered as an extra benefit. The farmers used to grow *Robicrop* and winter vegetables which provided them good earning.

Now he cultivates paddy twice a year. There is no way to cultivate *Robicrop*. The IRRI varieties have replaced *Robicrops*. When he applied fertilizer for the 1st time in his land, the amount was just 10 kg. Now the demand of fertilizer is 30 kg in the same amount of land. On the other hand, the dealers in the market do not want to sell the pesticide to a young customer like him. They always want the elderly people to buy the pesticide. The price of fertilizer and pesticide rises higher and higher and they supply the money from other sources. At the present time he cultivates the varieties called BR 28, BR 8 , *Muktadhan* and a local variety called *Luckydhan*. The change in agriculture has been occruing since late 80s. The farmers were told that they would get 20 mounds of rice from each *kyer* of land. Many of the farmers were unable to control their grid. They started cultivating those varieties to improve the economic condition of their family.

The pesticide is required during the period of transplantation. The pests attack just after 20 days of transplantation. He has to collect the pesticide on time. If this is not managed, he is at a fix.. Gradually some new pests are seen in the rice fields which were not seen earlier. The quality of seed may be maintained from the market if he searches carefully. Although the productivity increases, the expenses are too high. So it does not benefit him. This is one of the major problems.

The laborer is paid Tk 3000.00 for a season. He rears the cattle and takes care of the land for the year. He is paid Tk 3000.00 for his service, food and clothes. During the harvesting period migrating laborers come from Mymensingh, Sunamgonj, Habigonj. They are paid Tk 150.00 a day. Labor is a crisis during harvesting period.

The cost of cultivation in one *kyer* land is Tk 7200.00. The production of rice in one *kyer* of land is around 19 mounds. After selling the rice in the market, nothing remains with him. The price of paddy in the market is (Tk 450.00 x 19) Tk 8550.00. The buyers visit their house to purchase the rice when farmers inform them. They do not cheat the farmers. It is worth to sell the paddy at home. The buyers may try to make some profit out of it because this is their business. He earns some money by cultivating vegetables. Last year he sold 50 mounds of potato and got Tk 3000.00. This small earning helps him survive.

AGROECOLOGICAL ZONE 21

Sylhet Basin

Sylhet Basin (4,573 sq km) region occupies the lower, western side of the Surma-Kushiyara floodplain. Relief is locally irregular near rivers. Soils of the area are grey silty clay loams and clay loam on the higher parts that dry out seasonally and grey clays in the wet basins. The soils have a moderate content of organic matter and soil reaction is mainly acidic. Fertility level is medium to high.

Sub Region: a) Central and Southern; b) Northern; c) Western

Name of the Farmer: Md. Abdul Kader, Age: 50, Vilage: Naiati Annarpur (Word No.9), UP: Dirai Annarpur, Upazila: Dirai Annarpur, District: Sunamganj



Abdul Kader has succeeded his father in agriculture. He has no land of his own. He got two *keyar* (1 *bigha*) of land by signing a contract with the landowner. This contract is locally termed as *haja chukti*. He pays Tk 2000.00 to lease the land for a year. The scenario of agriculture in the area has been changing in last 13 years. The cultivable land has been declining as people are constructing houses in the paddy fields. Most of the land in the area remain under water for more than five months as it is part of *haor*. On the other hand, some of the landowners run fisheries project in their land. About half of the cultivable land has been occupied by fisheries project.

He has said that the price of rice has been increasing in an alarming manner. On the other hand, the cost of rice cultivation has been increasing, but farmers do not get the real price of the paddy.

About 15 years back local varieties called *Tupashail*, *Bagunbichi* etc were cultivated in the submerged land. In the present days situation has completely changed. Water does not recede from the land as the influentials run fisheries project.

Now-a-days he cultivates varieties called BR-28, 9, 29 etc. The low line areas produce only one crop a year. He cultivates rice in the month of *Kartrik* and harvests in the month of *Baishakh*. Some people cultivate small amount paddy in the month of *Bhadro* on high land. Major crops grow in the low line area. After the harvest, farmers have no work, except for siting idly and eating. The yield of this the newly introduced variety of paddy in each *bigha* is 18-20 mounds. But the cost of cultivation is Tk 6000.00. The high yield of these paddies attract most of the farmers in the area. No one cares about the cost because they pay gradually-not at one go. About three years back hybrid rice was being popular in this area. The varieties are *Aloran*, *Jagoran*, *Sonarbangla*. The downside of these varieties is the emergence of weeds in the land and the cost of cultivation is very high. So the poor farmers like him have no interests in these varieties.

In the past he preserved his own seeds in the house. Now he buys them from the dealers' shop. The seeds can not be preserved for more than two years. After that period it yields less. The price of fertilizer is also fixed by the dealer. Fertilizer is required just 10-12 days after the transplantation of the seedling. But fertilizer is not available at dealers' shop. If he applies the fertilizer on time, it helps the plants grow better and thus ensures better yield. Unavailability of fertilizer and/ or delay for 4-5 days reduce the yield of rice. He only experiences this loss. The fertilizer dealers manipulate the price and ask for some extra money. They increase Tk 20.00 – 25.00 in each sack of fertilizer. Moreover, the dealers' shops are situated at the *Upazila Sadar*. It would have been better if the shops were at the Union Parishad. The present system which involved the UP leaders in fertilizer distribution needs to be changed as he pointed out that these people manipulate the system by favoring their relatives.

He rents shallow machine to irrigate the land. Rent of shallow machine is Tk 25.00 – 30.00. On top of this, he has to manage the money for the fuel. Shallow machines are available, but the demand is a high during the irrigation period. This creates a problem. Irrigation is mainly required in the high land. Now-a-days nobody tills their fields by cattle. The cost of tilling by power tiller is Tk 350.00 per *keyar* while the cost of plough and cattle is Tk 600.00 hundred. He prefers power tiller because it is cost effective and it saves time.

He does not apply any pesticide in his land. He is aware about the downsides of the pesticide use. It badly affects human body and kills animals. It eliminates both harmful and useful insects. So he avoids applying pesticides on the crop. He tries to prevent the crop from pests' attack by using ash, paste of *neem* and *tut* leaves.

The cost of rice cultivation in one *keyar* of land is given below:

Land rent for one year	Tk 2000.00
Tilling charge	Tk 350.00

Price of seed	Tk 300.00
Labor cost of weeding	Tk 400.00
Labor cost of transplantation	Tk 400.00
Labor cost of harvest and processing (not measured)	Tk00
Price of urea (15 Kg)	Tk 105.00
Price of <i>maitta</i> fertilizer (18 kg)	Tk 100.00
Price of red fertilizer (35kg)	Tk 105.00
Cost of irrigation	Tk 1000.00

Total cost is around Tk 4710.00 in each *keyar* of land. The yield in each *keyar* is around 18 mounds. The market price of paddy is around Tk 570.00 per mound. Total price of his product is Tk 10260.00. He keeps most of the paddy for family consumption. He sells little amount of paddy which returns him Tk 2000.00. He thinks after such a hard work and spending so much money he hardly gets the benefit. He loves to cultivate. He thinks it is pleasant to eat rice which is grown by himself. He does not like to buy rice for family consumption. He can save the labor cost because his family members work in the cultivation. Three of his sons help him in the fields. Labor crisis is a big constraint in this area. Those who do not get any assistance from the family members pay a lot for labor charge. The paddy seperated for the family consumption does not cover the need of the whole year. He buys rice for two months. He sells his labor to survive. His sons also earn some money to run the family. There is no work in the land at that period. Often he borrows money from the money lenders.

