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Historical Background and Diffusion Process of Rice Prawn Gher Farming System in Bangladesh —A case study of Khulna District—

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Summary

This paper aims to explain the historical background and the rapid diffusion process of rice prawn gher farming in the southwest Bangladesh. The research was conducted in Bilpabla village under Dumuria Thana in Khulna District. Case studies (two landlords-one from Bilpabla village and the other from Rayermahal village, two tenants-both of them have rented in gher land from first landlord, and the first introducer of gher farming in the study village) are used to explain the historical background and the rapid diffusion process of gher farming. Primary data are also used in this study. The findings of the study indicate that the participation of landless and marginal farmers is one of the main reasons to diffuse and expand the rice prawn gher farming rapidly. The farmers were innovated more easily to operate the rice prawn gher farming compared to modern variety (MV) technology in Bangladesh because the farmers used indigenous inputs for gher operation such as prawn fingerlings (from rivers and sea) and meat of mud snails for prawn feed (from swamplands, rivers and paddy fields) at the early stage of gher farming. The gher farming system has redistributed the landholding patterns and some marginal and landless gher farmers became small landowners after the successful operation of gher farming. The landlords change the tenants if the tenants break the rules and regulations of rental agreements. The landlords mainly change the tenants if the tenants do not pay rent on time. The rice prawn gher farming system has changed the rental agreement from sharecropping to fixed cash.

1. Introduction

Rice prawn gher farming is a combined form of aquaculture and agriculture. Rice prawn gher farming is an indigenous agricultural system solely developed by farmers in the southwest Bangladesh during mid 1980s. In Bangladesh, two types of gher farming are operated; one is brackish water based shrimp culture and another is fresh water based rice-prawn culture. Shrimp gher farming is large in size and scale, and needs saline water, whereas prawn gher farming is comparatively small in size and scale, and need fresh water. Rice prawn gher is a modified rice field having high wide dikes and a canal inside the periphery of the dikes that re-

tains water during the dry season. It is the physical construction used for rice prawn (*Macrobrachium rosenbergii*) gher farming.

Rice prawn gher farming system has significant impacts on agriculture and national economy of Bangladesh and has created many diversified local job opportunities like mud snail traders, prawn fingerlings traders, ice factory, depot owners, etc. A large number of male and female worker supply their labor in these sector for their daily life. The basic components of standard of living such as food consumption, medical facilities, educations, house, clothes have improved after the introduction of gher revolution. Now the people can have three meals a day that would not possible in the past.

They also can afford to send their children to school for education (Barmon et. al., [4]).

The agricultural system as well as cropping patterns have changed since the development of export-oriented fresh water rice prawn gher farming that have influenced the land contractual agreement from traditional sharecropping to fixed cash rent system as well as land ownership of gher farming. It is obvious that farmers of developing countries have struggled by indecision at the early stage of any agricultural technological progress and innovation for agricultural development (Byerlee [7]). For example, at the early stage of green revolution the farmers of Bangladesh have struggled by indecision to cultivate modern varieties (MV) of rice due to not sufficient knowledge of using chemical fertilizer, unavailable of irrigation system, and taste of rice, which played as the main criteria in farmer decision-making process (Field survey, 2004). But the opposite pictures have found in case of rice prawn gher farming in Bangladesh.

There are few studies that focus on labor demand for male and female worker, daily wage rate, cost and benefit analysis of rice prawn gher farming, the impact of shrimp gher farming on the environment and ecology in the coastal region in Bangladesh. The rice prawn gher farming has positive impacts on both male and female labor market compared to MV *boro* and local *aman* paddy. The gher farming system has also increased daily labor wage rate for day laborers, landless, and marginal farmers compared to paddy farming (Barmon et. al., [3]). The shrimp gher farming has negative impacts on environments in the coastal region in Bangladesh (Asaduzamman et. al., [2]; Nijera Kori [11]; Nabi et. al., [10]; and Sobhan [12]; Bhat-tacharya et. al., [6]), whereas the impacts of rice prawn gher farming on environments are ambiguous. However, the rice prawn gher farming has negative impacts on ecology and a large

number of indigenous species of fish that have already disappeared (Datta [8]). However, the historical background and the diffusion process of rice prawn gher farming in the southwest Bangladesh have been paid less attention. Therefore, the present study explains the origin and the diffusion process of rice prawn gher farming in the southwest Bangladesh.

This paper explains the historical background of rice prawn gher farming and the diffusion process of rice prawn gher farming in the southwest Bangladesh. Following the introduction, the paper briefly discusses methodology in section two. The historical background and diffusion process of gher farming are briefly discussed in section three, whereas land tenancy procedure and determinants of land rent is briefly discussed in section four. In this section, the landholding patterns of landlords and tenants are also presented. Finally conclusions are drawn based on the results and discussions.

2. Methodology of the Study

Bilpabla is one of the typical villages in rice prawn production in Khulna district. The case studies are used in order to explain the origin and the rapid diffusion process of rice prawn gher farming in southwest Bangladesh. The researchers have interviewed pioneer gher farmer (first introducer) in the study village, landlords and tenants directly and collected primary data and information that explains the origin and rapid diffusion process of gher farming. Two landlords are purposively selected: one is from Bilpabla village and another is from nearby Rayermahal village. There are only three landlords in Bilpabla village. The selected landlord has comparatively large scale of gher land (26 bigha¹⁾) among the three landlords. Another two landlords rent out only 5 bigha and 4 bigha of gher land. On the other hand, the selected landlord of Rayermahal village holds about 88 bigha gher lands, which is the average size of gher

land similar to other landlords in the village. Before gher farming had started, he rented out almost same scale of farmland to several sharecroppers. Moreover he is a landlord by ancestor.