The buyers come to get the paddy from the house. There is a strong pact between the rice stokers and buyers. If a farmer takes his product in the market, they would offer him the same price.

At his early age he was able to buy only one *shari* by selling one mound of paddy. Now he is able to buy two *sharis*. But the happiness has disappeared. If the cost of fertilizer is reduced and it is made available, the farmer may survive. Otherwise, he thinks farmers will become extinct.

AGROECOLOGICAL ZONE 22

Northern and Western Piedmoundt Plains

Northern and Western Piedmoundt Plains (4,038 sq km) is a discontinuous region occurring as a narrow strip of land at the foot of the northern and eastern hills. The region comprises merging alluvial fans which slope gently outward from the foot of the northern and eastern hills into smooth, low-lying basins. Grey piedmoundt soils and non-calcareous grey floodplain soils are the major general soil types of the area. Soils of the area are loams to clays, slightly acidic to strongly acidic in reaction. General fertility level is low to medium.

Sub Region: a) Northern and Eastern Basins; b) Northern and Eastern Plains and Basins; c) North-western Plains and Basins; d) South Sylhet Piedmoundt Plains. (Bangla pedia)

Name: Md. Sultan Mia, Age: 40, Vill : Gobrakura , Union:4, Upazila: Haluaghat, District :Mymensingh



Md. Sultan Mia was involved in agriculture from his childhood. He used go to the land with his father and uncle. He has 1.5 acres of land of his own. He cultivates his own land. In the past, most of the agricultural activities were carried out manually. Farmers used to prepare the land with cattle and plough. They would use the seeds in the seed beds that they conserved in their home. They used to collect seeds from the good grains. No fertilizer was applied as the land was very fertile. They used paddle pump for irrigation and there was no use of shallow machine for irrigation. Most of the paddies were cultivated depending on the rain water. If there was any draught, there was a big crop failure. At that time they grew two crops- *Aoush* and *Baua*. *Aoush* used to be cultivated in the month of *Boishakh* and harvested in the month of *Shraban*. *Aoush* varieties were called *Chitri*, *Balujhuri*, *Agali* etc. The *Baua* was grown in the month of *Bhadro* and harvested in the month of *Agrahayan*. *Baua* varieties were *Paijam*, *Paiyam* etc . Now the *Baua* varieties are replaced by *IRRI*, *Mukta*, *BR 15*, *29* etc. In last few years a big change occurred in agriculture. They are carrying out agricultural activities which are considered as '*baje krishi*'. It is carried out from the month of *Asshin* to *Chaitra* and these include cultivation of different vegetable. In the early period the land remained fallow. According to Sultan, the soil of this area is black.

There are some high lands and quite a few low lands in the area. It is not possible to provide irrigation in high land areas. Often they work very hard to irrigate with paddle pump. They are unable to cultivate IRRI varieties in *Poush* due to the irrigation problem. They have only one deep tube-wel in the area that remains out of order most of the time. On the other hand, it covers only 80 acres of land; so people depend on paddle pumps. This area was suitable for watermelon cultivation. People have stopped cultivating watermelon because it was attacked by an unknown virus five years ago. The new kind of agriculture was introduced in 1980s. A few farmers brought seeds of HYV varieties in this area. The agriculture officer used to visit farmers' house and requested them to cultivate those varieties. They supplied free seeds and fertilizer and gradually the farmers became used to this. After 90s NGOs tried to introduce seeds in this area. The NGO called BRACK forcefully influenced the farmers to cultivate the variety called *Shufola*. They forced the group members to receive the seeds. They also insisted them to receive seeds of other hybrid vegetables and fruits.

They used to collect seeds from the dealers of Shapla bazaar. If it is not available at Shapla bazaar, they go to Haluaghat. The main problem with seeds is that they are not available on time. He has to visit many places, and usually pays higher prices than the market price. The problem related to fertilizer is inexplicable. Fertilizer is not available in the market. He often needs small amount of fertilizer, but the dealers refuse to sell. They, then, go to the retailer and pay high price for the fertilizer. The price of one kg of urea is Tk 7.00 in the market which rises up to Tk 10.00 to 12.00. It costs them Tk 150.00 per sack for fertilizer. Irrigation cost is not very high for him. He used to collect seeds from his own land. He separates the good grains from the harvest. Often he goes to the agriculture office to collect the seeds.

The UP members have distributed cards among the farmers as they can collect fertilizer by it. He spent four days with that without any result. The dealer is unable to produce fertilizer according to the demand of the farmer. For example, his requirement was two sacks of fertilizer this year, but he received only one sack. Now he has to rely on this one sack of fertilizer instead. It will produce less yield or low yield. He would encounter a big loss.

He works hard to provide irrigation in his land. The paddle pump requires a good amount of physical strength. It becomes much harder during the dry season when water level declines. Now they use tractor to cultivate the land and it costs about Tk 1200.00 to cultivate one acre land. In the current seasons he has cultivated *Chitridhan*. The season is also good for the variety called *Biplob*. It yields very fast. Each acre produces 40 mounds of rice although in the current year it has produced only 30 mounds. Yield of *Agalidhan* is 40 mounds in one acre but it depends on the rain and availability of fertilizer. The cost of cultivation of *Biplob* is high. The *Biplob* variety is planted in the seed bed in the *Boishakh* and harvested in *Bhadro*. He puts some pesticide into fertilizer and then throws

them on the crop. The application of pesticide depends on the type of pest. He does not use pesticide before the crop is attacked by pests because he knows the application of pesticide killed both good and harmful insects.

He is unable to collect any credit or loan for agriculture. Some NGOs like BRAC and ASHA offer loan, but in a very high interest rate. But BRAC insists them on receiving their seeds. He takes his harvest on his own to the market. Often the stockers come to collect their paddy from the house if they are informed. The situation has been created like this that the price at home and in the market is same. Moreover, if they take it to the market, they need to pay the carrying cost. So the farmers sell at home as they are unable to pay the carrying cost.

AGROECOLOGICAL ZONE 23

Chittagong Coastal Plain

Chittagong Coastal Plain (3,720 sq km) this region occupies the plain land in greater CHITTAGONG district and the eastern part of FENI district. It is a compound unit of piedmoundt, river, tidal and estuarine floodplain landscapes. The major problem in these soils is high salinity during the dry season (October to May). Grey silt loams and silty clay loam soils are predominant. Acid sulphate soils occur in mangrove tidal floodplains. General fertility level of the soils is medium, but N and K are limiting. Organic matter content is low to moderate.

Sub region: a) Beach Ridges, Mangrove Swamp and Mud Clay; b) Mangrove Tidal Floodplain; c) Piedmoundt Plains and River Floodplains; d) Young Tidal Floodplain (Bangla Pedia)

Name : Md. Abdus Sobur , Age : 60 , Vill : Nazirpara , UP : Dokkhin Potenga, Dist : Chittagong .



Nazirpara is situated beside the sea beach of Potenga. Most of the farmers in the village depend on agriculture. Rice is the main crop in the area. Most of the farmers in the village are share-croppers. About 18 to 20 years back the fields of this area were inundated by salty water. It devastated the crops. Many farmers sold their land. The rich people of outside took over 70% land of the area. As roads and dams were constructed, it protected the land from salty water. It brought changes in agricultural. In the past people used to cultivate local varieties called *Aildhan* and some of the farmers used to cultivate *Aoush* varieties. These were replaced by BR 3, BR 14 etc. The farmers cultivate rice only once a year and it covers the rainy season. Farmers also grow *Robicrops* from December to April.