The tenants are also purposively selected: one from Bilpabla village and another from Rayermahal village because these two tenants have rented in gher farm from the selected landlord of Bilpabla village. The tenant who lives in Bilpabla village sold their own land to landlord in 2001 and he rented in the same selling land in 2001. In other words, just changes entitle of landownership from landowner to tenant. On the other hand, the tenant who lives in Rayermahal village rented in land from the landlord of Bilpabla village in 2000. Before 2000, another tenant operated this plot of gher.

3. Historical Background and Diffusion Process of Gher Farming

1) History of Gher Farming in South West Bangladesh

Rice prawn gher farming has a historical background in the southwest Bangladesh. The southwest region (Khulna, Bagerhat, Satkhira, and Jessore districts) have experienced a period of severe environmental change during 1960s and 1980s. Many people in this region blame the construction of embankments and polders during the 1960s for the resulting environmental problems: water logging; restricted floodplain inundation with associated reductions in soil fertility; subsidence of land within the polders; siltation of rivers and canals; and increased saline intrusion. The embankments were designed to limit saline intrusion so that more land could be brought under cultivation but the changes of environment actually caused to drastically constraints on agricultural production. There were many seasonal and perennial *beels*²⁾ before embankment construction and farmers used to grow one or two rice crops every year (deepwater *aman* rice during the

monsoon and some *aus* during the winter season) in these seasonal *beels* and low laying agricultural lands. However, some seasonal *beels* and low-lying areas became permanently water logged after the construction of embankments and polders. The natural flood plain dynamics were disrupted and saline intrusion actually increased in some areas. A large number of farmlands were rendered agriculturally due to saline water intrusion and water logging in Fakirhat and Chitalmari Thanas under Bagerhat district. As a result, people in these areas were suffered from the increasing of poverty and food shortages. During the crisis period, people used to eat wild foods like *shapla* (water lily) and its seeds for survival. Most of the people were unemployment in the rural areas and people started migrating to big cities looking for works. At the same time, a few farmers in Fakirhat Thana under Bagerhat district began to experiment with giant freshwater prawn (*Macrobrachium rosenbergii*) cultivation. They obtained good results in terms of growth and the neighboring farmers gradually adopted the practice (Kendrick, [9]).

During that time farmers did not use any supplementary feed and wild Post Larvae (PLs) that were available cheaply and the production was very profitable. However, till the 1980's there were no prawn exports from Bangladesh. Farmers sold their harvest in the local markets. After the introduction of export markets, the local farmers gradually started to convert their low-lying lands into gher for prawn cultivation. In the 1990s, the adoption of gher farming had increased dramatically simply because farmers saw their neighbors making lots of money from gher farming. The gher farming technology then had spread to neighboring Thanas and districts quickly, and the so-called gher revolution had begun (Kendrick, [9]).

The history of rice prawn gher farming in southwest Bangladesh is briefly delineated bel-

low according to one of the first introducer of rice prawn gher farming.

Soumen Barmon, 38, was one of the first introducer of rice prawn gher in Kurshail village in Fathirhat Thana under Bagerhat district of the southwest Bangladesh. He started the rice prawn gher farming since 1986 by using the practical experience of prawn production in fresh water pond. Before starting of the rice prawn gher farming, his father was a retailer fish businessman and bought fish directly from fishermen at river gate, and further sold it to local market. The fishermen caught various types of fishes including prawn and shrimp fingerlings from rivers and swamplands by using fishing nets. One day, Mr. Soumen found some living prawn fingerlings inside the buying fish baskets and collected it and realized the fingerlings in the ponds. After one year he harvested big sizes of prawn like the fishermen rarely caught from rivers and swamplands. At that time he developed an idea that if the prawn grow up in pond, off course, the prawn grow up in the paddy fields if the paddy field retain optimal depth of water during the production period. After develop the ideas, he constructed dikes around the whole paddy field by using the inside soils. After construction of the dike he found that the whole paddy field looks like pond that was covered by the small canals. From the next year he collected prawn fries from rivers and realized it to modified paddy field (pond) at the end of May and supplied the meat of mud snail for feeding. Several times he harvested prawn from the modified paddy until December and earned very good income. To see the very good income from prawn production he started to convert their total paddy fields gradually within few years and finally started gher farming commercially since 1986.

2) Diffusion Process of Gher Farming in Bilpabla Village

Land is an important natural resource that has direct and indirect linkages with human being in every sense such as agricultural production system, economic, social and cultural activities. After the gher revolution, increasing number of local farmers has been found to be actively participating in rice prawn gher farming in the southwest Bangladesh.

The first introduced place of rice prawn gher farming is Fakirhat Thana under Bagerhat district in the mid 1980s is about 30 kilometers far from Khulna district and Bilpabla is about 7 kilometers west of headquarter of Khulna district. Even though Khulna is nearby district of Bagerhat the diffusion period of rice prawn gher farming was about five. However, after the introduction of gher farming in Bilpabla village in 1990 the diffusion of rice prawn gher farming was fast and completed in 1997 but the speed of diffusion was not uniform between 1990 and 1997. The diffusion of gher farming in Bilpabla village is presented in figure1. The figure shows that the farmers in Bilpabla village have adopted the new rice prawn gher farming technology very fast from 1992 simply due to better income from gher farming compared to paddy farming and a large number of farmers were adopted to better income from gher farming and

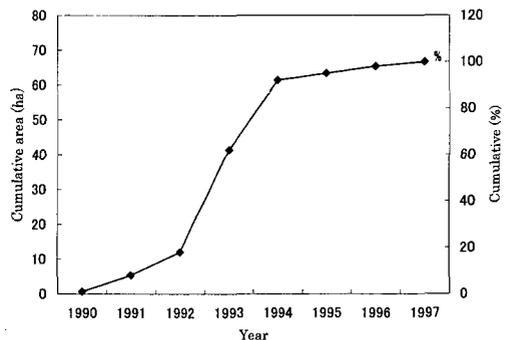


Figure 1. Cumulative land area converted into gher farming from 1990 to 1997 in the study area.

converted their paddy farming into gher farming between 1992 and 1994, and gradually the farmers have converted the whole paddy farming into gher farming in 1997.