Post harvest gathering

Abdus Sobur was introduced in agriculture at his early age. He succeeded his father and grandfather in agriculture. He was unable to go to school as his family was in need. He got involved in agriculture at his age of 12. He is in agriculture because this is the only work he knows. He has no land of his own. Eight years ago, he was the owner of one *kani* of land. This was sold when he sent his son abroad as a wage laborer. Now he cultivates eight *kani* of land. He has obtained the land on contract basis. He pays Tk 3000.00 for each *kani* (1 *kani* = 40 dcml). He used to cultivate local *Aoush* varieties and *Aman* varieties called *Aildhan*. Now-a-days he cultivates BR 3 and BR 14. He started cultivating these varieties about 16 years back when the salt water stopped to inundate the place. Now he is able to cultivate vegetables and other *Robicrops*. Now he doesn't cultivate any local varieties. He prefers to preserve his seeds at home. When he cultivates local varieties, seeds are preserved in his house. Often he borrows seeds from the neighboring farmers. At present he depends on the packet seeds. These seeds are not of better quality. One of the NGOs distributes the seeds among the farmers. They try to put some seeds in the packet collected from the farmers. These seeds don't produce good yield; farmers are cheated as well.

In the past when he used to cultivate the *Aoush* and *Aman* varieties, there was no application of fertilizer. He used to provide cowdung, *bhushi* and rotten straw in the land. Now he applies fertilizer called urea, gypsum, TSP etc. He applies less fertilizer compared to other farmers. The demand of fertilizer per *bigha* is 20 kg of urea, 16 kg of TSP and one packet of gypsum. He states that five years back application of fertilizer was lesser than the current time.

He used to collect the fertilizer from the local market two years back. Now it is available with the dealers. This has become a hassle for him. He has to go to the agriculture office at Agrabad to collect a token. Then he goes to Majhirghat to collect the fertilizer from the dealer. He gets one sack of urea by submitting the token. The cost of one sack of urea is supposed to be Tk 300.00, but he spends Tk 150.00 more for the carrying cost. It is also time consuming. He spends a long time at Agrabad to collect the token. However, the amount of fertilizer that he gets is inadequate. So the application of fertilizer to the land delays. If the fertilizer is sold in the open market, some people secretly collect the fertilizer from the dealer and sell in the black market. It increases the price of fertilizer. He

buys the fertilizer at Tk 12.00 a kg which is supposed to be sold at Tk 7.00 a kg. If the same situation continues, farmers will not be able to cultivate. If the fertilizer is not made available in the open market, farmers will die. If this token system does not stop, farmers will not be able to get the fertilizer on time. The dealers misbehave with the farmers. If someone shows two tokens at the same time, the dealers say that he has arranged it by bribing the authority. It creates conflict as the dealer refuses to provide the fertilizer according to the number of token.

He doesn't need to irrigate water in his land but the increasing fuel price creates a problem. About 20 years back the cost of tilling by tractor in one *kani* was Tk 400.00 whereas the current cost is Tk 700.00. In addition, he applies pesticides in the land. The cost of pesticide is Tk 200.00 per *kani*. This is available in the market. He is aware that application of pesticide and fertilizer is injurious to health. He thinks increasing trend in fertilizer may completely devastate the soil.

Plowing by cattle is preferable. But he is unable to maintain this. If the land is ploughed by cattle, the soil becomes soft. It produces less weeds. This reduces the labor cost. As he has no cattle, he relies on tractor. The price of fodder is high. So he is unable to rear the cattle.

The total cost of rice cultivation is Tk 6720.00. He pays Tk 700.00 for the tractor, Tk 300.00 for urea (20 kg), Tk 320.00 for TSP (16 kg), Tk 100.00 for gypsum (one packet), Tk 200.00 for pesticide, Tk 500.00 for seed, Tk 1600.00 for labor cost. Moreover, he pays Tk 3000.00 on the rent of land in advance. Each *kani* of land produces around 20 mounds of rice. The price of rice in the market is Tk 500.00 per mound. Total price of the harvest is around Tk 10,000.00 and when he deducts the cost of cultivation, only Tk 30280.00 remains in his hand. He gets 160 mounds of rice from the eight *kani* of land and keeps 120 mounds for his family consumption. Rest of the paddy is sold in the market. The stocker and wholesaler collect the paddy from the house. They pay Tk 30.00 to Tk 40.00 less per mound than the market price. He has to bargain with the wholesalers to settle the price. The rice market is far away from the village. This is not convenient for him to go to the market with paddy as the carrying cost is pretty high.

He said that although rice cultivation is not profitable like other crops, farmers can't stop this. The main reason is that the low line areas are only able to produce rice. In addition, rice is required for their family consumption. He is unable to give up this practice as it has become a part of his life. Lastly he has mentioned that the fertilizer crisis and the increase of cost of other things in rice cultivation are making it more difficult.

Agro-cological Zone 24

St. Martin's Island

St Martin's Island (8 sq km) small but distinctive region occupies the whole of ST. MARTIN'S ISLAND in the extreme south of the country. The area has very gently undulating old beach ridges and inter-ridge depressions, surrounded by sandy beaches. The soils are developed entirely on old and young CORAL beach sands. Calcareous alluvium is the only general soil type of the area. General fertility level is low with poor moisture holding capacity.

Name of the Farmer: Ayub Mian, Age: 32, Village: Majher Para, UP: St. Martin's, Upazila: Teknaf, District: Cox's Bazaar



He has been involved in farming for the last 20 years. Before that his occupation was fishing. Besides fishing, gradually he got himself involved in farming. The sea becomes very furious at certain occasions in the year. Then fishing is too difficult. Most of the people in the island like him catch fish in the sea and conduct agricultural activities as it is difficult to fish in the rolling sea. About 80% of the population in the island follows this pattern of livelihood.

According to Ayub rice cultivation activities in this area depend completely on nature. It does not favor if it rains too less or too much. If it rains in the middle of rainy season, the risk of damage is very high. This year the seed-beds were swept away twice by the rain. The tidal water has damaged seed-beds. All farmers of this area prepare the seed-beds twice a year. Often they do it three times a year. So the farmers of this area need to store double amount of seeds so that they don't run short of seeds. He needs 30 *hari* seeds every year (one *hari* is equivalent to 15 kg). The requirement of seed is 8 mounds and half of it, i.e. , about 4 mounds are wasted. The price of 15 kg of paddy is Tk 200.00. He buys seeds from neighbors and relatives.

Like other farmers, he grows rice once a year. He cultivates rice during the rainy season and grows vegetables in the winter. He often cultivates watermelon at the end of the rainy season. The sandy soil of the island favors the watermelon cultivation. Although in some areas in the island people grow peanuts, paddy is the major crop. Those seven families who first entered the island introduced the agricultural activities in the Island. The oldest rice variety which is still cultivated by the farmers in the island is called *Amathadhan*. Other rice varieties are *Buri*, *Paijam*, *Binidhan*, *Lomburu*, *Chiraju* etc. Some farmers cultivate an exotic variety called BR-11 for more than a decade. Because of its low yield, it is not much popular among the islanders. Ayub cultivates chili, onion and potato in three *kani* of land. In rest of the land he cultivates paddy. He usually cultivates *Buridhan*. Other varieties he cultivates are *Amatha*, *Paijam*, *Binnidhan*, BR-11 etc. In the current season rice in his land has been attacked by pest. But he has been expecting a satisfactory yield. The paddy will be harvested in the month of *Agrahayan*. The temperature in his land is comparatively low, so he thinks that paddy in his land ripens slowly. The paddy ripens faster if the land is a warm. The place which is exposed to sunshine remains warm.