The pioneer rice prawn gher farmer has explained some factors that accelerated rapid diffusion process of rice prawn gher farming in the study village that can be explained as following :

1) Innovation and Motivation

Nripendranath Biswas, 40, was the introducer of rice prawn gher farming in Bilpabla village where the rice prawn gher farming in this area started in 1990.

The innovated farmer, Mr. Biswas got married in Kurshail village in Fakirhat Thana of Bagerhat district in 1986. His brother-in-laws cultivate rice prawn gher farming since 1984 innovated by the other gher farmers due to higher income. In 1988, Mr. Biswas discussed with his brother-in-laws about gher farming as well as gher management system so as to introduce gher farming in his area. After discussion Mr. Biswas expressed his intension of gher farming and gathered practical experience of gher management system from them. After the fruitful discussion with his brother-in-laws he came back to his own village and discussed with his father about gher farming. His father was struggled by indecision but motivated and went to Kurshail village at Fakirhat Thana in Bagerhat district to see gher farming on his own eyes. After visiting and discussion with their son's brother-in-laws and other peoples in Kurshail village he came back to his home and discussed again with his elder son Nripendranath Biswas about gher farming. Lastly Mr. Biswas introduced gher farming according to his brother-in-laws' advice in 1990.

Firstly he converted only 4 bigha of paddy field into gher farming due to lack of operating capital and high natural calamities. He bor-

rowed money from his relatives and paid back at the end of prawn harvesting. He earned good income from gher farming. Due to high profit he converted additional 3 bigha of paddy land in 1990 and 2.5 bigha of land in 1991 into gher farming. He did not produce paddy after harvesting of prawn until 1992. He believed that he cultivates paddy after the harvesting of prawn the land fertile will be decreased due to paddy production and as a result, the production of prawn would be decreased. He went to Kurshail village again in 1992 to visit his brother-in-laws' house and heard that the gher farmers are producing paddy after the harvesting of prawn and getting about same profit. He started to cultivate paddy production from the year after (1993) and saw that the prawn production was not hampered by paddy production. The rice prawn gher farming fully adopted and the other farmers expanded gher farming rapidly from 1993. The location of rice prawn gher farms of first introducer, Nripendranath Biswas, is exhibited in figure 2.

2) Profitable Enterprise

Before the starting of gher farming, farmers cultivate local *aus* and local *aman* once a year in relatively high altitude land and only local *aman* in swampland. The farmers could not cultivate local *aman* in comparatively low swampland due to permanent water logged. Farmers did not get any paddy in flooded year and could not have meals three times a day. Moreover, the paddy production under gher farming system is higher compared to the production before gher farming introduced. In addition, the technologically advanced rice prawn gher farming system is more profitable enterprise compared to local *aus* and *aman* production (Barmon et. al. , [4]). As a result, the farmers innovated too fast and converted their paddy field into gher farming rapidly.

The introducer has expanded gher farming by

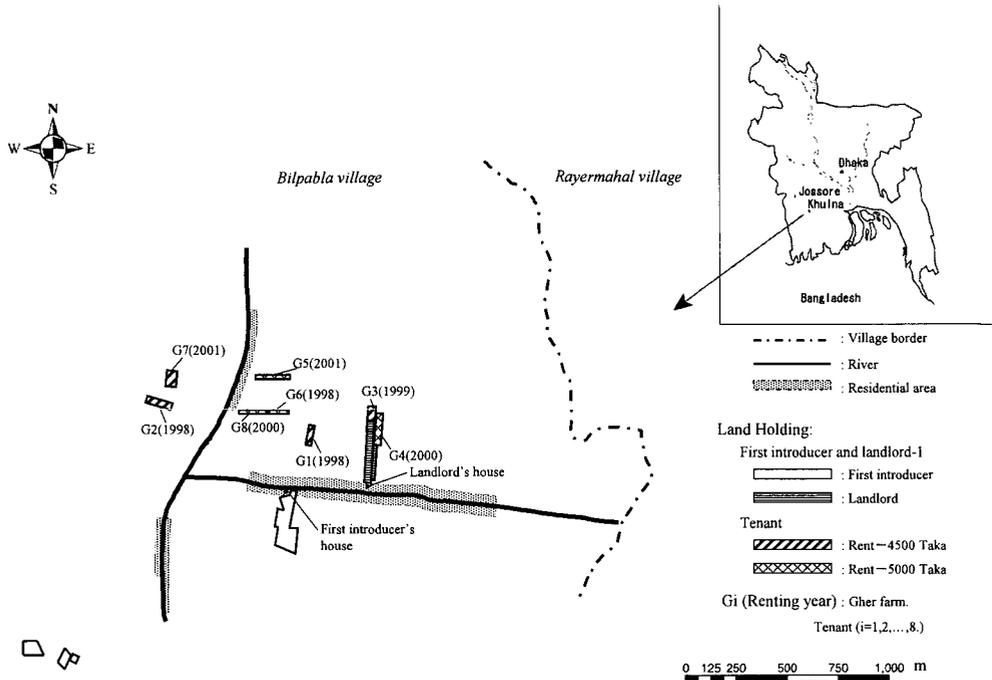


Figure 2. The location of gher farms of first introducer and landlord-1 and tenants of landlord-1.

buying new gher land from 1994 to 1999 using saving money. He bought these farmlands from neighbors who migrated to India secretly due to huge burden of debt. The paddy farm size before gher farming, buying gher land using gher farming's profit and operating gher farm size

are presented in Table 1. Mr. Biwas bought 2.5, 1.0, 2.0, 1.5, and 2.5 bigha of gher land in 1994, 1995, 1997, 1998, and 1999, respectively. The market price of gher land was Tk 12,000 per bigha in 1994 whereas it was Tk 63,000 in 1999, which indicate that land rent

Table 1. Change in farmland of first introducer of rice prawn gher farming, Nripendranath Biswas, Bilpabla village.

Particulars	Buying land (Bigha)	Price/Bigha (Taka)	Own land (Bigha)	Operating land (Bigha)
Before gher farming (1990)	—	—	9.5	9.5
Introduction of gher farming				
1991	—	—	9.5	4.0
1992	—	—	9.5	7.0
1993	—	—	9.5	9.5
1994	2.5	12,000	12.0	12.0
1995	1.0	20,000	13.0	13.0
1997	2.0	36,000	15.0	15.0
1998	1.5	36,000	16.5	16.5
1999	2.5	63,000	19.0	19.0

Source : Field survey, 2004.

Note : 1) Land prices are nominal (in Taka).

2) 1 US \$ = 59.85 Taka, November, 2004.

has increased more than five times (in nominal) within five year. The market price of land is about Tk 100,000 per bigha in 2004 (Field survey, 2004). Now he is practicing 19.0 bigha of gher land. He and his younger brother operate the gher farm. He has also hired two permanent hired labors to monitor the gher farming on yearly basis. Mr. Biswas is thinking to buy new gher farm so as to expand scale of gher farm within few months to using the profit from gher farming.

3) Gher Farming Operation

At the early stage of gher farming, the production cost of prawn culture was very low compared to present prawn culture. The farmers collected main prawn feed of mud snails from nearby swamplands, and paddy fields. Moreover, the prawn fingerlings cost was very low at the early stage of gher farming (Tk 200 to Tk 300 per thousand fingerlings) whereas this fingerling cost has increased about ten times (Tk 2,500 to Tk 3,000 per thousand fingerlings in 2004). Similarly, the market price of per kg mud snail was only Tk 2.00 whereas it was increased about four times (Tk 7.00 to Tk 8.00). As a result, the gher farming was more profitable at the earlier stage (Field survey, 2004). The introducer, Mr. Biswas, collected mud snails as prawn feed from nearby swampland and paddy fields by using temporary hired labors. Mr. Biswas made similar conclusions about market price of mud snails and prawn fingerlings. The farmers have converted all paddy fields and swamplands into gher farming innovated by the other farmers. As a result, the mud snails have almost disappeared from the local areas, which forced gher farmers to buy mud snails from traders, who collect mud snails from nearby districts.

4) Participation of Landless and Marginal Farmers

At the early stage of gher farming in the study area, few rich traders and businessmen cultured prawn using permanent hired labors. They were fully depended on permanent hired labors because they engaged in their main business and usually the permanent hired labor take cared the gher farming. The gher owners had no time to monitor the gher farming or sometimes they visited the gher farming once or twice a week in daytime only. For first few years they earned good profit because of low input costs such as feed costs and fingerlings costs, and proper gher management as well as the integrity of hired labor. The permanent hired labor disrupted prawn production at every step of gher farming, for example, the permanent hired labors did not give mud snail for prawn feed instead they sold it other farmers secretly or stealing prawn from gher at night and sold it secretly for their family's solvency. Some times the owners increased their wage but they could not prevent these disrupted actions from hired labors. As a result, the prawn production was not as good as early stage of gher farming and sometimes two-three years later the gher farming system has collapsed and the owners existed the gher farming due to loss.

This incidence opened the door for poor landless and marginal farmers to enter the gher farming. The landless and marginal farmers always monitored and take cared the gher farming by themselves and received better income from gher. To see the other landless and marginal farmers' good financial conditions other farmers also rented in land from landlords and converted the paddy field into gher along with own landowners. This expanding process occurred during from 1993 to 1995. As a result, gher farming expanded rapidly mainly due to huge number of landless and marginal farmers' participation.

4. Land Tenancy Procedure in Gher Farming

More than one-sixth of the total cultivated land in Bangladesh is farmed under different tenurial arrangements (Taslim and Ahmed [13]; Ahsan and Ahmed[1]). However, an unique form of tenancy has been found in the study area that is the fixed rent contract in which tenants pay a fixed sum of money to a landlord for the use of unit land for one crop year. Background and determinants of land rent, power of landlords, and selection of tenants in gher farming system are discussed briefly in this section.

1) Background of Rent of Gher Farming

The majority of fixed rental contracts³⁾ of gher farming (more than 80%) are usually written down. Only a fraction of the contracts (less than 20%) are unwritten and dependent on the sanctions of communal relationships rather than on the formal force of law (Field survey, 2004). The tenants buy non-judicial stamp papers⁴⁾ from local government office and write the terms and conditions of the tenancy agreements and after writing the term and conditions the landlord and tenant sign the papers. The tenants bear the cost of non-judicial stamp papers of contract. The tenants collect the agreement papers for their safety. For example, if the landlords deny the contract agreements and/or claim more rent then the tenants can easily take necessary steps or file up charge in the court against the landlords based on the written agreements.