Now most of the farmers use chemical fertilizer. He needs 15 sacks of urea but received only six sacks. Other fertilizers are also not available up to the demand. It is very difficult to get urea. They do not apply any pesticide on the growing paddy. They just silently watch if the paddy plant is attacked by pests. Like him other farmers do not apply pesticides because they do not get permission from BDR and Coast Guards. If someone manages to bring pesticides, he applies this manually because the spray machine is prohibited. One *kani* of land produces 20 mounds of paddy, but the yield goes down to 10/12 mounds when the rice is attacked by pests. There is no requirement of irrigation in the paddy field. Farmers use plough and cattle to cultivate the land.

Ayub Mian has 15 *kani* of land. He leased another two *kani* of land. He pays Tk 2500.00 for each *kani* for the leased land per year. He is not benefited at all through this arrangement. If the crop is damaged, the land owner does not show any concern. For example, rice of two *kani* of land which he leased was damaged this year. He paid Tk 5000.00 to the land owner but spent Tk 7000.00 to cultivate the rice. The tidal salty water enters the land and burns the paddy. Earlier the salty water used to recede with the tide. This did not harm the crops. Recently constructed sluice gates have created water logging which contributes to decline the yield.

Now-a-days the cost of rice cultivation in one *kani* of land is about Tk 6450.00. If he leases other people's land, he pays Tk 2500.00 more. The price of each mound of rice in the market is Tk 600.00. He gets about Tk 12000.00 from each *kani* of land. He thinks his own efforts are not taken into consideration. He thinks rice cultivation is not profitable. He only cultivates to keep up the tradition of his forefather. He thinks as a son of a farmer he should keep living space like a

farmer's house. On the other hand, food of ducks, chickens and cattle comes from the rice field. Cattle provide milk. These are the main benefits. If he leaves his land with the sharecropper, it wouldn't benefit him. He cultivates 15 *kani* of land, but this year he bought 10 sacks of rice from the market for family consumption. He earns something from fishing which helps maintain some of the household costs. He also earns some money from the vegetable garden. He gets about Tk 1500.00-2000.00 by selling out paddy. These sources of income help him survive.

AGROECOLOGICAL ZONE 25

Level Barind Tract

Level Barind Tract (8 sq km) region is developed over MADHUPUR CLAY. The landscape is almost level. The predominant soils have a grey, silty, puddled topsoil with ploughpan. Shallow grey terrace soil and deep grey terrace soils are the major components of general soil types of the area. The soils are low in available moisture holding capacity and slightly acidic to acidic in reaction. Organic matter status is very low and most of the available nutrients are limiting.

Sub region: a) Highland and Medium Highland; b) Medium Lowland and Lowland (Bangla Pedia)

Name: Md. Afzal Hossain, Age: 52, Village: Barokandi, Up: Mohammadpur, Upazila: Pachbibbi, District: Jaipurhat



Md. Afzal Hossain's father died when he was very young. He got four *bigha* (one *bigha* is equivalent to 50 dcml) of land from his father. But he was unable to keep them. He took over the charge of farming as soon his father died. At the beginning he used to cultivate local *Aoush* varieties called *Pulgaja* and *Jabgar*. The *Aman* varieties he cultivated were *Malsira*, *Pathraj*, *Sadadhan*, *Kalasalla*, *Kartikshail*. Currently the *Aoush* varieties have been replaced by IRRI 28, 29, 32, 50, *Mala*, *Guti*, *Chaina*, *Haridhan Jagoron* and some other hybrid rice. In the *Aman* season he cultivates BR-11, *Paijam*, *Shorna*, *Borno* etc. He is not cultivating any of the local varieties.

After the independence of Bangladesh a change occurred in rice cultivation. Firstly, he collected seeds of IRRI variety called BR 8 from the agriculture office. He received fertilizer and pesticides along with the seeds. He did not know how to use fertilizer. He was taught by the agriculture officers. He has started cultivating hybrid varieties 20 years ago. These varieties are called *Sonarbangla*, *Jagoron* and *Haridhan*. He collected some of the seeds from BRAC office. Although yield is high, the cost of hybrid rice cultivation is very high. It requires a lot of fertilizer, power tiller, irrigation and labor etc. The yield of hybrid rice per *bigha* is 40-50 mounds.

After the transplantation of paddy he needs to provide irrigation for the first three months on a regular basis. As one *bigha* is equivalent to 50 dcml in this area, he needs to irrigate 12-15 times during the rice season.

He usually uses 10 kg of seeds to cultivate paddy. Procedure of hybrid cultivation is different. So, it requires two kg of seeds per *bigha*. Hybrid varieties require a lot of amount of fertilizer and pesticides. If the pesticide is not applied properly, the yield goes down about eight mounds per *bigha*. He needs to apply pesticides three times; otherwise, hybrid varieties would be devastated by pests.

Afzal Hossain has one acre of land of his own. He sold the land which he got from his father. He bought some land later. Seed is available in the open market. Hybrid seeds are also available, but these are very expensive. The price is about Tk 200.00 – Tk 220.00 per kg. These seeds can not be preserved in his house. These are preserved with some 'red medicine' and the traders have these facilities.

Although expensive, seeds are available in the market. Often they do not produce the expected yield. Often they fail to produce grain in the paddy. It is a common problem with hybrid seeds.

He needs to apply 50 kg of urea, 20 kg of TSP, 20 kg of potash etc if he cultivates hybrid rice. The cost of fertilizer is Tk 2000.00. Urea is not available in the market, but other fertilizers can be found. It is really a great problem to get urea. The dealers can not supply required amount of urea on time. Earlier it was available in the market though the price was very high. He did not use pesticides earlier, but now it costs him Tk 500.00 – Tk 600.00.

The farmer who owns the pump requires Tk 1200.00 to provide irrigation to his land. Other people have to pay Tk 1500.00 per *bigha*. He gets irrigation water from both electric and power pumps. Electricity failure is very common. Low voltage and power cut for six to eight hours is a daily matter. On the other hand fuel price is rising very high. The earlier price of diesel is Tk 17.00 per liter whereas the price now is Tk 44.00. The rise of fuel cost troubles him a lot. He sells household assets and even domestic animals to pay for the excessive fuel cost. It is also difficult to get bank loan. The bank managers are greedy as they want Tk 500.00 as bribe. He borrows money from the village cooperative in high interest Rate. NGOs are not willing to provide them any loan.

The application of pesticides is very useful in terms pest control, but there are a lot of dangers. Often ducks and chickens die. Often the cows that eat grass from the fields where pesticides have been put fall sick and sometimes they die. Various kinds of pesticides are available in the market. Each *bigha* of land costs

from Tk 500.00 to Tk 600.00 for pesticide. If the pesticide is unavailable,, he applies fertilizer called potash. It is not effective in any way.

It is difficult to get fertilizer on time. He and other farmers had confrontation with the dealers. Few years back they together attacked a dealer as he was not responding according to their need.

There is no crisis of wage laborer in the area. During the harvesting period wage of a male laborer is Tk 100.00 while the female laborer gets Tk 80.00. Often Afzal Hossain's relationship with the power tiller owner deteriorates. He has to manage to till the land on time.

He needs 28 mounds of paddy a year for his family consumption. Rest of the paddy is sold in the market, but he does not get the government rate. Often the crop is destroyed by flood. It is also difficult to save the crop during the drought. Sometimes the hybrid seeds become a bit risky to cultivate. They do not produce grain. These risks are involved in rice cultivation.

The cost of rice cultivation per *bigha* is Tk 8240.00. This amount is spend on tilling with power tiller (Tk 1600.00), providing irrigation (Tk 1500.00), laborer hiring (Tk 2300.00), purchasing hybrid seed (Tk 440.00), purchasing fertilizer (Tk 1500.00) and purchasing insecticides and pesticides (Tk 500.00) and collecting cow dung (Tk 500.00). The production of paddy per *bigha* is 40 mounds. This is applicable only to the hybrid rice if there is no crop failure. Other varieties produce lesser yield. The price of produced paddy in the bazaar is Tk 14000.00. He can keep only Tk 5760.00 after the production cost is deducted. If the contribution of his and his family members is taken into consideration, he has no profit. As a rice farmer he is not benefited; rather, the profit is made by the traders. He is unable to get the actual price of his product.

AGROECOLOGICAL ZONE 26

High Barind Tract

High Barind Tract (16 sq km) includes the southwestern part of the Barind Tract where the underlying Madhupur Clay had been uplifted and cut into by deep valleys. The soils include puddled silt loam to silty clay loam in the topsoils and porous silt with mottled plastic clay at varying depth. Deep grey terrace soils and grey valley soils are major components of the general soil types of the area. General fertility status is low, having low status of organic matter.

Sub Region: a) Highland and Medium Highland; b) Medium Lowland and Lowland, High Barind Tract (Bangla Pedia)

Name of the Farmer: Abdus Samad, Age: 57, Village: 57, UP; No.4 Parbatipur, Upazila: Gomostapur, Education: SSC, District:Chapainawabganj



More than 95% people in this village are involved in agriculture. Abdus Samad's forefathers were farmers, so he succeeded them. He has got 30 *bigha* of land from his father. He also bought a few *bigha* of land himself. He used to cultivate paddy twice a year in the past. These were called *Aoush* and *Aman*. *Aoush* varieties were *Shaita* (it produces in 60 days) and *Kuchi*. He depended on rain to cultivate the paddy. The seeds were sown in to the land in the month of *Ashar* when it rains. This paddy was harvested in the month of *Bhadra*, but the yield was not very significant. The *Aman* varieties were *Shonashail*, *Batraj*, *Gaja*, *Bashfuli*, *Begunbichi*, *Aftab*, *Kaishayafuli*, *Binnaful*, *Baijhaki*, *Indushail*, *Jhingashail*, *Natshai*. These were cultivated in the month of *Bhadra*.

Presently he is able to cultivate once in a year. The varieties are called IRRI. These are *Shadashorna*, *Shumanshorna*, *Lalshorna*. Now he only *Begunbichi* and *Binnaful* among the local varieties. The change occurred about 12-13 years back when he had introduced a variety called *Lalshorna* in his land. The seed was collected from his relatives. Hybrid rice has not been introduced in the area

yet. Agriculture office is far away from here. The Block Supervisor does not visit the area very often.

When he had cultivated local varieties, there was no use of fertilizer. He used to collect soil from the bottom of the pond. It was spread on the land. This worked to increase fertility of the land.

The main constraint of agriculture in the area is the lack of irrigation facilities. The exotic varieties can not be cultivated without irrigation support as they are unable to bore the ground as it is a part of Barind Tract. There is no scope to fetch underground water. Those who have ponds are privileged. They irrigate water from the ponds. They get more yield compared to others. Abdus Samad is able to obtain one-thirds of the yield compared to other farmers. Only rain can help him. If it rains, the farmers somehow can manage to get some yield. Otherwise, it is a disaster. If there is no rain, the land needs to be irrigated from 10 to 12 times. The farmer stores rain water in the pond. It covers some of the main requirements. The farmer uses shallow pump to irrigate the land by pond water. The price of diesel is very high at the moment. This creates a problem for him and other fellow farmers. Often they borrow money from NGOs and money lenders in high interest rate.

In the past, he used to select healthy paddy from the harvest. These were dried up under the sun for 3-4 days. Still he is able to preserve the seed following the same procedure. He prefers those seeds which are preserved at farmers' house. The seed collected from the external sources are expensive. Now he preserves seeds of a few varieties and they are *Lalshorna*, *Sumanshorna*, *Sadashorna*. The seeds of these varieties are required in the month of *Jaisthaya*. The requirement of seeds per *bigha* (equivalent to 33 dcml) is around 7.5 kg. He prefers his own seeds because these are selected by himself.

The fertilizer was available in the open market earlier. Now it goes to the agriculture office and then it is taken to the dealers. The requirement of fertilizer per *bigha* is urea (12kg), potash and phosphate (5kg). He also applies cow dung in his land. He carries the cow-dung to the fields by ox-cart. Only urea is a bit difficult to obtain as other fertilizers are available in the market. Total cost of fertilizer per *bigha* is not more than Tk 500.00.

Laborers are available in this area. Each of them receives TK 100.00 a day. Female laborer gets only Tk 80.00. Meal is not provided by the farmer. Tilling with power tiller is good. The rent for power tiller increases when it rains. Everyone becomes desperate to till the land because if the land dries up, they would not be able to transplant paddy. He has to pay some extra money to get the power tiller on time.

He thinks that he does not get the actual price of paddy. His family requirement for the whole year is around 70 mounds of paddy. Rest of the paddy is sold in the

market by him. He does not get better the price of paddy compared to his investment. He spends around Tk 3750.00 to cover the total cost of fertilizer (Tk.500.00), irrigation (Tk. 1000.00), seed (Tk. 200.00), pesticides (Tk.250.00) and labor (Tk.1400.00). The production of rice per *bigha* is around 12 mounds. The price of paddy per mound does not rise above Tk.400.00. So he sells his harvest in around Tk. 4800.00. Only Tk.1050 remains in his hand. He is not satisfied at all with his earning.

Now-a-days he applies liquid pesticides with spray machine. It works rapidly. It cures three or four types of diseases caused by pests. The downside of pesticides is many. It kills earthworm, fish, useful insects, frog, snake and even domestic animals. It creates burning sensation in human eyes. Often people become unconscious when they spray this in the land. He applies both granular and liquid pesticides and insecticides in the land. These are available in the market.

Abdus Samad thinks that nothing can be cultivated without the application of cow dung and other manure. Although there is not any major conflict with UP leaders to get the supply of urea, often they argue with them. He is aware of the side-effects of the fertilizer and pesticides in human body. But no choice is open to him. He has been using those poisons just for better yield and for his survival.

They do not experience any flood in this area. But drought is very common in this area. They have nothing to do against it. Moreover, he stated that this area produces only one crop a year. It creates hardship in his life. If the government arranges an irrigation system for them, it would help them to survive. The market is also far away from this village. So he does not get the real price of the paddy. The government is also reluctant to purchase the paddy on time. He thinks if these measures are taken, he would be benefited as a farmer.

AGROECOLOGICAL ZONE 27

North Eastern Barind Tract

North Eastern Barind Tract (1,079 sq km) region occupies several discontinuous areas on the north-eastern margins of the Barind Tract. It has silty or loamy topsoil and clay loams to clay subsoil. The soils are strongly acidic in reaction. Organic matter in the soils is low. General fertility is poor.