On the other hand, when the landlords and tenants believe each other then the rental procedure convert from written to oral agreements. The landlord and tenant just trust each other and make verbal agreements under the unwritten contract. Both parties emphasize the power and binding nature of the verbal contracts. Successful oral contracts depend much more on trust, which is more a product of relations of community than of domination. Both parties of

the contractual agreement believe that “*the words of a man are more worth than pieces of papers.*”

The land tenant system was slightly different from sharecropping system at the early stage of gher farming (1990–1995), landlords claimed a fixed amount of specified variety of paddy per unit of land from tenants. As mentioned earlier that first three four years of gher farming, the gher farmers did not produce paddy after harvesting of prawn. Therefore, the tenant farmers bought specified variety of paddy from local market and gave it to landlord as land rent. Along with fixed amount of paddy some landlords also claimed fixed cash, which was equivalent to local market price in a specified period. According to the landlords and tenants this rental system sometimes created problems between landlords and tenants such as degree of dryness and quality of paddy. As a result, this rental system has transferred from fixed amount of paddy to fixed cash when the whole paddy field converted into gher farming to avoid such types of problems (Field survey, 2004).

2) Determinants of Rent

The land rent depends on the location, land productivity and altitude level of gher farming. The land holding patterns and rented out gher farms of the landlord, Ranjan Biswas, in Bilpabla village is delineated in figure 2. It is appeared from figure 2 that the gher farms are scattered with location. The gher plot, G1, G2, G3, and G7 are located comparatively far from the riverside than gher plots G4, G5, G6 and G8. The farmers usually operate and monitor the gher farms using boats mainly in rainy season. As the people of Bilpabla village are living both sides of the river therefore the monitoring cost is low for the riverside gher farm. As a result, the land rent of gher farm is comparatively higher in the areas close to riverside because of low transportation and monitoring costs. The

rent is also relatively high for low altitude level of gher farming because the canals of low altitude level gher plots retain water almost every months of the year and the farmers can release prawn fingerlings at the very early time (April) of the production cycle which is one of the main determinants for optimal prawn production. As land rent depends on the location, land productivity and altitude level of gher land therefore land rent of the gher plots G1, G2, G3, and G7 is comparatively low (Taka 4,500 per bigha) than other gher plots G4, G5, G6 and G8 (Taka 5,000 per bigha).

The land rent system and amount of rent has changed over the year from the introduction of rice prawn gher farming. Before the gher farming had started, the farmers usually produced local *aman* and *aus* paddy together once a year in beel and the production of local *aman* and *aus* paddy varied from 10 mounds⁵⁾ to 14 mounds per bigha in a normal year. At the early stage of gher farming (1990–1995) the landlords claimed a fixed amount of specified variety of paddy per unit of land per crop year with range from 8 mounds to 12 mounds (in monetary value was Tk 2,000 to Tk 3,000) depends on the location of gher land, productivity, and size.

The land rent has increased about three times (nominal price Tk 2,000 to Tk 6,000) from 1990 to 2004 simply due to higher demand for gher farming compared to supply. Almost every year new farmers entered into gher farming but the supply of gher farming is zero because the whole paddy fields already have converted into gher farming. In other words, the supply of gher lands is fixed but the demand is high therefore the land rent is increasing almost every year depends on the demand and supply (Field survey, 2004).

Therefore, it may be concluded that the rent differs among the tenants whose are rented in gher land from the same landlord. The land rent also differs from landlords to landlords

within and between the same areas. The land rent is varied from Tk 4,000 to Tk 5,000 for the landlord of Rayermahal village, and Tk 4,500 to Tk 5,000 for the landlord of Bilpabla village (Field survey, 2004).

3) Gher Farming Landlords

Landlord is an owner of real property who rents out property to tenants under a contractual agreement in a specific rate for a specific period. Most of the landlords of gher farming live in town, district, and metropolitan as well as outsides of the study village. Only three landlords live in Bilpabla village and a fraction of their land rent out to several tenants. The general information about gher farming is discussed below based on two case studies (landlords) :

1) Landlord-1 (Bilpabla Village)

Ranajan Biwas, 42, is a typical landlord like other gher farm landlord village in Khulna District. Along with gher farming he is also an elected member of a Ward under the Gutudia Union Parisad⁶⁾. Before the gher farming had started, he cultivated his own 14 bigha of paddy land and rented in about 50 bigha of land from landlord on sharecropping basis where he carried all production costs and gave half of the output to the landlord. He produced local *aus* and *aman* paddy like other swampland areas of Bangladesh.

Mr. Ranjan Biswas was diffused by other farmers and motivated like other farmers and started gher farming in 1991. When he entered into gher farming only 5 gher farmers were existed in Bilpabla village. At first he operated only 5.0 bigha of gher out of his own 14.0 bigha farmland in 1991. He expanded more 4.0 bigha of gher farm in 1994. At the starting year he borrowed money from moneylender and bank for gher farm operation, however, he paid all money after few years. At first he rented out 5.0

Table 2. Size of gher land of landlords and reasons for renting out.

Particulars	Landord-1 (Bilpabla Village)	Landord-2 (Rayermahal Village)
Before gher farming	64 Bigha	120 Bigha
Rented out	0 Bigha	120 Bigha
Total gher farming	26 Bigha	88 Bigha
Operating ownself	12 Bigha	18 Bigha
Renting out	14 Bigha	70 Bigha
First operating year	1991	1992
First renting out year	1994	1992
Current number of tenants	8	10
Main occupation	Local administrator	Biscuit factory
Reasons of renting out	Difficult to maintain and monitor, lack of capital	Difficult to maintain and monitor, long distance lack of capital
Gher operation using permanent hired labor	Steel prawn from gher in night, and enjoy more leisure	Steel prawn and prawn feed, and enjoy more leisure
Perfect information about land rent among landlords	Yes	Yes
Changing in tenants	Yes	Yes
Continue same tenant	Yes	Yes

Source : Field survey, 2004.

bigha of gher land between two tenants of Bilpabla village in 1994.