Sub Region: a) Mainly poorly drained; b) Mainly well drained; c) Mixed well drained and poorly drained

Name: Shafiruddin, Age: 90, Village: Moktarpur, UP: Khayerbari, Upazila; Fulbari, District: Dinajpur



Shafiruddin has been cultivating rice for the last 76 years. He has inherited 4 *bigha* of land from his father. He mainly cultivates paddy for his family consumption. He used to cultivate local Aman varieties called *Shilkamar, Bankalam, Bhashamanik, Jashua, Shapahar, Karticshail, Sindur, Kouta, Jata Bangaldoura, Derkashail, Gajalgora, Panishail* and *Malshara*. Local Aoush varieties were called *Gajalgareya, BATERJAMI, Shadajhali, Boumaldudhabar* etc. Now he cultivates Aman varieties namely *Ranjit, Gutisharna, BR11, Paijam, Jhirashail*. The Aoush season has been replaced by China, *Chandina, BR-32, 28, 16, Pari, Mala, Hira, Sonarbangla, Jagoron* etc. He does not cultivate any local variety. He began to cultivate HYV and Hybrid rice because more people in the family needed more food and these varieties gave him more production.

He started cultivating exotic varieties in the mid sixties. Name of those varieties were China and BR-11. Cultivation of these varieties includes new requires like fertilizer, irrigation, pesticides. These materials were very cheap at that period. The agriculture office used to supply these materials and quality was up to the

mark. This trend changed as few years (3-4 years) back hybrid rice was introduced. The varieties of hybrid were Jagoran and Sonarbangla.

The seed of hybrid rice used to be collected from the market. These can not be cultivated without irrigation. The requirement of irrigation in each *bigha* (equivalent to 49 dcml) is 21-28 times. He needs to pay Tk. 3000.00 in advance to provide irrigation to one acre of land.

The demand of HYV seed is 10 kg per *bigha* during the *Aoush* season whereas in the *Aman* season it is 15 kg. He needs three kg of hybrid seed to cultivate one *bigha* of land. In the past, he was able to preserve the seed in his house. He used to preserve seed in the dried shell of gourd. These seeds never required any fertilizer to grow and he had applied only cow-dung and ash. There is no way to preserve hybrid seed in the house. Seeds of *Sonarbangla* and *Jagoran* varieties are available at the traders. The seed is required in the months of *Kartrik* and *Baishakh*.

A demand of fertilizer in the land has been increasing alarmingly as it is stated by Shafiruddin. At the beginning he had applied 10 kg of fertilizer in one *bigha* of land whereas now he requires one mound of fertilizer. Fertilizer like urea, phosphate, potash and gypsum were available in the market. Recently the distribution of urea is controlled by the government. It is quite difficult for him to get required amount of urea through the UP chairman. He spends about Tk. 1200.00 on fertilizer to apply in the land.

The cost of irrigation in each *bigha* of land is Tk 1600.00. The land requires a small amount of water at the beginning of the cultivation. The pump owners are privileged as they are able to provide irrigation in their own land on time. Farmers like him who depends on others faces problem to irrigate the land on time. On top of it, the increased price of fuel suffocates him. He borrows money from NGOs and money lenders to pay for the irrigation. It creates an extra pressure on him. Often some farmers are forced to work as laborers to cover up this extra cost.

He thinks the application of pesticides and insecticides to control pests is effective to certain extent. The exotic varieties won't survive if pesticide is not applied. The downside of pesticide use is mentioned as it deteriorates food value of the rice grain. This also causes damage to the human body, and people are attacked by some unknown diseases. It kills many useful insects and animals. Often chicken, ducks and even the calves die beside the land where farmers apply pesticides. This creates social conflicts. Farmers have quarreled with their neighbors. On the other hand, the man who applies pesticides puts his health at risk.

It is quite difficult for him to afford a laborer in the field. The cost of labor is about Tk. 130.00 a day with one meal. Tilling by power tiller is much easier and quicker.

It only requires money. He prefers to cultivate with plough and cattle which is convenient for him.

Total cost of rice cultivation in each *bigha* (equivalent to 49 dcml) is around Tk. 7700 (this expenditure is about hybrid rice cultivation). It includes cost of fertilizer (Tk.1500.00), irrigation (Tk.2000.00), seed (Tk.600.00), labor (Tk 2000.00), pesticides (Tk. 600.00) and tilling (Tk. 1000.00). The yield in each *bigha* is around 32 mounds (production of HYV varieties is around 20 mounds per *bigha*). He does not get the actual price during the harvest. The price of paddy per mound is around Tk. 350.00 (the actual price should have been Tk.500.00-600.00). He can hardly manage to get around $(32 \times \text{Tk } 350.00) = \text{Tk. } 11,200.00$ by selling his product. After that only Tk. 3500.00 remains in his hand if he deducts the cost of production. On the other hand, he needs around 30 mounds of paddy for his family consumption. The price of paddy is manipulated by traders in the market when the farmers harvest their paddy. According to him the price of paddy rises to above six hundred when it is already transferred from the farmers' house to the traders' hand. Now farmers have no control on the paddy; the control is in the hand of the traders.

AGROECOLOGICAL ZONE 28

Madhupur Tract

Madhupur Tract (4,244 sq km) is a region of complex relief and soils developed over the Madhupur Clay. The landscape comprises level upland, closely or broadly dissected TERRACES associated with either shallow or broad, deep valleys. Eleven general soil types exist in the area of which deep red brown terrace, shallow red brown terrace soils and ACID BASIN CLAYS are the major ones. Soils in the valleys are dark grey heavy clays. They are strongly acidic in reaction with low status of organic matter, low moisture holding capacity and low fertility level.

Sub Region: a) Mainly poorly drained level terrace; b) Mainly well drained dissected terrace (Bangla Pedia)

Name of the farmer: Surendrabarman, Age: 60, Village: Gachabaria, UP: Aronkhola, Upazila: Modhupur, District: Tangail.



This area is a bit elevated. The soil color is red and it is very fertile. It is suitable for rice, vegetable and fruit cultivation. It only requires hard work to obtain a good yield of crops. After the independence of Bangladesh a wide range of banana and pineapple cultivation spread in the area. It has reduced that land where people used to cultivate rice. This area is famous for rainy season. The low line areas remain under water for more than five months a year. The low line areas provide the fields with water for irrigation.

He has two daughters and two sons. He owns 14 *pakhi* (one *pakhi* is equivalent to 30 *kara* or dcml) of land. He is also share cropping in another four *pakhi* of land. He succeeded his father in agriculture. He was unable to continue with his

education as his family wanted him to take over the charge of farming in their own land. He used to cultivate *Aman* varieties. The Mandis of these area used to undertake *Joom* cultivation. Rice was harvested in the months of *Shravan* and *Bhadra*. They used to harvest rice within the month of *Bhadra* as it was thought to be an inauspicious month. They used to be in a hurry to fetch cotton, arum, sweet potato etc within the month of *Bhadra*.. After describing the previous situation, Surendra has shifted to the present agricultural practices. Now he cultivates the broadcast *Aman* in the months of *Ashar* and *Shravan* and harvests them in the months of *Kartrik* and *Agrahayan*. There are two seasons and they are *Aman* and *Boro*. Most of the farmers in this area cultivate BR 11, 21, 20 , 29. A few farmers still cultivate local varieties. He collects his own seeds from the harvest and preserves them in the house. Often he collects seeds from the Jolchhotro bazaar. The fertilizer is collected from the local dealers' shop. Often he goes to Muktagachha and Mymensingh to purchase fertilizer on emergency basis. The fuel is available in the local market. It is also available at fuel station. The price is higher in the bazaar as some people make more profits.

The cost of cultivation in 4.5 *pakhi* of land is described here. He has stated that the amount of money he spends on broadcast *Aman* cultivation is quite high. The return is not satisfactory. The cost of the labor, fertilizer and tilling is Tk 2140.00 in the first phase. In the second phase he spends Tk 800.00. The price of seed is Tk 200.00. In the *Boro* season he needs to pay around Tk 1000.00 for the cost of irrigation. The labor charge during the harvest is very high. He pays Tk 2700.00 for the labor. Wage of the laborer is Tk 150.00 a day. The rent of shallow machine for irrigation during the *Boro* season is Tk 1800.00 for three days. The production of rice in one *pakhi* of land is only 20 mounds. The market price is Tk 9600.00. The cost of *Aman* cultivation is a little cheaper because it requires less irrigation as it rains during the season. The yield of *Boro* is high because the days are sunny. During the *Boro* season they need to irrigate by deep tubewell and he has to pay Tk 1000.00 for this purpose. He used to preserve seeds in his house. Often he collected it from the neighboring farmers. Now seeds are being collected from external sources. Demand of pesticide is not very significant in the *Aman* season. But this increases during the *Boro* period. The pests and insects attack the plants during this period. Locally preserved seeds were of better quality. The new varieties have increased the production. But there is no taste or flavor of the rice of these varieties. The taste he used to get from the wet rice is now absent in instantly cooked rice. Fertilizer is very difficult to obtain. The price also rises up. He borrows money from various sources to meet up the increased cost of fertilizer. He thinks fertilizer should be distributed through the farmer's channel. Application of pesticide in the land has destroyed the bird, fish and other useful insects. He applies pesticides called *Andrin*, *Basudin*, *Ripcond* etc. Often a crisis is created by the sellers in the market.

Mandai women help during the harvesting period. They help in harvest, rice processing etc. He thinks that female members of the family also contribute a lot to process the rice. But their contribution is not taken into consideration.



The use of power tiller may soften the soil, but it does not allow deeper layer soil to come up. It reduces the fertility of land and this is why he prefers tilling by plough.

The marketing system in this area is not farmer friendly. Local people used to sell their product at their house because the carrying cost is high. The buyers used to come to their house and pay Tk 20.00 less in each mound compared to the market price. They used to sell their harvest only to pay their loan.

There is no benefit in rice cultivation. He thinks his life was better in the past. They don't observe any festival during the harvest anymore. Rice production was not very high, but people had peace in their mind. Now the yield is high, but no way to be benefited. Everyone has to analyze their cost from the beginning of the paddy transplantation. Often he fears to measure the cost. Mandi people often hesitate to go to the market with their product. The situation in the area has been created in such a way that they prefer to sell their product at home. The stocker visits their house and purchases the harvest and pays less amount of money. They make the farmer realize that this money covers their carrying cost. Often Mandi people encounter some problems when they try to go to the market. They want to get rid of this hassle. They are least bothered even about the market price of their product. So they are cheated.

Surendraberman thinks the fertilizer and pesticide should be available in the open market. It would reduce the corruption of the dealers. The main problem of cultivating local varieties is related to the ignorance of the farmers of the technology. He thinks peasants are not aware of the procedures of modern rice farming. So often they apply more fertilizer than the requirement and often they apply less. It puts impact in the yield. Often the farmer encounters crop failure. The traditional farming was not that complex.

AGROECOLOGICAL ZONE 29

Northern and Eastern Hills

Northern and Eastern Hills (18,171 sq km) this region includes the country's hill areas. Relief is complex. Hills have been dissected to different degrees over different rocks. In general, slopes are very steep and few low hills have flat summits. BROWN HILL SOILS is the predominant general soil type of the area. Organic matter content and general fertility level are low.

Sub Region: a) Low hills and Piedmountd Plains; b) Mainly high hill ranges; c) Mainly low hills

Name of the farmer: Bhairab Chandra Karbari, Age: 65, Village: Rangapani, UP: 6 No., Upazila: Rangamati Sadar, District: Rangamati



Bhairab Chandra Karbari has been involved in agriculture for a long period. He has observed a lot of changes in agricultural practices. Still he works in the *Joom*. According to him, about 50 years back agricultural practices were totally different. The peasant farmers had problem when it rained a lot. The low land areas went under water. It used to damage the crop. If there was no rain he used to fetch water from the spring. The whole scenario has been changing after the construction of Kaptai dam. Acres and acres of land went under water. Hundreds of thousands families were displaced. Most of the *Joom* land went under water. It has affected the agricultural practices. A big amount of cultivable land has lessened due to this. For this reason nobody wants to leave their land with the sharecropper. Bhairab Chandra Karbari has 5 acres and 7 dcml of land. He succeeded this land from his father. He used to cultivate varieties called *Kamarandhan, Shada, Rangigelong, Amichuri, Somachuri, Gelongdhan*. In Chakma language these varieties are called *Barkatdhan*. Grain of the varieties is fat and takes a while to settle in the stomach.

Now he cultivates a rice variety called *Kamaran*. This variety is still very popular among the farmers. He also cultivates BR-28 and 29 varieties. Beside rice he also cultivates vegetable called pumpkin, brinjal, lady's finger, banana, arum etc. Chakma people divide agriculture in two seasons and these are warm and winter seasons. During the summer and rainy seasons he cultivates most of the paddy varieties along with banana and maize. In the winter he cultivates different vegetables and spices.

The indigenous people of Chittagang Hill tracts used to preserve their own seeds. In the recent past new agricultural practices have been introduced and as a result, they have lost most of the seeds of traditional varieties. Now he collects seeds from the dealers' shop at Rangunia or Rangamati Bazar.

Fertilizer is also collected from Rangamati Bazaar. Because of the carrying cost the price of fertilizer goes up. The retailer also asks for high price for pesticides and insecticides. The shop-keepers show the cause of high carrying cost. Farmers have no choices. Otherwise, they will have to pay bus fare of Tk 50.00 to Rangunia or Rangamati.

He follows the traditional irrigation method. They construct narrow drains and connect them with the water bodies. He does not require any pump to irrigate in the land. He used spade, chopper and other hand-made tools to cultivate in the *Joom*. But things have changed due to the introduction of new varieties called BR-21, 28 and 29. Now he cultivates with plough and cattle. It creates quarrel with the cattle. The cows do not enjoy to move through the hilly path. The soil in the land is very coarse and this is why the cattle need to work very hard to pull the plough. This makes the animal very tired in short period.

Now-a-days he mainly cultivates local variety called *Kararan*. This is considered as *Barkatdhan*. It produces fat rice which is tasty and stays longer in the stomach. All family members prefer this rice. But the yield is very low as it produces only 9/10 mound per *bigha*.

Major changes in rice cultivation began after the independence of Bangladesh. A few farmers introduced this variety. But farmers were not adequately informed about the cultivation method. Other farmers showed no interest in this. In 80s BR varieties became popular in Rangamati. At the beginning the agriculture officer and the dealers used to visit the farmers' house to deliver them seeds. Later these were collected from the dealer at the bazaar. Earlier there was no application of fertilizer and pesticide in the *Joom* because the farmers used to set fire in the *Joom* to burn all dried leaves. It was an excellent system. Now farmers don't practise this method. So they need to apply pesticide. The ash produced in the *Joom* used to contribute to the soil fertility. Now-a-days soil fertility declines because farmers have ceased the burning method. Now they cultivate in the plain land with power tiller. A few farmers jointly rent the power tiller to cultivate the land. It costs them about Tk 1500.00 to till one acre of land. The cost of

fertilizer in each acre of land is around Tk 1200.00. The fertilizer applied in the land are TSP, MP , urea , gypsum , zinc and potash . The cost of pesticide is Tk 100 per acre The labor cost is Tk 1890.00. The production of rice per acre is 26 mound. And the price is Tk 450.00 per mound. The market value of the product is around Tk 12000.00.