At the early few years he earned good income from gher farms. As a result, he bought 7.0 bigha, 2.0 bigha, 1.0 bigha and 2.0 bigha of gher farmland from small landowners of Bilpabla and neighboring villages in 1997, 1998, 2000, and 2001, respectively, by using the gher farm income (Field survey, 2004). Now he holds 26 bigha of gher farmland and 1.5 bigha of home-stead gardening.

Mr. Ranjan Biswas is engaged in another local administrative activities therefore it is very difficult to manage a large quantity of gher farm. Among 26 bigha of gher farmland he operates only 12 bigha gher and remaining 14 bigha of gher for renting out to eight tenant farmers on fixed cash rent basis (Table 2 and Table 3). Even though he has a permanent hired labor but it is very difficult to monitor and operate the gher farming properly. He mainly operates the gher farming for his family's home consumption along with commercial basis. The renting out year and size of gher farms are pre-

sented in table 3. It is appeared from the table that each plot of rented out gher land is very small in scale with range between 1.0 bigha to 3.0 bigha. The rented out plots of gher land are located in different places and the tenants who live in nearby the gher plots have rented in (figure 2). The table also shows that the landlord has changed two tenants (tenant 4 and tenant 5) after the first tenure of contract agreement. The main reason was due to these two tenants did not pay land rent on time because of repeated loss from their gher in their tenures.

2) Landlord-2 (Rayermahal Village)

The average farm size of landlords in Rayermahal village is relatively larger, and economic and social status is also higher compared to the landlords of Bilpabla village. Shekh Humayun Kabir, 46, has a big joint family with a wife, a mother, a sister, three daughters, two brothers, their two wives and two sons and four daughters living together. His elder brother operates business in town and younger brother operates a prawn depot in local market in Rayermahal

village. He mainly engages in his own biscuit factory.

Before gher farming had started, his father was a landlord with more than 120 bigha of paddy farmland and rented out all paddy land to sharecroppers. They sold about 32 bigha of land after death of their father. Now they holds about 88 bigha of gher land and operate only 18 bigha of gher farm from 1992 and remaining 70 bigha of gher farmland rented out among 10 tenants from 1992 to 1995 (Table 3), five tenants live in Bilpabla village and other five tenants live in neighboring villages. Three tenants in Bilpabla village cultivated the same farm-

land under sharecropping basis before gher farming.

Shekh Kabir has also hired a permanent hired labor to operate and monitor the gher farming properly. He claimed that the permanent hired labor engage in sabotage and steal prawn feed and prawn from gher in night and sold it secretly. Moreover, he has no sufficient capital to operate the gher farming in large scale. Therefore, he rented out the gher farm to tenants.

The landlords have proper information and discuss with each other about tenants and rent whenever they need. The landlords fix the

Table 3. Renting out land, land rent, living place of tenants, and changed in year of tenant.

Gher	Tenant ¹⁾	Living place	Land (Bigha)	Rent (Taka)	Year ²⁾											
					1992	93	94	95	96	97	98	99	00	01	02	03
<u>Landlord - 1 (Bilpabla village)</u>																
Gher-1	T1	Other	1.5	4,500												
Gher-2	T2	Bilpabla	1.0	4,500												
Gher-3	T3	Bilpabla	2.0	4,500												
	T4															
Gher-4	T5	Other	3.0	5,000												
	T6															
Gher-5	T7	Bilpabla	1.5	5,000												
Gher-6	T8	Bilpabla	1.5	5,000												
Gher-7	T9	Bilpabla	2.0	4,500												
Gher-8	T10	Bilpabla	1.5	5,000												
Total Rent				66,750												
<u>Landlord - 2 (Rayermahal village)</u>																
Gher-1	T1	Other	10.0	5,000												
Gher-2	T2	Bilpabla	4.0	5,000												
Gher-3	T3	Bilpabla	6.0	4,000												
	T4															
Gher-4	T5	Other	6.0	4,500												
	T6															
Gher-5	T7	Bilpabla	4.0	5,000												
Gher-6	T8	Bilpabla	10.0	5,000												
Gher-7	T9	Other	10.0	5,000												
Gher-8	T10	Other	10.0	5,000												
	T11															
Gher-9	T12	Bilpabla	4.0	4,500												
Gher-10	T13	Other	6.0	5,000												
Total Rent				339,000												

Source : Field survey, 2004.

Note 1) T indicate tenant.

2) \longleftrightarrow indicate duration of tenant.

amount of rent based on the demand at the beginning of the each contract. The landlords have a tendency to increase rent each new contract.

The landlords earn a major portion of household income from land rent of gher farming. It is evident from the table 3 that the landlord-1 (Bilpabla village) and landlord-2 (Rayermahal village) earn Tk 66,750 and Tk 339,000 from gher rent annually, respectively. The opportunity cost of land rent of gher farm owners, on an average, is contributed about 6 percent to the total household income. However, the contributing share of rent to total household income is lower for general gher farm owners but the income share from rent to total household income for landlords is higher compared to general gher farm owner (Barmon, et. al., [4]).

It is concluded that the landlords mainly engage in other non-agricultural activities and operate a small fraction of gher farming using permanent hired labors. The landlords mainly operate gher farming for daily home consumption and earn a major portion of total household income from gher rent.