The requirement of pesticide is very high. On the other hand, now-a-days it's quite difficult to get quality seeds. The yield is declining every year. On the other hand, local seeds are not available; these are disappearing. The agriculture department should reorganize supply sytem of the seeds to the farmer The seed should be distributed to the farmers because it would benefit the farmers.

He used to sell the paddy at his home. The price is a little low but it avoids spending on carrying cost. The stocker buys the paddy in Tk 450.00 a mound. They are aware of the low price that is fixed by the stocker. It helps them because they do not to wait for a long period and thus they can save the carrying cost.

No incident occurred to get fertilizer and pesticide from the dealer. He knows that the dealer and the business men are very organized and powerful. Farmers can not escape.

The application of fertilizer is injurious to health. It causes diseases. On the other hand, the doses of fertilizer have been increasing every year. It increases the cost. All family members help him preparing the land, burning the bush etc. The female members in the family undertake the rice processing work. After the harvest, they arrange a program to observe the harvest festival. They prepare a drink called *Arho* and drink it together. The male and female members spend the night talking and drinking. This was very colorful very earlier. People used to dance and sing on this occasion.

AGROECOLOGICAL ZONE 30

Akhaura Terrace

Akhaura Terrace (113 sq km) this small region occupies the eastern border of BRAHMANBARIA and the southwest corner of HABIGANJ district. The main soils in the uplands have strong brown clay. The valley soils range from silty clay to clays. Deep red brown terrace soils, grey piedmoundt soils and acid basin clays are the major components of the general soil types of the area. The general fertility including organic matter status is low. The soils are strongly acidic in reaction. [M Shahidul Islam and Mamunul Haque Khan]

Sub Region : a) Low hills and Piedmoundt Plains; b) Mainly high hill ranges; c) Mainly low hills

Name :Abdul Gafur , Age :56, Vill : Razapur, UP: Akhaura North, District: Brahmanbaria.



Abdul Gafur has five brothers and two sisters. All his brothers are farmers. He started agricultural activities at the age of eight. His education stopped just at the beginning. He had 18 *kani* of land at the beginning. When his father died, they were in trouble. They sold most of the land at that time. He cultivates only paddy. but also ginger, turmeric etc. The soil of this area is red. It is suitable for jackfruit ,lychees, pumpkin etc. This soil is not very suitable for rice cultivation. He cultivates paddy in the month of *Baishakh*. These varieties are BR 29,,hybrid varieties named *Jagoron* , *Shufola* etc. BR 28 is very popular in this area. This hybrid rice was introduced in this area about five years ago. They have started cultivating HYV varieties during the reign of Ayub khan. Before this high yielding varieties he used to cultivate *Boro* rice called *Jagli* , *Tepi*. He used to cultivate it in the month of *Agrahayan*. Other local varieties are *Poshoal* and *Temi*. They used to grow on the high land. After the introduction of HYV varieties cultivation of local varieties ceased. He has two *bigha* of land in the high areas and one *kani* in the low land areas. All of these three plots are in his control according to the share cropping arrangement. In the *Aman* season he cultivates the variety called

29. It is cultivated in the month of *Bhadro* and harvested in the month of *Agrahayan*. During the *Boro* season the cost of irrigation is Tk 1200.00. Total cost is about Tk 3000.00. Other cost like price of seedling is Tk 210.00. He collects the seed from the dealer.

Each *kani* of land produces six *ari* paddy (1 *ari* = 3 mound). The land owner gets half the yield. This man is his close relative. He shares half of the cost. This year the price of rice is reasonable in the market. It is about Tk 500.00 a mound. This is not the case all the year around. This year he got good price.. Otherwise he experiences loss due to the low price of paddy in the market. Like last year the price of one mound of paddy was only Tk 250.00. He counted the loss of about Tk 2000.00. He also paid some extra money during the harvesting period. This season he paid Tk 1800.00 for the labor charge. The total cost was Tk 4800. So the rice cultivation was not cost effective for him. He subsidized in his farming as he underwent loss. He is not familiar with any other work. There are no other ways that he can survive. The money was not spent at one go. As he spent the money gradually, he didn't feel the whole pressure. He used to sell bamboo in the market. He collects bamboo from people's house and sells in the low land areas. He collects money from other sources to subsidize his agricultural practices. Most of the money he earns from the business is spent for the rice farming. The glory is that he is consuming the rice of his own land. As a farmer it's a prestige for him to feed on the home produced rice. As a share cropper there is no way to be benefited.

In the month of *Agrahayan* the agriculture officer creates a block in the market. And seeds are available in the block in the market. Previously he used to preserve the seeds in his house, but gradually it was obsolete. Local varieties can be preserved in the house as their quality does not deteriorate. Hybrid rice cannot be preserved because the technology is with the businessmen. The price of 10 kg seeds was Tk 220 last year. Although seeds are available, often the price rises high. The price of fertilizer is rising alarmingly. The price of urea fertilizer rises by Tk 2.00 per kg. Irrigation water is also available. In the past he used to pay Tk 400.00 for each *kani* of land. The price has been increasing due to the increase of fuel cost. It has troubled him a lot. However, he preserves the seed of *Aman* paddy in his house.

Hybrid rice is a little risky to cultivate. But it produces satisfactory yield. Last year those who cultivated the variety called 28 had a disaster. In the whole area paddy plants didn't produce any grains. It happened as the farmer cultivated it earlier. The problem was not identified. The whole eastern part of Brahmanbaria and Akhaura had been affected by this crop failure. The cost of pesticide is Tk 100.00 per *kani*. According to him, some farmers think that applying pesticide benefited them. But he thinks pesticide application is devastating. It kills one of the very useful earth-warms which is locally called *Manikjir*. And other useful insects also eliminated by it. If he applies local method, it produces good result.

Like last year he didn't apply any pesticide. At his early age they used to put organic manure in his land like cow dung. They had 25 cows. There is no scarcity of cow dung. When IRRI was introduced, nobody wanted to cultivate it. His father and uncle were requested by the agriculture officer to cultivate this variety. They taught how to cultivate this variety. The farmers got additional support that includes fertilizer and even they received Tk 250.00. But this practice failed to benefit him. This has eliminated all fish in the area. The quality of soil has deteriorated. White fertilizer is harmful for the soil. Application of fertilizer is gradually increasing. Last year he applied 2.5 mounds of fertilizer in one *kani* of land. At the beginning they started with 10 kg fertilizer in each *kani* of land. The price of fertilizer increased in the market which created the law and order situation of the area quite vulnerable. The farmer fought against the corrupted businessmen. The rise of fuel price troubles the farmers in many ways. Last year this crop failure also disadvantaged him. Unfortunately the land owner did not share this loss. It happened as he thought there was a problem with the seeds. Some farmers thought it happened because they transplanted it earlier. Growing rice does not benefit him any way now-a-days. He considers it as a loss. He grows rice because his children cry for rice. So he collects money from other sources to subsidize the rice farming. This money he gets from other sources would have allowed him to buy rice from the market. But he thinks there is a difference between self made thing and the thing made by others.