4) Selection of Tenants

After the gher revolution, sharecroppers, who are, more financially stable preferred a fixed-period rental contract to operate gher farming, while the financially weaker farmers were unable to operate the gher by themselves and work as hired labors in gher farming. Moreover, some of the non-agricultural day laborers, landless and marginal farmers have also rented in land from landlords on a rental contract basis. For the purpose of the study, two tenants are interviewed and the views are incorporated in this section. The landholding patterns of the interviewed two gher tenants are presented in table 4.

1) Tenant-1 (Bilpabla Village)

Monimohan Bairagi, 50, is landless, has a

wife, two sons, wife of elder son and a baby son living together. He and his two sons work as daily farm laborers in and around the village. His wife is also engaged in gher farming related activities such as mud snail crashing for prawn feed during the peak season. Before the gher had started, he was a fisherman and collected fish from rivers and swamplands daily and could earn Tk 80–100 per day by selling these at the market. He could not fulfill their everyday need with this money.

After the gher revolution he entered into gher farming in 1993 and rented in 1.5 bigha of gher land from a landlord in nearby Rayermahal village and continued the same gher farm until 1998. At the starting year he borrowed Tk 10,000 from his relatives with no interest rate for gher operations. First two years he earned good income from production of prawn and saved about Tk 110,000 in Bank from his gher farming income. He bought 2 bigha of gher land using the income of gher farming in 1995 and expanded his gher farming from 1.5 bigha to 3.5 bigha. He operated this 3.5 bigha of gher farm until 1998. The farm size again decreased from 3.5 to 2.0 bigha in 1999 because the landlord gave this plot of land to his relative with same rent.

The village politics affect the land ownership of gher farming. Sometimes socially and politically more powerful landlords force the poor landowners so as to sell their land to them and apply malicious activities. Monimohan Bairagi faced such type of village politics. He was blamed for the murder case that he was not involved but ending up in the jail in 1999. His family borrowed money from moneylender with high interest rate (10 percent per month) and expensed for court purposes and released from jail in 2001. He sold his own 2.0 bigha of farmland to the landlord of Bilpabla village to avoid from burden of debt and high interest rate of loan in 2001 and paid all money to moneylender.

Table 4. Landholding patterns of tenants under rice prawn gher farming.

Particulars	Year	Land (Bigha)	Tenant-1 (Bilpabla Village)		Selling/Buying landowner (Village)
			Initial source of operating capital	Renting out landowner (Village)	
First operating year	1993	--	--	--	--
First renting in	1993	1.5	Relatives	Rayermahal	--
Buying land	1995	2.0	Own	--	Bilpabla
Total gher farm untill	1998	3.5	Own	--	--
Total own gher farm	1999	2.0	Own	--	--
Selling own gher farm	2001	2.0	--	--	Bilpabla
Total renting gher until	2001	2.0	Own	Bilpabla	--
<u>Tenant-2 (Rayermahal Village)</u>					
First operating year	1993	--	--	--	--
First renting in	1993	3.0	Sold cows, and wife's ornament	Neighboring village	--
Second renting year	1994	1.5	Own	Neighboring village	--
Total renting land until	1995	4.5	Own	--	--
First time buying land	1996	1.0	Own	--	Bilpabla
Second time buying land	1998	3.0	Own	--	Metropolitan
Operating own gher	1998	4.0	Own	--	--
Third time buying land	2000	2.0	Own	--	Neighboring village
Operating own gher	2000	6.0	Own	--	--
Renting in	2000	3.0	Own	Bilpabla	--
Total gher farm from	2000	9.0	Own	--	--

Source : Field survey, 2004.

From this he is operating the same gher plot but unfortunately change the title from landowner to tenant.

2) Tenant-2 (Rayermahal Village)

Jalal Ahmed, 46, has a wife, two sons and one daughter. He was a sharecropper before the introduction of gher farming. He entered into gher farming simply innovated by other farmers due to self-employment opportunity as well as good profit. He entered into gher farming in 1993 and rented in 3.0 bigha of gher land from landlord. He sold his draught animals and wife's ornamentals for operating the gher farming. He also rented in another 1.5 bigha of gher in next year. At the first few years of his own gher farm he also worked as a daily labor during the peak period of prawn harvesting (Octo-

ber to December).

Because earning of good income from gher farming, he bought extra 1.0 bigha of gher land from the small landowner of Bilapabla village, 3.0 bigha of gher land from government service holder who lives in Khulna metropolitan, and 2.0 bigha of gher land from the small landowner of neighboring village (Dewana village-west of Bilpabla village) in 1996, 1998, and 2000, respectively. The first small landowner sold gher land due to her daughter's marriage ceremony and dowry. The second and third landowner sold the gher lands because of lack of gher management experiences and distance. When he bought 3.0 bigha of gher land he discontinued renting in gher farming simply due to location that were far from his residence. He operated only 4.0 bigha of gher until 1999.

As earlier mentioned that the landlords change the tenants if tenants do not pay the land rent on time. The landlord of Bilpabla village has changed the tenant in 2000 due to unpaid land rent. At that time Mr. Ahmed heard this news from other tenants and contacted directly to landlord and after the negotiation and contact he rented in 3.0 bigha of gher land in 2000 because this plot of gher is located in riverside as well as near to his residence. Since then, he is operating 9.0 bigha of gher land. Along with gher farming, he also engages in prawn business during the period of prawn harvesting. He buys prawn directly from gher farmers and sells it to processing plant after the de-heading of prawn.

Usually the landlord prefers reliable tenants who pay the land rent on time. The landlord has a right to change the tenants if the tenants do not pay the rent on time. The landlord chooses the tenants who live in their own villages because they can easily contact with tenants and collect rent. Moreover, the landlord rents in land to his relatives and well-known farmers if they are interested in operating the gher farming and pay land rent properly according to contracts. On the other hand, the landlords renew the contract with the same tenants if the tenants pay the rent properly with current rental market. The sampled two landlords have terminated the tenants after the first contracts of agreement due to violating the rules and regulations of agreement contracts (Table 3). The landlords have also continued with same tenants because the tenants have paid land rent on time with current rental market (Field survey, 2004).

Usually the gher farmers borrow money from moneylenders, relatives and friends during the first operating year of gher farming. However, some farmers also borrow money every year for smooth gher operating and pay it after the harvesting of prawn. Usually the landless and mar-

ginal gher farmers borrow money from moneylenders simply due to easy and simple procedure even though the interest rate is (about 10% per month) high compared to commercial bank (12% per year). The landless and marginal farmers are unable to borrow money from bank because the banks do not lend money without mortgage security. The inter-linkage system is also existed in the study area under gher farming system. Under this system, the gher farmers borrow money from prawn businessman for gher operation and sell prawn to that particular businessman.

5. Conclusions

The rice prawn gher farming is an indigenous agricultural system solely developed by farmers during mid 1980s and has a historical background. Prior to gher farming, the farmers cultivated local germplasm of *aus* and *aman* paddy in the swampland and various oil seed crops such as rape, mustard and *til* (sesame) in the comparatively high altitude land, which was located in the small riverside of Bilpabla village. The farmers could not produce modern varieties (MV) of paddy due to waterlogged. As a result, people in the study area were suffered from the increasing of poverty and food shortages. A few farmers in Fakirhat Thana under Bagerhat district began to experiment with giant freshwater prawn (*Macrobrachium rosenbergii*) cultivation. They obtained good results in terms of growth and profit. One farmer of the study village was introduced gher farming innovated by the relatives who live at Fakirhat Thana in Bagerhat district. He also obtained good profit from gher farming. The other farmers were innovated to see the higher profit of gher farming.

The diffusion process of rice prawn gher farming was fast compared to modern variety (MV) technology in Bangladesh. The main reasons were that rice prawn gher farming is a profitable and export-oriented enterprise, par-

ticipation of large number of marginal and landless farmers, and the application of indigenous inputs for gher operation. The equipment tools of irrigation, chemical fertilizers, construction of irrigation canals, pesticides as well as seeds are required for MV paddy production and these were expensive for poor and marginal farmers. On the other hand, at the early stage of gher farming, the farmers used only indigenous inputs such prawn fingerlings (collected from rivers and sea), and meat of mud snails as prawn feed (collected from swamplands, paddy fields and rivers) for gher operation. As a result, the production cost of prawn was low and the profit was high. As the rice prawn gher farming was indigenous technology the marginal and landless farmers were innovated and motivated very easily due to higher profit. The nominal price of per kg prawn has increased (average per kg price was taka 200 in 1990s, whereas taka 400 in 2004). Now the farmers are using various types of homemade feed for prawn production along with meat of mud snails and fish-meal, which are also indigenous inputs.

The rice prawn gher farming system has redistributed the landholding patterns due to the participation of marginal and landless farmers. Some marginal and landless farmers became small landowners after the successful operation of rice prawn gher farming.

The landlords mainly engage in non-farm activities and a small portion of their total gher farm operate mainly for home consumptions using permanent hired labor. Even though the rice prawn gher farming is a profitable enterprise, landlords do not operate total gher farm because the permanent hired labor disrupt prawn production at every step. As a result, the landlords rented out gher farms to marginal and landless farmers on fixed rent agreement basis. Therefore, the rice prawn gher farming have diffused rapidly in the southwest Bangladesh.

- 1) One bigha is equivalent to about 0.5 acres in the locality.
- 2) Swampland is locally known as *beel*.
- 3) At first both parties-landlord and tenant settle the rent of the piece of gher farmland and make a written agreement on non-judicial stamps. The terms and conditions of the written document (Deed) are as follows : (i) location of land, size, and plot number, (ii) cropping patterns and types of crops (iii) length of the contract (iv) rent per bigha (v) payment times. Lease contract will be terminated if the rental installments are not paid in time. The tenants of gher farm can use mud for creating gher dikes but do not any damage of the cultivable land. The tenants can construct and use sluice gates for irrigation and drainage anywhere of the rented land. The landlord of gher farming will not be liable for any compensation for any natural disasters and calamities that may break the dikes and damages the prawn and crops. The tenants cannot sell gher land but they renting out gher farm to third party discuss with landlord for short time (only two–three months). If the tenants do not discuss with landlords before renting out the land to third party, then the contract will become null and void. Along with the signs of landlord and tenant, at least two witnesses are also required to sign the deed.
- 4) Land rent registration means recording the transfer deed of ownership of a piece of land. The transfer deed is written/typed on non-judicial stamps of adequate value. Stamps are available of different denominations such as Tk 2, 3, 5, 50, 100, 150, 500, 1000, 2000, 3000, 5000, 10,000 etc. Usually Tk 50 and Tk 100 non-judicial stamps are used in the gher farming system.
- 5) One mound equivalent to 40 kgs.
- 6) Union Parishad is the lowest tier of local government, which consists several villages. Chairman is the head of the Union Parisad. Every Union Parisad is divided into several words and member is the chief of the word. The Chairman and the Members of the Union Pariasad are directly elected by the people of the same Union Parisad after every five years. There are 4,228 Union Parisads and 38,052 Words in Bangladesh in 2003 (BEC, [5]).

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